

CANADA  
DEPARTMENT OF MINES  
MINES BRANCH

HON. W. B. NANTEL, MINISTER; A. P. LOW, LL.D., DEPUTY MINISTER;  
EUGENE HAANEL, PH.D., DIRECTOR.

---

CATALOGUE OF PUBLICATIONS

OF THE

MINES BRANCH

(1907-1911)

CONTAINING TABLES OF CONTENTS OF THE VARIOUS  
TECHNICAL REPORTS, MONOGRAPHS, BULLETINS,  
ETC., TOGETHER WITH A LIST OF MAGNETOMETRIC  
SURVEY MAPS, WORKING PLANS, ETC.; INCLUDING  
ALSO A DIGEST OF TECHNICAL MEMOIRS AND THE  
ANNUAL SUMMARY REPORTS OF THE SUPERINTEND-  
ENT OF MINES ISSUED BY THE DEPARTMENT  
OF THE INTERIOR, 1902-1906.

OTTAWA  
GOVERNMENT PRINTING BUREAU  
1912.

No. 104

## TABLE OF CONTENTS.

	PAGE
Director's preface.....	5
Instructions to applicants.....	7
Copy of "The Geology and Mines Act"—1907: defining work and scope of the Mines Branch of the Department of Mines.....	8
Part I. (a) Annual Summary Reports of Superintendent of Mines, Department of the Interior, 1902 to 1907.....	13
(b) Annual Summary Reports of the Director of Mines Branch, Department of Mines, 1907-8 to 1910.....	19
Part II. General reports, monographs, bulletins, etc.....	27
(a) Under auspices of Department of the Interior 1902 to 1906.....	27
(b) Under auspices of Department of Mines, 1907-8 to 1911.....	51
Part III. Statistical reports on mineral resources, etc.....	113
Part IV. Records of Chemical Laboratory tests and analyses: special .....	123
Schedule of charges for analyses, examinations, etc.....	129
Part V. Magnetometric survey maps, working plans, sketch maps, etc.....	133
Numerical index.....	135

## DIRECTOR'S PREFACE.

The publications catalogued in this pamphlet are the joint product of the Department of the Interior, 1902-1906, and the Department of Mines, 1907-1911. These publications had their beginning on June 8, 1901, with the passing of an Order-in-Council, appointing Dr. Eugene Haanel Superintendent of Mines to the Department of the Interior: an office created nearly thirty years ago, but the function of which had hitherto been practically limited to the survey of mining lands, etc. The following historical sketch from *Economic Geology*, Vol. V, No. 7, October-November, 1910, entitled "The Department of Mines of Canada," sets forth the facts regarding the above-mentioned appointment and the subsequent events which culminated in the creation of the Mines Branch of the Department of Mines, in a very concise manner:—

### HISTORICAL.

The first duty assigned to this officer (Dr. Eugene Haanel) was the establishment of the Dominion Government Assay Office at Vancouver. In the following six years a number of technical reports on mining subjects were prepared and published under the direction of this officer. The most important work undertaken during this period was probably the investigation of the processes of electric smelting of iron ores in Europe, followed by the experimental work under government auspices in electric smelting of iron ores at Sault Ste. Marie. Another important innovation was the introduction of the Swedish methods of magnetic surveying for exploring Canadian magnetite deposits, and the publication of a monograph on "Magnetometric Methods of Surveying."

During this period, we find an anomalous state of affairs in the organization of the governmental service for investigating mines and mining. The original Department of the Geological Survey, one branch of which was engaged in special investigations of mining matters, was presided over by the Minister of the Interior. Under this same minister, in the Department of the Interior, was a Technical Branch, controlled by a superintendent of mines, and a third branch, called the Mines Branch<sup>1</sup> also existed, in which was vested the control of mineral lands belonging to the Crown.

It was not until near the end of the year 1906 that the government decided to further accede to the wishes of those interested in the mining industry, as made known to it both by the resolution of the Canadian Mining Institute,<sup>2</sup> and independently, by individuals and corporations.

<sup>1</sup>At present, this Branch of the Department of the Interior is called "The Mining Lands and Yukon Branch."

<sup>2</sup>Resolved, that the Canadian Mining Institute, in annual session assembled, desires to direct the attention of the Federal Government to the magnitude and importance of our mining industry, which during recent years has developed so rapidly, and respectfully urges an increase of government aid wherever possible, and the establishment of a strong and practical Department of Mines, or of a department which shall be devoted to the interests of the mining and metallurgical industries, and which shall include the Geological Survey and all other necessary branches."—Canadian Mining Institute, Montreal meeting, 1900.)

On the twenty-seventh of April, 1907, the statute now in force, entitled *An Act to Create a Department of Mines*, (6-7 Edward VII, Chapter 29) became law.

### FUNCTIONS OF THE MINES BRANCH.

Clauses 5 and 6 of *The Geology and Mines Act* read as follows:—

“5. The department shall consist of two branches, one of which shall be called the Mines Branch, and the other of which shall be called the Geological Survey.

“6. The functions of the Mines Branch shall be: (a) to collect and publish full statistics of the mineral production and of the mining and metallurgical industries of Canada, and such data regarding the economic minerals of Canada as relate to the processes and activities connected with their utilization, and to collect and preserve all available records of mines and mining works in Canada; (b) to make detailed investigations of mining camps and areas containing economic minerals or deposits of other economic substances, for the purpose of determining the mode of occurrence, and the extent and character of the ore-bodies and deposits of the economic minerals or other economic substances; (c) to prepare and publish such maps, plans, sections, diagrams, drawings, and illustrations as are necessary to elucidate the reports issued by the Mines Branch; (d) to make such chemical, mechanical and metallurgical investigations as are found expedient to aid the mining and metallurgical industry of Canada; (e) to collect and prepare for exhibition in the Museum specimens of the different ores and associated rocks and minerals of Canada, and such other materials as are necessary to afford an accurate exhibit of the mining and metallurgical resources and industries of Canada.”

### WARRANT FOR PUBLICATIONS.

The issuance of the Annual Summary reports, monographs, bulletins, etc., is in accordance with the requirements of clauses 18 and 20, respectively:—

“18. The Directors of the branches shall, as soon as may be after the close of each calendar year, make summary reports of the proceedings and work of their respective branches for the year, and shall also furnish final and detailed reports, to be issued from time to time in such manner and form as the Minister directs; and the Minister shall cause the said reports to be laid before Parliament, with such remarks, explanations and recommendations as he thinks proper.

“20. The Minister may cause distribution to be made of duplicate specimens to scientific, literary and educational institutions in Canada and other countries, and also authorize the distribution or sale of the publications, maps and other documents issued by the department.”

Inasmuch as the reports of the Mines Branch deal with the investigation of the mineral and metal resources of the Dominion from a technical and economic standpoint—thus giving them permanent scientific value—special care has been taken in their production: as regards popularity of style, copious illustration, durability of paper, etc. This necessarily involves unusual expense, hence it has been deemed equitable to make a nominal charge; the prices fixed being generally less than the actual cost of printing. A single copy of each publication will be sent *free*, however, to any *bona fide* applicant in Canada who may be particularly interested in the district to which the report refers.

Seeing that subsequent editions of this catalogue—embodying tables of contents—can only be issued at comparatively long intervals, the custom is, to insert an up-to-date list of the publications of the Mines Branch at the end of the Annual Summary Report for each calendar year. Any reports, monographs, or bulletins, therefore, not included in this catalogue will be found in the list accompanying the latest Annual Summary Report of the general work of the Mines Branch.

There is one condition imposed on applicants for reports, etc., which it is imperative should be strictly complied with, namely, that the acknowledgement form accompanying the publication should be filled in and returned promptly to the Mines Branch office; in order that the official records of the Department of Mines may be accurately kept, and the public interest in the industrial progress of the country intelligently gauged.

(Signed) EUGENE HAANEL,  
*Director of Mines.*

#### INSTRUCTIONS TO APPLICANTS.

- NOTE.—1. Reports, Maps, etc., marked thus (\*) are out of print.  
2. Maps marked thus † have been printed independently of reports, hence can be procured separately by applicants.  
3. In ordering publications, they may be designated by their respective distinguishing numbers.  
4. All inquiries and applications for Mines Branch publications should be addressed to—

DR. EUGENE HAANEL,  
*Director of Mines,*  
*Department of Mines,*  
OTTAWA.

## COPY OF ACT ESTABLISHING THE DEPARTMENT OF MINES.

With a view to enabling all interested in the work of the Department of Mines to gain a knowledge of its scope and functions, a copy of the legislative Act, authorizing its establishment, has been incorporated herewith.

### **An Act to Create a Department of Mines (6-7 Edward VII, Chap. 29).**

(Assented to 27<sup>th</sup> April, 1907.)

HIS MAJESTY, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

1. This Act may be cited as *The Geology and Mines Act*.
2. In this Act, unless the context otherwise requires,—
  - (a) "Department" means the Department of Mines;
  - (b) "Minister" means the Minister of Mines.
3. There shall be a department of the Civil Service to be called "The Department of Mines," which shall be under the control and management of the head of one of the present departments of the Government of Canada, who shall be named from time to time for that purpose by the Governor in Council, and who shall be called "The Minister of Mines."
4. The department shall administer all laws enacted by the Parliament of Canada relating to mines and mining, and shall also have the management and direction of all subjects assigned to it by the Governor in Council.
2. Whenever, under the provisions of this section, the management and direction of any subject is transferred from any other department to the Department of Mines, the Minister of Mines and the Deputy Minister of Mines shall be substituted for, and have all the powers and perform all the duties of the minister and deputy minister, respectively, of such other department, as defined and provided by the Acts and regulations relating to such subject.
5. The department shall consist of two branches, one of which shall be called the Mines Branch, and the other of which shall be called the Geological Survey.
6. **The functions of the Mines Branch shall be,—**
  - (a) To collect and publish full statistics of the mineral production and of the mining and metallurgical industries of Canada, and such data regarding the economic minerals of Canada as relate to the processes and activities connected with their utilization, and to collect and preserve all available records of mines and mining works in Canada;
  - (b) To make detailed investigations of mining camps and areas containing economic minerals or deposits of other economic substances, for the purpose of determining the mode of occurrence, and the extent and character of the ore-bodies and deposits of the economic minerals or other economic substances;

(c) To prepare and publish such maps, plans, sections, diagrams, drawings and illustrations as are necessary to elucidate the reports issued by the Mines Branch;

(d) To make such chemical, mechanical and metallurgical investigations as are found expedient to aid the mining and metallurgical industry of Canada;

(e) To collect and prepare for exhibition in the Museum specimens of the different ores and associated rocks and minerals of Canada, and such other minerals as are necessary to afford an accurate exhibit of the mining and metallurgical resources and industries of Canada.

**7. The functions of the Geological Survey shall be,—**

(a) To make a full and scientific examination and survey of the geological structure and mineralogy of Canada; to collect, classify and arrange for exhibition in the Victoria Memorial Museum such specimens as are necessary to afford a complete and exact knowledge of the geology, mineralogy, palæontology, ethnology, and fauna and flora of Canada; and to make such chemical and other researches as will best tend to ensure the carrying into effect the objects and purposes of this Act;

(b) To study and report upon the facts relating to water supply for irrigation and for domestic purposes, and to collect and preserve all available records of artesian or other wells;

(c) To map the forest areas of Canada, and to make and report upon investigations useful to the preservation of the forest resources of Canada;

(d) To prepare and publish such maps, plans, sections, diagrams and drawings as are necessary to illustrate and elucidate the reports of surveys and investigations;

(e) To carry on ethnological and palæontological investigations.

**8.** The department shall maintain a Museum of Geology and Natural History for the purpose of affording a complete and exact knowledge of the geology, mineralogy and mining resources of Canada.

**9.** The Governor in Council may appoint a Deputy Minister, a Director of the Mines Branch, a Director of the Geological Survey, and such other officers and clerks as are required for the proper conduct of the business of the department, who shall be appointed and classified under schedule A of *The Civil Service Act*, and in accordance with and under the terms of section 6 of the said Act.

**10.** Such officers of the department as are continuously engaged in the prosecution of original scientific work or investigation shall be classified as technical officers, under paragraph (b) of schedule A of *The Civil Service Act*; and the Governor in Council may cause to be prepared a list of such officers of the department as are considered to be entitled to be thus classified, with any designations deemed expedient to indicate the scientific work in which they are engaged.

**11.** No person shall be appointed to the department under paragraph (b) of schedule A of *The Civil Service Act*, unless he is a science graduate of either a Canadian or a foreign university, or of the Mining School of London or the Ecole des Mines of Paris, or of some other recognized science school of standing equal to that of the said universities and schools, or a graduate of the Royal Military College.

**12.** When the Deputy Minister reports, for reasons set forth in such report, that assistance of a technical or professional character is required in the department, the Governor in Council may, without reference to any

examination, or to the age of the person, if the Minister concurs in such report, temporarily employ such person at such remuneration as is deemed expedient.

13. Any person appointed to the department shall be appointed on probation, and shall not receive a permanent appointment until he has served a probationary term of at least one year, during which probationary term he may be rejected upon the report of the Director of the branch in which the temporary appointment has been made; but if he is not rejected, the Deputy Minister may signify, in writing, to the Minister that he considers the person so appointed competent for the duties of the Department, and the appointment may thereupon be made permanent.

14. Persons employed in one section of a branch may be directed by the Minister to perform any duty in or with respect to any other section in the same branch.

15. The Governor in Council may, on the recommendation of the Minister, assign the present officials of the Geological Survey to the branch in which it is deemed desirable that their services shall be utilized; provided that the rate of pay or tenure of office as at present existing shall not be impaired or altered by such assignment.

16. Nothing in this Act shall be construed to invalidate or interfere with the commissions, as assistant directors, heretofore issued under orders in council to certain members of the scientific staff of the Geological Survey.

17. No person employed in or under the department shall, directly or indirectly,—

(a) Purchase any Dominion or provincial lands other than for personal residential purposes, except under authority of the Governor in Council;

(b) Locate military or bounty land warrants, or land scrip, or act as agent of any person in that behalf;

(c) Disclose to any person, except his superior officer, any discovery made by him or by any other officer of the department, or any other information in his possession in relation to matters under the control of the department or to Dominion or provincial lands, until such discovery or information has been reported to the Minister, and his permission for such disclosure has been obtained;

(d) Make investigations or reports relating to the value of the property of individuals, or hold any pecuniary interest, in any mine, mineral lands, mining works or timber limits in Canada.

18. The Directors of the branches shall, as soon as may be after the close of each calendar year, make summary reports of the proceedings and work of their respective branches for the year, and shall also furnish final and detailed reports, to be issued from time to time in such manner and form as the Minister directs; and the Minister shall cause the said reports to be laid before Parliament, with such remarks, explanations and recommendations as he thinks proper.

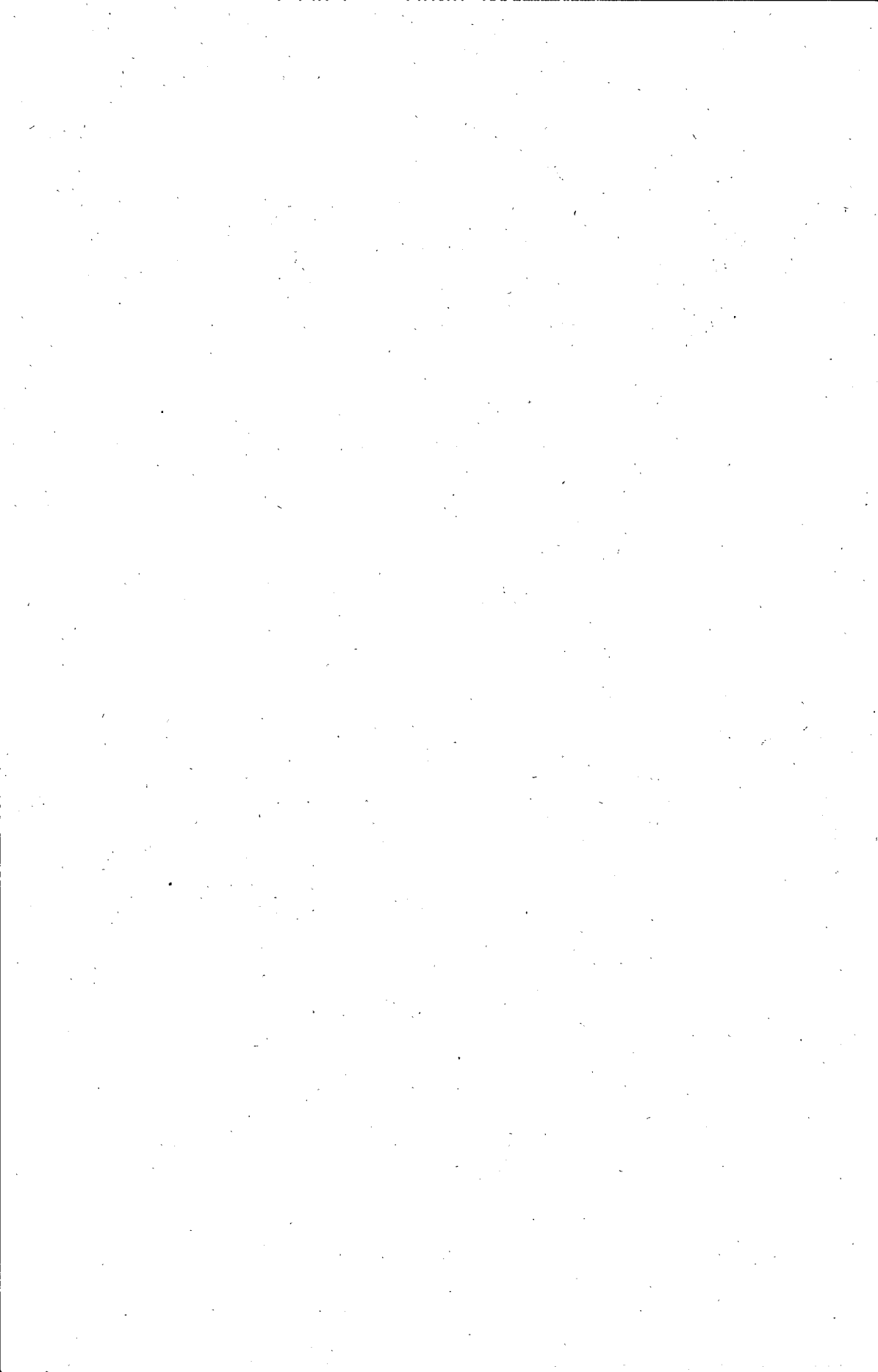
19. The department shall be furnished with such books, instruments and apparatus as are necessary for scientific reference and for the prosecution of the work of the Mines Branch and of the Geological Survey.

20. The Minister may cause distribution to be made of duplicate specimens to scientific, literary and educational institutions in Canada and other countries, and also authorize the distribution or sale of the publications, maps and other documents issued by the department.



**21.** The Minister may, for the purpose of obtaining a basis for the representation of the mineral, mining and forestry resources and of the geological features of any part of Canada, cause such measurements, observations, investigations and physiographic, exploratory and reconnaissance surveys to be made as are necessary for or in connection with the preparation of mining, geological and forestry maps, sketches, plans, sections or diagrams.

**22.** Chapter 65 of the Revised Statutes, 1906, is repealed.



## PART I.

### (a) ANNUAL SUMMARY REPORTS.

NOTE.—Unless otherwise indicated, a charge of 10 cents will be made for each of the following reports; but a single copy will be sent free to any *bona fide* applicant in Canada who may be specially interested in the district to which the report refers.

#### DEPARTMENT OF THE INTERIOR.

#### I. Annual Report of the Superintendent of Mines, Department of the Interior, Part VI, fiscal year ending June 30, 1902.

##### CONTENTS.

- Establishment of Dominion of Canada Assay Office at Vancouver, B.C.
- Instructions governing the operation of the Assay Office.
- Procedure of receiving, assaying, and reporting bullion.
- Weekly Reports.
- Amount of business done.
- Refund of 1 per cent. to miners.
- Government indebtedness to the Canadian Bank of Commerce.
- Manufacture of proof gold and silver.
- Recovery from grains.
- Receipts and expenditure.
- Changes and improvement in internal arrangements.
- Additions to equipment.
- Financial statements—
  - Amount and value of bullion deposited to June 30, 1902.
  - Detailed list of refunds of 1 per cent. made to miners.
  - Difference in value of assays between Vancouver and Seattle from June 29, 1901, to June 30, 1902.
  - Recapitulation.
  - Account between Assay Office and Canadian Bank of Commerce.
- Report of Manager—Thomas McCaffrey—
  - Proof gold received from United States of America.
  - “ silver received from United States of America.
  - “ gold manufactured in Dominion of Canada Assay Office.
  - Totals of proof gold and silver on hand.
  - Statement showing clean-up of silver residues.
  - General statement of appropriation and expenditures.

PLANS FOR VICTORIA MEMORIAL MUSEUM PREPARED BY DR. HAANEL, AND DELIVERED TO MR. EWART, CHIEF ARCHITECT OF THE PUBLIC WORKS DEPARTMENT.

##### ILLUSTRATIONS.

###### Photographs.

- Plate I. Receiving Office.
- “ II. Melt Room.
- “ III. Motor and Blower.
- “ IV. Assaying Room.
- “ V. Balance Room.
- “ VI. Crusher, Drying furnace, and Washing tank.
- “ VII. Store Room.

###### Drawings.

- Fig. 1. Detailed plan of Assay Office building.

II. \*Appendix to Annual Report of the Superintendent of Mines, Department of the Interior, Part VI, fiscal year ending June 30, 1902.

CONTENTS.

On the copper belt and coal lands near Whitehorse; and on the mining conditions of the Klondike, Y.T.

WHITEHORSE —

Copper.

Coal—

First test: socratic inquiry.

Second test: socratic inquiry.

Chemical analyses—

Sample 1.

Sample 2.

Coking—

Specimen A.

Specimen B.

KLONDIKE —

Mining methods: description of

Machinery and appliances used in the working by open cut method.

Method of shaft and drift.

Description of self-dumper, No. 1 pattern.

Description of self-dumper, No. 2 pattern.

Need of testing ground by panning when drifting.

Hydrauliclicking—

The Coffee plant.

Rockers.

Puddling machines.

The cleaning of auriferous black sand.

Character of the gold.

Eldorado Creek—

215 ft. shaft on No. 3A.

Indian River conglomerate.

Quartz.

Lone Star and New Bonanza mineral claim.

Divide: Hunker and Dominion creeks.

On Golden creek.

On Hunker creek, below Discovery: quartz claim.

On Lepine creek: Ladue quartz property.

Analysis of Coal.

Fuel—

Suggested use of coal oil.

Comparative data on fuels.

Future of the Klondike—

Proposed quartz mill in Dawson City.

Geological work in the Klondike.

Proposed Assay office.

Notes on the local manufacture of machinery.

ILLUSTRATIONS.

*Photographs.*

Plate I. Steam shovel plant on Claim 134, below Lower Discovery, on Dominion creek.

NOTE.—Reports, Maps, etc., marked thus \* are out of print.

*Drawings.*

- Fig. 1. Self-dumping appliance: pattern No. 1.  
 Fig. 2. Self-dumping appliance: pattern No. 2.  
 Fig. 3. Section of Eldorado mine—215 ft. shaft.

*Map.*

- No. 1a. Map of Whitehorse copper belt.

**III. Annual Report of the Superintendent of Mines, Department of the Interior, Part VIII,  
 Fiscal Year ending June 30, 1903.**

## CONTENTS.

## DOMINION OF CANADA ASSAY OFFICE —

- Amount of business done.
- Canadian Bank of Commerce.
- Receipts and expenditures.
- Additions to equipment.

Collection of gold dust and nuggets from Yukon, British Columbia, and North-West Territories.

## YUKON —

- Quartz mill and Assay office, Dawson City.
- Black sands on Bonanza and Dominion creeks.
- Bornite.
- Auriferous pyrites.
- Quartz.
- Blowpipe apparatus.
- Mining districts established in Yukon Territory during fiscal year ending June 30, 1903.
- Statistics of gold output in Yukon.
- Report on the location and examination of magnetic ore deposits by magnetometric measurements.
- Addition to staff: Mr. Erik Nystrom.
- Landslide at Frank, Alberta—  
 R. W. Brock and R. G. McConnell commissioned to investigate the disaster.

## Appendices—

- I. Assay office statistics, A-H.
- II. Report of A. J. Beaudette, Government Mining Engineer, on quartz mill and Assay office at Dawson City.

**IV. Annual Report of the Superintendent of Mines, Department of the Interior, Part VIII,  
 1904.**

## CONTENTS.

## DOMINION OF CANADA ASSAY OFFICE

- Canadian Bank of Commerce.
- Statistics: receipts and expenditures.
- Changes in staff.
- Collection of gold dust and nuggets from the Yukon, British Columbia, and North-West Territories.

**ELECTRIC SMELTING**

Commission to investigate Ruthenburg process of electric smelting;  
Commission to investigate electro-thermic processes in Europe.

**PEAT**

Peat industry exhibition at Berlin, Germany.  
Notes on machinery exhibited.  
E. Nystrom, M.E., work of—  
Magnetometric surveying.  
North Arm of Lake Temagami.  
Accompanying Commission on electric smelting.

**THE YUKON—**

Quartz—  
Quartz mill.  
Charges.  
Development.  
Assay office.  
Water measurements of streams.

**ELECTROLYTIC METHOD FOR PRODUCING BICALCIC PHOSPHATE.****Appendices—**

- I. Assay Office statistics A-H.
- II. Report of A. J. Beaudette, Government Mining Engineer on stampmill and Assay office.
- III. Brief account of an electrolytic method for producing bicalcic phosphate for use as a fertilizer out of unserviceable raw phosphate.

**V. Annual Report of [Superintendent of Mines, Department of the Interior, Part VIII,  
Fiscal Year ending June 30, 1905.**

**CONTENTS.****FIELD WORK —**

Notes on building materials, etc., in North-West Provinces.

Investigations by J. W. Wells as follows —

- (a) Hydraulic cement: report on raw materials, manufacture, and uses of.
- (b) Industrial value of clays and shales of Manitoba.
- (c) Limestones, and the lime industry of Manitoba.
- (d) Lignite coal deposits in Pembina valley.

Special search for coal in Pembina valley, from La Riviere to Mowbray—by  
J. W. Wells.

Evidence of settlers.  
Personal investigation by Dr. Haanel.  
Drilling records.  
Geological evidence.  
Conclusion.

Report on the Economic Minerals of Canada—

Fritz Cirkel, M.E., commissioned to investigate mica and asbestos.

**Magnetometric surveys —**

- (a) Iron ore property of Mr. C. V. Wetmore.
- (b) Calabogie mine on east half of lot 16, concession IX, in Bagot township,  
Renfrew county, Ont.

Mr. Erik Nystrom's report —

- (c) Wilbur mine, Lavant township, Lanark county, Ont.
- (d) Magnetic ore deposit, lot 7a, range V, Leeds Township, Que.

Mr. B. F. Haanel's report.

Office work.

Dominion of Canada Assay office—  
Amount of business done.

- American Mining Congress—  
 Dr. A. E. Barlow as Canadian representative.  
 Objects attained by the Congress.  
 Movement to establish Department of Mines and Mining in the United States.  
 Report of A. J. Beaudette, Government Mining Engineer—  
 Alluvial deposits.  
 Placer mining.  
 Hydraulic mining.  
 Dredging.  
 Steam shovels.  
 Population.  
 Development of local deposits.  
 The quartz mill.  
 The Assay office.

**VI. Annual Report of the Superintendent of Mines, Department of the Interior, Part VIII,  
 fiscal year ending June 30, 1906.**

CONTENTS.

Mineral Resources of Canada.

IRON ORE DEPOSITS —

Field parties—

- Nova Scotia—Dr. J. E. Woodman.  
 Western Ontario—F. Hille, M.E.  
 Ottawa valley—Fritz Cirkel, M.E.

MAGNETOMETRIC SURVEYS

Field work

- B. F. Haanel, B.Sc.—  
 (a) Wilbur mine;  
 (b) Belmont mine.

Analyses of iron ores.

ELECTRIC SMELTING

Experiments at Sault Ste. Marie, January 1 to March 4, 1906.

Report of Mr. E. A. Sjöstedt, chief metallurgist, Lake Superior Power Company,  
 on nickel-pig, produced by electro-thermic process at Sault Ste. Marie.

Recent progress in Europe and United States of America.

Investigation of zinc resources of British Columbia—

Instructions given to Mr. W. R. Ingalls, chief of staff of Zinc Commission  
 appointed by Dominion Government.

OFFICE WORK

Dominion of Canada Assay office—

Report on work done, statistics, changes in business methods, improve-  
 ments in equipment, additions to staff, etc.

Appendices—

- I. Description of the Heskett-Moore direct and continuous process for treating fer-  
 ruginous ores in the manufacture of iron and steel.
- II. Explosive ammonal.

ILLUSTRATIONS.

Section of the Moore-Heskett furnace for the manufacture of wrought iron and steel.

**VII. Annual Report of the Superintendent of Mines, Department of the Interior, Part VIII,  
 for the fiscal nine months ending March 31, 1907.**

CONTENTS.

MINERAL RESOURCES OF CANADA—

Iron Ore Deposits—

Field work—

- Nova Scotia—Dr. J. E. Woodman.  
 Western Ontario—F. Hille, M.E.  
 Ottawa Valley—Fritz Cirkel, M.E.

- Magnetometric Surveys—  
 Black Lake, Que.  
 Austin Brook, Bathurst, N.B.—E. Lindeman, M.E.,
- MONOGRAPH ON GRAPHITE—  
 Fritz Cirkel, M.E.
- ON ELECTRIC SMELTING EXPERIMENTS AT SAULT STE. MARIE, ONT.
- ON ELECTRIC SMELTING PLANTS—  
 Welland, Ont., Canada.  
 Baird, California, United States of America.
- VISIT OF SUPERINTENDENT OF MINES TO COBALT FIELD, NORTHERN ONTARIO.
- NEW CHEMICAL LABORATORY—  
 Description of Laboratory equipment.  
 Appointment of Harold A. Leverin, Ch. E.
- DOMINION OF CANADA ASSAY OFFICE—  
 Tabulated record of Bullion received and assayed.  
 Statement of earnings and expenditure.  
 Inventory of proof gold and silver on hand.  
 Residues.  
 Resignation of the Manager—Thomas McCaffrey, and of G. McCaw.  
 Promotion of Messrs. G. Middleton and D. Robinson.
- OFFICE WORK—  
 E. Nyström, M.E.  
 B. F. Haanel, B.Sc.
- PRELIMINARY REPORT ON FIELD WORK—  
 Examination of the Iron Ore Deposits in the Ottawa Valley—  
 Fritz Cirkel, M.E.  
 On the Iron Ore Deposits of Western Ontario—  
 F. Hille, M.E.  
 On Iron Ore Deposits of parts of Nova Scotia—  
 Dr. J. E. Woodman.  
 (a) Black Lake Iron Ore Deposits—  
 (b) Magnetometric Survey of the country east of Thirty Islands Lake; Thirteen  
 Islands Lake, and further in a northeast direction—  
 (c) Iron Ore Deposits at Austin Brook, Bathurst, N.B.—  
 E. Lindeman, M.E.
- REPORT ON CHEMICAL LABORATORY—  
 Harold A. Leverin, Ch. E.



## (b) ANNUAL SUMMARY REPORTS.

NOTE.—Unless otherwise indicated, a charge of 10 cents will be made for each of the following reports; but a single copy will be sent free to any *bona fide* applicant in Canada who may be specially interested in the district to which the report refers.

## DEPARTMENT OF MINES.

## 21. \*Summary Report of the Mines Branch for the Fiscal Year 1907-8.

## CONTENTS.

## DIRECTOR'S REPORT—

Introduction: scope of report.  
 Transfer of Mines Branch to Department of Mines.  
 Staff specified.  
 Appointment of Director of Mines  
 Transfer of Division of Mineral Resources and Statistics to Mines Branch.  
 Transfer of Chemistry Section to Mines Branch.

## FIELD WORK: IRON ORE INVESTIGATIONS.

British Columbia.  
 On Nipisiguit river, near Bathurst, N.B.  
 Near Kinnear Mills, Megantic county, Que.  
 Penetanguishene, Ont.

## PEAT INDUSTRY—

Petition.  
 Mr. Nystrom instructed to investigate in Europe.  
 Notes on production of nitrates from peat.  
 Utilization of peat as fuel.  
 Proposed Testing Station.

## ELECTRIC SMELTING—

Note on recent progress.  
 The Lash Steel process.  
 Utilization of waste gases: Swedish experiments.  
 Experiments at Welland, Ont.  
 Desulphurization, Dr. A. Schmidt on  
 Induction furnaces, comparative merits of  
 Notable installation at Nelson, B.C.

## MINING AND METALLURGICAL INDUSTRY OF CANADA—

Yukon Territory.  
 British Columbia, Alberta, Saskatchewan and Manitoba.  
 Ontario.  
 Quebec.  
 Nova Scotia and New Brunswick.

## COAL TESTS AT MCGILL UNIVERSITY—

Boiler tests.  
 Gas engine and producer work.

## CHEMICAL LABORATORIES—

Sections: (1) Wellington Street, (2) Sussex Street.

## ON THE STATISTICS OF MINERAL RESOURCES.

## DOMINION OF CANADA ASSAY OFFICE—

Assay values.  
 Gold deposits and earnings.  
 Appropriation and expenditure.  
 Residues and supplies.  
 Changes in staff.  
 Need of new assay building.  
 Suggested transfer of gold to Royal Mint at Ottawa.

## REPORT OF THE ACCOUNTANT.

## GENERAL NOTE—

- Preliminary Report on the Iron Ore Deposits of Vancouver, and Texada Islands.  
(E. Lindeman, M.E.)
- Investigation of Certain Alleged Iron Ore Deposits in Quebec and Ontario.  
(B. F. Haanel, B.Sc.)
- Report of Work done in the Chemical Laboratories.
- Report of a visit to some Gas Producer Plants in and around New York City,  
and to the University of Illinois Testing Laboratory. (B. F. Haanel, B.Sc.)
- Report on the Work of the Division of Mineral Resources and Statistics.  
(J. McLeish, B.A.)
- Preliminary Statistical Report on the Mineral Production of Canada in 1907,  
(J. McLeish, B.A.)

## Appendix.

- Comparison of Induction Furnaces at present employed for the production  
of Steel. By A. Grönwall, Electrical and Metallurgical Engineer, Lud-  
vika, Sweden.
- Abstract showing results of experiments in Intensified Nitrification, by means  
of Peat Beds. By MM. Müntz and Lainé.
- Diagram of Plant for Continuous Nitrification Process by means of Peat Beds.  
By Müntz and Lainé.

## LIST OF PUBLICATIONS OF MINES BRANCH.

## 28.—\*Summary Report of the Mines Branch for the Nine Months ending December 31, 1908.

## CONTENTS.

## DIRECTOR'S GENERAL REPORT—

- Change from fiscal to calendar year.
- Organization.
- Appointment of Editor.
- On the publication of the Report on the Mining and Metallurgical Industries  
of Canada, 1907-1908.
- Investigation of electric high-furnace in Sweden—
  - Description of electric high-furnace.
  - Operation of the furnace.
  - Electric steel furnace.
  - Process for manufacturing electrodes.
- Processes for the reduction of zinc ores—
  - The De Laval electro-thermic process.
  - Bisulphite process for treating refractory zinc ores.
- Investigation of producer gas plants in and around Berlin, Germany.
- On the experimental peat-fuel plant.
- On the fuel testing plant.
- Chemical laboratories.
- Dominion of Canada Assay Office.
- Scope of investigations in the field.
- Field work—
  - Iron ore deposits—
    - Dr. J. E. Woodman.
    - B. F. Haanel, B.Sc.
    - Howells Fréchette, M.Sc.
    - Einar Lindeman, M.E.
  - Tungsten—
    - Dr. T. L. Walker.
  - Gypsum—
    - W. F. Jennison, M.E.

- Coal—  
 W. W. Leach, M.E.  
 Theophile, Denis, M.E.  
 J. G. S. Hudson, M.E.
- Asbestos—  
 Fritz Cirkel, M.E.  
 Letter and Petition.
- Peat—  
 Erik Nyström, M.E.  
 S. A. Anrep, M.F.
- Oil-shale tests—  
 Dr. R. W. Ells.  
 Petition.
- General considerations.

COAL TESTS AT MCGILL UNIVERSITY.  
 CHEMICAL LABORATORIES—

- Report of the Chief Chemist—F. G. Wait, M.A., F.C.S.  
 DIVISION OF MINERAL RESOURCES AND STATISTICS—  
 Report of the Chief of Division—John McLeish, B.A.  
 DOMINION OF CANADA ASSAY OFFICE, VANCOUVER, B.C.—  
 Report of the Manager—Mr. G. Middleton.
- PRELIMINARY REPORTS ON FIELD WORK—  
 Tungsten Ores of Canada—  
 Dr. T. L. Walker.
- Chrome Ores in the Province of Quebec—  
 Fritz Cirkel, M.E.
- Iron Ores of Nova Scotia, Part II—  
 Dr. J. E. Woodman.
- Investigation of Iron Ore Deposits of New Brunswick and Northwestern Ontario—  
 E. Lindeman, M.E.
- On a Magnetometric Survey of the Huron Mountain Mine, Timagami Forest Reserve—  
 B. F. Haanel, B.Sc.
- Magnetite Iron Ore Deposits in Mayo Township, Hastings county, Ontario—  
 Howells Fréchette, M.Sc.
- Tests of the Smelting of Titaniferous Ores in the Electric Furnace at Welland, Ontario—  
 B. F. Haanel, B.Sc.
- Collection of Coal Samples for Testing Canadian Coals at McGill University—  
 Theophile Denis, B.Sc.
- On Tests made in Scotland, Great Britain, of Oil-Shales sent from New Brunswick—  
 Dr. R. W. Ells.
- On Asbestos in the Province of Quebec—  
 Fritz Cirkel, M.E.
- On the Peat Bogs of Canada—  
 E. Nyström and S. A. Anrep.
- On Coal and Coal Mining in Nova Scotia—  
 Joseph G. S. Hudson, M.E.
- On the Gypsum Deposits and Industry of Nova Scotia and New Brunswick—  
 W. F. Jennison, M.E.
- Report of a Visit to some Producer Gas Plants in and around the City of Berlin, Germany—  
 B. F. Haanel, B.Sc.

**Appendix I—**

Progress of electric smelting in Norway.

**Appendix II—**

Mineral production of Canada, 1907-8.

LIST OF PUBLICATIONS OF MINES BRANCH.

## 63. Summary Report of the Mines Branch for the Calendar year ending December 31, 1909.

## CONTENTS.

## DIRECTOR'S GENERAL REPORT—

Changes in staff.

Progress in electro-metallurgy.

Iron—

Steel making furnaces.

Iron smelting furnaces.

Zinc—

The De Laval process—London.

The Côté-Pierron process.

On the bisulphite process for the treatment of refractory zinc-lead-silver ores.

Air nitrates by electricity

Nitrates in Norway.

Plea for a Canadian nitrates industry.

Accidents in mines caused by explosives

Proposed code of regulations.

Comparative statistics of accidents in mines.

Station for testing explosives.

Peat bog and plant at Alfred, Ont.

Fuel testing station at Ottawa.

Peat by-products: moss litter and peat mull.

Oil-shale industry

New market for oil fuel.

World's oil production: statistics.

Oil-shale testing laboratory, Ottawa.

On magnetometric surveying.

Chemical laboratories.

Division of Mineral Resources and Statistics.

Dominion of Canada Assay Office, Vancouver, B.C

Statistics.

Diversion of gold to United States of America.

New quarters for Assay Office.

Scope of investigations in the field

Iron—

Dr. J. E. Woodman.

Einar Lindeman, M.E.

Howells Fréchette, M.Sc.

B. F. Haanel, B.Sc.

G. C. Mackenzie, B.Sc.

Copper—

Dr. Alfred W. G. Wilson.

Molybdenum—

Dr. T. L. Walker.

Manganese—

Theophile Denis, M.E.

Nickel—

G. C. Mackenzie, B.Sc.

Peat—

A. Anrep.

Coal—

J. G. S. Hudson, M.E.

Asbestos—

Fritz Cirkel, M.E.

Gypsum—

W. F. Jennison, M.E.

Talc and Soapstone—

Dr. Alfred W. G. Wilson.

General considerations.

COAL TESTS AT MCGILL UNIVERSITY—Dr. J. B. Porter.

CHEMICAL LABORATORIES—

Report of the Chief Chemist—F. G. Wait, M. A., F.C.S.

DIVISION OF MINERAL RESOURCES AND STATISTICS—  
 Report of the Chief of the Division—John McLeish, B.A.  
 DOMINION OF CANADA ASSAY OFFICE, Vancouver, B.C.—  
 Report of the Manager—George Middleton.

PRELIMINARY REPORTS ON FIELD WORK—

Molybdenum Ores of Canada—

Dr. T. L. Walker.

Magnetic Concentration of Iron Ores from Quebec and New Brunswick; also copper-nickel ores from Ontario—

G. C. Mackenzie, B.Sc.

Investigation of some Manganese Ore Deposits in Nova Scotia and New Brunswick—  
 Théophile C. Denis, M.E.

Investigation of Iron Ores and Metallurgical Limestones in Nova Scotia—

Dr. J. E. Woodman.

Magnetic Survey of some Mining Locations at Timagami, Ontario—

Einar Lindeman, M.E.

(a) On the Copper mining industry of Quebec.

(b) Memorandum on the Nicolet Antimony mine.

(c) Memorandum on Iron Locations in Spalding, Megantic county, Quebec.

(d) Memorandum on an occurrence of Talc and Soapstone in Megantic county, Quebec.

Dr. Alfred W. G. Wilson.

Examination of Certain Iron Ore Properties in Northeastern Ontario—

Howells Fréchette, M.Sc.

On the Gypsum Resources of Nova Scotia—

W. F. Jennison, M.E.

On further Investigation of the Asbestos Deposits of the Province of Quebec—

Fritz Cirkel, M.E.

(a) Examination of Reported Iron Ore Occurrences —

(1) Magnetite and Chrome Iron Ore in the counties of Wolfe and Megantic, Que.

(2) Magnetite near Namegos, Montcalm co., Que., on main line of Canadian Pacific railway.

(3) Matthews and Chaffey Iron mines, in North and South Crosby townships, respectively, Ont.

On Line of Central Ontario railway —

(4) Coehill Iron Mine.

(5) Jenkins Mine.

(6) Magnetic iron ore, Wollaston township, Hastings county.

(7) Ricketts iron mine, Tudor township, Hastings county

(8) Magnetic iron ore, Faraday township, Hastings county.

(9) Blairton iron mine, Northumberland county.

(10) Magnetite near St. John, N.B.

(b) Investigation of Harris Peat Gas Process.

B. F. Haanel, B.Sc.

Preliminary Report on Peat Bogs of Canada—

A. Anrep.

(a) Collection of Data on Coal mining in Nova Scotia.

(b) Preliminary Report on Explosives and Accidents in Mines.

J. G. S. Hudson.

REPORT, BULLETINS, MAPS, ETC., PUBLISHED IN 1909.

ACCOUNTANT'S STATEMENT.

**Appendix I—**

Preliminary Report on the Mineral Production of Canada—

John McLeish, B.A.

**Appendix II—**

Commercial methods for analysis of oil-shales: with two photographic illustrations—

H. Leverin, Ch. E.

**Appendix III—**

United States Geological Survey Report on the prevention of mine explosions:  
as submitted by three foreign experts. (From U. S. Geological Survey  
Special Bulletin No. 5—issued October, 1908).

**Appendix IV—**

On the Examination of Magnetic Ore Deposits—  
Howells Fréchette, M.Sc.

INDEX.

LIST OF MINES BRANCH PUBLICATIONS.

## ILLUSTRATIONS.

- Plate I. Peat Plant at Alfred, Prescott county, Ont.  
" II. Fuel Testing Station, Ottawa.  
" III. Apparatus for the determination of crude oil.  
" IV. Apparatus for determination of sulphate of ammonia

**103. Summary Report of the Mines Branch for the Calendar year ending December 31, 1910.**

## CONTENTS.

## DIRECTOR'S GENERAL REPORT—

Changes in staff.

Introductory.

Progress in electro-metallurgy.

Progress of peat fuel industry.

Fuel Testing Station at Ottawa; Peat gas producer and gas engine plant, and gas testing laboratory.

Establishment of Government ore dressing and concentration laboratory at Ottawa.

Investigation of processes for the reduction of refractory zinc ores.

Explosives: Investigations preparatory to drafting of Explosives Bill 79

Magnetometric surveying.

Chemical laboratories.

Division of Mineral Resources and Statistics.

Dominion Assay Office, Vancouver, B.C.

Directors visit, November, 1910—

Description of new offices and equipment.

Office routine.

Abstract of Assay Office statistical returns.

## Field work—

## IRON—

E. Lindeman, M.E.

Howells Fréchette, M.Sc.

## COPPER AND PYRITES—

Dr. Alfred W. G. Wilson.

## MOLYBDENUM—

Professor T. L. Walker, Ph.D.

## TIN, SILVER-COBALT, AND GOLD—

L. H. S. Cole, B.Sc.

## MICA—

H. S. de Schmid, M.E.

## BUILDING STONES—

Professor W. A. Parks, Ph.D.

## PEAT—

A. Anrep, Jr.

## EXPLOSIVES—

Captain Arthur Desborough.

## MINING DATA—

J. G. S. Hudson, M.E.

REPORTS ON CHEMICAL LABORATORIES, STATISTICAL DIVISION, ASSAY OFFICES,  
FUEL TESTING STATION, METALLURGICAL LABORATORY, ETC.

## CHEMICAL LABORATORIES—

Report of the Chief Chemist, F. G. Wait, M.A., F.C.S.

## DIVISION OF MINERAL RESOURCES AND STATISTICS—

Report of the Chief of the Division—John McLeish, B.A.

## DOMINION OF CANADA ASSAY OFFICE, VANCOUVER, B.C.—

Report of the Manager—G. Middleton.

## FUEL TESTING STATION, OTTAWA—

Report on peat gas producer and gas engine plant.

B. F. Haanel, B.Sc.

Report on gas analytical laboratory.

Edgar Stansfield, M.Sc.

## ORE DRESSING AND METALLURGICAL LABORATORY, OTTAWA—

Geo. C. Mackenzie, M.Sc.

## PRELIMINARY REPORTS ON FIELD WORK, ETC.—

Molybdenum ores of Ontario and British Columbia.

Professor T. L. Walker, Ph.D.

Copper Mining Industry in Ontario, and Maritime Provinces.

Alfred W. G. Wilson, Ph.D.

The Austin Brook iron bearing district, New Brunswick.

E. Lindeman, M.E.

(a) Investigation of iron ore deposits at Torbrook, Annapolis county, Nova Scotia.

(b) Magnesite deposits, township of Grenville, Argenteuil county, Province of Quebec.

Howells Fréchette, M.Sc.

(a) Investigation of reported discovery of tin ore, in the vicinity of Arnprior, Ont.

(b) Cobalt-silver district.

(c) Gowganda and Elk lake silver district.

(d) Shiningtree and Rosey creek silver district.

(e) Porcupine gold district.

L. H. S. Cole, B.Sc.

Mica deposits of Ontario and Quebec.

Hugh S. de Schmid, M.E.

On the Building and Ornamental Stones of Ontario: south of the Ottawa and French rivers.

Professor W. A. Parks, Ph.D.

On the Investigation of the Peat bogs of Canada, and manufacture of peat fuel at the Government peat plant, Alfred, Ont.,

A. Anrep, Jr.

Special report on tests of Blaugas.

Edgar Stansfield, M.Sc.

(a) Report on the explosives industry in the Dominion of Canada.

Captain Arthur Desborough, H. M. Inspector of Explosives.

(a) Report on itinerary inspecting the explosives factories of Canada, and on the collection of data relating to mining operations.

(b) Report on the explosion of Virite at Hull, Que.

(c) Report on the explosion of Blasters Friend, at Sandpoint, near Arnprior, Ont.

(d) Report on the coal mine disaster at Bellevue mine, near Frank, Alberta

J. G. S. Hudson, M.E.

Maps and drawings made during 1910.  
 List of publications issued during 1910.  
 Accountant's statement.  
 Director's final note.  
 Index.

## ILLUSTRATIONS.

*Photographs.*

Plate	I.	Jarnkontorets experimental electric furnace, Trollhattan.
"	II.	Dominion of Canada Assay Office, Cor. Granville and Pender streets, Vancouver, B.C.
"	III.	Vestibule.
"	IV.	Manager's office.
"	V.	Rail room.
"	VI.	Melting room.
"	VII.	Muffle room.
"	VIII.	Virite explosion at Hull, Que.— View showing evidence of the force of the blast caused by explosion.
"	IX.	View showing disruptive force due to concussion.
"	X.	Remains of magazine after explosion.
"	XI.	View showing direction of projected stone through house.
"	XII.	View showing direction of projected stone through house; which killed two persons sitting on door step.
"	XIII.	View showing path of stone into slanting roof and out through gable end.
"	XIV.	View showing where stone struck house and rebounded; killing one person and injuring another.
"	XV.	House, 1,500 feet from magazine: where two girls were killed.
"	XVI.	Rear of above house: showing stones which killed the two girls.

*Drawings.*

Fig. 1. Diagram showing projectile and destruction zone of Hull explosion.

*Maps.*

No. 94. Map showing Cobalt, Gowganda, Shiningtree, and Porcupine districts, Ont.

**Appendix I—**

Preliminary report on the Mineral Production of Canada for 1910.  
 John McLeish, B.A.

**Appendix II—**

Proceedings of Conference on proposed legislation to regulate the manufacture, importation, and testing of Explosives: held in room 16, House of Commons, Ottawa, September 23 and 30, 1910.

**Appendix III—**

Copy of Bill 79: "An act to regulate the manufacture, storage, and importation of Explosives."

LIST OF MINES BRANCH PUBLICATIONS.



## PART II.

## GENERAL REPORTS, MONOGRAPHS, BULLETINS, ETC.

NOTE.—Unless otherwise indicated, a charge of 10 cents will be made for each of the following reports and maps; but a single copy will be sent free to any *bona fide* applicant in Canada who may be specially interested in the district to which the report refers.

## (a) DEPARTMENT OF THE INTERIOR.

McCONNELL, R. G.  
BROCK, R. W.

## 2. \*Report on the Great Landslide at Frank, Alta., 1903. (Extract from Part VIII, Annual Report, Department of the Interior.)

Letter of transmittal.  
Situation.  
Topography.  
Geology of mountains.  
    Upper Palæozoic.  
    Age of limestones.  
    Cretaceous beds.  
Structure of mountains.  
Description of the slide.  
Classification.  
Time and rate of movement.  
Character of movement.  
The slide rock.  
Surface of slide.  
Changes in topography.  
Some minor features.  
Dimensions.  
Causes of the landslip.  
Statements regarding the condition of the mine before the slide.  
Present condition.  
Present dangers.  
Summary.

## ILLUSTRATIONS.

*Photographs.*

- Frontispiece.—Turtle mountain and the great rock-slide at Frank, Alta., looking northward.
- Plate I. Valley of Oldman river and Turtle mountain before the slide.
- " II. Valley of Oldman river and the town of Frank before the slide, looking northward from Sandstone knoll south of railway track.
- " III. Valley of Oldman river and the town of Frank after the slide, looking northward from nearly the same point as in Plate II.
- " IV. Mouth of the Canadian-American Coal and Coke Company's mine and slope of Turtle mountain before the slide.
- " V. Dominion Avenue, Frank.
- " VI. The slide-rock in detail.
- " VII. Looking eastward along the slide.
- " VIII. View looking down the valley across the slide-rock.
- " IX. Conical mound of debris on surface of slide-rock and some of large boulders in the background which may have produced it.
- " X. Conical mound on surface of slide.
- " XI. View from the slope of Turtle mountain, southward across the slide, showing lakes formed at the base of the mountain by the ploughing out of the bed of Oldman river.
- " XII. View from the north peak of Turtle mountain to the south peak, showing the edge of the break and the fissured zone behind.
- " XIII. Shoulder projecting from the north peak and overhanging the town.

NOTE.—Reports, Maps, etc., marked thus \* are out of print.

*Drawings.*

- Fig. 1. Diagram showing method of mining.  
 Fig. 2. Diagram showing longitudinal section through centre of chamber.  
 Fig. 3. Section along line A-B, Turtle mountain.

*Map.*

Map of Frank and Vicinity, showing landslide.

HAANEL, EUGENE, Ph.D.

**3. \*Report of the Commission Appointed to Investigate the Different Electro-Thermic Processes for the Smelting of Iron Ores and the Making of Steel, in Operation in Europe, 1904.**

## CONTENTS.

Letter of instructions.  
 REPORT OF SUPERINTENDENT OF MINES.  
   Kjellin process  
     Furnace.  
     Measurements of electric energy.  
     Cost of steel by the Kjellin process.  
     Quality of the steel produced.  
     Cost of power per electric horse-power year.  
     List of patents.  
   Hérault process  
     Furnace.  
     Electrodes.  
     Electrical measurements.  
     Cost of converting scrap into steel.  
     Production of pig.  
     List of patents.  
   Stassano process  
     Furnace.  
     List of patents.  
   Keller process  
     Furnace.  
     Lining.  
     Method of charging.  
     Electrodes.  
     Experiments.  
     Electrical measurements and determination of  $\cos. \varphi$   
     Cost of production of pig by the Keller process.  
     Production of steel.  
   Furnace with a plurality of hearths  
     Construction of the furnace.  
     Electrodes.  
   Installation of a plant producing 100 tons of pig per twenty-four hours.  
     Project.  
     Machines.  
     Manufacture of electrodes.  
     Raw material.  
     List of patents.  
   Other processes  
     The Harmet process.  
     The Gustave Gin process.  
   General conclusions.

REPORT OF ELECTRICIAN—  
   The production of pig iron.  
     The Hérault process, La Praz, France.  
     The Keller process, Livet, France.  
       First run, furnaces Nos. 11 and 12.  
       Results from voltmeter and ammeter readings.  
       Results from wattmeter reading and power factor determination.  
       Second run, furnaces Nos. 1 and 2.

The manufacture of steel  
 The Kjellin process, Gysinge, Sweden.  
 The Héroult process, Kortfors, Sweden.  
 The Héroult process, La Praz, France.  
 The Keller process, Livet, France.  
 Summary of results obtained for pig iron.  
 Summary of results obtained for steel.

#### REPORT OF METALLURGIST—

##### Steel processes

##### Kjellin process

First experimental charge No. 546.  
 Second experimental charge, No. 547.  
 Third experimental charge, No. 548.  
 Cost of production.  
 Analytical results.

##### Héroult process

Kortfors.  
 La Praz.  
 Charge No. 658.  
 Charge No. 660.  
 Cost of production.  
 Analytical results.

##### Keller steel process.

##### Summary.

Mechanical and microscopical tests.

Results of experiments made at the Royal Arsenal, Woolwich.

##### Direct smelting from the ore.

Direct smelting experiments at La Praz.

Direct smelting experiments at Livet.

First experiment.  
 Second experiment.  
 Experiment with charcoal.  
 Quality of the iron.  
 Cost of production.

Pig iron smelting in combination with steel making.

##### Conclusions.

#### REPORT ON THE MARCUS RUTHENBURG PROCESS OF ELECTRIC SMELTING OF MAGNETITE—

Description of furnace.

Description of the process.

Investigation of the Ruthenburg process by the Commission—

Calibration of electrical measuring instrument.

Preparation and conveyance of charge to reduction space of furnace.

Determination of electric energy absorbed.

Metallurgist's report.

##### Conclusion.

#### Appendix—

Treatise on Electro Metallurgy of Iron, by Henri Harmet. First Part.  
 Treatise on Electro Metallurgy of Iron, by Henri Harmet. Second Part.  
 The Electrical Manufacture of Steel, by Gustave Gin.  
 Electro-Thermic Process for the Reduction of Iron Ore, by Captain Ernesto Stassano.  
 Lecture on the Treatment of Copper Ores by the Electric Furnace, (Keller Process), by  
 M. Ch. Vattier.

#### ILLUSTRATIONS.

##### Photographs.

Plate I. General view of Kjellin furnace.  
 " II. Top view of Kjellin furnace.  
 " III. Power house, Gysinge.  
 " IV. General view of Héroult furnace.

- Plate V. Regulator of the electrodes, La Praz.  
 " VI. Power house, La Praz.  
 " VII. General view of the plant at La Praz.  
 " VIII. General view of rotating electric furnace of Stassano.  
 " IX. General view of switch board and valve stand for the Stassano furnace.  
 " X. General view of Keller furnace.  
 " XI. View of the pig iron and castings produced for the Commission at Livet.  
 " XII. View of the apparatus employed in determining cos.  $\varphi$  of alternators 4 and 2 at the works of Keller, Leleux, and Company, Livet.  
 " XIII. View of model to show method of replacing electrodes in furnace with 4 hearths, Keller.  
 " XIV-XXII. Photomicrographs of steel from the experimental charges and photographs of high class steel for comparison.  
 " XXIII. Photographs of bending, welding, and drifting tests of the Gysinge and La Praz electric steels.  
 " XXIV. The Marcus Ruthenburg electric furnace: front view.

*Drawings.*

- Fig. 1. Kjellin furnace—vertical section.  
 " 2. " " —horizontal section.  
 " 3. Héroult " —transverse section.  
 " 4. " " —longitudinal section.  
 " 5. " " —profile.  
 " 6. " " —half elevation.  
 " 7. " " —plan.  
 " 8. " " —diagram showing the operation of the regulator of the electrodes of the Héroult furnace.  
 " 9. Stassano " —vertical section.  
 " 10. " " —horizontal section.  
 " 11. The Keller electric high furnace with a plurality of hearths—vertical section.  
 " 12. The Keller electric high furnace with a plurality of hearths—horizontal section.  
 " 13. Latest form of the Keller electric high furnace with a plurality of hearths—vertical section.  
 " 14. Installation of the Keller high furnace, Fig. 13.  
 " 15. Preliminary plan of the installation of an electric furnace with 4 hearths, according to Keller, producing 20 tons of pig iron in 24 hours.  
 " 16. Preliminary plan of the installation of an electric furnace with 4 hearths, according to Keller, producing 20 tons of pig iron in 24 hours. Overhead work.  
 " 17. Preliminary project for the installation of an electro-thermic plant with a capacity of 100 tons of pig iron in 24 hours (Keller)—plan.  
 " 18. Preliminary project for the installation of an electro-thermic plant with a capacity of 100 tons of pig iron in 24 hours (Keller)—section.  
 " 19. The latest type of the Harmet furnace—vertical section.  
 " 20. " " " —horizontal section.  
 " 21. Diagram showing the electrical connexions of the furnace employed for making pig iron at La Praz.  
 " 22. Diagram showing the electrical connexions of the Keller furnace with 2 hearths.  
 " 23. Standardization of voltmeter 130,285, Livet.  
 " 24. " " ammeter 103,137, "  
 " 25. " " " 33,521, Gysinge.  
 " 26. " " " 115,346, "  
 " 27. Automatic stress strain diagrams of the Gysinge steel.  
 " 28. " " " " La Praz steel.  
 " 29. Diagram showing the general arrangement of the Keller furnace with 4 hearths.

**Appendix—**

**HARMET—FIRST PART.**

Figures, 1-6, 7, 8 (see second part.)

**HARMET—SECOND PART.**

Figures, 1, 1a, 2, 3, 3a, 4, 5, 6, 7, 8.

**GIN.**

Figures 1, 2, 3, 4, 5, 6.

STASSANO.

Figures 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13.

HAANEL, EUGENE, PH.D.

4. \*Rapport de la Commission Nommée pour Etudier les Divers Procédés Electro Thermiques pour la Réduction des Minerais de fer et la Fabrication de L'Acier Employés en Europe, 1905.

## TABLE DES MATIÈRES.

## LETTRE D'INSTRUCTIONS.

## RAPPORT DU SURINTENDANT DES MINES—

## Procédé Kjellin—

Four

Mesurage de l'énergie électrique.

Prix de revient de l'acier par le procédé Kjellin.

Qualité de l'acier produit.

Prix de l'énergie par cheval-an électrique à Gysinge.

Liste des brevets.

## Procédé Héroult—

Four.

Electrodes.

Mesurages électriques.

Prix de revient de l'acier de riblons.

Production de la fonte.

Liste des brevets.

## Procédé Stassano—

Four.

Liste des brevets.

## Procédé Keller—

Four.

Parois.

Méthode de chargement.

Electrodes.

Expériences.

Mesurages électriques.

Prix de revient de la fonte par le procédé Keller.

Production de l'acier.

## Four a pluralité de foyers—

Construction du four.

Electrodes.

## Installation d'une usine produisant 100 tonnes de fonte par 24 heures—

Projet.

Machines.

Fabrication des électrodes.

Matières brutes.

Liste des brevets.

## Autres procédés—

Le procédé Harmet.

Le procédé Gustave Gin.

Conclusions générales.

## RAPPORT DE L'ÉLECTRICIEN SUR LA RÉDUCTION ÉLECTRIQUE DU FER ET DE L'ACIER EN EUROPE.

## La Production de la fonte—

Le procédé Héroult, La Praz, France.

Le procédé Keller, Livet, France.

Lectures, fours nos 11 et 12.

Lectures du voltmètre et de l'ampère-mètre.

Lectures du wattmètre et détermination du coefficient de puissance.

Fours nos 1 et 2.

## La Fabrication de l'acier.—

Procédé Kjellin, Gysinge, Suède:

Le procédé Héroult.

La Praz, France.

Le procédé Keller.

Sommaire des résultats obtenus pour la fonte.

Sommaire des résultats obtenus pour l'acier.

## RAPPORT DU MÉTALLURGISTE SUR LA RÉDUCTION DU FER ET DE L'ACIER EN EUROPE

## Procédé Kjellin—

Première expérience, charge No. 546.

Deuxième expérience, charge No. 547.

Troisième expérience, charge No. 548.

Prix de revient.

Résultats de l'analyse.

## Procédé Héroult—

Usine de la Praz.

Charge No. 658.

Charge No. 660.

Prix de revient.

Résultats de l'analyse.

Four électrique Keller.

Sommaire.

Épreuves mécaniques et microscopiques.

Résultat des expériences faites à l'Arsenal Royal, Woolwich, pour éprouver les qualités de l'acier employé au tournage.

## Réduction directe du minerai—

Expériences de réduction directe à La Praz.

Expériences de réduction directe à Livet.

Première expérience.

Seconde expérience.

Expérience avec du charbon de bois.

Qualité du fer.

Prix de revient.

Réduction de la fonte en combinaison avec la fabrication de l'acier.

Conclusions.

## LE PROCÉDÉ MARCUS RUTHENBURG POUR LA RÉDUCTION ÉLECTRIQUE DE LA MAGNÉTE.

Description du four.

Description du procédé.

Étude du procédé Ruthenburg par la commission—

Calibration des compteurs électriques.

Préparation et transport de la charge au four.

Détermination de l'absorption d'énergie électrique.

Rapport du métallurgiste.

Conclusion.

## Appendice—

Étude sur l'électro-métallurgie du fer,  
par Henri Harmet. Première partie.Étude sur l'électro-métallurgie du fer,  
par Henri Harmet. Seconde partie.

La fabrication électrique de l'acier.

par Gustave Gin.

Procédé électro-thermique pour la réduction du minerai de fer,  
par le capitaine Ernesto Stassano.Conférence sur le traitement des minerais de cuivre au four électrique (Procédé  
Keller.)

par M. Ch. Vattier.

## ILLUSTRATIONS.

*Photographies.*

- Planche I. Vue générale du four Kjellin.  
 " II. Partie supérieure du four Kjellin.  
 " III. Salle des machines, Gysinge.  
 " IV. Vue générale du four Hérault.  
 " V. Régulateur des électrodes, La Praz.  
 " VI. Salle des machines, La Praz.  
 " VII. Vue générale de l'usine de La Praz.  
 " VIII. Vue générale du four électrique rotatoire de Stassano.  
 " IX. Vue générale du tableau de distribution et du support des soupapes du four Stassano.  
 " X. Vue générale du four Keller.  
 " XI. Vue de la fonte et des pièces coulées fabriquées pour la commission à Livet.  
 " XII. Vue de l'appareil employé pour la détermination de  $\cos. \varphi$  des alternateurs 4 et 2 à l'usine Keller, Leleux et Cie, Livet.  
 " XIII. Modèle du dispositif pour le remplacement des électrodes dans le four Keller à 4 foyers.  
 " XIV-XXII. Photomicographies des divers aciers des charges expérimentales et photographies d'aciers de qualité supérieure pour fins de comparaison.  
 " XXIII. Photographies de pièces d'acier soumises aux essais de pliage à froid, de soudure et d'étampage, aciers électriques de Gysinge et de La Praz.  
 " XXIV. Four électrique Marcus Ruthenburg, vue de face.

*Dessins.*

- Fig. 1. Four Kjellin —Section verticale.  
 " 2. " " —Section horizontale.  
 " 3. " Hérault—Section transversale.  
 " 4. " " —Section longitudinale.  
 " 5. " " —Profil.  
 " 6. " " —Demi-élévation.  
 " 7. " " —Plan.  
 " 8. " " —Diagramme montrant le fonctionnement du régulateur des électrodes dans le four Hérault.  
 " 9. " Stassano—Section verticale.  
 " 10. " " —Section horizontale.  
 " 11. Haut-fourneau électrique Keller à pluralité de foyers—Section verticale.  
 " 12. Haut-fourneau électrique Keller à pluralité de foyers—Section horizontale.  
 " 13. Dernier modèle du haut-fourneau électrique Keller à pluralité de foyers—Section verticale.  
 " 14. Installation du haut-fourneau électrique Keller, fig. 13.  
 " 15. Plan préliminaire de l'installation d'un four électrique à quatre foyers, d'après Keller, d'un rendement de 20 tonnes de fonte en 24 heures.  
 " 16. Plan préliminaire de l'installation d'un four électrique à quatre foyers, d'après Keller, d'un rendement de 20 tonnes de fonte en 24 heures.  
 " 17. Plan préliminaire de l'installation d'une usine électro-thermique d'un rendement de 100 tonnes de fonte en 24 heures (Keller)—Plan.  
 " 18. Plan préliminaire de l'installation d'une usine électro-thermique d'un rendement de 100 tonnes de fonte en 24 heures (Keller)—Section.  
 " 19. Dernier modèle du four Harmet—Section verticale.  
 " 20. Dernier modèle du four Harmet—Section horizontale.  
 " 21. Diagramme montrant les contacts électriques du four employé à la fabrication de la fonte à La Praz.  
 " 22. Diagramme montrant les contacts électriques du four Keller à deux foyers.  
 " 23. Etalonnage du voltmètre 130285, Livet.  
 " 24. " de l'ampère-mètre 103137, Livet.  
 " 25. " " " 33521, Gysinge.  
 " 26. " " " 115346, Gysinge.  
 " 27. Epreuves mécaniques des aciers de Gysinge.  
 " 28. Epreuves mécaniques des aciers de La Praz.  
 " 29. Diagramme montrant la disposition générale du four Keller à quatre foyers.

## Appendice—

## HARMET—PREMIERE PARTIE.

Figures 1-6, 7, 8, (voir seconde partie).

## HARMET—SECONDE PARTIE.

Figures 1, 1a, 2, 3, 3a, 4, 5, 6, 7, 8.

## GIN.

Figures 1, 2, 3, 4, 5, 6.

## STASSANO.

Figures 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13.

## HAANEL, EUGENE, PH.D.

5. On the Location and Examination of Magnetic Ore Bodies by Magnetometric Measurements, 1904.

## CONTENTS.

Introduction.

## CHAPTER I.

## MAGNETS AND THEIR PROPERTIES.

Definition of magnet. Poles. Law of attraction and repulsion. Theory of the constitution of magnets.

## CHAPTER II.

## THE MAGNETIC FIELD.

Lines of force. Strength of a magnetic field at a point. Conservation of flow of force. Construction of diagrams of magnetic fields. Diagrams of unipolar magnetic fields. Diagrams of bipolar magnetic fields: (1) two unlike poles of equal strength; (2) two unlike poles of different strengths. Equation of a line of force. Inductive effect of the magnetic field upon magnetic bodies.

## CHAPTER III.

The earth's normal magnetic field.

## CHAPTER IV.

## THE DISTURBED TERRESTRIAL FIELD OF FORCE.

Relation of dip to intensity of magnetization.

## CHAPTER V.

Effect of a magnet on a compass needle in a normal terrestrial field.

## CHAPTER VI.

## THE THALEN-TIBERG MAGNETOMETER.

Description: The compass. The support of the compass with its deflecting magnet.

Testing and adjusting the magnetometer:

1. Examination of error due to eccentric suspension of compass needle.
2. Examination whether axis of rotation of support is perpendicular to plane of box-level D, on base plate P.



3. Examination whether axis of compass box is perpendicular to vertical axis of rotation of support.
  4. Examination whether the vertical screw of bar Q when in contact with the lower plate of compass box renders compass box horizontal.
  5. Examination whether the horizontal screw of the bar Q when in contact with plate P<sub>2</sub> of compass box indicates its vertical position.
  6. Neutralization of the vertical component of the earth's normal field.
- Precautions to be observed in taking observations with the magnetometer.

## CHAPTER VII.

Method of observation: (With the Thalén-Tiberg magnetometer).  
Horizontal intensity of a magnetic field.

## CHAPTER VIII.

## DAHLBLOM'S MODIFICATION OF THE SINE METHOD.

Method of observation. Calibration of millimeter scale and construction of scale for reading  $R$  direct.

## CHAPTER IX.

The value of the horizontal intensity in a terrestrial field of force, disturbed by the presence of a magnetic ore body.

## CHAPTER X.

## THE VERTICAL INTENSITY OF THE DISTURBED FIELD.

Theory of the Inclinator. Determination of the value of  $K$ . Method of observation.

## CHAPTER XI.

## THE THOMSON-THALEN MAGNETOMETER.

Description. Theory. Calibration.

## CHAPTER XII.

Description of the Swedish mining compass.

## CHAPTER XIII.

## INVESTIGATION OF MAGNETIC ORE DEPOSITS BY MAGNETOMETRIC MEASUREMENTS.

Chart of the horizontal intensity. Charts of vertical intensity.

§

## CHAPTER XIV.

Information conveyed by the charts of magnetic intensity.

## CHAPTER XV.

Determination of the distance of the upper pole of a magnetic ore body beneath the surface. Four methods.

## CHAPTER XVI.

Determination of the extension in depth of a magnetic ore body: (1) method by Dahlblom; (2) method by Robert Thalén.

## CHAPTER XVII.

Laboratory practice.

## Appendix—

## THE DAHLBLÖM MAGNETOMETER.

Description of the magnetometer. Adjustment of the magnetometer. Measurement of horizontal intensity. Measurement of vertical intensity.

*List of Tables.*

Table I.	Table of values of $\frac{\sin a_0}{\sin a}$
" II.	Table of values of $\frac{\tan a_0}{\tan a}$
" III.	Table of values of $\left(\frac{1}{n}\right)^{\frac{1}{3}}$ from $n=0.01$ to $n=5.00$ .
" IV.	Table of natural tangents.
" V.	Table for the reduction of the angles $\nu$ observed with the Tiberg Inclinator $V_n$ from 1 to 41; $k_n$ from 0.50 $H$ to 0.90 $H$ . $V_n$ from 42 to 90; $k_n$ from 0.50 $H$ to 0.90 $H$ . $V_n$ from 1 to 49; $k_n$ from 0.95 $H$ to 1.40 $H$ . $V_n$ from 50 to 90; $k_n$ from 0.95 $H$ to 1.40 $H$ . $V_n$ from 1 to 51; $k_n$ from 1.45 $H$ to 1.80 $H$ . $V_n$ from 52 to 90; $k_n$ from 1.45 $H$ to 1.80 $H$ .
Table VI.	Table of $\cot x$ and $x^\circ$

## ILLUSTRATIONS.

*Photographs.*

Plate A.	The Dahlblom pocket magnetometer. (Face).
" B.	The Dahlblom pocket magnetometer. (Back).
" C.	Thalén-Tiberg magnetometer. (Set up as inclinometer).
" D.	Thalén-Tiberg magnetometer with Dahlblom's arm.
" E.	Thomson-Thalén magnetometer. (Glass cap removed).
" I.	Vertical section of the field of force through the station line $m$ of Plates II and III.
" II.	Isodynamic lines of horizontal intensity $R$ .
" III.	Isodynamic lines of vertical intensity $G$ .
" IV.	Isogonic lines $\delta^\circ$ .
" V.	Isodynamic lines of the horizontal intensity of a deposit of magnetite.
" VI.	Isodynamic lines of the vertical intensity of a deposit of magnetite.
" VII.	Chart of isodynamic lines of an actual ore body.
" VIII.	Field of force of an ideal magnet.

*Drawings.*

Figs. 1-54. Illustrative diagrams, drawings of apparatus, etc.

WELLS, J. WALTER

## 7. \*Preliminary Report on the Limestones and The Lime Industry of Manitoba, 1905.

## CONTENTS.

I.	PREFACE.
II.	SOME POINTS REGARDING SEDIMENTARY LIMESTONES
	Origin.
	Geological occurrence.
	Chemical composition.
	Mineralogical composition.
	Colour.
	Texture.
	Weathering qualities.

### III. SOME USES OF LIMESTONE AS APPLIED TO MANITOBA

Paper making.  
Glass making.  
Furnace flux.  
Road making material  
Hydraulic lime and cement.  
Minor uses.

### IV. LIME AND LIME BURNING

Composition of limestone for lime burning.  
Some points in lime burning.  
Types of lime kilns  
Some properties of quicklime.  
Hydrated lime.

### V. SOME USES OF LIME AS APPLIED TO MANITOBA

Mortar.  
Portland cement-lime mortar.  
Artificial stone.  
Sand-lime pressed brick.  
Hard wall plaster.  
Rough plaster.  
Water-softening.  
Soap making.  
Tanning.  
Straw board pulp and paper.  
Minor uses.

### VI. LIMESTONE OCCURRENCE IN MANITOBA BY DISTRICTS

Tyndall district, with analyses.  
Stonewall district, with analyses.  
Lake Winnipeg district, with analyses.  
Lake Manitoba district, with analyses.  
Northwestern Manitoba, with analyses.  
Scattered deposits, with analyses.

### VII. THE GYPSUM CEMENT PLASTER INDUSTRY IN MANITOBA

Gypsum mining.  
Gypsum milling.  
The use of calcined gypsum as a material of construction.

#### ILLUSTRATIONS.

- Plate I. Showing the pot kilns in operation at Henry's quarry, Tyndall, also the character of the quarry stone.
- " II. Photograph showing the character of the bedded limestone on the west face of Garson's quarry, Tyndall.
- " III. Photograph showing the type of draw-kiln used at Gunn's quarry, Tyndall.
- " IV. Photograph showing the character of the limestone at Stonewall and the method of handling the quarried stone for building purposes.
- " V. Photograph showing the style of pot kilns commonly used and the method of handling the stone and burnt lime at the Stonewall quarries.
- " VI. Photograph showing the style of vertical shaft lime-kiln without a fire-place. This particular kiln is used at the Arnold Cement Works, Manitoba, to produce natural cement from a highly calcareous shale. The fuel (lignite) is delivered by the tram car as shown, while the cement rock is hoisted by bucket elevator. The product is delivered to tram cars at the bottom.
- " VII. Drawing showing a simplified vertical section of a draw-kiln equipped with the Eldred process of flame regulation.
- " VIII. Photograph of the interior of the Brandon Sandlime Brick Works, showing the brick press and the cylinder for treating the fresh brick with super-heated steam.

WELLS, J. WALTER

**8. \*Preliminary Report on the Industrial Value of the Clays and Shales of Manitoba.**

## CONTENTS.

- Preface.  
 Some points regarding clays and shales.  
   Origin.  
   Mineralogical composition.  
   Chemical composition.  
   Physical properties.  
 Distribution and character of clays in Manitoba.  
 Distribution and character of shales in Manitoba.  
 The brick-making industry in Manitoba.  
   Common building brick.  
   Character and extent of the output.  
   Dry pressed brick.  
   Suggestions for reducing the cost and improving the product  
 Some uses for clays and shales in Manitoba.  
   Common, pressed, and hollow building brick.  
   Paving brick.  
   Firebrick.  
   Sewer and drain pipes.  
   Terra-cotta fireproofing.  
   Chimney flues and pots.  
   Glazed and encaustic tiles.  
   Coarse pottery.  
   Portland and natural hydraulic cement.  
   Mineral paints.  
   Road-making materials.

## ILLUSTRATIONS.

- Plate I. Outcrop of calcareous shale and chalk (Niobrara formation) Pembina River valley, Township 1, range 6, west, Manitoba.  
 " II. A hill at La Riviere consisting of Pierre shale used for the manufacture of pressed building brick in the plant, as shown.  
 " III. Stratified clay overlying boulder clay, East Favel river, near Minitonas.  
 " IV. Stratified rearranged Red River Valley clay, overlying sand at Carman Brick Yards.  
 " V. Up and down draft rectangular kiln used at Stephen's Brick Yard, Portage la Prairie, for burning bricks made by soft mud process.  
 " VI. Pallet drying and scove kiln burning of brick made by soft mud process at Brandon Brick Yards.  
 " VII. Samples of the products of Pierre shale and clay derived from its erosion, made at Walhalla Brick Yards, North Dakota, just south of the Manitoba boundary.  
 " VIII. Drawing showing vertical section, horizontal section, and plan of the Hoffman continuous circular down draft brick kiln.  
 " IX. Tunnel kiln for burning brick using coal dust as fuel.

WELLS, J. WALTER

**9. \*Preliminary Report on the Raw Materials, Manufacture, and Uses of Hydraulic Cements in Manitoba, 1905.**

## CONTENTS.

- Letter of instructions.  
 I. PRESENT INDUSTRIAL CONDITIONS IN MANITOBA.  
 II. SKETCH OF THE MANUFACTURE OF HYDRAULIC CEMENT.  
   Definition of hydraulic cement.  
   Portland cement.  
     Raw materials.  
     Proportion of ingredients.

- Mixing of materials.
- Calcination of the mixture.
- Clinker.
- Grinding of clinkers.
- Storage.
- Composition.
- Natural rock cement.
  - Raw materials.
  - Composition of natural cement rocks
- Manufacture of natural cement.
  - Mining.
  - Scheme of operation for making natural rock cement.
  - Calcining of material.
  - Grinding of clinker.
  - Composition of natural cement.
- The physical qualities of hydraulic cement.

### III. AVAILABLE RAW CEMENT-MAKING MATERIALS IN MANITOBA.

- Coal.
- Raw materials—limestones, etc.
- Quarrying and shipping facilities.
- Marl and chalk deposits.
- Clay shales.
- Benton shales.
- Niobrara shales.
- Pierre shales.
- Clays.

### IV. METHODS OF CEMENT MAKING AND WHERE CEMENT CAN BE MADE IN MANITOBA.

- Some methods of making cement from limestone and clays or shales.
- Method of manufacture in the Lehigh district, Pennsylvania, and New Jersey, U.S.A.
- Method of manufacture, Edison Portland Cement Company, Stewartville, New Jersey.
- Method of manufacture used at the works of Alpena Portland Cement Company, Alpena, Michigan.
- Method of manufacture at Kansas Portland Cement Works, Iola, Kansas.
- Method of manufacture at the Works of the International Cement Company, Hull, Que.
- Probable locations for Portland Cement Works in Manitoba.
- The manufacture of natural cement in Manitoba.

### V. THE USES OF PORTLAND CEMENT IN MANITOBA.

- The uses of Portland cement as a mortar.
- Portland cement lime mortar.
- Portland cement plaster.
- Uses of Portland cement in common concrete.
- The preparation of cement concrete.
- Practical uses of cement concrete.
  - Foundation and footings.
  - Massive monolithic construction.
  - Monolithic concrete walls.
  - Artificial stone building blocks.
  - Foundations for posts.
  - Sidewalks and street pavements.
  - Road foundations.
- The uses of reinforced cement concrete.
  - Grain storage elevators.
  - Posts for fences and wiring.
  - Railroad ties.
  - Abutments, bridges, piers, etc.
- List of manufacturers of cement brick, hollow block, and tile.

## VI. USES OF NATURAL CEMENT IN MANITOBA.

Cement plaster.  
 Cement mortar.  
 Natural cement concrete.  
 Directions for mixing concrete.  
 Concrete floors.  
 Foundations, etc.  
 Culverts and bridges.  
 Monolithic walls.

## ILLUSTRATIONS.

- Plate I. Exterior view of the King Grain Storage Elevator, Port Arthur, Ontario, mostly built of fireproof reinforced concrete.  
 " II. View of Arnold Cement Works, Pembina Hills, showing vertical clinker kiln, clinker grinding house, and storage shed on the Canadian Northern railway.  
 " III. View of a new dwelling house built of Miracle patent stone building blocks at Emerson, Manitoba.  
 " IV. Type of monolithic concrete house being adopted in Ontario. This house, at St. David, is built of natural cement concrete from cellar to roof, and the foundations and walls cost \$670.  
 " V. A rough monolithic concrete stable at Virden, Manitoba.  
 " VI. Method of replacing decayed end of telegraph pole by a cement concrete butt.  
 " VII. Drawing showing cement concrete fence post used in Michigan.

CIRKEL, FRITZ, M.E

## 10. \*Mica: Its Occurrence, Exploitation, and Uses, 1905.

## CONTENTS.

Introduction.

## CHAPTER I.

PHYSICAL AND CHEMICAL PROPERTIES AND GEOGRAPHICAL DISTRIBUTION OF THE MICAS.

The mineral mica. Crystallization. Percussion and pressure figures. Colour. Internal imperfections and inclusions. Hardness. Chemical composition. Geographical distribution.

## CHAPTER II.

MUSCOVITE AND PHLOGOPITE.

*Muscovite.*

Geological occurrence. Petrographic character of the pegmatite. Mode of occurrence of muscovite mica.

Locations of muscovite mica occurrences—

Province of Quebec: Saguenay district, County of Ottawa, County of Berthier.  
 Province of Ontario. Province of British Columbia. Ungava.

*Phlogopite.*

History. Geographical distribution. Topographical features of the mica fields. Geological occurrence. Contact deposits. Pocket deposits. The occurrence of apatite in connection with mica. The Ontario section of the mica field. Mica outcrops. Origin of mica deposits. Chemical composition of phlogopite mica.

## CHAPTER III.

## THE MINING AND PREPARATION OF MICA.

## The mining of mica—

Mining methods. The winning of mica. Effect and cost of hand drilling. Effect and cost of machine drilling. Cost of blasting. Removal of debris. Construction of cable derricks. Disposal of rock and run of mine. Cost of mining. Percentage of mica in rock. Percentage of grades in the run of mine.

## Preparation of the mica—

Trimming, splitting, ground mica.

## CHAPTER IV.

## MICA MINES AND LOCATIONS.

Province of Quebec. Province of Ontario. Mica cutting factories.

## CHAPTER V.

Status of the Canadian mica industry. Production, export, market, and prices.

## CHAPTER VI.

Commercial applications of mica.

## CHAPTER VII.

## MICA IN FOREIGN COUNTRIES.

United States. Brazil. Norway. China. India. Comparison of Indian and Canadian mining methods. World's production of mica.

**Appendix—**

Abstract from the mining law of the Province of Quebec.  
Abstract from the Mines Act of the Province of Ontario.  
Bibliography.  
Index.

## ILLUSTRATIONS.

*Photographs.*

Occurrence of mica in Blackburn mine.

*Drawings.*

- Fig. 1. Crystal of phlogopite with core of primary crystal.  
" 2. Intergrowth of phlogopite crystals.  
" 3. Twin crystal of muscovite.  
" 4. Percussion figure.  
" 5. Percussion and pressure figure.  
" 6. Pegmatite dike.  
" 7. Pegmatite dike.  
" 8. Pegmatite dike in faulted country rock.  
" 9. Map of the Saguenay mica mining district.  
" 10. Cut through Villeneuve mine.  
" 11. Pyroxene dike in crystalline limestone.  
" 12. Contact deposit.  
" 13. Pocket deposit.  
" 14. Section of mica vein in Wallingford mine.  
" 15. Section of mica vein in Wallingford mine.  
" 16. Section of mica vein in Kodak mine.

- " 17. Section of mica vein in Battle Lake mine.
- " 18. Section of mica vein in Rheaume Lake mine.
- " 19. Section of mica vein in Baby mine.
- " 20. Cut through workings of the Lake Girard mine.
- " 21. Mica vein cut off by apatite.
- " 22. Displacement of mica in soil.
- " 23. Boom derrick.
- " 24. Incline cable hoisting shaft.
- " 25. Carrier for cable hoisting.
- " 26. Machine mica cutting knife.
- " 27. Surface plan of Wallingford mine.
- " 28. Surface plan of Battle Lake mine.
- " 29. Cut through workings on lot 9, range X, Templeton. Owned by the Canada Industrial Company.
- " 30. Surface plan of the Laurentide Mica Company's mine.
- " 31. Surface plan of Lacey mine, near Sydenham, Ont.
- " 32. Section AB through shaft of Lacey mine.
- " 32a. Diagram of steam pressures.
- " 32b. Diagram of steam pressures.
- " 33. Mica deposit at Minas Geraes, Brazil.
- " 34. Mica deposit at Godfjeld mine, Norway.
- " 35. The mica fields in Bengal, India.
- " 36. Section of pegmatite dike, Hazaribagh, India.
- " 37. Mica vein in gneiss, Hazaribagh, India.
- " 38. Pegmatite vein in Southeast Wainad, Nilgris, Madras Presidency, India.

*Map.*

Mica region, Ontario.

CIRKEL, FRITZ, M.E.

11. \*Asbestos: Its Occurrence, Exploitation, and Uses, 1905. First Edition. (Out of print.)<sup>1</sup>

INGALLS, WALTER RENTON, M.E.

12. \*Report of the Commission appointed to Investigate the Zinc Resources of British Columbia and the Conditions affecting their Exploitation.

CONTENTS.

REPORT ON THE ZINC RESOURCES OF BRITISH COLUMBIA AND THEIR COMMERCIAL EXPLOITATION, BY WALTER RENTON INGALLS.

Letter of transmittal.

Introductory.

HISTORICAL:

Production of zinc ore in the United States. Imports of zinc ore into the United States.

Statistics of production.

Character of the ore:

Slocan Star mine. Ruth mine. Lucky Jim mine. American Boy mine. Other mines.

Market for ores:

American smelters. European smelters. The European vs. the American market. Tariff conditions.

The valuation of zinc ores.

Cost of smelting.

Value of argentiferous blende.

Wet processes of zinc extraction.

<sup>1</sup> NOTE.—Inasmuch as this, the first edition, is entirely out of print, the table of contents has been omitted; but a complete syllabus will be found in the description of the second edition.



- The zinc mines of British Columbia—  
 Cost of production and productive capacity. Methods of exploitation.  
 Zinc smelting in Canada.  
 The design of a zinc smeltery.  
 The smelting works at Frank, Alberta.  
 Lead smelting in British Columbia  
 Canadian smelting works. Hall smelting works. Sullivan smelting works.  
 Other smelting works.  
 Smelting rates on silver-lead ore  
 Galena ore. Blende ore. Siliceous ore. Iron ore. General.
- Mechanical concentration of zinc ores—  
 Manual selection or hand-sorting. Separation of minerals of nearly equal specific gravity. The mixed ores British Columbia.
- Magnetic separation.  
 Summary of magnetic ore tests  
 Lots 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, and 19.  
 General conclusions.
- Magnetic separators—  
 Monarch, Sautter, Siemens and Halske, Heberli, Ferraris No. 1, Payne, Wenstrom, Buchanan, Mechernich, Siemens, Delvik-Gröndal, Conkling, Ferraris No. 2, Rowand, Wetherill, Cleveland-Knowles, Finney, Ferraris No. 3, Courtney, Knowles, and other separators.
- Separators used in experimental work—  
 Wetherill separator. The International separator. The Ding's separator.  
 Magnetic separating plants in the Slocan.  
 Patent rights.  
 Electrostatic separation.
- Flotation processes—  
 Ruth, Blue Bell, St. Eugene, and Big Ledge mines.  
 Railway transportation.  
 Electro-thermic zinc smelting.
- STATISTICS OF PRODUCTION, CONSUMPTION, AND PRICE—  
 Imports of zinc in blocks, pigs, and sheets. Imports of spelter. Imports of zinc, manufactures of quantity and value of zinc in blocks, pigs, and sheets, and of spelter and manufactures of zinc imported into Canada for the fiscal years ending June 30, 1903, 1904, 1905, and 5 months to November 30, 1905.
- Production of zinc and zinc ore—  
 Production of zinc ore in Europe and Australia. World's production of zinc. Production of zinc in United States, Great Britain, Germany, Netherlands, Italy, and Russia.
- Consumption of zinc—  
 World's consumption of zinc. Consumption of zinc in the United States.  
 Consumption of zinc white in the United States.
- Statistics of price—  
 Average monthly price of Prime Western spelter at New York, in cents per pound. Average annual price of ordinary Silesian spelter at London, per ton of 2,240 pounds. Equivalent prices of spelter in pounds sterling per 2,240 pounds, and dollars and cents per 100 pounds. Equivalent prices in pounds sterling per 2,240 pounds and dollars and cents per 100 pounds, at different rates of exchange. Average annual price of spelter in various markets, reduced to cents per pound. Average monthly price of zinc blende ore at Joplin, Mo.

REPORT ON THE ZINC MINES OF THE EAST AND WEST KOOTENAYS, BY PHILIP ARGALL.

Letter of transmittal.

## AINSWORTH CAMP—

Highlander Mill and Mining Company.  
 Highlander mine.  
 Tariff mine.  
 Blue Bell and Kootenay Chief mining claims  
 Krao mine.  
 Star vein.  
 Spokane.  
 Old Jeff.  
 Glengarry.  
 United mines.  
 General conclusions.

## THE SLOCAN—

South fork of the Kaslo river.  
 Cork mine.  
 Province mine.  
 Whitewater mine.  
 Whitewater Deep mine.  
 Jackson mines.  
 Bell mine.  
 Echo-Almeda mine.  
 Slocan-Star mine—  
     Zinc shipments from the Byron N. White Co., of Sandon, B.C., to the  
     United States Zinc Co., of Pueblo.  
 Richmond group.  
 Ruth mines.  
 Payne mine.  
 Ivanhoe and Elgin mines.  
 Noble Five and Goodenough mines.  
 Monitor mine.  
 Lucky Jim mine.  
 Mountain Chief group.  
 Hartney group of mines.  
 Bosun mine.  
 Lipton group.  
 Standard group.  
 Wakefield mines.  
 Wakefield mill.  
 Hewitt mines—  
     Ore shipped from Hewitt mine, Silverton, by M. S. Davys, from  
     Lorna Doone.  
 Enterprise mine.

## EAST KOOTENAY—

Saint Eugene mines.  
 Sullivan group.

## ROCKS AND ORES OF THE SLOCAN—

Dyke rocks.  
 The ores—  
     Blende, siderite, iron pyrites, pyrrhotite, calcite, galena, and grey  
     copper (freibergite).

## ECONOMIC CONDITIONS

Labour.  
 Ore reserves and output.  
 Operating expense.  
 Forms of leases.  
 Ore reserves.

## ORE MILLING IN THE SLOCAN.

## REPORT ON SOME MINES OF AINSWORTH AND THE SLOCAN, BY ALFRED C. GARDE, M.E.

Letter of transmittal.

## THE SLOCAN—

American Boy mine.  
Noble Five group.  
Reco mine.  
Goodenough mine.

## AINSWORTH DISTRICT—

Union mine.  
Buckeye mine.  
Gallagher mine.

## NELSON DISTRICT—

Molly Gibson mine.  
Bismark mine.  
Black Fox mine.  
B. and A. mine.  
Black Prince mine.  
Emily-Edith mine.  
Galena Farm mine.

## REPORT ON SOME OF THE UNDEVELOPED ZINC DEPOSITS OF BRITISH COLUMBIA, BY ALFRED ERNEST BARLOW, M.A., D.Sc.

## Introduction—

## VANCOUVER ISLAND

Means of communication, geology, economic minerals, occurrence of zinc blende.

Clayoquot mining division.

Other occurrences of zinc on Vancouver Island.

## TEXADA ISLAND

Geology, economic minerals, occurrence of zinc blende, geology of the Commodore group.

## MAIN COAST OF BRITISH COLUMBIA—

New Westminster mining district, Nanaimo mining division.

## INTERIOR OF BRITISH COLUMBIA—

Similkameen mining district, Kamloops mining division, Kettle River mining district, Revelstoke mining district, Arrow Lake mining district, Illecillewaet mining division, Lardeau mining division, Steele mining division, Golden mining division.

## OTHER OCCURRENCES OF ZINC ORE IN BRITISH COLUMBIA—

Giant mine.  
Monarch mine.  
Lone Prospector mine.  
Donald mine.  
Fort Steele mining division  
Victor, King of Kootenay, Bill Nye, Estella, Aurora.  
Hesquoit lake,  
Vancouver island.

## REPORT ON METHODS FOR THE CONCENTRATION OF ZINC ORES OF BRITISH COLUMBIA, BY PHILIP ARGALL.

Letter of transmittal.

## Report on ore tests

Lot No. 1. Jackson mine.  
Lot No. 2. Ruth mine.  
Lot No. 3. Payne mine.

- Lots 1, 2, and 3. Mixed.
- Lot No. 4. Hartney group.
- Lot No. 5. Slocan Star mine.
- Lot No. 6. Monitor and Ajax mine.
- Lot No. 7. Enterprise mine.
- Lot No. 8. Molly Gibson mine.
- Lot No. 9. Big Ledge.
- Lot No. 10. Big Ledge.
- Lot No. 11. Big Ledge.
- Lot No. 12. Goodenough mine.
- Lot No. 13. Hewitt mine.
- Lot No. 14. Emily-Edith mine.
- Lot No. 15. Lucky Jim mine.
- Lot No. 16. Hewitt mine.
- Lot No. 17. Aurora mine.
- Lot No. 18. Blue Bell mine.
- Lot No. 19. St. Eugene mine.
- Lot No. 20.

REPORT ON THE METHODS OF ASSAYING, BY HENRY HARRIS AND HENRY E. WOOD.

Methods of assaying.

Report of Henry Harris—

Silver assay, lead assay, zinc assay, insoluble matter, iron, samples per Philip Argall, samples per Dr. Barlow, special samples of limestone per Philip Argall.

Report by Henry E. Wood—

Lead, zinc, iron, insoluble matter, sulphur, gold, and silver.

Synopsis of mining laws of British Columbia—

Free miners' certificates.

Mineral claims.

Placer claims.

Co-owners and partnerships.

Hydraulic and dredging leases.

Taxation of mines.

Coal and petroleum prospecting licenses.

Mining recorders in outlying districts:

Table of fees.

The lead bounty.

An Act to provide for the payment of bounties on lead contained in lead-bearing ores mined in Canada.

Index.

ILLUSTRATIONS.

*Accompanying Mr. Ingall's Report.*

- Fig. 1-2. Ore-picking table.
- " 3. Ore-picking belt.
- " 4. Arrangement of magnetic separators at Friedrichsseggen, Germany.
- " 5. Plan of magnetic separating works at Friedrichsseggen, Germany.
- " 6-9. Magnetic separator formerly used at Friedrichsseggen, Germany.
- " 10-11. Calcining furnace used at Friedrichsseggen, Germany.
- " 12. Flow-sheet at Meiern, Tyrol.
- " 13. Longitudinal elevation of Wetherill magnetic separating plant at Lohmannsfeld, Germany.
- " 14. Transverse section of Wetherill magnetic separating plant at Lohmannsfeld, Germany.
- " 15. Plan of Wetherill magnetic separating plant at Lohmannsfeld, Germany.
- " 16. Transverse section of Wetherill magnetic separating plant at Lohmannsfeld, Germany.
- " 17-18. Mechernich separator. Diagrams showing forms of pole-pieces and distribution of lines of force.
- " 19-20. Mechernich separator. Diagrams showing forms of pole-pieces and separation of ores.

- Fig. 21. Mechernich separator. Side elevation.  
 " 22. Knowles separator. Side elevation.  
 " 23. Principle of Wetherill, Type "E", separator.  
 " 24. Wetherill, Type "E", No. 2 separator.  
 " 25. International separator.  
 " 26. International separator, sectional view.  
 " 27. International separator, armature and pole-pieces.  
 " 28. Dings separator.  
 " 29. Works of Kootenay Ore Company, Kaslo.  
 " 30. Blake separator, vertical section.  
 " 31. Blake separator (experimental testing size) in the U. S. Geological Survey's testing plant at Portland, Oregon.  
 " 32. Standard Blake separator (double) set up in Denver shop for testing, April, 1901.

*Plates accompanying Mr. Argall's Report.*

- Plate I. Highlander tunnel, showing Highlander, Tariff, and other veins, Ainsworth, B.C.  
 " II. Diagram showing composition of Highlander vein, on line of tunnel.  
 " III. Illustration of crustification and the order of mineral deposition in the Highlander vein.  
 " IV. Blue Bell mine, Ainsworth, B.C., plan of main tunnel.  
 " V. Diagrammatic section of Blue Bell mine.  
 " VI. Blue Bell peninsula, Ainsworth, B.C.  
 " VII. A southerly view of the main open-cut on the Blue Bell mine.  
 " VIII. A northerly view of the main open-cut on the Blue Bell mine.  
 " IX. Westerly view, looking into the face of smaller cut.  
 " X. Blue Bell harbour and pier.  
 " XI. Main open-cut, Blue Bell mine.  
 " XII. Pilot Bay concentrator and smelter.  
 " XIII. Sheeted zone, Krao mine, Ainsworth, B.C.  
 " XIV. Sketches of Cork, Jackson, and Whitewater veins.  
 " XV. Sketches of Bell, Payne, and Slocan Star Mines veins.  
 " XVI. Plan of workings of Ruth mine.  
 " XVII. Sketches of veins of Ruth and Payne mines.  
 " XVIII. Flow-sheet of Slocan Star mill, Sandon, B.C.  
 " XIX. Map of workings of Payne mine.  
 " XX. Photograph of Payne lower terminal.  
 " XXI. Photograph of Payne tramway, Sandon, B.C.  
 " XXII. Photograph of Ivanhoe mill, Sandon, B.C.  
 " XXIII. Photograph of Ivanhoe No. 2 and tramway, Sandon, B.C.  
 " XXIV. Photograph of Ivanhoe wire tramway, Sandon, B.C.  
 " XXV. Flow-sheet of Ivanhoe mill, Sandon, B.C.  
 " XXVI. Photograph of Noble Five concentrator, Sandon, B.C.  
 " XXVII. Photograph of Noble Five tramway, Sandon, B.C.  
 " XXVIII. Photograph Monitor mill, Brockman, Roseberry, B.C.  
 " XXIX. Photograph Lucky Jim lower terminal of tramway, Sandon, B.C.  
 " XXX. Flow-sheet of Monitor Mill, Brockman, Roseberry, B.C.  
 " XXXI. Plan of workings, Lucky Jim mine, West Kootenay, B.C.  
 " XXXII. Plan of workings, Bosun mine, Sandon, B.C.  
 " XXXIII. Sections of Wakefield and Standard mines.  
 " XXXIV. Plan of workings of The Wakefield mines, Ltd.  
 " XXXV. Vein plan, Hewitt mine.  
 " XXXVI. Photograph of Hewitt ore.  
 " XXXVII. Plan of workings of Lake Shore mine and Sullivan mine.  
 " XXXVIII. Photograph of ore from 8th level, Payne mine.  
 " XXXIX. Photograph of ore from 4th level, Slocan Star mine.  
 " XL. Photograph of ore from Bosun veins, 3 inches wide, showing the ore and vein structure.  
 " XLI. Photograph of calcite from Wakefield vein.

*Maps accompanying Mr. Argall's Report.*

- Map of the Slocan mining camp.  
 Map of South Fork of Kaslo creek, embracing district from Whitewater to Kaslo.

*Photographs accompanying Mr. Argall's Report.*

View from Payne residence, looking south.  
 Sullivan mine, No. 5 shaft house.  
 Head of aerial tramway at Sullivan mine, Kimberley, B.C.  
 Slocan Star mine, Sandon.  
 Sullivan mine—boiler house.  
 Whitewater mill, Whitewater, Ainsworth, B.C.  
 View of the Payne lower tramway terminal.  
 Enterprise mine, Slocan lake.

*Plates accompanying Mr. Garde's Report.*

- Plate I. Sketch of No. 2 level on Deadman claim, Noble Five Group, Sandon, B.C.  
 " II. Sketch map of Grey Copper claim, Goodenough Mines, Ltd., Sandon, B.C.  
 " III. Sketch map of Molly Gibson mine, Nelson mining division, B.C.  
 " IV. Sketch map of The Bismark mine, Kaslo creek, B.C.  
 " V. Sketch of lower tunnel on The B. and A. claim, Kaslo creek, B.C.

*Plates accompanying Dr. Barlow's Report.*

- Plate I. Plan of the Aurora mine, Moyie, B.C.  
 " II. Plan showing position of Aurora mine.  
 " III. Plan of Commodore group of mineral claims near Van Anda, Texada island.  
 " IV. Plan showing position of Peerless zinc mine near Quatsino sound, Vancouver island.

HAANEL, EUGÈNE, PH.D.

16. \*Experiments made at Sault Ste. Marie, Ont., under Government auspices, in the Smelting of Canadian Iron Ores by the Electro-Thermic Process, 1907.

CONTENTS.

Letter of Transmittal.  
 Introduction.  
 Location and Description of Plant.  
   Description of furnace.  
   Electrical machinery and arrangements.  
   Experiments.  
   Preliminary experiments: analyses, composition of charge, electrical measurements, etc.  
     Runs No. 1 to 19.  
 Smelting of magnetite.  
 Use of charcoal as a reducing agent.  
 Power factor.  
 Consumption of electrode.  
 Modification of experimental furnace for commercial production of pig iron.  
 Production of ferro-nickel pig.  
 The electric furnace as compared with the blast furnace.  
 General remarks.  
   Estimate for a 10,000 horse-power plant producing 120 tons of pig iron per day of 24 hours.  
   Cost of production of pig iron per ton.

Appendix—

New inventions of electric smelting and reduction furnaces—  
 Induction furnaces for steel smelting.  
 Electric furnaces for the reduction of ores.  
   Transformer furnace.  
   Contact furnace.  
   Rotating furnace.  
 Specifications Nos. 1, 1a, 2, 3, 4, 5, 6.

- Results obtained with the Héroult steel furnace at Remscheid in Germany.  
 Experiments made by L. Guillet with Héroult steel.  
 Comparative experiments with different classes of steel made by L. Guillet.  
 Cost of production—  
     Time required for operations, in minutes.  
     Production per year of 280 days—6,720 hours in tons.  
     Power expenditure.  
 Improvement in electric furnace construction suggested by R. Turnbull.  
 Electric smelting plant in Canada.  
     “ “ “ in the United States.  
 List of electric steel works.

## ILLUSTRATIONS.

*Photographs.*

- Plate A. Electric furnace just after metal has been tapped.  
 “ B. “ “ showing measuring instruments in place and method of regulating electrode.  
 “ C. Exhibit of two-thirds of the pig iron produced during the Government experiments.  
 “ D. Experimental electric furnace as modified by the Lake Superior Corporation for the production of ferro-nickel pig.  
 “ E. Ferro-nickel pig produced by the Lake Superior Corporation during April-July, 1906 (168 tons).

*Drawings.*

- Plate I. Plan of experimental electric smelting plant at Sault Ste. Marie, Ont.  
 “ II. Section of experimental electric smelting plant at Sault Ste. Marie, Ont.  
 “ III. Experimental electric furnace.  
 “ IV. “ “ “ for runs 4-5.  
 “ V. “ “ “ “ 6-7.  
 “ VI. “ “ “ “ 8-12.  
 “ VII. “ “ “ “ 13-19.  
 “ VIII. Electrodes.  
 “ IX. Two-shaft electric furnace, with isolated electrodes.  
 “ X. Eight-tons electric steel furnace: plan.  
 “ XI. “ “ “ “ side view.  
 “ XII. “ “ “ “  
 “ XIII.  
 “ XIV. Transformer furnace combined with shaft furnace: plan.  
 “ XV. “ “ “ “ “ “ section.  
 “ XVI. “ “ “ “ “ “ “  
 “ XVII. Contact furnace.  
 “ XVIIa. Transformer furnace with compensation coils for decreasing magnetic leakage.  
 “ XVIIb. Transformer furnace with compensation coils for decreasing magnetic leakage.  
 “ XVIIc. Transformer furnace with iron core for decreasing magnetic leakage.  
 “ XVIId. Transformer furnace showing short-circuited conductors for decrease of self-induction—2 sheets.  
 “ XVIIe. Transformer furnace showing crucible in a shaft furnace with endless groove; the material forming a secondary coil—6 sheets.  
 “ XVIIf. Electric contact furnace, for metal production direct from ores.  
 “ XVIIg. Rotating smelting furnace—2 sheets.  
 “ XVIII. Turnbull's improved electric furnace.

HAANEL, EUGENE, PH.D.

**17. Mines of the Silver-Cobalt Ores of the Cobalt district: Their Present and Prospective Output, 1907.**

CONTENTS.

Statistical Statement showing tonnage of Cobalt ore shipped over Timiskaming and Northern Ontario Railway, from Cobalt Station.

List of shipping mines—

Larose.  
 Nova Scotia.  
 Silver Queen.  
 Nipissing.  
 Trethewey, J. B. VII-  
 Foster.  
 Kerr Lake.  
 Coniagas.  
 Buffalo.  
 Violet.  
 University.  
 McKinley-Darragh-Savage.  
 Drummond.  
 Green and Meehan.  
 Downey, L.  
 Colonial.  
 Bailey.

Report on prospective shipments—

Detailed estimate of tonnage of shipments for 1907.

Managers tabulated returns of total ore shipped by the respective mines, since the opening of same.

Discrepancy between statistical returns of railway officials and mine managers accounted for.

Smelters to which cobalt-silver ores are shipped, and terms on which ore is received for treatment.

- (1.) The American Smelting and Refining Company.
- (2.) The Balbach Smelting & Refining Company.
- (3.) The Oxford Copper Company.

Proposed smelting plant at Hamilton, North American Cobalt Refining Company of Hamilton.

The Anglo-French Nickel Company, Limited, of Swansea, South Wales, Great Britain:—

Application for consignment of cobalt ores for experimental treatment. Conditions specified.



## GENERAL REPORTS, MONOGRAPHS, BULLETINS, ETC.

## (b) DEPARTMENT OF MINES.

CIRKEL, FRITZ, M.E.

18. <sup>P. 1</sup> Graphite: Its Properties, Occurrence, Refining, and Uses, 1907.

## CONTENTS.

Introduction.

## CHAPTER I.

## HISTORY, CHEMICAL AND PHYSICAL PROPERTIES OF GRAPHITE.

History.

Chemical and physical properties of graphite.

Chemistry of graphite.

## CHAPTER II.

## OCCURRENCE OF GRAPHITE.

General features of graphite deposits—

Graphite associated with precious metals and iron.

Classification of deposits.

Veins or vein-like occurrences.

Bedded veins or masses.

Disseminated graphite.

Occurrence of graphite in Canada—

Province of Quebec.

Graphite mines and mills in the Province of Quebec—

The Anglo-Canadian Graphite Syndicate.

The Buckingham Company.

The Buckingham Graphite Company.

The Dickson graphite locations.

The Grenville deposits.

General conclusions on graphite areas—

Summary of graphite localities in the Province of Quebec.

Ontario, graphite occurrences in.

New Brunswick.

Nova Scotia.

British Columbia.

Hudson strait.

United States—

New York.

Rhode Island.

Maine.

Pennsylvania.

South Dakota.

Pacific states.

● Alabama.

Virginia.

New Mexico.

Brazil.

Occurrences of graphite in Europe, Asia, and Australia.

Bohemia and Bavaria.

NOTE.—Reports, Maps, etc., marked thus \* are out of print.

Moravia.  
 Lower Austria.  
 Northern Germany.  
 Spain.  
 France.  
 Italy.  
 England.  
 Russia and Siberia.  
 Ceylon—  
     General features.  
     Graphite mining.  
     Dressing.  
 India.  
 New South Wales.  
 Queensland.  
 Japan.

## CHAPTER III.

## ORIGIN OF GRAPHITE.

## CHAPTER IV

## COMPOSITION OF GRAPHITE ORES.

Canadian graphite ores—  
     Notes.  
     Conclusions.  
 Graphite from foreign countries—  
     Italy.  
     England.  
     Greenland.  
     Bohemia.  
     Styria.  
     Moravia.  
     New South Wales.

## CHAPTER V.

## QUALITIES OF GRAPHITE FOR COMMERCIAL PURPOSES.

Qualities of Canadian graphites.

## CHAPTER VI.

## DETERMINATION OF THE VALUES OF GRAPHITES.

Determination of carbon by combustion.  
 Determination of carbon by fusion.  
 Determination of silicic acid, aluminium, iron, etc.

## CHAPTER VII.

## STATISTICS OF PRODUCTION, EXPORTS, IMPORTS, AND PRICES.

Canada.  
 United States.  
 Germany.  
 Italy.  
 Austria.  
 Mexico.  
 Ceylon.  
 India.  
 The world's production of graphite.  
 Consumption of graphite by the various branches of manufacture.

## Prices—

Canada and United States.  
 Bavaria and Bohemia.  
 Ceylon.

## CHAPTER VIII.

## DRESSING AND REFINING OF GRAPHITE.

Hand sorting.  
 Mechanical separation.  
 Machinery used in the dry method—  
   Drying of the ore—  
     Rotary dryer.  
     Natural draft gravity flow dryer.  
 Rock breakers—  
   Jaw breakers.  
   Rotary and gyrating crushers.  
 Fine crushing and pulverizing—  
   Rolls.  
   Ball mills.  
     American ball mill.  
   Emery mill.  
   Buhrstone mills.  
   Pebble tube mill.  
   Concentrators.  
 Separation by air-blast—  
   Air jigs—  
     Krom pneumatic jig.  
     Hooper pneumatic concentrator.  
 Separation by force other than air-blast.  
 Apparatus used in the wet method—  
   Edge stone mills.  
   Classifiers.  
   Buddles.  
   Horizontal revolving sizing sieve.  
   Brumell's hydraulic separator.  
   Settling tanks.  
   Filter presses.  
   Merrill filter press process.  
 Accessories for mills—  
   Ore bins.  
   Feeders.  
   Removal of pick-points, bolts, and sticks.  
   Dust-fans.  
   Screens and sieves.  
   Slime pumps.  
 Summary of principles in the separation of graphites.  
   Dry and wet methods compared.  
   Specific gravities of graphite and other minerals.  
   Mill schemes.  
   Chemical refining of graphite.

## CHAPTER IX.

## USES OF GRAPHITE.

Crucibles.  
   Making of crucibles by machinery.  
   Drying and burning of crucibles.  
   Properties of graphite crucibles, their use and abuse.  
   Various graphite crucibles.  
 Other refractory articles made of graphite.  
   Kryptol.

## Pencils—

- History.
- Manufacture of pencils.
- Other uses of graphite.
  - Graphite as a lubricant.
  - Foundry facings.
  - Graphite paints.
  - Various uses of graphite.
- Bibliography.

## ILLUSTRATIONS.

*Photographs.*

- |       |        |   |
|-------|--------|---|
| Plate | I.     | Canadian graphite ore: pure vein graphite exhibiting a coarse lamellar structure.   |
| "     | II.    | Canadian graphite ore: pure vein graphite, exhibiting a radiated structure.   |
| "     | III.   | Canadian graphite ore: pure vein graphite, exhibiting a wood-like or columnar structure.  |
| "     | IV.    | Canadian graphite ore: disseminated flake graphite in crystalline limestone.  |
| "     | V.     | Outcrop of graphite on lot 14 A, range X, township of Buckingham. Property of the Diamond Graphite Company.                               |
| "     | VI.    | The milling plant of the Buckingham Graphite Company, western drift, Buckingham Graphite Company.   |
| "     | VII.   | Outcrop of graphite on lot 14B, range X, township of Buckingham. Property of the Diamond Graphite Company.                                |
| "     | VIII.  | Big outcrop of graphite at the extreme north end of lot 14B, township of Buckingham.  |
| "     | IX.    | New graphite mill of the Diamond Graphite Company at Buckingham.  |
| "     | X.     | The new hundred ton graphite mill of the Calumet Graphite Mining and Milling Company, at Calumet, Que.                                    |
| "     | XI.    | Graphite mill at North Elmsley; operated by water power.  |
| "     | XII.   | Interior view of North Elmsley mill; part of the polishing department.  |
| "     | XIII.  | Black Donald graphite mill. The Black Donald Graphite Mining and Milling plant, Renfrew county, Ont.                                      |
| "     | XIV.   | Rotary dryer.   |
| "     | XV.    | Pebble tube mill.   |
| "     | XVI.   | New graphite milling plant erected by the International Dry Concentrating Company of New York, near Buckingham. Elevation.                |
| "     | XVII.  | New graphite milling plant erected by the International Dry Concentrating Company of New York, near Buckingham. General plan of basement. |
| "     | XVIII. | Making crucibles in Dixon's crucible factory, New York.   |
| "     | XIX.   | Drying crucibles in Dixon's crucible factory, New York.   |
| "     | XX.    | Lead presses in the pencil factory of A. W. Faber, Stein, near Nuremberg.<br>A graphite mine in the jungle of Ceylon.                     |

*Drawings.*

- |      |     |  |
|------|-----|--|
| Fig. | 1.  | Columnar or long-fibred aggregates of graphite.                                      |
| "    | 2.  | " " " " " "  |
| "    | 3.  | Flatulent forms of graphite produced by chemical treatment.                          |
| "    | 4.  | Fissure vein of graphite, Buckingham, Grenville, Que.                                |
| "    | 5.  | Lenticular masses of graphite near Passau, Bavaria.                                  |
| "    | 6.  | Disseminated graphite, Buckingham, Que.  |
| "    | 7.  | Graphite veins occurring on the property of the Walker mine.                         |
| "    | 8.  | Map of the Buckingham mining district, Canada.                                       |
| "    | 9.  | Graphite vein in granular limestone near Calumet station, Canada.                    |
| "    | 10. | Map of the Ticonderoga and Lake George graphite mining districts, State of New York. |
| "    | 11. | Map of the Bavarian and Bohemian graphite mining district.                           |
| "    | 12. | Occurrence of graphite in the valley of the Olseibach near Kruman, Bohemia.          |
| "    | 13. | Rose porcelain crucible for the determination of carbon.                             |
| "    | 14. | Geissler's apparatus for the determination of carbonic acid gas in graphite ores.    |
| "    | 15. | Apparatus for the preparation of oxygen.   |

- Fig. 16. Stillwell's apparatus for the determination of graphite in ores.
- " 17. Revolving ore-picking table.
  - " 18. Natural draft gravity flow dryer, as manufactured by the Krom Machine Works, Jersey City, N.J.
  - " 19. Ball mill.
  - " 20. Cannon ball mill.
  - " 21. Horizontal 42 inch direct running Emery mill, as manufactured by the Sturtevant Company, Boston, Mass.
  - " 22. Buhrstone mill, manufactured by Muson Brothers Company, Utica, U.S.A.
  - " 23b. Krom air jig, as manufactured by the International Dry Concentrating Company, New York.
  - " 23. Krom air jig, as manufactured by the International Dry Concentrating Company, New York.
  - " 24. Perspective of the Hooper pneumatic concentrator.
  - " 25. Longitudinal section. Scale  $\frac{3}{4}$  in. = 1 foot.
  - " 26. Mumford and Moodies separator.
  - " 27. Edgestone mill.
  - " 28. Pointed boxes.
  - " 29. Spitzlutte.
  - " 30. Circular buddle.
  - " 31. Horizontal revolving sizing sieve.
  - " 32. Brumell's wet box.
  - " 33. Filter press.
  - " 34a. Electro magnets.
  - " 34b. "
  - " 35. Tools for making crucibles.
  - " 36. Apparatus for the manufacture of crucibles.
  - " 37. Half of No. 70 graphite crucible.
  - " 38. Crucible showing pin-hole from which metal has leaked.
  - " 39. Crucible showing the cracks which begin to form at the top when its life is nearly ended.
  - " 40. No. 200 crucible which ran 61 heats in a tilting furnace.
  - " 41. Phosphorizers.
  - " 42. Pencil boards.
  - " 43. Conte's graphite mill.
  - " 44. Talmie's graphite mill.
  - " 45. "
  - " 46. Pencil lead mixing and cutting apparatus.
  - " 47. Pencil lead mixing and cutting apparatus.
  - " 48. Pencil lead press.
  - " 49. " " "
  - " 50. Improved pencil lead press.
  - " 51. Apparatus for growing and cutting pencil boards.
  - " 52. Grooves for pencil lead.

#### *Maps.*

Townships of Bouchette, Cameron, and Ottawa, Quebec.  
 Township of Amherst, Que.  
 Townships of Buckingham and Lochaber, Que.  
 County of Argenteuil. County of Ottawa, Que.  
 Townships of Bedford, Loughborough, Crosby North, Burgess, and Elmsley North, Ontario.  
 Townships of Ashby, Denbigh, Faraday, and Dungannon, Ont.  
 Townships of Brougham and Blithesfield, Ont.  
 Township of Marmora, Ont.  
 Township of Westmeath, Ont.

NYSTROM, E., M.E.

19. Report on Peat and Lignite: their Manufacture and Uses in Europe, 1908.

CONTENTS.

INTRODUCTION.

CHAPTER I.

ORIGIN, OCCURRENCE, CLASSIFICATION, AND USES OF PEAT.

CHAPTER II.

COMPOSITION AND CALORIFIC VALUE OF PEAT.

CHAPTER III.

MANUFACTURE OF AIR DRIED PEAT FUEL.

General requirements for a successful peat fuel manufacture.  
 Preliminary work.  
 Pumping machinery.  
 Methods of manufacture.

I. CUT PEAT—

- (a) Cut peat dug by hand.  
 At Sparkaer.  
 At Moselund.  
 At Triangel.  
 At Haspelmoor.  
 At Raubling.  
 At Bernau.  
 At Feilenbach.  
 In Oldenburg.  
 In Russia.
- (b) Cut peat dug by machinery.  
 R. Dolberg's cutting machine.  
 Peat plant at Ostrach.  
 Special drying arrangements.

II. MACHINE PEAT—

1. MACHINE PEAT MANUFACTURED WITH ADDITIONAL WATER—

- (a) Manufactured without the aid of machinery.  
 (b) Manufactured with the aid of machinery.  
 Arrangements at smaller plants.  
 Arrangements at larger plants.  
 At Sparkaer.  
 At Okaer.  
 At Stafsjö.  
 At Herning.  
 At Moselund.  
 At Aamosen.  
 At West Torup.  
 At Ilpendam.  
 At Elisabethfehn.

2. MACHINE FORMED OR PRESSED PEAT—

- Elevators.  
 Peat machines.  
 C. Schlickeysen's peat machines.  
 " " excavator  
 R. Dolberg's " machines.  
 A. Heinen's " "  
 L. Lucht's " "  
 A. Anrep's " "  
 Svedala " "  
 Akerman's " "

Arrangement of peat machine and motor.  
 Transportation and laying out the machined peat for drying.  
 Anrep's round track with mechanical transportation.  
 Anrep's mechanical transportation combined with C. W.  
 Jakobson's Field Press.  
 A. Körner's arrangement for transport to the drying field.

Drying and storing.  
 Description of individual peat plants.  
 Sweden: Tests with Anrep's Machine No. 1 B. at Stafsjö.  
 Tests with Anrep's Machine No. 11 B. at Stafsjö.  
 Tests with Svedala Machine No. 2 at Stafsjö.  
 Koskivara.  
 St. Olof.  
 Yxenhult.  
 Stafsjö.  
 Russia.  
 Germany: Beuerberg.  
 Feilenbach.  
 Triangel.  
 Elisabethfehn.

Capacities of R. Dolberg's peat plants.  
 Costs of plants.

Åbjörn Anderson's (A. Anrep's).  
 A. Heinen's.

Approximate cost of production of machine formed peat fuel under Canadian conditions with Anrep's Machine No. 1 B. Combined, with Mechanical Transportation and Jakobson's Field Press.

#### CHAPTER IV.

### MANUFACTURE OF PEAT AND LIGNITE BRIQUETTES.

Drying apparatus  
 Steam plate drier.  
 Schulz drier.

Cooling apparatus.  
 Briquetting presses.  
 Briquetting plants.  
 Peat briquettes.

1. Nature of the bog.
2. Price of the raw material.
3. Steam or fuel consumption for drying.
4. Labour cost.
5. Cost of plant.
6. Total cost of manufacture.
7. Competition with other fuels.

Canadian peat briquette manufacture.  
 The Welland plant.  
 The Beaverton plant.

Manufacture of briquettes without air drying the peat.  
 Drying by pressure.  
 Drying by heat.  
 Kerrinne's method of drying peat by means of electric energy.  
 Electro peat coal.  
 The Ekenberg wet carbonizing process.

#### CHAPTER V.

### PEAT POWDER.

## CHAPTER VI.

## PEAT COKE.

- Coking in heaps.
- Coking in ovens.
  - The Hahnemann oven.
  - The Wagenmann oven.
  - The Lottmann oven.
- M. Ziegler's peat coking process.
  - The Oldenburg plant.
  - The Redkino plant.
  - The Beuerberg plant.

- Bamme's peat coking oven.
- The Sahlstrom process.
- Schöning and Fritz process.

## CHAPTER VII.

USES OF PEAT FUEL FOR HEATING, STEAM RAISING, AND  
POWER PURPOSES

- For domestic purposes.
- For steam raising
  - I. Plane grates.
    - Air dried peat as locomotive fuel
  - II. Step grates.
  - III. Half gas furnaces.
  - IV. Peat powder.

## PEAT GAS—

- (a) Peat gas for heating purposes.
  - For boiler firing.
  - In the iron and steel industry.
  - For brick and lime manufacture.
  - For glass manufacture.
- (b) Power gas.

## PRODUCERS FOR NON-BITUMINOUS FUELS—

- Dowson plants.
- Bénier plants.
- Taylor plants.
- Pintsch plants.
- Körting plants.

## PRODUCERS FOR BITUMINOUS FUELS—

- The Mond producer.
- Körting's lignite briquette producer.

## Peat gas producers—

- Körting's producer.
- Skabersjö peat gas power plant.
- Burängsberg peat gas power plant.
- Pintsch's producer.
- Luther's producer.
- Ziegler's producer.
- Frank & Caro's producer.
- Riehé's producer.

## CHAPTER VIII.

## MANUFACTURE OF MOSS LITTER AND PEAT MULL.

- Manufacture of moss litter on a small scale.
- Manufacture of moss litter and peat mull on a large scale.



Tearing machines or disintegrators.  
 Peat mull mills.  
 Presses.  
 Description of the moss litter plant at Yxenhult.

Properties of moss litter.

#### CHAPTER IX.

### USES OF MOSS LITTER AND PEAT MULL AND OTHER PEAT PRODUCTS.

Moss litter for bedding purposes.  
 Moss litter for insulation and packing purposes.  
 Manufacture of alcohol from moss litter.  
 Peat mull for sanitary purposes.  
 Peat mull for packing purposes.  
 Peat molasses.  
 Manufacture of peat paper.  
 Other peat products.  
     Textile peat.  
     Peat wood.

GENERAL CONCLUSIONS.

#### ILLUSTRATIONS.

34 *Photographic plates.*  
 228 *Line Drawings.*

WOODMAN, J. E., A.M., Sc.D., (Harv.), F.G.S.A., M.A.I.M.E.

20. Report on the Iron Ore Deposits of Nova Scotia (Part I) 1909.

#### CONTENTS.

Letter of transmittal.  
 Table of contents.  
 List of illustrations.  
 Introduction.  
 Summary of report.

### Part 1. General Considerations.

#### CHAPTER I.

##### GEOGRAPHIC RELATIONS OF IRON ORE DEPOSITS

General distribution of ore.  
 Relation to fuel.  
 Relation to fluxes.  
 Possible smelting centers.  
 Relation to ore and metal markets.

#### CHAPTER II.

##### THE IRON MINERALS—

Sources of metallic iron.  
     Magnetite.  
     Hematite.  
     Limonite.  
     Siderite.  
     Ankerite..

**Impurities**

- Common accessories.
- Silica.
- Alumina.
- Lime and magnesia.
- Manganese.
- Moisture and combined water.
- Titanium.
- Phosphorus.
- Sulphur.

**Summary of chemical conditions—**

- Ores elsewhere than in Nova Scotia.
- Ores of the Triassic.
- Clementsport basin.
- Nictaux-Torbrook field.
- Brookfield.
- Londonderry.
- Arisaig.
- Whycomagh.
- Barachois.

**CHAPTER III.****GENERAL GEOLOGY OF IRON DEPOSITS—**

- Factors influencing iron ore distribution.

- Purpose of chapter.
- Comparative shallowness of iron ores.
- Limiting conditions of deposition.
- Characteristic indications.

- Exploration and development.

- Surface continuity.
- Underground development.
- Use of core drills.
- Analyses.

- Geology of the deposits.

- Rock series represented.
- Pre-Cambrian.
- Ordovician.
- Silurian.
- Devonian.
- Lower carboniferous and triassic.

**CHAPTER IV.****MINING POLICY—**

- Cost of labor.
- Capitalization.
- Smelting centres.

**CHAPTER V.****BOUNTIES UPON NATIVE IRON ORE PRODUCTION—**

- Methods of direct aid.
- Conditions affecting ore production.
- Present aid to manufacture of pig iron.
- Effects of present system.
- Attitude of steel companies.
- Proposed remedy for inactivity.
- Method of application.
- Automatic operation.
- Criticisms.
- Need for a new system of aid.
- Special advantages.

## CHAPTER VI.

## TITLES TO IRON ORE—

- Systems of holdings.
  - Two systems.
  - Earlier grants.
  - Acts of 1858.
  - Cape Breton island.
  - Records.
  - Ownership and promotion.
- Leasing from the Crown.
  - Licenses to search.
  - Conversion to leases.
  - Lapsing of licenses.
  - Costs and tenure.

**Part 2. Details of Iron Districts.**

## CHAPTER I.

## THE CLEMENTSPORT BASIN—

- Location and extent.
- History of Clementsport workings.
- Description of openings
  - Potter trench.
  - Milner openings.
  - Milbury opening.
- Structure of basin
  - Restriction of Silurian.
  - Number of iron beds.
  - Extension of iron beds on strike.
  - Permanence of the deposits.
- Development of the district
  - Value of the field.
  - Prospecting.
  - Timber and power.

## CHAPTER II.

## THE NICTAUX-TORBROOK BASIN—

- Introduction.
- Location, extent, and ownership.
- Topography and general features.
- Transportation.
- Water power and wood.
- Adaptability to magnetic surveying.
- Local smelting.
- History of previous operations.
  - Early endeavours.
  - Page and Stearns.
    - Leckie mine.
  - Annapolis Iron Company.
  - Output.
- General lithology—
  - Series represented.
  - Inglesville district.
  - Eastern areas.
  - Sediments of the basin.
  - Eruptives.
  - Metamorphism.
  - Ore beds.
- Structure—
  - Previous studies: simple folding.
  - Recent studies: multiple folding.
  - Hypothesis of pitching synclinorium.
  - Consequences of hypothesis.

Catalogue of iron occurrences—  
Properties showing iron ore.

South Mountain pits—

Messenger vein: Pit No. 1  
Pit No. 2  
Messenger Pit (No. 3).  
Status of Messenger Ore.  
Pit No. 4.  
South Mountain vein: Pits 5 to 14.  
Scattered South Mountain openings.  
Character of South Mountain vein.

Cleveland pits—

Heatley ore.  
Stearns ore.

Leckie vein—

Leckie mine.  
Pits toward Wheelock mine.  
Borehole sections.  
Wheelock mine.  
Western pits on Leckie vein.

Lean hematite vein—

Leckie mine.  
Boreholes.  
Allen pit.

Shell vein—

Leckie mine.  
Eastern pits.  
Hoffman shaft  
Boreholes.  
Wheelock mine.  
Western openings.

Ward pits—

Scattered western openings.

Eastern ore occurrences—

Spicer pits.  
Spinney pits.  
Scattered openings.

Leckie mine—

Location and history.  
Underground development.  
Details of levels.  
Structural conditions.  
Physical and chemical character of ore.  
Continuity of ore body.

Wheelock mine—

Location and characteristics.  
Shaft section.  
No. 1 level: west.  
No. 1 level: east.  
No. 2 level: west.  
No. 2 level: east.  
Chemistry of the ore.

Boreholes—

No. 1: Sam, McConnell property.  
No. 2: Fletcher Wheelock property  
No. 3: Josephine Wheelock estate.  
No. 4: Josephine Wheelock estate.  
No. 5: Page and Stearns estate.  
No. 6: Melville Hoffman property  
No. 7: E. M. Barteaux property.  
No. 8: E. M. Barteaux property.  
No. 9: E. M. Barteaux property.

- No. 10: Leckie mine.
- No. 11: Leckie mine.
- No. 12: Leckie mine.
- No. 13: Leckie mine.
- No. 14: Leckie mine.

Interpretation of structural conditions—  
 Leckie mine: cross-cuts.  
 Relation of syncline to Leckie ore body.  
 Horizon of shell vein.  
 Downward limit of Leckie ore.

### CHAPTER III.

#### IRON OF THE TRIASSIC TRAP.

Distribution and character.  
 Summary.

### CHAPTER IV.

#### DEVONIAN DEPOSITS OF HANTS AND COLCHESTER COUNTIES.

Situation and general character.  
 Avon river to Tennycape—  
 Lantz and Tomlinson openings.  
 Goshen mine.  
 Analyses.  
 Scattered occurrences.  
 Summary.  
 Selma—  
 Location.  
 Sweeney and Ells openings.  
 Summary.  
 Clifton—  
 Situation.  
 Ore.  
 Brookfield—  
 Situation.  
 Location of deposit.  
 The Chambers mine.  
 Analyses from Londonderry.  
 Analyses from Nova Scotia Steel and Coal Co.  
 Recent openings.

### CHAPTER V.

#### ORES OF THE WESTERN COBEQUIDS.

The Cobequid mountains—  
 Distribution and general composition.  
 Accessibility of iron-bearing zone.  
 Transportation.  
 Power.  
 Timber.  
 The iron—  
 Distribution and classification.  
 Scattered occurrences within the Devonian.  
 Iron near Carboniferous contact.  
 The Londonderry range—(1) to Portapique river.  
 Distribution and cross-section.  
 Zone of Devonian strata.  
 Outcrops of ore.  
 The Range—(2) Londonderry Iron and Mining Company property.  
 Portapique river to West mines.  
 Cumberland brook to East mines.  
 Association of the ores.

- History of Acadia mines—
  - Early history.
  - Londonderry Iron and Mining Company.
  - Mixture of ores.
  - Output.
- Description of mines—
  - Cumberland or West mine; west side.
  - Cumberland: east.
  - Martin brook: west.
  - Martin brook: east.
  - Cook brook.
  - Old mountain.
  - Great Village river to Folly river.
  - East mines.
- Chemistry of ores—
  - The West mines and Old mountain.
  - East mines.
  - Current values.
  - General chemical considerations.

## CHAPTER VI.

### PARTIALLY BEDDED ORES OF ARISAIG AND MALIGNANT COVE.

- Location and extent.
- Topography.
- Power and timber.
- Transportation.
- Tenure of ore lands.
- History of operations—
  - Nova Scotia Steel and Coal Company.
  - Speculation.
- General geology—
  - Ordovician.
  - Silurian.
  - Eruptives.
- Description of openings—
  - Scattered eastern occurrences.
  - Silurian ore beds.
  - McKenzie veins.
  - East Branch, Doctor brook.
  - Chemistry of East Branch ores.
  - Iron brook.
  - Relations of Iron Brook ore beds.
  - Chemistry of Iron Brook ores.
  - Tunnel lead openings.
  - Tunnel lead ore.
  - Tunnel lead analyses.
  - Coarse lead.
  - Intermediate ore bed.
  - Miscellaneous pits.
  - McInnes brook.
  - Chemistry of McInnes Brook ores.
  - Gillis Brook openings.
  - Western pits.
- General chemistry of Arisaig ores.
  - Unidentified analyses.
  - Chemical quality.
- Physical problems—
  - Continuity along strike.
  - Extension of field.
  - Continuity in depth.
  - Amount of ore.
  - Working policy.

## CHAPTER VII.

## IRON ORES OF WHYCOCOMAGH AND MIDDLE RIVER, CAPE BRETON.

Situation.  
 Transportation, power, timber.  
 Occurrences north of Whycomagh.  
 Logan glen.  
 Lewis mountain.  
 Summary of conclusions.  
 Skye mountain.  
 Iron brook: tunnels and exposures.  
 Other occurrences.  
 Early analyses.  
 Summary of conclusions.  
 Middle river.

## CHAPTER VIII.

## IRON ORES OF BARACHOIS, CAPE BRETON.

Location.  
 General geology.  
 Timber and power.  
 Long island.  
 Greener or Ingraham areas—  
 Situation and character of openings.  
 Analyses.  
 Summary.  
 McPherson areas—  
 Location and rock distribution.  
 Magnetite deposits.  
 Analyses.  
 Summary of conditions.

General index.

## ILLUSTRATIONS.

- Plate I. Map of Nova Scotia, showing localities of iron, dolomite, limestone and coal.  
 " II. Outline map of Nova Scotia, showing natural smelting centres.  
 " III. a. Hematite; Wabana, Newfoundland.  
 b. Shell magnetite; Torbrook.  
 " IV. a. Goethite; Bridgeville, Pictou county.  
 b. Fibrous limonite; Londonderry.  
 " V. a. Botryoidal limonite; Londonderry.  
 b. Limonite in geode form; Londonderry.  
 " VI. a. Ankerite and specular ore; Londonderry.  
 b. Ankerite core surrounded by limonite; Londerry.  
 " VII. Index of symbols used in following maps and sections.  
 " VIII. Index geological map of Clementsport iron district.  
 " IX. Detailed map of Clementsvale iron workings.  
 " X. a. Falls of Moose river; Clementsport district.  
 b. Falls of Nictaux river; Nictaux-Torbrook district.  
 " XI. Index geological map of Nictaux-Torbrook iron district.  
 " XII. Property map, Nictaux-Torbrook district, showing holdings of iron companies and location of iron ore openings.  
 " XIII. Diagrammatic cross-section of Nictaux-Torbrook basin, on theory of simple synclinal folding.  
 " XIV. Diagrammatic section across centre of Nictaux-Torbrook basin, to illustrate possible synclorium structure.

- Plate XV. Sections of ore in pits, South mountain:—
- a. Pit No. 3 (Messenger pit).
  - b. " " 5 (Whitfield Wheelock property).
  - c. " " 7 (J. L. Brown property).
  - d. " " 10 (E. and M. Baker property).
- " XVI. Sections of ore in pits, South and Cleveland mountains:—
- a. Pit No. 11 (S. McConnell property).
  - b. " " 12 (ditto).
  - c. " " 13 (E. and M. Baker property).
  - d. " " 23 (Stearns property).
- " XVII. Detailed map of pits on north side of basin.
- " XVIII. Sections of ore in pits, Leckie and Shell veins:—
- a. Pit No. 24 (Stanley Brown property).
  - b. " " 27 (George Holland property).
  - c. " " 28 (ditto).
  - d. " " 33 (J. Goucher property).
- " XIX. Sections of ore in pits, north side of basin:—
- a. Pit No. 34 (J. Goucher property).
  - b. " " 35 (Edward Martin property).
  - c. " " 36 (ditto).
  - d. Lean hematite vein (Leckie mine).
  - e. Pit No. 37 (J. Allen property).
- " XX. Sections of ore in pits, on Leckie and Shell veins:—
- a. Pit No. 29 (George Holland property).
  - b. " " 38 (M. Hoffman property).
  - c. " " 40 (ditto).
  - d. " " 41 (DeLacy Foster property).
- " XXI. Sections of ore in pits, on Shell vein:—
- a. Pit No. 43 (Edward Banks estate).
  - b. " " 45 (H. P. Wheelock property).
  - c. Ore in trench near pit No. 46 (H. P. Wheelock and E. Banks property).
  - d. Pit No. 47 (E. Banks estate).
- " XXII. Sections of ore in pits:—
- a. Leckie vein (Hoffman shaft).
  - b. Pit No. 30 (Page and Stearns property).
  - c. " " 48 (E. Martin property).
  - d. Ore in trench (J. Allen property).
  - e. Pit No. 14 (S. McConnell property).
- " XXIII. Sections of ore in pits:—
- a. Pit No. 18 (M. and E. Armstrong property).
  - b. " " 25 (Stanley Brown property).
  - c. " " 39 (Page and Stearns property).
  - d. " " 46 (E. Martin property).
  - e. " " 42 (M. Wheelock property).
  - f. " " 31 (ditto).
- " XXIV. Plan and longitudinal or stope section of Leckie mine.
- " XXV. Transverse section of Leckie mine, showing rock structure.
- " XXVI. Plan and longitudinal section of Wheelock mine.
- " XXVII. Transverse section of Wheelock mine.
- " XXVIII. Structure sections in Wheelock mine:—
- a. Transverse section between No. 1 and No. 2 levels in shaft.
  - b. No. 2 east level; termination of ore.
  - c. No. 1 east level; beginning of ore.
  - d. " " " end of main ore body.
  - e. No. 2 east level; section of roll.
  - f. " " " showing pitch of end of ore body.
- " XXIX. Structure sections in Wheelock mine:—
- a. No. 2 east level; plan of ore at beginning of ore body.
  - b. No. 1 west level; transverse section at bottom of roll.
  - c. " " " section 58 feet west from shaft.
  - d. " " " longitudinal section along roll.
  - e. " " " plan of sinuous foot-wall.
  - f. " " " transverse section across roll.
  - g. " " " longitudinal section along top of roll.
  - h. No. 1 east level; section at end of ore shoot.



- Plate XXX. Sections of pits and drill holes:—
- a. Pit No. 32 (J. Goucher property).
  - b. McConnel calyx drill hole.
  - c. Portion of Hoffman diamond drill hole.
  - d. " " Josephine Wheelock diamond drill hole.
  - e. Shell vein in Hoffman shaft.
  - f. Portion of Page and Stearns diamond drill hole.
  - g. Portion of Josephine Wheelock calyx drill hole.
- " XXXI. Profile between Leckie and Wheelock mines.
- " XXXII. Index geological map of North Mountain iron localities.
- " XXXIII. Index geological map of iron deposits in western Hants county.
- " XXXIV. Index geological map of Selma.
- " XXXV. Index geological map of Clifton (Old Barns).
- " XXXVI. Index geological map of Brookfield.
- " XXXVII. Index geological map of district between Portapique and Debert rivers, showing iron-bearing zone.
- " XXXVIII. Property map, Londonderry Iron and Mining Company.
- " XXXIX. Approximate profile along the line of ore-bearing zone, from Matheson brook to Debert river.
- " XL. Plan and longitudinal section of workings from Cumberland (West mine) to Martin brook.
- " XLI. Plan and longitudinal or stope section of surface and underground workings of Cook brook and Old Mountain.
- " XLII. a. Wheelock shaft house, Torbrook district.  
b. View of Cumber and Brook openings, west side.
- " XLIII. a. General view of valley of Cumberland brook and loading platform.  
b. View of Martin Brook openings, west side.
- " XLIV. a. General view of furnaces, Londonderry.  
b. " " of valley of Great Village river, east branch, from below furnace.
- " XLV. a. View of blast furnace, Acadia Mines, from west.  
b. " " and stock and pig sheds, from east.
- " XLVI. a. View of falls, west branch of Great Village river.  
b. Near view of head of gorge, Great Village river, below Londonderry.
- " XLVII. Section of Derry hematite ore-body north of Londonderry.
- " XLVIII. Plan and sections of East Mines.
- " XLIX. Index lease map of Arisaig iron district.
- " L. Index geological map, Arisaig iron district.
- " LI. Detailed property and geological map of Arisaig district.
- " LII. a. View of an open-cut in ankerite, East mines, Londonderry.  
b. View of Pit No. 33, Arisaig, looking westward along foot-wall.
- " LIII. a. View of Pit No. 53, looking west.  
b. " " 52, looking east.
- " LIV. Detailed map and profile along line of openings on base line between East Branch and McInnes brook.
- " LV. a. View of Pit No. 13, looking south-west.  
b. Specimen of kidney ore, from Tunnel vein.
- " LVI. a. View of Pit No. 40, looking west.  
b. View of Pit No. 29, looking east.
- " LVII. Index lease map, Whyecomagh iron district.
- " LVIII. Index geological map, Whyecomagh iron district.
- " LIX. a. Valley of Brigend brook and Indian river, looking west.  
b. View westward over Whyecomagh from Salt mountain, showing shipping facilities.
- " LX. Map and profile of Drummond workings on Iron brook, Skye mountain.
- " LXI. Index lease map, Barachois iron district.
- " LXII. Index geological map, Barachois iron district.
- " LXIII. a. View of Skye mountain from the north-east, showing elevation of land holding Drummond iron workings.  
b. View over Little Bras d'Or lake from near the McPherson iron field, Barachois district, showing character of water.

HILLE, F., M.E.

22. Report on the Examination of some Iron Ore Deposits in the Districts of Thunder Bay and Rainy River, Province of Ontario, 1908.

CONTENTS.

REPORT ON THE IRON MINING LANDS OF WESTERN ONTARIO.

- Matawin range.
  - Magnetite—
    - Situation.
    - Surveyed territory.
    - Owners and history.
    - Physical features of the Matawin range.
    - Water power.
    - Timber.
    - Arable land.
    - Nature of the ore deposits and ore.
    - Treatment of the ore.
    - A source for coke.
    - Lime.
    - Water power for electrical development.
    - Locality for plants.
    - Ore deposits.
    - Location W-212.
    - Location W-213.
    - Location W-214.
    - Location W-215.
    - Location W-216.
    - Experiment with Matawin magnetite taken from the west end of deposit on W-216.
    - Location W-218.
    - Location W-219.
    - Locations W-221 and W-222
    - Locations R-476 and 484.
  - Magnetic iron ore deposits of the Atikokan river—
    - General physical features.
    - Gabbro or norite.
    - Origin of the Atikokan ore deposits.
    - Development work done.
    - Development on E-10 and 11.
    - Locations R-400 and 401.
  - Hematites—
    - Locations examined.
    - Location No. 4, lot 1, area 240 acres.

ILLUSTRATIONS.

- South part of stripping on lot 1, Loon lake.
- Map of iron ore deposits contiguous to the Matawin river.
- Location 211.
- Location 212.
- Part of iron deposit on W-214, Matawin iron range.
- Location 214.
- Location 215.
- Part of iron deposit on W-216, Matawin iron range.
- Location 216.
- Iron ore cliff on W-218, Matawin iron range.
- Location 218.
- Middle fall, Matawin river.
- Lower fall, Matawin river.
- Profiles, Matawin and Shebandowan rivers.
- Location 219.
- Locations 221 and 222.

Map of locations R-476, R-484, R-495.  
 Atikokan Iron Company's mine, drill holes and tunnel.  
 Blast furnace, Atikokan Iron Company, Port Arthur.  
 Atikokan Iron Company's mine, showing tunnel.  
 Plan of Atikokan Iron Company's mine.  
 Map of mining locations R-400 and 401.  
 Lot 1, southeast of Loon lake.  
 Map showing work done on three claims in MacTavish township.  
 Sections of drill holes on lot 1.

CIRKEL, FRITZ, M.E.

**23. Report on the Iron Ore Deposits Along the Ottawa (Quebec side) and Gatineau Rivers, 1909.**

CONTENTS.

INTRODUCTION.

CHAPTER I.

HISTORY, LITERATURE, GEOGRAPHY, AND TOPOGRAPHY OF THE DISTRICT.

History and literature.  
 Geography and topography.  
 Gatineau river.  
 Topography of the southeastern part of the county of Pontiac, along the Ottawa river.  
 Ottawa river.  
 Forest conditions.

CHAPTER II.

GEOLOGY OF THE DISTRICT, AND DISTRIBUTION OF FORMATION.

Western division.  
 Centre division.  
 Eastern or Gatineau division.

CHAPTER III.

ORE DEPOSITS.

Magnetite.  
 Hematite.  
 Iron ore deposits along the Gatineau river.  
 Crystalline limestone.  
 Forsyth and Baldwin mines.  
 Baldwin mines.  
 Lawless mine.  
 The ores of the Hull iron range—  
   Minerals associated with the Hull magnetite.  
   Chemistry of the ore.  
   Summary of investigations regarding the Hull iron range.  
 Hull-Templeton town line locations—  
   Haycock location.  
   Other iron locations in the vicinity of the Haycock mine.  
   Ore of the deposits along the Hull-Templeton town line.  
   Summary of investigations regarding the Hull-Templeton town line locations.  
 Scattered deposits along the Gatineau river.  
 Bristol mines—  
   Ore of the Bristol mines.  
   Summary regarding the Bristol Iron Range.  
 Other ore deposits in the county of Pontiac.  
 Grenville iron ore deposits.  
 Summary of iron ore locations in the district under consideration.  
 General conclusions.

Appendix—

WATER-POWERS OF THE OTTAWA AND GATINEAU RIVERS EMBRACED BY THE DISTRICT  
UNDER CONSIDERATION.

Ottawa river—

L'Islet rapids.

Calumet island water-powers—

Sable rapids.

Rapid, head of Desjardin island.

Timber slide.

Garvin chute.

Crawford rapids.

Black falls.

Mice rapids.

Muskrat rapid.

Long rapids.

Roche Fendu chute

Grand Calumet falls

Mountain rapid.

Dargis rapid.

Portage-du-Fort water-power.

Chats falls.

Gatineau river.

Six Portage falls—

Rapids at head of Six Portages

Corbeau rapids.

Boom rapids.

Cedar rapids.

La Passe rapid.

Bonnet Rouge rapid.

Cascades.

Chelsea rapids—

Eaton chute.

Chelsea falls.

Fall and rapids below shingle mill.

Summary of water-powers.

Index.

ILLUSTRATIONS.

*Photographs.*

- Plate I. Chats falls.  
 " II. Oiseau rock.  
 " III. Open-cut in the Forsyth mine.  
 " IV. Black River falls.  
 " V. Coulonge falls.

*Drawings.*

- Fig. 1. Magnetite crystals.  
 " 2. The long cut and pits of the Forsyth mine, at Ironsides, Hull  
 " 3. Section of ore lode (Fig. 2b).  
 " 4. Section through ore lodes.  
 " 5. Section through ore lodes.  
 " 6. The Hull-Forsyth iron range.  
 " 7. The Baldwin locations.  
 " 8. The Haycock mines.  
 " 9. The Bristol mines.  
 " 10. Section through formation in pit 5, Bristol mines.  
 " 11. Typical succession of rocks in connexion with iron veins on lot 12, range  
 VI, township of Sheen.  
 " 12. The Calumet falls water-power.  
 " 13. The Six Portage water-power, on the Gatineau river.  
 " 14. The Cascades on the Gatineau river.  
 " 15. The water-powers from Kirks Ferry to Wright Bridge, on the Gatineau  
 river.

*Maps.*

- No. 53. Iron ore occurrences, Ottawa and Pontiac counties, Que., 1908.  
 No. 54. Iron ore occurrences, Argenteuil county, Que., 1908.

**24. Report on the Mining and Metallurgical Industries of Canada, 1907-8.**

## CONTENTS.

- Table of textual contents.  
 List of illustrations.  
 List of maps.  
 Errata.  
 Introductory note by the Director of Mines.

## PART I.

## GENERAL MINING AND METALLURGICAL INDUSTRIES.

**Yukon Territory.**

- Historical.  
 Placer mining.  
 Lode mining.

*Dawson District.*

## Gold:—

- Yukon river and tributaries.  
 Fortymile river.  
 Klondike river and tributaries.  
 Bonanza creek.  
 Eldorado creek.  
 Hunker creek and tributaries.  
 Last Chance creek.  
 Goldbottom creek.  
 Costs.  
 Indian river and tributaries.  
 Quartz creek.  
 Costs.  
 Toronto creek.  
 Eureka creek.  
 Dominion creek.  
 Sulphur creek.  
 Gold-run and Lower Dominion creeks.  
 Sixty-mile river and tributaries.  
 Henderson creek.  
 Stewart river and tributaries.  
 Gold returns by creeks in Dawson district.

*Whitehorse District*

- Livingstone Creek mining division—  
 Cotoneva creek.  
 Livingstone creek.

Copper-gold:—  
 Windy Arm.Quartz mining:—  
 Conrad mining district.Coal:—  
 Dawson district.  
 Whitehorse district.

**British Columbia.**

Historical.  
 Placer mine production.  
 Genesis of lode mining.  
 Lode mine production.  
 Coal.  
 Coke.  
 General notes on recent development and progress.  
 Labour conditions in British Columbia.

Gold ores:—  
 Atlin district.  
 Cariboo district.  
 Kamloops division.  
 Nelson division: including the Salmon river valley.  
 Placer mining:—  
     Revelstoke division: Big Bend placer mines.  
 Lode mining.  
 Gold milling.

Gold-copper:—  
 Boundary creek district.  
 Similkameen division.  
 Rossland division.

Copper:—  
 Mining in province generally.  
 Coast mining districts.

Copper mines:—  
 Silver-lead:—  
     Lardeau division.  
     Ainsworth mining division.  
     Mining.  
     Concentration of ores.  
     Mines: list of

Zinc.  
 Iron ores.  
 Power development on the Kootenay and Kettle rivers—  
     Electrical energy: Bonnington falls.  
     Compressed air: Ainsworth.  
 Smelting: List of works.  
 Coal.

**Alberta.**

Coal.  
 Natural gas.  
 Gold.

**Saskatchewan.**

Coal mining.

**Ontario.**

Historical and statistical—  
     Iron: bounties.  
     Copper and nickel.  
     Silver.  
     Gold.  
     Other minerals.  
 Iron mines.  
 Iron and steel works.  
 Iron pyrites: mines.  
 Gold mines.

Silver: The Cobalt district—  
 Current ore production.  
 General production since 1903.  
 Smelting furnaces.  
 Silver mines.  
 Custom smelters.  
 Copper and nickel.  
 Zinc.  
 Lead.  
 Graphite.  
 Mica.  
 Talc.  
 Corundum.  
 Carbide of calcium.  
 Salt.  
 Peat.  
 Petroleum.  
 Oil refinery.  
 Natural gas.

#### Quebec.

Historical.  
 Statistical.  
 Asbestos.  
 Iron.  
 Chrome iron.  
 Copper: Eastern townships.  
 Aluminium.  
 Zinc and lead.  
 Mica.  
 Calcium carbide.  
 Graphite.  
 Apatite.  
 Gas and oil.

#### New Brunswick.

Iron ores.  
 Copper.  
 Coal.  
 Antimony.  
 Manganese.

#### Nova Scotia.

Historical notes on coal mining.  
 Antimony.  
 Gold—  
 Mining and milling costs.  
 Mines.  
 Iron and steel.  
 Coal.  
 Statistical review of mining.

### PART II.

#### STRUCTURAL MATERIALS.

(Non-Metallic.)

#### Introduction.

#### British Columbia.

Brick and tile.  
 Silica brick.  
 Lime.  
 Building stone.  
 Granite.  
 Sandstone.  
 Limestone and marble.  
 Portland cement.

**Alberta**

Brick and tile.  
Lime and cement.

**Saskatchewan.**

Brick and tile.

**Manitoba.**

Brick and tile.  
Lime and limestone.  
Gypsum.

**Ontario**

Introduction.  
Brick and tile.  
Sand-lime brick.  
Artificial stone.  
Sewer pipe.  
Concrete brick, blocks and tile  
Stone quarries.  
Lime works.  
Cement.  
Natural rock cement.  
Plaster.  
Potteries.

**Quebec**

Brick.  
Silicate brick.  
Limestone for building.  
Lime.  
Granite.  
Marble.  
Flagstone.  
Slate.  
Cement.  
Ochre.  
Pottery.  
Fire-clay.

**New Brunswick**

Gypsum.  
Brick and tile.  
Pottery works.  
Stone quarries.

**Nova Scotia.**

Brick and tile.  
Building stone.  
Limestone.  
Gypsum.  
Cement.

**Dominion of Canada Assay Office**

Description of plant.  
Bullion received and assayed.



## General statistical review of mining in Canada.

## Index.

## ILLUSTRATIONS.

*Photographs.*

Exhibit of pig iron produced by electro-thermic process.  
 Dawson.  
 A legal stake.  
 Dredges on No. 104 below, on Bonanza creek.  
 Below Discovery, Bonanza creek, open-cut work with self-dumping outfit.  
 Bear creek dredge at work.  
 Clean-up, Hunker creek.  
 Valley of Indian river below Australia creek.  
 Below Discovery, Sulphur creek.  
 Automatic dumping, Gold-run creek.  
 Individual placer mining, Boundary creek, Atlin.  
 Guggenheim's steam shovel, Pine creek, Atlin.  
 Mother Lode mine, near Greenwood.  
 Glory hole at Mother Lode mine, Greenwood.  
 General view of Rosslund, showing mines.  
 Head works, War Eagle-Centre Star mine, Rosslund.  
 Glory hole, Granby mines (a).  
 Glory hole, Granby mines (b).  
 Glory hole, Granby mines (c).  
 LeRoi head works, Rosslund.  
 Phoenix camp. General view of Snowshoe, Gold Drop, and Rawhide mines.  
 Glory hole at Snowshoe mine, Phoenix.  
 Zinc smelter at Frank, Canadian Metal Co.  
 West Kootenay Power and Light Co.'s power house No. 1, Bonnington falls.  
 Power house No. 2, West Kootenay Power and Light Co.  
 Head works, power house No. 2, West Kootenay Power and Light Co.  
 Interior of power house No. 3, Cascade, West Kootenay Power and Light Co.  
 British Columbia Copper Co.'s smelter, Greenwood.  
 Blowing engine, British Columbia Copper Co.'s smelter, Greenwood.  
 Three furnaces, British Columbia Copper Co., Greenwood.  
 Smelter at Trail, from Columbia river bank.  
 Electrolytic lead refinery at Trail.  
 Electrolytic lead refinery at Trail (interior).  
 Daly Reduction Co.'s mill, Hedley.  
 Boundary Falls smelter.  
 Granby Co.'s compressor room, Phoenix.  
 Granby Co.'s hoist, Phoenix.  
 Blower room, No. 2 Granby smelter, Grand Forks.  
 Michel colliery, Michel: Crow's Nest Pass Coal Co., Fernie.  
 Coal Creek colliery, Coal creek, near Fernie, Crow's Nest Pass Coal Co.  
 Pithead, Western Fuel Co., Nanaimo.  
 On bank of Saskatchewan river, Edmonton: Edmonton Coal Co.  
 Galt colliery, Lethbridge: Alberta Railway and Irrigation Co.  
 Coal breaker at Bankhead: Bankhead Collieries, Limited.  
 Canada West Coal and Coke Co.'s colliery, Taber.  
 Denison colliery, Coleman: International Coal and Coke Co.  
 Parkdale Coal Co.'s colliery, Edmonton.  
 Washing plant and Bernard coke ovens at Lille, West Canadian Collieries, Limited.  
 Washery and Belgian ovens at Lille.  
 Western Dominion Collieries, Limited, Taylorton.  
 Manitoba and Saskatchewan Coal Co.'s colliery, Bienfait.  
 Shaft No. 3, Bruce mines, Algoma district.  
 Surface plant, Mineral Range Mining Co., Bessemer.  
 Plant of Canada Iron Furnace Co., Midland.  
 Blast furnace, Canada Iron Furnace Co., Midland.  
 Blast furnace and ore docks, Lake Superior Corporation, Sault Ste. Marie.  
 Steel plant, Lake Superior Corporation, Sault Ste. Marie.

Blast furnace plant, Lake Superior Corporation, Sault Ste. Marie.  
 Interior of rail mill, Lake Superior Corporation, Sault Ste. Marie.  
 Helen mine, Michipicoten.  
 Crusher plant and shafts, Helen mine, Michipicoten.  
 General view of plant of Atikokan Iron Co.  
 Main plant, Atikokan Iron Co.  
 Furnace and roaster, Atikokan Iron Co.  
 Coke ovens of the Atikokan Iron Co.  
 Gold, Laurentian mine, 100 miles east of Kenora.  
 Lawson vein, Cobalt.  
 Kerr Lake mine, Cobalt region, principal vein.  
 Smelter plant at Copper Cliff, The Canadian Copper Co.  
 Converters in smelter plant at Copper Cliff, The Canadian Copper Co.  
 Slag pots in smelter house at Copper Cliff, The Canadian Copper Co.  
 Creighton mine, The Canadian Copper Co.  
 Cobden mine, Dean lake, 12 ft. vein of copper ore.  
 Torpedoing a petroleum well.  
 Petroleum wells: looking north from Petrolia West.  
 Tank yard of the Imperial Oil Co., Sarnia.  
 Wharf of the Imperial Oil Co., Sarnia.  
 Main deposit of Asbestos, Bell mines, Buckingham.  
 King Bros.' Asbestos mine, Thetford.  
 Fibreizing plant of the Standard Asbestos Co., Black Lake.  
 Lac-a-la-Tortue, near Three Rivers.  
 Occurrence of mica in Blackburn mine.  
 Graphite mill of the Calumet Mining and Milling Co., Calumet.  
 Outcrop of graphite on lot 14A, Range X, Buckingham township.  
 Roof of 600 ft. level west of winze No. 1, Dominion Antimony Co., West Gore.  
 Plant of Boston Richardson Gold Mining Co., Goldboro.  
 Cyanide plant, Mimac property.  
 Stamp mill, Mimac property.  
 Blast furnaces, Dominion Iron and Steel Co., Sydney.  
 Discharging ore steamer, Dominion Iron and Steel Company, Sydney.  
 Interior of machine shop, Dominion Iron and Steel Company, Sydney.  
 Dolomite quarry at George river, Cape Breton, Dominion Iron and Steel Co., Sydney.  
 Blast furnace plant at Sydney Mines, Nova Scotia Steel and Coal Co.  
 Colliery No. 3, Sydney Mines, Nova Scotia Steel and Coal Co.  
 Mine No. 3, Cumberland Coal Co., Springhill.  
 Acadia colliery, at Westville.  
 Albion colliery.  
 Vale colliery, at Thorburn.  
 Allen shaft.  
 Colliery Dominion No. 2, Glace Bay: Dominion Coal Co.  
 Tipple and power house, Port Hood Coal Co.  
 Kilns protected by verandahs and awnings: Hill Bros.' Brick and Tile Works  
 Essex, Ont.  
 Open shed scoved kiln.  
 Permanent walled, up-draft kiln.  
 Round, down-draft kiln.  
 Double, rectangular, down-draft kiln.  
 Continuous, down-draft kiln, 16 chambers.  
 Don Valley Brick Works, Toronto.  
 Rectangular, down-draft kilns, for burning paving brick.  
 Stock yards of the Dominion Concrete Co., Limited, Kemptville.  
 The Lakefield Portland Cement Co.'s works, Lakefield.  
 Amherst Redstone Co.'s quarry, Amherst, N.S.  
 Limestone quarry, Marble mountain, N.S.  
 Victoria Gypsum Co.'s quarry, St. Anns, N.S.  
 Gypsum quarry, at Walton, Hants county, N.S.  
 Assaying room, Dominion of Canada Assay Office.  
 Balance room, Dominion of Canada Assay Office.  
 Milling room, Dominion of Canada Assay Office.

*Drawings.*

- Fig. 1. Transverse section of pit at Bullion.  
 " 1a. Mine plan and sections of the Stemwinder, Fairview.  
 " 2. Plan and section of Mother Lode mine. Above first level, showing glory hole and stope.  
 " 3. Section of stope in an ore body of low dip.  
 " 4. Stope in Emma mine.  
 " 5. Flow sheet of Britannia Mill.  
 " 5a. Flow sheet of Blue Bell Mill.  
 " 9. Sketch map of workings on No. 2 and No. 3 veins of the Reco mine.  
 " 10. Vertical projection of workings on No. 3 vein of the Reco mine, Sandon.  
 " 6. Flow sheet of the St. Eugene mill, Moyie.  
 " 7. Flow sheet of Whitewater mill, Slocan.  
 " 7a. Geological sketch map of a portion of West Kootenay district.  
 " 11. Water system, British Columbia Copper Co., Greenwood.  
 " 12. Plan of smelting works and refinery at Trail.  
 " 13. Plan of smelter, Granby Consolidated Mining, Smelting and Power Co., Limited, Grand Forks.  
 " 8. Plan of Northport Smelting and Refining Co.'s smelting works at Northport, Wash., U.S.A.  
 " 8a. Vertical section of property of Micmac Gold Mining Co.  
 " 14. Sketch map showing property of the Maritime Coal, Railway and Power Co., Limited.  
 " 15. Plan of principal areas leased to the Dominion Coal Co.  
 " 16. Western Canada Cement & Coal Co., Exshaw, block plan of mill buildings.

*Maps.*

- Mineral map of Yukon.  
 " British Columbia.  
 " Manitoba, Saskatchewan, and Alberta.  
 " Ontario.  
 " Quebec.  
 " Maritime Provinces.

WALKER, T. L., M.A., PH.D.

**25. Report on the Tungsten Ores of Canada, 1909.**

CONTENTS.

Letter of transmission.

GENERAL STATEMENT.

- The metal and its uses.  
 The chief Tungsten ores.  
 General chemical tests for all tungsten ores.  
 Signs for the prospector.  
 General geological occurrence of tungsten ores.  
 The concentration of tungsten ores.  
 Tungsten producing countries, production and prices.  
 World's production of tungsten ores, 1905-1906.  
 Tungsten production of the United States, 1900-1906.  
 Basis for purchasing tungsten ore.  
 Producing regions in the United States.  
 Tungsten development in India.

CANADIAN TUNGSTEN OCCURRENCES.

- Nova Scotia—  
 Cape Breton.  
 Moose river, Halifax county.  
 Mineralogical association.  
 Molega mines.  
 New Ross.

- Quebec—  
 Beauce county.
- Ontario—  
 Victoria Mines.  
 Lake Couchiching.
- British Columbia—  
 Kootenay district—  
 General geological associations.  
 Kootenay Belle mine.  
 Springer creek—Meteor mine.  
 St. Mary creek—Fort Steele mining division.
- Cariboo district, Barkerville.  
 Atlin district.
- Yukon Territory—  
 Chemical analysis of concentrates.  
 Result of examination of concentrates.

## GENERAL CONCLUSIONS.

## BIBLIOGRAPHY OF CANADIAN TUNGSTEN LITERATURE.

## BRIEF LIST OF IMPORTANT LITERATURE ON AMERICAN TUNGSTEN OCCURRENCES.

## Appendix—

## INDEX.

## ILLUSTRATIONS.

- Plate I. Geological sketch map, Boulder county tungsten area.  
 " II. Tungsten mines, Boulder county, Colorado.  
 " IIa. Brecciated tungsten ore.  
 " III. Wolf Tongue mill, Nederland, Colorado.  
 " IIIa. Reservoir for tailings, Wolf Tongue mill.  
 " IV. Geological sketch map, part of Cape Breton Island tungsten area.  
 " V. Faulted quarry veins, Stillwater brook.  
 " Va. Part of a lense of ore, Moose River tungsten mines.  
 " VI. Geological sketch map, Moose River tungsten area.  
 " VII. Moose River tungsten mines, initial stage.  
 " VIIa. Reynolds Bros., operators of Moose River tungsten mines.  
 " VIII. Map of New Ross tin-tungsten region.  
 " IX. Geological sketch map, West Kootenay tungsten area.  
 " X. Hardscrabble tungsten mine.  
 " Xa. Means of transportation to and from Hardscrabble mine.

*Drawing.*

Fig. 1. Diagram showing sectional elevation of mill. (After Hobbs)

CIRKEL, FRITZ, M.E.

29. Report on the Chrome Iron Ore Deposits in the Eastern Townships, Province of Quebec, 1909.

## CONTENTS.

## Introduction:

- Chapter I. Historical.  
 " II. The chrome iron ore deposits of Canada.  
 " III. Mining of chrome iron ore.  
 " IV. Dressing for the market.  
 " V. Market prices, and status of the Canadian industry.  
 " VI. Chrome iron ore mines: prospects in Canada.  
 " VII. Chrome iron ores in foreign countries.

- Chapter VIII. Origin.  
 " IX. Composition of chrome iron ores.  
 " X. Statistics and chronology.  
 " XI. Determination of the value of chromium.  
 " XII. Uses of chromium  
 " XIII. Technology of chromium and its compounds.

- Appendix I. Notes on the metallurgy of chromium, by W. Borchers.  
 " II. Experiments with chromite at McGill University.

## Bibliography.

## Index.

## ILLUSTRATIONS.

*Photographs.*

- Plate I. Pocket of chrome iron ore, Montreal mine of the Black Lake Chrome and Asbestos Co.  
 " II. Diamond drilling at the Montreal mine.  
 " III. Arrangement of cable derricks and tracks near border of pit. King Bros.' mine.  
 " IV. Wilfley table.  
 " V. Callow screen.  
 " VI. Callow screen, uncovered.  
 " VII. Thirty stamp mill of the Black Lake Chrome and Asbestos Co., Pit No. 1.  
 " VIII. Surface shaft equipment of Pit No. 1 of the Black Lake Chrome and Asbestos Co.  
 " IX. Stamp mill at the Montreal mine, Black Lake Chrome and Asbestos Co.  
 " X. Twenty stamp mill of the Canadian Chrome Co., Black Lake.  
 " XI. Veins of chrome iron ore. Kronendaal, near Rustenburg, Transvaal.

*Drawings.*

- Fig. 1. Map showing the distribution of serpentine in the Eastern Townships of Quebec.  
 By Fritz Cirkel, M.E.  
 " 2. Sectional view of granitic dyke: (a) (Kaolinized) 18 inches wide, displaced by faults over a length of 30 feet, accompanied by chrome iron ore.  
 " 3. Peculiar deposition of chrome iron ore: (a) granitic dyke, 14 inches wide; (b) chrome iron ore (containing fragments of granitic dyke); (c) kaolinized granite of purple colour; (d) slickensided serpentine and kidneys of chrome iron ore; (e) chrome iron ore in ordinary serpentine; (f) ordinary serpentine.  
 " 4. Sectional view through serpentine formation, showing: (a) banded accumulations of disseminated ore; (b) chrome iron ore accompanying slickenside; (c) chrome iron ore pockets, and disseminated ore.  
 " 5. Incline cable hoisting plant.  
 " 6. Horizontal cable hoisting plant.  
 " 7. Carrier for cable hoisting.  
 " 8. Revolving ore-picking table.  
 " 9. General arrangement of standard 10 stamp battery, as manufactured by the Jenckes Machine Co., Sherbrooke, Que.  
 " 10. Division of products on Wilfley table: (i) concentrates; (ii) middlings; (iii) tailings; (iv) slimes.  
 " 11. Horizontal revolving sizing sieve.  
 " 12. Chrome steel shoes and dies.  
 " 13. Burglar proof round chrome steel bar, as manufactured by the Chrome Steel works at Chrome, N.J.  
 " 14. Burglar proof flat chrome steel bar, as manufactured by the Chrome Steel works at Chrome, N.J.  
 " 15. Burglar proof armour plate for safes.

NYSTRÖM, E.  
ANREP, A., JR.

**30. Bulletin No. 1. Investigation of the Peat Bogs and Peat Industry of Canada, during the Season 1908-1909.**

CONTENTS.

Letter of transmittal.  
Method of investigation.  
Canadian bogs—  
    Characteristic plants of the peat bogs of Ontario.  
Description of individual peat bogs.  
    Mer Bleu peat bog.  
    Alfred peat bog.  
    Welland peat bog.  
    Newington peat bog.  
    Perth peat bog.  
    Victoria Road peat bog.  
Present status of the peat industry in Canada—  
    Victoria Road peat plant.  
    Guelph peat plant.  
    Farnham peat plant.  
    Lac du Bonnet peat plant.  
    Drying, carbonizing, etc.

ILLUSTRATIONS.

Mer Bleu peat bog.  
Alfred peat bog.  
Welland peat bog.  
Newington peat bog.  
Perth peat bog.  
Victoria Road peat bog.

HAANEL, EUGENE, Ph.D.

**32. Report on the Investigation of an Electric Shaft Furnace, Domnarfvet, Sweden, Etc., 1909.**

CONTENTS.

**Part I.**

Introduction.  
Evolution of the electric shaft furnace.  
Description of plant.  
Description of electric shaft furnace.  
Raw materials used.  
Heating of the furnace.  
Power supplied to the furnace.  
The trial run.  
Analyses of pig iron produced.  
Electrical measurements.  
Technical objective of trial run.  
Deductions from observations.  
Comparative cost of production.

**Part II.**

Electric steel furnace.  
Abstract of Swedish patent specifications.

### Part III.

Factory for making carbon electrodes—  
 Raw materials.  
 General arrangement of works.  
 Coarse crushing plant.  
 Fine crushing plant.  
 Tar heating.  
 Coal and tar mixing.  
 Presses, and pumping plant.  
 Mendheim's gas kiln.  
 Estimate of necessary expenditure, and working costs—  
 Electrode machinery.  
 Total cost of factory.  
 Labour.  
 Yearly expenses.

### Part IV.

Modern methods of charcoal making—  
 Kilns.  
 Tunnel ovens.  
 Iron retorts.  
 Shaft furnaces.

Appendix I—  
 " II—

#### ILLUSTRATIONS.

##### *Photographs.*

Plate I. General view of electric shaft furnace at Domnarfvet, Sweden.  
 " II. Machinery for generating electrical energy.  
 " III. Electrical instruments and wheels for controlling electrodes.

##### *Drawings.*

Plate IV. Electric steel furnace.  
 Fig. 1. General arrangement of smelting plant at Domnarfvet, Sweden.  
 " 2. Diagram of switchboard in generating station.  
 " 3. Diagram of electrical controlling instruments.  
 " 4. Electric shaft furnace: sectional elevation.  
 " 5. Plan: with shaft and electrodes removed.  
 " 6. Electrode factory: general arrangement.  
 " 7. Charcoal kiln.  
 " 8. " iron retort.  
 " 9. " tunnel oven.  
 " 10. " shaft furnace.

LINDEMAN, E., M.E.

47. Iron Ore Deposits of Vancouver, and Texada Islands, British Columbia, 1910.

#### CONTENTS.

Introduction.  
 Character of the ore deposits.  
 Description of districts—  
 Sooke district.  
 Gordon River district.  
 Copper island.  
 Sarita river.  
 Alberni canal.

Sechart.  
 Kennedy lake.  
 Maggie lake.  
 Head Bay.  
 West Arm, Quatsino sound.  
 Klaanch river.  
 Quinsam river.  
 Texada island.

Possibilities of an industry on the coast of British Columbia.

Index.

*Maps.*

- No. 48. Magnetometric map of Iron Crown claim at Klaanch river, Vancouver island, B. C.  
 " 49. Magnetometric map of Western Steel Iron claim at Sechart, Vancouver island, B. C.  
 " 50. Map of Vancouver island, B. C.  
 " 51. Map of iron mines, Texada island, B. C.  
 " 52. Sketch map of bog iron ore deposits, West Arm, Quatsino sound, Vancouver island, B. C.

ELLS, R. W., LL.D., F.R.S.C.

55. **Joint Report on the Bituminous, or Oil-Shales of New Brunswick and Nova Scotia; also on the Oil-Shale Industry of Scotland: Part I, Economics; Part II, Geology, 1910.**

CONTENTS.

Part I.

Introductory.

Official report of the Pumphreston Oil Co., Scotland, on the New Brunswick oil-shales:—

Fractionation—

Actual yield of crude oil, and sulphate of ammonia.

Refining method A, described.

" " B, "

Refined products: actual yield by method A.  
 " " " " B.

Products and samples: quality of.

Analyses of uncondensed gases.

Analyses of oil-shales at New York, U.S.A.

Analyses of oil-shales at Ottawa, Canada.

Scotch oil-shale industry:—

Descriptive geology.

List of seams developed.

History of oil-shale industry.

Statistics—

Retort capacity of works.

Mining costs.

Manufacturing costs.

Wages.

Prices of output.

Output, 1873-1904.

Estimated cost of installation of plants for retorting and distillation.

Market stock value of six leading Scotch companies, manufacturing mineral oil, etc., from bituminous shales.

Commercial value of oil-shale—

Value of New Brunswick shales tested.

Cost of mining and retorting shale.

Cost of manufacturing ammonium sulphate.



**Appendix I. Technology of Scottish Oil Shale Industry, by W. A. Hamor—**

Crude oil works—  
 Retorts.  
 Retort condensers.  
 Ammonium sulphate plant—  
 Stills.  
 Refinery.  
 Operations.  
 Costs.  
 Products of manufacture.

ILLUSTRATIONS.

*Photographs.*

- Plate I. General view of Pumpherston works.  
 " II. General view of refinery, Pumpherston works, Scotland.  
 " III. Experimental Bryson retort, used for testing New Brunswick shale, Pumpherston works, Scotland.  
 " IV. Battery of stock tanks, Pumpherston works, Scotland.  
 " V. Bench of retorts, with condensers attached, Pumpherston works, Scotland.  
 " VI. Battery of stills, front view, Pumpherston works, Scotland.  
 " VII. General view of Broxburn refinery, Broxburn, Scotland.  
 " VIII. Breaker house, showing trams from mine and to retorts, Broxburn, Scotland.  
 " IX. Discharge from breaker, Broxburn, Scotland.  
 " X. Discharge from bottom of breaker, showing pair of toothed rolls, Broxburn, Scotland.  
 " XI. Bench of retorts, Broxburn works, Scotland.  
 " XII. Condensers, Pumpherston works, Scotland.  
 " XIII. Endless tram conveying shale from breakers to retorts, Broxburn, Scotland.  
 " XIV. "Bings" or heaps of spent shale, with tramway from retorts to summit, Broxburn works, Scotland.  
 " XV. View in refinery, Broxburn oil works.

*Drawings.*

- Fig. 1. Young and Beilby retort.  
 " 2. Bryson retort.  
 " 3. Henderson retort.  
 " 4. Beilby's ammonia column still.  
 " 5. Two trays of Henderson's ammonia column still.  
 " 6. Connected boiler still.

**Part II.**

Letter of transmittal.

Introductory:—

Historical sketch of oil-shale discoveries in Canada.

Geological formations.

On Palaeontological evidence.

Similarity of New Brunswick and Scottish shale strata.

Bore-hole logs at Baltimore, N.B.

Bore-hole logs at Memramcook and Petitcodiac rivers, N.B.

General distribution of the Albert shale series, N.B.

Oil-shales of Nova Scotia:—

General occurrences and analyses.

Notes on Pictou County deposits, with analyses.

Notes on Antigonish County deposits, with analyses.

Oil-shales from other countries.

History of Scottish oil-shale industry.

Geology of Scotch oil-shales.

Comparative study of Scotch and Eastern Canadian shales.

Economic geology of the oil-shales of Scotland—  
 Specification of oil-shale seams under operation.  
 Torbanehill mineral (torbanite).  
 Comparison of stellarite with torbanite.  
 Oil-shales of Newfoundland.  
 Oil-shales of Quebec.  
 The Utica shales.  
 Origin of oils.  
 Index.

LINDEMAN, E.,  
 MACKENZIE, GEORGE C.

67. Bulletin No. 2: Iron Ore Deposits of the Bristol Mine, Pontiac county, Que. Magnetometric Survey, Etc., 1910.

#### CONTENTS.

##### INTRODUCTORY NOTE BY THE DIRECTOR.

##### IRON ORE DEPOSITS OF THE BRISTOL MINE.

Introduction.  
 Location.  
 History.  
 Geology.  
 Character of ores.  
 Analyses.  
 Extent of ore bodies.  
 General conclusions.

##### MAGNETIC CONCENTRATION OF ORES—

Particularization of shipment No. 1.  
 Particularization of shipment No. 2.  
 Preparatory treatment of ore for separation.

##### Analyses of general samples A:—

(a) Shipment No. 1.  
 (b) Shipment No. 2.

##### Results of separation—

Shipment No. 1—  
 (a) Dry process.  
 (b) Wet process.

Shipment No. 2—  
 (a) Dry process.  
 (b) Wet process.

Briquetting, or nodulizing.  
 General conclusions.

#### ILLUSTRATIONS.

##### *Photographs.*

Plate I. General view of Bristol mine plant, 1894.  
 " II. General view of Bristol mine plant.

##### *Diagrams.*

Fig. 1. Concentration tables of Shipment No. 1.  
 " 2. " " " " " No. 2.

HAANEL, EUGENE, PH. D.

68. \*Bulletin No. 3: Recent Advances in the Construction of Electric Furnaces for the Production of Pig Iron, Steel and Zinc, 1910.

### CONTENTS.

INTRODUCTORY, by Eugene Haanel, Ph.D.

Steel furnaces—

Present status of electric steel industry.

List of electric steel furnaces in Europe, etc.

Iron ore smelting furnaces—

Historical comparisons.

Grönwall on recent practice at Domnarfvet, Sweden.

Discussion in Swedish Parliament.

Swedish government enterprise.

Private enterprise in Norway.

India to have electric smelting, and steel plant.

Electric furnaces for the reduction of spelter and zinc oxide—

Côte-Pierron process.

De Laval process, 1909.

Appendix I—

Translation of Mr. Lars Yngstrom's Official Report on experiments conducted at Domnarfvet, Sweden, (May-July, 1909), in the smelting of iron ores by the Electro-Thermic process.

Appendix II—

Frick Electric Reduction Furnace.

Appendix III—

Frick Electric Steel Furnaces.

### ILLUSTRATIONS.

#### *Photograph.*

Plate I. Frick Electric Steel Furnace.

#### *Drawings.*

Fig. 1. Côte-Pierron electric zinc furnace and condenser.

Domnarfvet furnace:—

- " 2. Diagram: carbon and electric energy required in smelting magnetite.
- " 3. Diagram: volumetric percentage of CO<sub>2</sub> in the gas.
- " 4. Diagram: carbon and electric energy required in smelting hematite.
- " 5. Diagram: volumetric percentage of CO<sub>2</sub> in the gas.
- " 6. Plan of Domnarfvet furnace plant.—
- " 7. Arrangement of switchboard connexions.
- " 8. Arrangement of furnace electrical connexions.
- " 9. Experimental furnace No. 1.
- " 10. Experimental furnace No. 2.
- " 11. Experimental furnace No. 3.
- " 12. Experimental furnace No. 4.
- " 13. Final design of electric shaft furnace.
- " 14. Frick electric reduction furnace.
- " 15. " " steel furnace, types I and II.
- " 16. " " " refining furnace, type III.
- " 17. " " " " rotation of steel-bath.

CIRKEL, FRITZ, M.E.

**69. Chrysotile-Asbestos: Its Occurrence, Exploitation, Milling, and Uses, 1910. (Second Edition, enlarged.)**

## CONTENTS.

## INTRODUCTORY.

## CHAPTER I.

Historical.  
 Physical and chemical properties of asbestos.  
 Asbestos minerals:—  
   Antophyllite.  
   Amphibole:—  
     Tremolite, actinolite, asbestos, mountain leather, and crocidolite  
 Serpentine:—  
   Pierolite, soapstone (talc), and chrysotile  
     Physical properties of chrysotile.  
     Chemical composition of chrysotile.  
 Summary of asbestos minerals.

## CHAPTER II.

CANADIAN SERPENTINE AREAS:—  
 Laurentian serpentines.  
 Chrysotile-asbestos in the Laurentian—  
   Characteristics of the Laurentian deposits.  
   Description of typical occurrences.  
   Localities of Laurentian chrysotile-asbestos.  
 Huronian serpentines.  
 Cambrian serpentines.  
 Broughton, Thetford, and Black Lake areas.  
 Rock forming minerals of the serpentine range.  
 Vein, and slip fibre.  
 Discoloration and alteration of fibre.  
 Metallic minerals associated with Canadian chrysotile-asbestos.  
 PRODUCTIVE SERPENTINE RANGE:—  
 Broughton serpentine.  
 Thetford serpentine.  
 The great vein fibre belt.  
 Vein fibre and slip fibre belts compared.  
   Present economic features of the vein fibre belt.  
 Granitic dykes.  
 Danville, Eastman and Vermont serpentines.  
 Asbestos fibre compared with other organic and inorganic fibres.  
 Origin of chrysotile-asbestos.  
 Depth of asbestos deposits.

## CHAPTER III.

QUARRYING OF ASBESTOS—  
 Advantages and disadvantages of open-cast work.  
 Removal of overburden.  
 Quarry work.  
 Explosives.  
 Effect and cost of hand drilling.  
 Effect and cost of machine drilling.  
 Electric drills.  
 Separation and removal of rock and ore.  
 Construction of boom derricks.  
 Construction of cable derricks.  
 Hoisting engines.

Efficiency of hoisting plants.  
 Haulage and dumping.  
 General hoisting and hauling arrangements, and position of cable derricks.  
 Recent improvements in hoisting appliances.  
 Compressed air.  
 Drainage.

#### CHAPTER IV.

##### THE DRESSING OF ASBESTOS FOR THE MARKET—

Hand dressing.  
 Mechanical treatment: history.  
 Apparatus used in the separation of asbestos.  
 Drying of the mill rock.  
 The drying problem.  
 Rock breakers—  
 Jaw breakers.  
 Rotary crusher.  
 Spindle or gyrating breakers  
 Final crushing—  
 Rolls.  
 Fiberizers.  
 Cyclones.  
 Pulverizers.  
 Fans.  
 Accessories for mills.

##### SUMMARY OF PRINCIPLES IN THE SEPARATION OF ASBESTOS

##### GENERAL FEATURES OF THE MILLS IN THE DISTRICT.

Plant.  
 Electricity as a motive power.  
 Compagnie Hydraulique St. Francois.  
 Shawinigan Water and Power Company.  
 Motors.  
 Amount of power used.  
 Cost of labour in mills.  
 Percentage of milling material in total rock mined.  
 Percentage of fibre in the milling rock.  
 Percentage of crude in the total rock mined.  
 Grades.  
 Cost of mill and mine equipment.  
 Mine equipment.

#### CHAPTER V.

##### COST OF EXTRACTION, MARKET, PRICES, STATISTICS, AND STATUS OF THE ASBESTOS INDUSTRY.

Cost of extraction.  
 Market and prices.  
 Statistics.  
 Imports of asbestos goods.  
 Status of the industry.

#### CHAPTER VI.

##### ASBESTOS MINES AND PROSPECTS.

Amalgamated Asbestos Corporation (Limited).  
 Beaver quarries.  
 British Canadian quarries.  
 Dominion quarries.  
 King quarries.  
 Standard quarries.  
 The Asbestos and Asbestic Co., Limited.  
 Belmina Consolidated Asbestos Company, Limited.  
 Beaudoin and Audette Asbestos Co.  
 Bell Asbestos Co.

Berlin Asbestos Co.  
 Black Lake Consolidated Asbestos Co.  
 The Imperial Asbestos Co.  
 Boston Asbestos Co.  
 Broughton Asbestos Fibre Co.  
 Coleraine Exploration Co. (operations suspended).  
 D'Israeli Asbestos Co.  
 Eastern Townships Asbestos Co.  
 The Frontenac Asbestos Mining Co.  
 The Jacobs Asbestos Mining Co., of Thetford, Limited.  
 The Johnson Asbestos Co.  
 The Ling Asbestos Co.  
 The Robertson Asbestos Co.  
 Asbestos locations and prospects.

#### CHAPTER VII.

##### ASBESTOS IN FOREIGN COUNTRIES:—

United States.  
 Philippine islands.  
 Newfoundland.  
 Russia and Siberia.  
 Mongolia.  
 Finland.  
 Italy.  
 France.  
 Cyprus.  
 Queensland.  
 South Australia.  
 New South Wales.  
 Western Australia.  
 New Zealand.  
 West Griqualand (Africa).  
 Transvaal (District of Carolina).  
 Natal.  
 Rhodesia.  
 Matabeleland (Africa).  
 India.  
 Japan.

#### CHAPTER VIII.

##### COMMERCIAL APPLICATIONS OF ASBESTOS—

Steam packing.  
 Metallic asbestos packing.  
 Asbestos cloth.  
 Asbestos rope and yarn.  
 Asbestos as an insulating material.  
 Removable boiler covering—  
     Asbestos cement felting.  
     Asbestos mattresses.  
 Asbestos mill-board.  
 Asbestos writing paper.  
 Lining of furnaces.  
     Firebrick.  
 Asbestos as a building material.  
     Asbestos cement slate.  
     Wall-plaster and asbestic.  
     Asbestos paints.  
     Asbestos board.  
         Testing asbestos board.  
     Asbestolith tiling for floors.  
     Asbestos protected metal.  
 Asbestos in electrical machinery.

- Miscellaneous uses and manufacturing processes.  
 Treatment of asbestos for rendering it waterproof.  
 Improved treatment of asbestos diaphragms to enable them to resist disintegration.  
 Application of asbestos to the manufacture of fire resisting and refractory materials used in building construction, etc.  
 Process of using fibrous asbestos in the form of a liquid or plastic mass.  
 Process for making moist rolls of asbestos, suitable for spinning.  
 Behaviour of asbestos in non-luminous flames.  
 Manufacture of fibrous fireproof sheets.  
 Binding of asbestos fibre.  
 Preparation of asbestos articles from finely divided asbestos, without the use of binding agents.  
 Use of asbestos in mines.

## BIBLIOGRAPHY.

## Appendix.

## INDEX.

## LIST OF PUBLICATIONS.

## ILLUSTRATIONS.

*Photographs.*

- |       |         |  |
|-------|---------|--|
| Plate | I.      | Canadian chrysotile-asbestos.  |
| "     | II.     | First asbestos mill at Black Lake.   |
| "     | III.    | Italian (hornblende) asbestos.   |
| "     | IV.     | Picrolite.   |
| "     | V.      | Black Lake village and vicinage: showing the milling plant of the British Canadian quarry in background.   |
| "     | VI.     | Serpentine close to asbestos vein, Dr. Reed's mine.  |
| "     | VII.    | Rock 18 inches away from asbestos vein.  |
| "     | VIII.   | Serpentine close to asbestos vein, Imperial Asbestos Co., Black Lake.                                      |
| "     | IX.     | Rock 18 inches away from asbestos vein.  |
| "     | X.      | Serpentine close to asbestos vein, Southwark mine, Black Lake.   |
| "     | XI.     | Rock 15 inches away from asbestos vein.  |
| "     | XII.    | Serpentine close to asbestos vein, Standard quarry, Black Lake.  |
| "     | XIII.   | Rock 15 inches away from asbestos vein.  |
| "     | XIV.    | Peculiar forking of chrysotile-asbestos veins.   |
| "     | XV.     | Seamy partings containing asbestos veins, from Black Lake Consolidated Asbestos Company's Southwark mines. |
| "     | XVI.    | Ribbon structure of chrysotile-asbestos.   |
| "     | XVII.   | Peculiar species of serpentine from lot 13, range XI, Broughton, Quebec.                                   |
| "     | XVIII.  | Spun glass.  |
| "     | XIX.    | Thetford fibre.  |
| "     | XX.     | Black Lake fibre.  |
| "     | XXI.    | Black Lake fibre fracture.   |
| "     | XXII.   | Templeton asbestos fibre.  |
| "     | XXIII.  | Thetford fibre ends.   |
| "     | XXIV.   | Break in Thetford fibre.   |
| "     | XXV.    | Fibre from the Urals, Russia.  |
| "     | XXVI.   | Fibre from the Aosta valley, Italy.  |
| "     | XXVII.  | Asbestos fibre from West Griqualand, South Africa.   |
| "     | XXVIII. | Break in asbestos fibre from West Griqualand, South Africa.  |
| "     | XXIX.   | Fibre from the Carolina district, Transvaal.   |
| "     | XXX.    | Fibre from Pilbarra district, Western Australia.   |
| "     | XXXI.   | Break in fibre from the Pilbarra district, Western Australia.  |
| "     | XXXII.  | Fibre from Casper mountain, Wyoming, U.S.A.  |
| "     | XXXIII. | Break in fibre from Casper mountain, Wyoming, U.S.A.   |
| "     | XXXIV.  | Large quarry of the British Canadian (Amalgamated Asbestos Corporation), Black Lake.                       |
| "     | XXXV.   | Typical construction of cable tower.   |
| "     | XXXVI.  | Jenckes cable hoist.   |

- Plate. XXXVII. Arrangement of cable supports at King's quarry of the Amalgamated Asbestos Corporation, Thetford.
- " XXXVIII. Ore pockets and pan conveyer installed at the quarries of the Jacobs Asbestos Mining Co., Thetford, Que.
- " XXXIX. Rotary dryer.
- " XL. Cummer dryer.
- " XLI. Butterworth and Low rotary crusher.
- " XLII. Gates rotary crusher.
- " XLIII. Milling plant at the Beaver quarries of the Amalgamated Asbestos Corporation, Thetford.
- " XLIV. Bunch of fibreized asbestos, ready for the market.
- " XLV. Mill at the Dominion quarry of the Amalgamated Asbestos Corporation, Black Lake.
- " XLVI. Arrangement of electric motors for cyclones in the British Canadian mill of the Amalgamated Asbestos Corporation, Black Lake.
- " XLVII. Mill No. 1, King's quarry of the Amalgamated Asbestos Corporation, Thetford.
- " XLVIII. Mill building of the Frontenac Asbestos Mining Company, during construction.
- " XLIX. The Beaver quarry: Amalgamated Asbestos Corporation, Thetford
- " L. Milling plant at British Canadian quarries of the Amalgamated Asbestos Corporation, Black Lake.
- " LI. King's quarry of the Amalgamated Asbestos Corporation: looking west, Thetford.
- " LII. Mill at the Standard quarries of the Amalgamated Asbestos Corporation, Black Lake.
- " LIII. Mining and milling plant of the Berlin Asbestos Co., near Robertson station, Que.
- " LIV. Plant of Broughton Asbestos Fibre Company, East Broughton.
- " LV. Fibreizing plant of the Black Lake Consolidated Asbestos Co., Black Lake.
- " LVI. New mill of the Robertson Asbestos Co., Robertson.
- " LVII. View of Russian asbestos quarry.
- " LVIII. Transport of asbestos rock from quarry to mill in Russian asbestos quarries.
- " LIX. Step-like exploitation of Russian asbestos quarries.
- " LX. Specimen of asbestos from Uralit mines, near Bajenowa station, Asiatic Russia.
- " LXI. Asbestos reef in the Carolina district of the Transvaal.
- " LXII. In the Carolina district of the Transvaal: nearer view of the drive on the asbestos reef.
- " LXIII. Thetford building covered with asbestos slate.
- " LXIV. Carded chrysotile-asbestos: resembling silk fibre.
- " LXV. General arrangements of electric apparatus for heat testing purposes.
- " LXVI. Asbestos woven heating net and coils of fine wire on zinc plate.

*Drawings.*

- Fig. 1. Laurentian asbestos deposits.
- " 2. Profile of asbestos-bearing formation at Black Lake and Thetford.
- " 3. Typical asbestos veins.
- " 4. Section through northeast parts of lots 13 and 14, range VII, Broughton.
- " 5. Section through productive part of lot 2, range V, Thetford.
- " 6. Cut through hill south of Black Lake station, Que.
- " 7. Section through vein fibre belt in direction of Poudrier road.
- " 8. Fibre of raw silk.
- " 9. Fibre of sheep's wool.
- " 10. Filaments of raw cotton.
- " 11. Spun glass.
- " 12. Quartz fibre.
- " 13. Section of seamy parting.
- " 14. Section of seamy parting, showing disposition of mineral matter through segregation.



- Fig. 15. Section of seamy parting, showing disposition of mineral matter through segregation.
- " 16. Section of seamy parting, showing disposition of mineral matter through segregation.
- " 17. Section of seamy parting, showing disposition of mineral matter through segregation.
- " 18. Section of large quarry: King Bros., Thetford.
- " 19. Boom derrick.
- " 20. Incline cable hoisting plant.
- " 21. Horizontal cable hoisting plant.
- " 22. Two-leg support for cable derrick.
- " 23. Carrier for cable hoisting.
- " 24. Construction of transport boxes.
- " 25. Anchorage of carrier rope.
- " 26. New mining method introduced in Bell mines.
- " 27. Campbell's rotary dryer.
- " 28. Sturtevant rotary crusher.
- " 29. Fibreizer: Jenckes Machine Co.
- " 30. Laurie cyclone fiberizer.
- " 31. Section through new Pharo cyclone.
- " 32. Sturtevant, 42 inch horizontal, direct running Emery mill.
- " 33. Fan for taking up fibre from shaking screen.
- " 34. Collector.
- " 35. Collecting and settling chamber.
- " 36. Modern asbestos separation plant.
- " 37. Chart I.
- " 38. " II.
- " 39. " III.
- " 40. " IV.
- " 41. " V.
- " 42. Magnet for picking steel from ore.
- " 43. Double shaking screen.
- " 44. Typical sloping mill.
- " 45. Typical flat mill.
- " 46. Milling plant: British-Canadian quarries (Amalgamated Asbestos Corporation).
- " 47. Surface plant: Frontenac Asbestos Mining Co., East Broughton, Que.
- " 48. Diagram: production of asbestos and asbestic, 1880-1909.
- " 49. Diagram: value of production of asbestos and asbestic, 1880-1909.
- " 50. Diagram: average prices of asbestos and asbestic, 1880-1909.
- " 51. Occurrence of asbestos in Pilbarra district, Western Australia.
- " 52. Asbestos packing in stuffing-box of steam cylinder.
- " 53. Asbestos packing in joints of steam pipes.
- " 54. Various kinds of asbestos packing.
- " 55. Asbestos air-cell steam pipe covering.
- " 56. Asbestos magnesia pipe covering.
- " 57. Asbestos magnesia pipe covering.
- " 58. Asbestos felt covering.
- " 59. Chart for calculating difference in loss between bare and asbestos covered pipe.
- " 60. Asbestos cement applied to steam pipes.
- " 61. " felt.
- " 62. " roofing felt.
- " 63. " cement applied on boilers.
- " 64. " cement applied on boilers.
- " 65. " air-cell covering.
- " 66. " wired mattress for covering boilers, etc.
- " 67. " mill-board.
- " 68. " wood graining and finishing.
- " 69. " wood for building construction.
- " 70. Door and door frame made of asbestos wood.
- " 71. Freight sheds of the Boston and Maine Railway, Boston, Mass. (Covered with asbestos slates.)
- " 72. Arrangement of asbestos slates on roof.
- " 73. Residence covered with asbestos slate.

- Fig. 74. Residence covered with asbestos stucco (asbestic).  
 " 75. Construction of asbestos protected metal.  
 " 76. Asbestos protected metal corrugated ridge capping.  
 " 77. Asbestos protected metal flat ridge capping.  
 " 78. (a) Omelette pan, consisting of two steel plates with sheet of asbestos between.  
       (b) Stove mat.  
       (c) Iron holder.  
 " 79. Asbestos brake.  
 " 80. Insulating frame for conductivity test.  
 " 81. Frame for air gap experiments.  
 " 82. Diagrammatic section for conductivity test.  
 " 83. Diagrammatic section for air-gap experiments.  
 " 84. Heat diagram for yellow pine tests: square feet per hour.  
 " 85. " " " yellow pine tests: per hour.  
 " 86. " " " silicate cotton: square feet per hour.  
 " 87. " " " silicate cotton: cooling curves.  
 " 88. " " " air-jacket: square feet per hour.

#### Maps.

- No. 78. Map of Asbestos region, Province of Quebec, 1910.  
 " 86. Map showing general distribution of serpentine in the Eastern Townships.

ANREP, A., JR., *Peat Expert.*

71. Investigation of the Peat Bogs and Peat Industry of Canada, during the season 1909-10. (Second Edition.) To which is appended Mr. Alf. Larson's paper on Dr. M. Ekenberg's Wet-Carbonizing Process: from *Teknisk Tidskrift*, No. 12, December 26 1908, translated by Mr. A. Anrep, Jr.; also a translation of Lieut. Ekelund's pamphlet entitled "A Solution of the Peat Problem," 1909; describing the Ekelund Process for the manufacture of Peat Powder, by Harold A. Leverin, Ch., E.

#### CONTENTS.

- Letter of transmittal.  
 Method of investigation.  
 Description of individual peat bogs—  
   Brunner peat bog.  
   Komoka " "  
   Brockville " "  
   Rondeau " "  
   Alfred " "  
     (a) Delimitation.  
     (b) Development.  
       Drainage.  
       Buildings.  
       Levelling.  
       Machinery equipment.  
         Anrep's peat machine.  
         " round track.  
         " mechanical transportation system.  
       Jakobson's field press.  
 Dorchester peat plant.  
 Farnham peat plant.
- Appendix I—**  
 Manufacture of peat powder in Sweden.
- Appendix II—**  
 Anrep's 100-ton improved peat machine.

**Appendix III—**

Translation of Larson's paper on the Ekenberg wet-carbonizing process, by A. Anrep, Jr.

**Appendix IV—**

Translation of Lieut. Ekelund's pamphlet entitled "A Solution of the Peat Problem," 1909, by Harold A. Leverin, Ch.E.

## ILLUSTRATIONS.

*Photographs.*

- Plate I. Thirty-ton Anrep Peat Machine: General view when in actual operation.  
 " II. General view of peat storage shed, workshop and office.  
 " III. Peat machine: side elevation showing belt conveyer and dumping car.  
 " IV. Thirty-ton Anrep Peat Machine: end elevation, showing elevator, trenching operations, and track.  
 " V. Mechanical transportation device: station car.  
 " VI. " " " " guide frame.  
 " VII. Jakobson's field press.  
 " VIII. Perspective view of drying field: showing method of air-drying the peat briquettes.  
 " IX. Peat powder factory at Bäck.  
 " X. Large digging machine, placed at bottom of peat bog at Bäck.  
 " XI. Front elevation of digging machine.  
 " XII. Part of apparatus for spreading and cutting peat on field.  
 " XIII. Spreading and dumping peat on field.  
 " XIV. Storage sheds at peat powder factory, Bäck: each shed is 100 metres long.  
 " XV. Peat powder being transferred to depot.  
 " XVI. Interior of peat powder factory at Bäck.  
 " XVII. Firing peat powder under boiler.

*Drawings.*

- Fig. 1. Alfred peat bog: plan of lots 8 and 9, concessions VI, VII, and VIII.  
 " 2. General arrangement of Government peat plant at Alfred, Ont.  
 " 3. Peat storage shed: front and side elevations.  
 " 4. Blacksmith's shop and office.  
 " 5. Side dump car: details.  
 " 6. Diagram showing theoretical working of wet-carbonizing oven.

*Maps.*

- No. 72. Brunner peat bog.  
 " 73. Komoka "  
 " 74. Brockville "  
 " 75. Rondeau "  
 " 76. Alfred "  
 " 77. " " Profile of main ditch.

MACKENZIE, GEORGE C., B.Sc.

82. Bulletin No. 5. Magnetic Concentration Experiments with Iron Ores of the Bristol Mines, Que.; Iron Ores of the Bathurst Mines, New Brunswick; A Copper-Nickel Ore from Nairn, Ontario,

## CONTENTS.

Introductory.  
 Iron ores.  
 Copper nickel ore.

- Magnetic concentration of Bristol ores—  
 Shipment No. 1.  
 Shipment No. 2.  
 Preparatory treatment of the ore for separation.  
 Results of separation.  
 Shipment No. 1.  
 Shipment No. 2.  
 Briquetting or nodulizing.
- Magnetic concentration of Bathurst ores—  
 Shipment No. 1.  
 Shipment No. 2.  
 Preparatory treatment of the ore for separation.  
 The separation process—  
 Shipment No. 1.  
 Shipment No. 2.
- Magnetic separation of a copper nickel ore—  
 Preliminary treatment of the ore.  
 Concentration of the ore.  
 Concentration of the 60 mesh size.  
 Concentration of the 40 mesh size.  
 Concentration of the 20 mesh size.  
 Tabulated results of magnetic concentration of the three sizes—60, 40 and 20 mesh.  
 Sieve test on 60 mesh concentrates, dry.  
 Sieve test on 40 mesh concentrates, dry.  
 Sieve test on 20 mesh concentrates, dry, after secondary separation.  
 Table—I.M.M. standard laboratory screens.  
 Hydraulic classification 60 mesh concentrates.  
 Wet magnetic separation of the above hydraulic spigot heads.  
 Hydraulic classification 40 mesh concentrates.  
 Wet magnetic separation of the above hydraulic spigot heads.  
 Hydraulic classification 20 mesh concentrates.  
 Wet magnetic separation of the above hydraulic spigot heads.

*Diagrams.*

- Fig. 1. Bristol mine ore: concentration tests and analyses of shipment No. 1.  
 " 2. " " concentration tests and analyses of shipment No. 2.  
 " 3. Bathurst mine ore: concentration tests and analyses of shipment No. 1.  
 " 4. " " concentration tests and analyses of shipment No. 2.

PROFESSOR J. B. PORTER, E.M. D.Sc. }  
 PROFESSOR R. J. DURLEY, B.Sc., MA.E. } AND OTHERS

83. Investigation of the Coals of Canada: at McGill University, under the Auspices of the Dominion Government.

CONTENTS.

VOL. I

Part I

- INTRODUCTORY, by J. B. Porter.  
 Technical staff.  
 Laboratories.  
 Peat fuel problem.  
 Canada's principal coal fields.  
 List of coals tested.

- Divisions of the investigation—
  - Sampling in the field.
  - Crushing and sampling in the laboratory.
  - Mechanical purification of coal.
  - Coking trials.
  - Boiler trials.
  - Producer trials.
  - Chemical laboratory work.
- The Report.
- Interpretation of results.

## Part II

### THE COAL FIELDS OF CANADA, by T. C. Denis.

#### General

#### The Coals of the Atlantic Provinces: Nova Scotia and New Brunswick.

##### The Sydney, N.S., coal basin:—

- History, general description and statistics.
- Dominion Coal Co.—Collieries Nos. 1 to 14.
- Nova Scotia Steel and Coal Co.
- Mackay Coal Co.
- Sydney Coal Co.

- Colonial Coal Co., Limited.
- North Atlantic Collieries Co.
- Cape Breton Coal Mining Co.

##### The Inverness, N.S., coal field:—

- Inverness Railway and Coal Co.
- Mabou Coal Mining Co.
- Port Hood and Richmond Railway and Coal Co.

##### The Richmond, N.S., coal field:—

##### The Pictou, N.S., coal field:—

- Acadia Coal Co.
- Intercolonial Coal Mining Co.
- Nova Scotia Steel and Coal Co.

##### The Cumberland, N.S., coal basin:—

- Cumberland Coal and Railway Co., Springhill.
- Maritime Coal, Railway, and Power Co., Chignecto.
- Eastern Coal Co.
- Minudie Coal and Transportation Co.
- Stratheona Coal Co.
- Other collieries.

- Other collieries.

##### The New Brunswick coal basins:—

- King mine, Grand Lake field, Minto, N.B.

#### The lignites of Northern Ontario.

#### The coals and lignites of the Great Plains:—

- Alberta and Saskatchewan.

##### The Souris and Turtle Mountain coal fields, Saskatchewan:—

- Western Dominion Collieries Co.
- Eureka Coal and Brick Co.
- Manitoba and Saskatchewan Coal Co.
- Other collieries in the district.

##### The Edmonton series and Laramie coal formation, Alberta:—

- Edmonton Standard Coal Co.
- Parkdale Coal Co.
- Stratheona Coal Co.
- Twin City Coal Co.
- Alberta Coal Co.
- Cardiff Coal Co.
- Diamond Coal Mine, Ltd.

##### The Belly River formation, Southern Alberta:—

#### Cretaceous series.

- Canada West Coal Co.
- Reliance Coal Co.
- Alberta Railway and Mining Co.

- Royal Collieries, Limited.
- Breckenridge and Lund Coal Co.
- Galbraith Coal Co.
- Coals of the eastern slopes of the Rocky mountains, Alberta.
- The Blairmore-Frank coal field:—
  - Maple Leaf Coal Co.
  - Leitch Collieries, Limited.
  - Hillcrest Coal and Coke Co., Limited.
  - West Canadian Collieries, Limited.
  - Canadian American Coal Co.
  - International Coal and Coke Co.
- The Canmore and Cascade Mountain coal areas:—
  - H. W. McNeill Co.
  - Bankhead Mines, Limited.
- Coals and lignites of British Columbia.
- Rocky Mountain coal fields.
  - Crowsnest pass.
  - Elk river and Kananaskis.
  - Crowsnest Pass Coal Co., Limited:—
    - Coal Creek colliery.
    - Michel colliery.
    - Carbonado mines.
    - Hosmer Mines, Limited.
    - Corbin Coal and Coke Co.
- The Princeton (Similkameen district), Nicola, and Telkwa Valley coal fields.
  - Princeton coal fields.
  - Granite Creek coal field.
  - Nicola Valley coal field—
    - Nicola Valley Coal and Coke Co.
    - Middlesboro collieries.
    - Diamond Vale Coal and Iron Mines, Limited.
  - Telkwa coal field.
- Vancouver island and the coast.
  - Comox field.
  - Nanaimo field:—
    - Wellington Coal Co.
    - Extension colliery.
    - Union colliery.
    - Western Fuel Company.
  - Suquash coal field—
    - Pacific Coast Coal Co., Limited.
- Queen Charlotte islands.
  - Camps—
    - Wilson.
    - Robertson.
    - Anthracite.
- Yukon Territory.
  - Whitehorse coal area.
  - Tantalus coal area.
    - Tantalus mine.
    - Tantalus butte.
    - Five Fingers mine.
  - Rock Creek coal area.
    - Coal creek: tributary of Rock creek.
    - Coal creek: tributary of Yukon river.
    - Cliff creek.

**BIBLIOGRAPHY.**

List of official reports, maps, etc., relating to coal resources of Canada.

**Part III**

COLLECTING THE COAL SAMPLES, by T. C. Denis and E. Stansfield.

Description of the samples taken—

Maritime Provinces.

The Great Plains.

Eastern slopes of the Rocky mountains.  
British Columbia.  
Yukon.

#### Part IV.

SAMPLING IN THE TESTING PLANT AND LABORATORY, by J. B. Porter.  
Theory and practice of sampling.  
Brief description of the laboratory equipment and layout.  
Outline of the method of sampling employed.

#### Part V

MECHANICAL PURIFICATION OF COAL, COMMONLY CALLED COAL WASHING, by J. B. Porter.

Introduction.  
Impurities of coal and their effects.  
General principles of coal washing.  
Historical sketch of coal washing devices.  
Present methods of preparing bituminous coal.  
Crushing machinery.  
Sizing and screening machinery.  
Washing apparatus.  
Trough washers.  
Continuous ascending current washers or classifiers.  
Intermittent current ascending washers or jigs.  
Bumping tables.  
Washing plants in general.  
Description of typical washing plants.  
Discussion of the plants above described.  
Preparation of anthracite coal.  
Special features of anthracite preparation.  
Description of the anthracite breaker at Bankhead, Alta.  
Tests in the laboratory—  
Introduction.  
Specific gravity determinations—  
Purpose of such tests.  
Methods employed.  
Screen analyses—  
Purpose of these tests.  
Washing tests proper—  
Apparatus and methods employed.  
Typical log of one complete test—No. 37.  
Typical example of the 60 sheets of curve diagrams of coal washing tests, in Appendix I, Vol. III.  
Summary statements in tabular form for all washing trials from each field.

#### Part VI

MANUFACTURE AND TESTING OF COKE, by E. Stansfield and J. B. Porter.

Introduction.  
Non-recovery beehive ovens.  
Non-recovery retort ovens.  
By-product retort ovens.  
Comparison of types of ovens.  
Tests—  
Object, scope, and method of testing the coking power of coals.  
Coking plants at which the tests were made—  
Dominion Iron and Steel Co., Limited, Sydney, N.S.  
Dominion Coal Co., Limited, Glace Bay, N.S.  
Nova Scotia Steel and Coal Co., Limited, Sydney Mines, N.S.  
West Canadian Collieries, Limited, Lillooet, Alberta.  
International Coal and Coke Co., Limited, Coleman, Alberta.

## Method of conducting coking tests of coals—

General description of the tests.

Details of the various methods employed.

Preliminary tests.

Experiments on the method in general.

" " influence of age.

" " duration of tests.

" " position of test in oven.

" " blending of coals for coking.

" " compression of coal.

" " moisture in coal.

## Methods devised for comparing the different samples of coke—

Apparent specific gravity.

Real specific gravity.

Porosity.

Strength.

## Tabulating the records of coking tests—

Numbering of samples with reference to tests for washing, steaming, etc.

List of commercial coles sampled for comparison tests.

Results of coking tests.

## Summary record in tabular form of all coking trials, arranged by coal fields in geographical order.

## VOL. II

## Part VII

## BOILER TESTS, by R. J. Durley—

Types of boilers, and their efficiency.

Coal, and its suitability for steam generating purposes.

Boiler furnaces and their adaptability for various coals.

Boiler trials, and their use in testing coals.

Equipment: brief description of plant and apparatus used for boiler trials.

Method of conducting tests and making measurements: log and calculations for one trial.

Duties of staff, method of handling fuel, and starting and stopping trials.

Measurement of water. Dryness of steam. Flue gas analysis.

Results of boiler trial No. 58—

Log of trial, with observation sheets.

Summary of observations.

Summary of results.

Details of calculations involved in the determination of the resultant figures given in the summaries of observations and results.

## Remarks on boiler trials and their results—

Value of coal.

Composition of coals.

Condition of coals when tested.

General tabular statement of results of whole series of trials.

Relative merit of the coals.

Treatment and behaviour of coal in fire.

## Remarks on coals, as arranged geographically by coal fields—

Sydney coal field, Cape Breton co., N.S.

Inverness coal field, Inverness co., N.S.

Pictou coal field, Pictou co., N.S.

Springhill coal field, Cumberland co., N.S.

Joggins-Chignecto coal field, Cumberland co., N.S.

Grand Lake coal field, N.B.

Souris, Edmonton, and Belly river coal fields, Saskatchewan and Alberta

Frank-Blairmore coal field, Alberta.

Crowsnest coal field, B.C.

Cascade coal field, Alberta.

Nicola Valley coal field, B.C.

Nanaimo-Comox, and Alert Bay coal fields, B.C.



**Part VIII****GAS PRODUCER TESTS, by R. J. Durley.**

- Gas producers and their method of working—
  - Gas producers for non-bituminous fuels.
  - Gas producers for bituminous fuels.
- Gas producer tests, and methods of testing coals in gas producers.
- Equipment of experimental plant for gas producer tests of Canadian coals.
  - General arrangement of plant and accessories.
- Methods of conducting tests, and making measurements: (with log and calculations for one trial.)
  - Method of handling fuel, and starting and stopping trials.
  - Temperatures, pressures, and other details of tests.
  - Determination of rate of fuel consumption.
  - Detailed results of producer trial No. 32.
    - Log of trial, with observation sheets.
    - Summary of observations.
    - Summary of results.
    - Details of calculations involved in the determination of the resultant figures given in the summaries of observations and results.
- Remarks on gas producer trials and their results: value of coals for gas producer work.
  - Treatment and condition of coals when tested.
  - General results.
  - Producer efficiency, as illustrated by proportion of combustible in coal, in refuse, and in producer contents.
  - Relative merit of the coals.
- Remarks on coals, as arranged geographically by coal fields—
  - Sydney coal field, Cape Breton, N.S.
  - Inverness and Pictou coal fields, N.S.
  - Springhill and Joggins coal fields, N.S.; and Grand Lake coal field, N.B.
  - Souris coal field, Sask.; Edmonton and Belly River coal fields, Alta.
  - Frank-Blairmore coal field, Alta.
  - Crowsnest coal fields, B.C.
  - Cascade coal field, Alta.
  - Nicola Valley, and the Nanaimo coal fields, B.C.
- Heat expenditure with various coals.

**Part IX****WORK OF THE CHEMICAL LABORATORY, by Edgar Stansfield.**

- Introduction.
- Collection and treatment of samples—
  - Coal samples.
  - Ash samples.
  - Coke samples.
  - Gas samples.
- Numbering of samples.
- Records and calculations.
- Air drying coal.
- Analytical methods and derived results—
  - General remarks.
  - Moisture.
  - Fixed carbon and volatile matter.
  - Ash.
  - Carbon and hydrogen.
  - Sulphur.
  - Nitrogen.
  - Oxygen.
  - Calorific value of solid fuels.
  - Calorific value of ash free coal.
  - Calorific value calculated from analysis of coal.
  - Fuel ratio.
  - Carbon-hydrogen ratio.

- Gas analysis—  
 Gas analysis with Orsat-Muncke apparatus.  
 Gas analysis with Randall and Barnhart apparatus.  
 Gas analysis with Bone and Wheeler gas analysis apparatus.  
 Calorific value of gaseous fuels.  
 Calorific value calculated from analysis of gas.  
 Miscellaneous determinations.  
 Experiments on the fusibility of ashes.  
 Discussion of work.  
 List of coals tested—  
 Sydney coal field, N.S.  
 Inverness coal field, N.S.  
 Pictou coal field, N.S.  
 Springhill coal field, N.S.  
 Joggins-Chignecto coal field, N.S.  
 Grand Lake coal field, N.B.  
 Souris coal field, Sask.  
 Edmonton coal field, Alta.  
 Belly River coal field, Alta.  
 Frank-Blairmore coal field, Alta.  
 Crowsnest coal field, B.C.  
 Cascade coal field, Alta.  
 Similkameen coal field, B.C.  
 Nicola Valley coal field, B.C.  
 Nanaimo-Comox coal field, B.C.  
 Alert Bay coal field, B.C.  
 Whitehorse coal field, Yukon Territory.  
 Summary record in tabular form of all chemical analyses, arranged by coal fields in geographical order.

*List of Tables.*

**VOL. I**

Table	I.	Geographical position of coal fields.
"	II.	Table showing the equivalency of the principal coal seams in the Sydney coal field, with the intervening strata in the several basins.
"	III.	Showing suitability of Sydney coals for gas manufacture.
"	IV.	Analyses of Telkwa coals.
"	V.	" Graham Island coals.
"	VI.	" coal from Coal creek: tributary of Rock creek.
"	VII.	" coal from Cliff creek.
"	VIII.	Reports issued by the Dominion Government on the working coal fields of Eastern Canada, 1863-1911.
"	IX.	Reports issued by the Dominion Government on the coal fields of western Canada.
"	X.	Geological Survey maps covering coal districts.
"	XI.	Summary record of coal washing tests: Sydney coal field, Cape Breton co., N.S.
"	XII.	" " " " Inverness and Pictou fields.
"	XIII.	" " " " Springhill, Joggins, and Grand Lake fields.
"	XIV.	" " " " Alberta and Saskatchewan lignite fields.
"	XV.	" " " " Eastern Crowsnest Pass coal fields.
"	XVI.	" " " " Western Crowsnest Pass coal field.
"	XVII.	" " " " Cascade coal field.
"	XVIII.	" " " " Coast Range coal fields.
"	XIX.	" " " " Vancouver Island coal fields.
"	XX.	List of cokes made in regular series of tests.
"	XXI.	List of special cokes made in blending tests.
"	XXII.	Special tests for comparison of open oven and box cokes.
"	XXIII.	" " " " types of ovens.
"	XXIV.	" " " " effect of time of coking.
"	XXV.	" " " " of position of box in oven.

Table	XXVI.	Special tests for effect of compression of coal.
"	XXVII.	" " of moisture in coal.
"	XXVIII.	List of special cokes: classified under coke numbers.
"	XXIX.	Special tests for effect of time of coking.
"	XXX.	Sundry special coking tests.
"	XXXI.	Special cokes—blending tests.
"	XXXII.	Special tests for comparison of types of ovens.
"	XXXIII.	" " commercial cokes.
"	XXXIV.	" " open oven and box cokes.
"	XXXV.	Summary record of coking tests: Sydney coal field, Cape Breton co., N.S.
"	XXXVI.	" " " Inverness coal field, Inverness co., N.S.
"	XXXVII.	" " " Pictou coal field, Pictou co., N.S.
"	XXXVIII.	" " " Springhill coal field, Cumberland co., N.S.
"	XXXIX.	" " " Joggins-Chignecto coal field, Cumberland co., N.S.
"	XL.	" " " Frank-Blairmore coal field, Alberta.
"	XLI.	" " " Crowsnest coal field, B.C.
"	XLII.	" " " Similkameen coal field, B.C., Nicola Valley coal field, B.C.
"	XLIII.	" " " Nanaimo-Comox coal field, Vancouver island, B.C.
"	XLIV.	" " " Whitehorse coal field, Yukon Territory.

## VOL. II

"	I.	Detailed record of coal fired.
"	II.	Trials of No. 2 Babcock and Wilcox boiler with No. 36 coal.
"	III.	Detailed record of gas analysis.
"	IV.	Summary record of boiler tests.
"	V.	Trials of Georges Creek coal on No. 2 Babcock and Wilcox boiler.
"	VI.	Coals in order of evaporation.
"	VII.	Remarks on combustion of Sydney coals.
"	VIII.	Evaporation with Sydney coals.
"	IX.	" " Inverness coals.
"	X.	Remarks on combustion of Pictou County coals.
"	XI.	Evaporation with Pictou County coals.
"	XII.	" " Springhill coals.
"	XIII.	" " Joggins-Chignecto coals.
"	XIV.	" " Grand Lake coal.
"	XV.	Remarks on combustion of lignites and lignitic coals.
"	XVI.	Evaporation with lignites and lignitic coals.
"	XVII.	Remarks on combustion of Frank-Blairmore coals.
"	XVIII.	Evaporation with Frank-Blairmore coals.
"	XIX.	Remarks on combustion of Crowsnest coals.
"	XX.	Evaporation with Crowsnest coals.
"	XXI.	Remarks on combustion of Cascade coals.
"	XXII.	Evaporation with Cascade coals.
"	XXIII.	" " Nicola Valley coal.
"	XXIV.	Remarks on combustion of Vancouver Island coals.
"	XXV.	Evaporation with Vancouver Island coals.
"	XXVI.	Composition of gases per cent by volume.
"	XXVII.	" " anthracite and coke.
"	XXVIII.	" " typical gases from bituminous coal.
"	XXIX.	Observations of composition of gas by volume.
"	XXX.	" " gas meter and B.H.P.
"	XXXI.	" " gas calorimeter and coal weighed.
"	XXXII.	" " temperatures and pressures.
"	XXXIII.	Summary record of gas producer tests.
"	XXXIV.	Proportion of combustible in coal, in refuse, and in producer contents.
"	XXXV.	Performance with Cape Breton coals.
"	XXXVI.	" " Inverness and Pictou coals.
"	XXXVII.	" " Springhill, Joggins, and Grand Lake coals.
"	XXXVIII.	" " lignites and lignitic coals.
"	XXXIX.	" " Frank-Blairmore coals.

Table	XL.	Performance with Crowsnest coals.
"	XLI.	" Cascade coals.
"	XLII.	" Nicola Valley and Nanaimo coals.
"	XLIII.	Heat value of coal charged per B.H.P. per hour.
"	XLIV.	Report of analysis of coal—Coal Testing Laboratory.
"	XLV.	Recorded temperature of water in calorimeter vessel.
"	XLVI.	Analysis of producer gas with Randall and Barnhart apparatus.
"	XLVII.	Analysis of producer gas with Bone and Wheeler apparatus.
"	XLVIII.	Ethylene: gross or higher calorific value in B.T.U. per cub. ft., moist, at 60 F. and 30 inch.
"		Ethylene: net or lower calorific value in B.T.U. per cub. ft., moist, at 60 F. and 30 inch.
"	XLIX.	Carbon monoxidé: gross and net calorific value in B.T.U. per cub. ft., moist, at 60 F. and 30 inch.
"	L.	Methane: gross or higher calorific value in B.T.U. per cub. ft., moist, at 60 F. and 30 inch.
"		Methane: net or lower calorific value in B.T.U. per cub. ft., moist, at 60 F. and 30 inch.
"	LI.	Hydrogen: gross or higher calorific value in B.T.U. per cub. ft., moist, at 60 F. and 30 inch.
"		Hydrogen: net or lower calorific value in B.T.U. per cub. ft., moist, at 60 F. and 30 inch.
"	LII.	Comparative ash determinations.
"	LIII.	Summary of approximate errors in coal analyses.
"	LIV.	Summary record of analyses of coals: Sydney coal field, Cape Breton co., N.S.
"	LV.	" " " " Inverness coal field, Inverness co., N.S.
"	LVI.	" " " " Pictou coal field, Pictou co., N.S.
"	LVII.	" " " " Springhill coal field, Cumberland co., N.S.
"	LVIII.	" " " " Joggins-Chignecto coal field, Cumberland co., N.S.
"	LIX.	" " " " Grand Lake coal field, N.B.
"	LX.	" " " " Souris coal field, Sask.
"	LXI.	" " " " Edmonton coal field, Alta.
"	LXII.	" " " " Belly River coal field, Alta.
"	LXIII.	" " " " Frank-Blairmore coal field, Alta.
"	LXIV.	" " " " Crowsnest coal field, Alta.
"	LXV.	" " " " Cascade coal field, Alta.
"	LXVI.	" " " " Similkameen coal field, B.C.
"	LXVII.	" " " " Nicola Valley coal field, B.C.
"	LXVIII.	" " " " Nanaimo-Comox coal field, Vancouver island, B.C.
"	LXIX.	" " " " Alert Bay coal field, Vancouver island, B.C.
"	LXX.	" " " " Whitehorse coal field, Yukon Territory.
"	LXXI.	" " " " Standard coal used for comparison.

## INDEX.

## ILLUSTRATIONS.

*Photographs.*

Frontispiece—Panoramic view of Dominion Colliery No. 2, Dominion Coal Co., Glace Bay, N.S., showing bankhead, main shaft, hoisting engine house, power house, and part of winter's accumulation of bank coal, approximating 300,000 tons.

## VOL. Ij

## Part II

Plate	I.	Dominion No. 1 colliery, Dominion Coal Co., Glace Bay, N.S.
"	II.	Dominion No. 2 colliery, Glace Bay, N.S.
"	III.	Winter view of collieries of Nova Scotia Steel and Coal Co., Sydney Mines, N.S.

- Plate IV. Colliery No. 3, Sydney Mines, N.S.  
 " V. Tipple and power house, Port Hood Coal Co., Inverness co., N.S.  
 " VI. Old Cornish pump, Foord colliery, Stellarton, N.S.  
 " VII. Albion colliery, Stellarton, N.S.  
 " VIII. Allan shaft, Stellarton, N.S.  
 " IX. Vale colliery, at Thorburn, Pictou co., N.S.  
 " X. Acadia colliery at Westville, N.S.  
 " XI. Colliery No. 3, Springhill, Cumberland co., N.S.  
 " XII. Western Dominion collieries, Taylorton, Saskatchewan.  
 " XIII. Manitoba and Saskatchewan Coal Co.'s colliery, Bienfait, Sask.  
 " XIV. Outcrop of lignite at crossing of Pembina river, Alberta.  
 " XV. View on bank of Saskatchewan river, Edmonton, Alta.  
 " XVI. Parkdale Coal Co.'s colliery, Edmonton, Alta.  
 " XVII. Canada West Coal and Coke Co.'s colliery, Taber, Alta.  
 " XVIII. Galt colliery, Lethbridge, Alta.  
 " XIX. Washing plant and Bernard coke ovens at Lille, Alta.  
 " XX. Denison colliery, Coleman, Alta.  
 " XXI. Anthracite coal breaker at Bankhead, Alta.  
 " XXII. Coal Creek colliery, Crowsnest Pass Coal Co., Coal Creek, B.C.  
 " XXIII. Michel colliery, Crowsnest Pass Coal Co., Michel, B.C.  
 " XXIV. Hosmer mines: main tunnel, Hosmer, B.C.  
 " XXV. Hosmer mines: steel tipple, Hosmer, B.C.  
 " XXVI. Pithead, Western Fuel Co., Nanaimo, Vancouver island, B.C.  
 " XXVII. Northfield colliery, Nanaimo, Vancouver island, B.C.

#### Part IV

- Plate XXVIII. Sampling—a cone of unbroken coal—Department of Mining and Ore Dressing, McGill University.  
 " XXIX. Sampling—a flattened cone of coal—Department of Mining and Ore Dressing, McGill University.  
 " XXX. Sampling—a quartered pile of coal—Department of Mining and Ore Dressing, McGill University.

#### Part V

- Plate XXXI. Shaking screens and picking belts, Pendleton collieries, Manchester, England.  
 " XXXII. Shaking screens and picking belt, Manton colliery; England.  
 " XXXIII. Coal tipple of the Springfield Collieries Co., U.S.A.  
 " XXXIV. Triumph four roll coal crusher.  
 " XXXV. Shaking screens and washers, New Cross Hands colliery, Swansea, Wales.  
 " XXXVI. Front end of belts showing arrangements for cleaning and delivery, Clock Face colliery, England.  
 " XXXVII. Jeffrey revolving screens: (a) Heavy screen for run of mine; (b) Screen making three sizes; (c) Screen on friction rollers.  
 " XXXVIII. Crusher platform, bar-screen, washer, and dust exhaust, Department of Mining and Ore Dressing, McGill University.  
 " XXXIX. Screens, feeder, and two compartment jig, Department of Mining and Ore Dressing, McGill University.  
 " XL. Revolving screens, jig, Robinson washer, etc., Department of Mining and Ore Dressing, McGill University.  
 " XLI. Drainage bin, screens, and jig, Department of Mining and Ore Dressing, McGill University.  
 " XLII. Drainage bin, for washed coal, Department of Mining and Ore Dressing, McGill University.  
 " XLIII. General view, fines washing section, Department of Mining and Ore Dressing, McGill University.  
 " XLIV. Wilfley table, fines washing section, Department of Mining and Ore Dressing, McGill University.  
 " XLV. Settling boxes and cones, fines washing section, Department of Mining and Ore Dressing, McGill University.

## VOL. II

## Part VII

Plate XLVI. Boiler room, experimental steam plant, Department of Mechanical Engineering, McGill University.

## Part VIII

- Plate XLVII. Diagram of Westinghouse double zone producer, vertical section.  
 " XLVIII. Down-draft producer (No. 4), Department of Mechanical Engineering, McGill University.  
 " XLIX. Boys' gas calorimeter as set up for producer tests, Department of Mechanical Engineering, McGill University.  
 " L. Interior of gas producer laboratory, looking west, Department of Mechanical Engineering, McGill University.  
 " LI. Interior of gas producer laboratory, looking east, Department of Mechanical Engineering, McGill University.

## Part IX

- Plate LII. Small ball mill for grinding samples, Department of Mining and Ore Dressing, McGill University.  
 " LIII. Small ball mill, opened for cleansing, Department of Mining and Ore Dressing, McGill University.  
 " LIV. Drying apparatus—Chemical Laboratory, Department of Mining and Ore Dressing, McGill University.  
 " LV. Kjeldahl nitrogen distillation apparatus, Chemical laboratory, Department of Mining and Ore Dressing, McGill University.  
 " LVI. Koehler bomb calorimeter, general view, Department of Mining and Ore Dressing, McGill University.  
 " LVII. Randall and Barnhart gas analysing apparatus, general view, Department of Mining and Ore Dressing, McGill University.  
 " LVIII. Bone and Wheeler gas analysing apparatus, general view, Department of Mining and Ore Dressing, McGill University.  
 " LIX. Bone and Wheeler gas analysing apparatus, details, Department of Mining and Ore Dressing, McGill University.  
 " LX. Rack for holding and storing gas samples.  
 " LXI. Ash cylinders after heating, viewed at an inclination.  
 " LXII. Ash cylinders after heating, viewed from above.

*Drawings.*

## VOL. I

## Part V

- Fig. 1. Ground plan of laboratories, Department of Mining and Ore Dressing, McGill University.  
 " 2. Bradford coal breaker.  
 " 3. (a) Swing-hammer pulverizer without cover.  
 " (b) Swing-hammer pulverizer with housing completely removed.  
 " 4. (a) Sectional elevation of Stedman (Carr) disintegrator.  
 " (b) Perspective of Stedman disintegrator with housing raised and cages pulled apart.  
 " 5. Elevation and plan of Coxe movable bar screen.  
 " 6. (a) Concentric conical trommel.  
 " (b) Concentric cylindrical trommel.  
 " 7. Sectional elevation and perspective of Scaife trough washer.  
 " 8. Elevation and plan of Elliott washer.  
 " 9. Sectional elevation of Jeffrey-Robinson washer.  
 " 10. Sectional elevation of Jeffrey-Robinson washing plant.  
 " 11. Small experimental two compartment jig, Department of Mining and Ore Dressing, McGill University.

- Fig. 12. (a) Vertical section, Luhrig nut-coal jig.  
 (b) Vertical section, Luhrig small coal jig with feldspar bed.
- " 13. Large experimental two compartment jig with three interchangeable piston mechanisms, Department of Mining and Ore Dressing, McGill University.
- " 14. Vertical section, New Century nut-coal jig.
- " 15. Vertical section, Sheppard nut-coal jig.
- " 16. Pittsburgh (movable sieve) coal jig.
- " 17. Campbell table.
- " 18. Wilfley slime table.
- " 19. Elevation and plan of a 350 ton capacity Sheppard washery.
- " 20. Elevation and plan of Stein and Boericke washery.
- " 21. Side and end elevations of a Luhrig washery.
- " 22. Section of coal tippie of Springfield Collieries Co.
- " 23. Combined coal tippie and Robinson washery.
- " 24. Sectional elevations of Ramsay sludge tank.
- " 25. Diagrammatic scheme for preparation of anthracite coal for market.
- " 26. Elevation and plan of Langerfield dry separator. (Slate picker).
- " 27. Elevations and sections of adjustable comet breaker, Department of Mining and Ore Dressing, McGill University.
- " 28. Elevations and plan of Tulloch feeder, Department of Mining and Ore Dressing, McGill University.

#### Part VI

- Fig. 29. Beehive coke ovens, International Coal and Coke Co., Coleman, Alta.
- " 30. Sectional elevations of Bernard retort coke oven.
- " 31. Cross section of Otto-Hoffman retort coke oven, showing also charging larries, coke ram, and quenching floor.

### VOL. II

#### Part VII

- Fig. 32. Standard types of steam boilers.
- " 33. Babcock and Wilcox boilers, Department of Mechanical Engineering, McGill University.
- " 34. General arrangement of experimental boiler plant, Department of Mechanical Engineering, McGill University.
- " 35. Diagram showing boiler efficiency and rate of combustion.
- " 36. Diagram showing boiler efficiency and percentage of fixed carbon.
- " 37. Diagram showing boiler efficiency and equivalent evaporation.

#### Part VIII

- Fig. 38. Diagram of simple form of gas producer.
- " 39. Suction gas producer (Ruston and Proctor).
- " 40. Suction gas producer (Pintsch).
- " 41. Gas producer for lignite briquettes (Koerting).
- " 42. Twin down-draft gas producers (Power and Mining Machinery Co.)
- " 43. Double zone gas producer (Westinghouse).
- " 44. Suction producer No. 1, Department of Mechanical Engineering, McGill University.
- " 45. Down-draft producer (No. 4), Department of Mechanical Engineering, McGill University.
- " 46. Forty horse-power gas engine, Department of Mechanical Engineering, McGill University.
- " 47. Section through gas washer, Department of Mechanical Engineering, McGill University.
- " 48. General arrangement of experimental producer gas plant, Department of Mechanical Engineering, McGill University.
- " 49. Diagram showing producer efficiency and coal consumption per B.H.P. per hour.

**Part IX**

- Fig. 50. Stansfield pressure regulators: Models (a) and (b).  
 " 51. Vertical section, Koehler calorimeter bomb.  
 " 52. Vertical section, Koehler calorimeter.  
 " 53. Section of glass parts of Randall and Barnhart gas analysing apparatus.  
 " 54. Diagram of Bone and Wheeler gas analysing apparatus.  
 " 55. Vertical section of Boys' gas calorimeter.  
 " 56. General view of Boys' gas calorimeter.

*Maps.***VOL. I**

- No. 95. General map of Canada, showing coal fields and locations from whence samples of coals were taken.  
 " 96. General map of coal fields of Nova Scotia and New Brunswick.  
 " 97. " showing coal fields in Alberta, Saskatchewan, and Manitoba.  
 " 98. " of coal fields in British Columbia.  
 " 99. " " Yukon Territory.

**APPENDICES.**

- VOL. III—**  
 APPENDIX I  
 COAL WASHING TESTS, by J. B. Porter.
- VOL. IV—**  
 APPENDIX II  
 BOILER TESTS AND DIAGRAMS, by R. J. Durley.
- VOL. V—**  
 APPENDIX III  
 PRODUCER TESTS AND DIAGRAMS, by R. J. Durley.
- VOL. VI—**  
 APPENDIX IV  
 COKING TESTS, by Edgar Stansfield and J. B. Porter.  
 APPENDIX V  
 CHEMICAL TESTS, by Edgar Stansfield.



JENNISON, W. F.

84. Gypsum Deposits of the Maritime Provinces, 1911.

CONTENTS.

Introductory.

CHAPTER I.

HISTORY AND DISTRIBUTION.

History of operations in Nova Scotia.  
History of operations in New Brunswick.

Distribution—

France.  
United States.  
Canada.  
Great Britain.  
Germany.  
India.  
Cyprus.  
Italy.  
Switzerland.  
Australia.  
Newfoundland.

CHAPTER II.

ORIGIN OF GYPSUM.

Anhydrite.  
Gypsite or gypsum earth.

CHAPTER III.

CHEMISTRY AND TECHNOLOGY OF GYPSUM.

Calcining and setting plaster.

CHAPTER IV.

GYPSUM DEPOSITS OF NOVA SCOTIA.

Associated limestone.  
Description of deposits.

CHAPTER V.

GYPSUM DEPOSITS OF NEW BRUNSWICK AND MAGDALEN ISLANDS.

Gypsum deposits of New Brunswick.  
Gypsum deposits of the Magdalen islands.

CHAPTER VI.

MANUFACTURE OF PLASTER.

Description of machinery.  
Objections to the present system of calcining gypsum.  
Cummer system.  
Plans, specifications, and cost of construction for plaster mill.

CHAPTER VII.

PRODUCTS OF GYPSUM.

Plaster of paris.  
Cement plaster.  
Report of fire and water test—  
Method of construction.  
Purpose of the test.  
Temperature.  
Thermometer readings on outside of partitions.  
Water.  
Effect of the test.  
Log of temperature readings: fire test.  
Pottery and terra-cotta  
Plate glass works.

Plaster produced by complete dehydration.  
 Hard wall plasters.  
 Used with Portland cement.  
 Alabastine.  
 As a basis for Portland cement.  
 As a sulphurizing and basic flux.  
 Retarders, their composition and use.  
 Hardening gypsum blocks.

## CHAPTER VIII.

## GYPSUM AS A FERTILIZER.

Methods of applying land plaster.

## CHAPTER IX.

## MANUFACTURING, AND ESTIMATES OF COSTS, WITH MISCELLANEOUS NOTES.

Costs.  
 Freight rates.  
 United States tariff on gypsum.  
 Canadian tariff on gypsum.  
 St. Peter canal.  
 Gypsum mining in United States.  
 Minerals associated with gypsum.  
 Plaster setting.  
 Thermometers.

## CHAPTER X.

## GYPSUM STATISTICS.

United States imports.  
 Canadian statistics.

## Appendix I—

List of maps and drawings relating to this report which are on file at the office of the Mines Branch of the Department of Mines.

## Appendix II—

List of maps published by the Geological Survey Branch of the Department of Mines, which embrace areas described in this report.

## ILLUSTRATIONS.

*Photographs.*

- |       |   |
|-------|---|
| Plate | I. Gypsum quarry at Walton, Hants co., N.S.   |
| "     | II. Boulder from Sanderson's quarry, Beaver brook, N.S., showing conversion of anhydrite to gypsum. |
| "     | III. Transparent crystal of selenite.   |
| "     | IV. Fibrous selenite crystals.  |
| "     | V. Gypsum with embedded selenite crystals.  |
| "     | VI. Gypsum exposures at Aspy bay, C.B.  |
| "     | VII. Gypsum exposures at Ingonish harbour, C.B.   |
| "     | VIII. Gypsum exposures at Aucoin brook, C.B.  |
| "     | IX. Gypsum exposures and works of Great Northern Mining Co., at Aucoin brook, C.B.                  |
| "     | X. Cliffs of anhydrite, Great Bras d'Or lake, C.B.  |
| "     | XI. Victoria Gypsum Co.'s quarry, St. Ann, C.B.   |
| "     | XII. O'Brien quarry, showing pipe or blow-hole, also structure of rock.                             |
| "     | XIII. Loading gypsum at Walton shipping pier.   |
| "     | XIV. The Cove quarry at Cheverie.   |
| "     | XV. Upper Head quarry at Cheverie.  |
| "     | XVI. Meadow quarry, near Windsor, N.S.  |

- Plate XVII. Quarry of the Windsor Gypsum Co., Newport, N.S.  
 " XVIII. Wentworth Gypsum Co.'s quarry, showing method of removing the clay.  
 " XIX. Wentworth Gypsum Co.'s quarry: general view of quarry and transportation to pier.  
 " XX. Wentworth Gypsum Co.'s loading-stage for cars.  
 " XXI. Wentworth Gypsum Co. Loading gypsum into barges.  
 " XXII. Wentworth Gypsum Co. Barges in tow.  
 " XXIII. Folded or crumpled ribbon-like structure of gypsum.  
 " XXIV. Gypsum quarry of Albert Manufacturing Co., Hillsborough, N.B.  
 " XXV. Gypsum quarry of Albert Manufacturing Co., Hillsborough, N.B.  
 " XXVI. SS. *Nanna* loading at low tide: Albert Manufacturing Co., Hillsborough, N.B.  
 " XXVII. Workmen with tools in Gray quarry, Hillsborough, N.B.  
 " XXVIII. Cape Meule, Grindstone island: showing a characteristic rounded topper hill of the Magdalen islands.  
 " XXIX. Ripper or jaw crusher, for coarse reduction.  
 " XXX. Cracker, for fine reduction.  
 " XXXI. Classifier.  
 " XXXII. Vertical burr mill.  
 " XXXIII. Ehrsman's four flue calcining kettle: standard setting.  
 " XXXIV. Enterprise noiseless mixer.  
 " XXXV. Albert Manufacturing Co.'s mill, Hillsborough, N.B.  
 " XXXVI. Howlite associated with gypsum, from Windsor, N.S.

#### *Drawings.*

- Fig. 1. Typical forms of gypsum crystals.  
 " 2. Section through Great Northern Mining Co.'s gypsum deposit, Cheticamp, N.S.  
 " 3. Section of borehole in the Cheverie gypsiferous area.  
 " 4. Side elevation of Cummer continuous calcining plant.  
 " 5. End section " " " "  
 " 6. Plan " " " "  
 " 7. One 6 ft. x 6 ft. kettle plaster mill.  
 " 8. One 6 ft. x 6 ft. " " "  
 " 9. Two 8 ft. x 8 ft. " " "  
 " 10. Two 8 ft. x 8 ft. " " "  
 " 11. Two 8 ft. x 8 ft. " " "  
 " 12. Two 8 ft. x 10 ft. " " "  
 " 13. Three 8 ft. x 10 ft. " " "  
 " 14. Three 8 ft. x 10 ft. " " "  
 " 15. Fireproof wall and fireproof studding of gypsum.  
 " 16. Plan and sections of Olson land plaster distributor.  
 " 17. Sections of Olson land plaster distributor.  
 " 18. General layout of gypsum mill, Great Northern Mining Co., Limited.  
 " 19. Elevation showing layout of plaster mill, Great Northern Mining Co., Limited.

#### *Maps.*

- No. 64. Index map of part of the Province of Nova Scotia, showing distribution of occurrences of gypsum.  
 " 65. Index map of part of the Province of New Brunswick, showing distribution of occurrences of gypsum.  
 " 66. Map of the Magdalen islands, showing gypsum deposits.

### 89. Proceedings of Conference on Proposed Legislation to Regulate the Manufacture, Importation and Testing of Explosives:

PART I.—Session on September 23, 1910.

PART II.—Session on September 30, 1910.

HAANEL, EUGENE, PH.D.

90. Reprint of Presidential address delivered before the American Peat Society at Ottawa, July 25, 1911.

CONTENTS.

- Importance of a peat industry in the middle Provinces, owing to the absence of coal.  
 Estimated area of peat bogs in Canada.  
 Failure of previous industrial enterprises in Canada for the manufacture of peat fuel.  
 Official investigation by the Dominion Government of European methods.  
 Results of the investigation:—  
 (1.) Necessity of substituting machinery for manual labour.  
 (2.) Processes for removal of water content of peat by pressure, and artificial heat, commercial failure.  
 Examples of disappointing experiments on commercial scale—  
 (1.) Electropeat Syndicate, Kilberg, Ireland  
 (2.) Ekenberg wet-carbonization process, Sweden.  
 Critique of attempts to accomplish *economically*, by artificial means, and in a *short time*, what nature takes long periods to attain.  
 Plea for practical methods.  
 General description of Government plant at Alfred, and the approved air-dried method adopted for the manufacture of peat fuel on a commercial scale.  
 Costs per ton of air-dried, machine made peat fuel.  
 Objections to air-drying method answered—  
 Example of Russia cited.  
 Advantages of peat-fuel for domestic purposes.  
 Swedish stove specially designed for burning peat fuel.  
 Comparative cost of coals and peat.  
 Twelve Canadian bogs investigated and mapped.  
 Economy of gas generated from peat fuel by means of gas-producers.  
 Central gas-producer plant, ideal for supplying heat and power to farming and village communities, where coal fuel is practically prohibitive.  
 Description and *modus operandi* of 60 H.P. Korting peat gas-producer in operation at Government fuel testing station, Ottawa.  
 Warning against erection of by-product plants, except within measurable distance of a profitable market.  
 Enumeration of uses to which peat may be applied—  
 (1.) Peat fuel.  
 (2.) Moss litter.  
 (3.) Peat mull.  
 (4.) Alcohol.  
 (5.) Packing paper.  
 (6.) Millboard.  
 (7.) Ammonia.  
 (8.) Nitrates, etc.  
 Conclusion: part which peat is destined to play in the industrial development of Canada.

DESBOROUGH, CAPT. ARTHUR.

92. Report on the Explosives Industry in the Dominion of Canada.

CONTENTS.

- Statement of general principles.  
 Explosives industry in the Dominion—  
 Storage.  
 Transportation.  
 Use.  
 Recommendations  
 (1.) Authorization of explosives.  
 (2.) Licensing of factories.  
 (3.) Control of storage.  
 (4.) Control of transportation.

- (5.) Importation.
  - (6.) Inspection and sampling.
  - (7.) Establishment of testing station.
  - (8.) Accidents in explosive factories.
  - (9.) Accidents in storage, transportation, and use.
- Causes of accidents in the mines, quarries, and construction works in Great Britain.
- (1.) Prematures.
  - (2.) Hang-fires.
  - (3.) Electrical prematures.
  - (4.) Ramming.
  - (5.) Striking unexploded charge when removing debris.
  - (6.) Boring into a missed shot.
  - (7.) Tampering with a missed shot.
  - (8.) Not taking proper cover.
  - (9.) Fumes.
  - (10.) Preparing charges.
  - (11.) Ignition of explosive by spark.
  - (12.) Socketing or springing.
  - (13.) Ignition of fire damp or coal dust.
- Suggested staff of the Explosives Division.

WALKER, T. L., M.A., Ph.D

93. Molybdenum Ores of Canada, 1911.

CONTENTS.

**Part I**

INTRODUCTORY.

On molybdenum ores.  
 General types of occurrence.  
 Concentration of molybdenite.  
 Uses of molybdenum.  
 Molybdenum production.

**Part II**

MOLYBDENUM IN CANADA.

Nova Scotia—  
 Jordan falls.  
 Chester district.  
 Halifax county.  
 Cape Breton.  
 New Brunswick—  
 Quebec—  
 North shore of the St. Lawrence.  
 North of the Ottawa.  
 Northern Pontiac.  
 Ontario—  
 Central Ontario.  
 Eastern Ontario.  
 Northern Ontario.  
 British Columbia—  
 Texada island.  
 Vancouver island.  
 Coast region.  
 Interior.

Other molybdenite occurrences.  
 General conclusion.  
 Bibliography.  
 Index.

## ILLUSTRATIONS.

*Photographs.*

- Plate I. Quarry in granite carrying molybdenite, Cooper, Maine.  
 " II. Concentration for dry treatment of molybdenite ores, Cooper, Maine.  
 " III. Elmore vacuum concentrator.  
 " IV. Pegmatite stringers in gneiss, Romaine.  
 " V. Old concentrator of the Harvey Hill mine, Broughton, Que.  
 " VI. Shaft house, Height of Land Mining Co.  
 " VII. Molybdenite-bearing quartz mass, Doucet and Sweezie claims.  
 " VIII. Open-cut on the molybdenite deposit, Harcourt township.  
 " IX. Open-cut on the Dwyer deposit.  
 " X. Elliott's mine, Cardiff township, general view.  
 " XI. " " " ore pile.  
 " XII. Chief pit on the Jamieson claim, Lyndoch township.  
 " XIII. Pegmatite dike, Jamieson claim, Lyndoch township.  
 " XIV. Pit on the Hunt property.

*Drawings.*

- Fig. 1. Typical form of occurrence of molybdenite.  
 " 2. Elmore vacuum concentrator.  
 " 3. Sketch map showing geological relations of region around confluence of  
 Main stream and Burnt Hill brook.  
 " 4. Map of portion of north shore Gulf of St. Lawrence.  
 " 5. Molybdenite along border of pegmatite in sillimanite gneiss, Romaine.  
 " 6. Map of region north of Ottawa river, showing position of chief molybdenite  
 occurrences.  
 " 7. Sketch map showing claims staked for molybdenum on Indian peninsula.  
 " 8. Map of the Lake Keewagama molybdenite region.  
 " 9. Section in pit on lot 3, concession A, Somerville township.  
 " 10. Section of shaft showing molybdenite, lot 11, concession IX, Cardiff town-  
 ship.

## PART III.

### STATISTICAL REPORTS ON MINERAL RESOURCES, ETC.

NOTE.—Unless otherwise indicated, a charge of 10 cents will be made for each of the following reports; but a single copy will be sent free to any *bona fide* applicant in Canada who may be specially interested in the district to which the report refers.

McLEISH, JOHN, B.A.

#### 26. Annual Report on the Mineral Production of Canada during the Calendar year, 1906.\*

##### CONTENTS.

Letter of transmittal.  
Explanatory notes.  
Introduction.  
Summary of production.

##### METALLIC PRODUCTS.

Precious metals—

Gold.  
Silver.

Copper.

Iron.

Lead.

Nickel.

Zinc.

Miscellaneous metallic—

Aluminium.

Antimony.

Mercury.

Platinum.

Palladium.

Tin.

##### NON-METALLIC PRODUCTS.

Abrasive materials—

Corundum.

Grindstones.

Tripolite.

Asbestos.

Chromite.

Coal and coke.

Peat.

Graphite.

Gypsum.

Manganese.

Mica.

Mineral pigments—

Ochres.

Barytes.

Mineral water.

Natural gas.

Petroleum.

Phosphate.

Pyrites.

Salt.

\*The reports on the mineral production of Canada, prior to 1906, were published by the Geological Survey, and are recorded in the "Catalogue of Publications of the Geological Survey, Canada," No. 1073, issued in 1909.

## Miscellaneous non-metallic—

Arsenic.  
 Chalk (imports).  
 Whiting (imports).  
 Feldspar.  
 Fire-clay.  
 Moulding sand.  
 Quartz.  
 Soapstone and talc.

## Structural materials—

Building stone.  
 Marble.  
 Granite.  
 Slate.  
 Flagstone.  
 Cement.  
 Lime.  
 Clay products.  
 Sands and gravel (exports).

McLEISH, JOHN, B.A.

27. Preliminary Report on the Mineral Production of Canada in 1908.  
 31. The Production of Cement in Canada during the calendar year 1908.  
 42. The Production of Iron and Steel in Canada during the calendar years 1907 and 1908.  
 43. The Production of Chromite in Canada during the calendar years 1907 and 1908.  
 44. The Production of Asbestos in Canada during the calendar years 1907 and 1908.  
 45. The Production of Coal, Coke, and Peat in Canada during the calendar years 1907 and 1908.  
 46. Production of Natural Gas and Petroleum in Canada during the calendar years 1907 and 1908.

McLEISH, JOHN, B.A.

58. Annual Report of the Division of Mineral Resources and Statistics on the Mineral Production of Canada during the calendar years 1907 and 1908.

## CONTENTS.

Letter of transmission.  
 Explanatory notes—  
 Definition of the terms "ton" and "year" used.  
 Basis of valuation and compilation.

## MINERAL PRODUCTION OF CANADA.

Introduction—  
 Summary of production in Canada.  
 Summary of exports and imports.  
 Summary of production in the respective provinces.

## METALLIC ORES.

Smelter production:—  
 Refined metals; nickel-copper matte, blister copper, copper matte, etc; operating smelters.

Copper:—  
 Production in Canada of copper contained in ore; copper recovered by smelters; prices, exports and imports; production in Nova Scotia, Quebec, Ontario, British Columbia, and Yukon; operating companies.



## Gold:—

Refined metal: Mine production in Canada, 1858-1908. Production in Nova Scotia, Quebec, Ontario, Alberta, British Columbia, and Yukon; operating companies.

## Iron:—

Iron ore: production in Canada, and by provinces; list of operators; exports and imports.

Pig iron and steel: production in Canada, and by provinces; ferro-products; bounties; exports and imports; operating companies.

## Lead:—

Production in Canada; refined pig lead; prices, bounties, exports and imports; production in Ontario and British Columbia.

## Nickel:—

Production in Ontario; exports and imports; prices; monel metal.

## Silver:—

Production in Canada; prices; refined silver; production in Quebec, Ontario, British Columbia, and Yukon.

## Zinc:—

Production; imports.

## Miscellaneous:—

Aluminium, antimony, cobalt, mercury, molybdenum, platinum, palladium, tin, and tungsten.

## NON-METALLIC PRODUCTS.

## Abrasive materials: Production, exports and imports:—

Corundum: Ontario.

Grindstone: Nova Scotia and New Brunswick.

Tripolite: Nova Scotia.

## Asbestos:—

Production in Quebec, prices, exports and imports; world's production; list of operators.

## Chromite:—

Production in Quebec, exports; consumption in United States; world's production; list of operators.

## Coal:—

Production in Canada, exports and imports, consumption; production in Nova Scotia, New Brunswick, Saskatchewan, Alberta, British Columbia, and Yukon; labour statistics.

## Coke:—

Production in Canada, exports and imports; production in Nova Scotia, Alberta, and British Columbia.

## Peat.

## Graphite.

Production in Canada, exports and imports; artificial graphite.

## Gypsum:—

Production in Canada, exports and imports; production in Nova Scotia, New Brunswick, Ontario, and Manitoba; operating companies.

## Manganese:—

Production, exports and imports.

## Mica:—

Production in Quebec and Ontario, exports; consumption in United States.

## Mineral pigments:—

Ochres: production, exports and imports.  
Barytes: production and imports.

## Mineral water:—

Production and imports.

## Natural gas:—

Production in Quebec, Ontario, and Alberta; legislation regulating export.

## Petroleum:—

Bounty; production in Ontario; production of oil refineries; exports and imports.

## Phosphate:—

Production in Quebec and Ontario; exports.

## Pyrites:—

Production in Quebec and Ontario; exports; imports of brimstone and sulphur.

## Salt:—

Production in Ontario; exports, imports and consumption; operating companies.

## Miscellaneous:—

Arsenic, calcium carbide, chalk and whiting, feldspar, fluorspar, magnesite, quartz, and talc.

*Structural Materials and Clay Products.*

## Cement:—

Production, exports, imports, consumption, operating companies.

## Clay products:—

Building, paving and ornamental brick; fireclay and fireclay products; pottery, sewer-pipe, tiles, etc.

## Lime:—

Production by provinces: exports and imports.

## Sand-lime brick:—

Production.

## Sands and gravels:—

Exports and imports.

## Slate:—

Production, exports and imports.

## Stone:—

Building stone, granite, marble, and flagstone.

McLEISH, JOHN, B.A.

62. Preliminary Report on the Mineral Production of Canada, 1909.

79. The Production of Iron and Steel in Canada during the calendar year 1909.

80. The Production of Coal and Coke in Canada during the calendar year 1909.

85. The Production of Cement, Lime, Clay Products, Stone, and other Structural Materials in Canada during the calendar year 1909.

McLEISH, JOHN, B.A.

88. Annual Report of the Division of Mineral Resources and Statistics on the Mineral Production of Canada during the calendar year 1909.

CONTENTS.

Letter of transmission.

Explanatory notes:—

Definition of the terms "ton" and "year" used.

Basis of valuation and compilation.

MINERAL PRODUCTION OF CANADA.

Introduction:—

Summary of Production in Canada.

Summary of Exports and Imports.

Summary of Production in the respective provinces.

METALLIC ORES.

Smelter production:—

Refined metals; nickel-copper matte, blister copper, copper matte, etc.; operating smelters.

Copper:—

Production in Canada; prices, exports and imports; production in Nova Scotia, Quebec, Ontario, British Columbia, and Yukon; operating companies.

Gold:—

Refined metal—Production in Canada, 1858-1909. Production in Nova Scotia, Quebec, Ontario, Alberta, British Columbia, and Yukon; operating companies.

Iron:—

Iron ore: production in Canada and by provinces; list of operators; exports and imports.

Pig iron and steel: production in Canada, and by provinces; ferro-products; bounties; exports and imports; operating companies.

Lead:—

Production in Canada; refined pig lead; prices, bounties, exports and imports; production in Ontario, and British Columbia.

Nickel:—

Production in Ontario; exports and imports; prices; monel metal.

Silver:—

Production in Canada; prices; refined silver; production in Quebec, Ontario, British Columbia, and Yukon.

Zinc:—

Production; imports.

Miscellaneous:—

Aluminium, antimony, cobalt, mercury, molybdenum, platinum, palladium, tin, and tungsten.

NON-METALLIC PRODUCTS.

Abrasive materials: production, exports and imports:—

Corundum: Ontario.

Grindstone: Nova Scotia and New Brunswick.

Tripolite: Nova Scotia.

- Asbestos:—  
Production in Quebec, prices, exports and imports; world's production; list of operators.
- Chromite:—  
Production in Quebec, exports; consumption in United States; world's production; list of operators.
- Coal:—  
Production in Canada, exports and imports, consumption; production in Nova Scotia, New Brunswick, Saskatchewan, Alberta, British Columbia, and Yukon; labour statistics.
- Coke:—  
Production in Canada, exports and imports; production in Nova Scotia, Alberta, and British Columbia.
- Graphite:—  
Production in Canada, exports and imports; artificial graphite.
- Gypsum:—  
Production in Canada, exports and imports; production in Nova Scotia, New Brunswick, Ontario, and Manitoba; operating companies.
- Manganese:—  
Production, exports and imports.
- Mica:—  
Production in Quebec and Ontario, exports; consumption in United States.
- Mineral pigments:—  
Ochres: production, exports and imports.  
Barytes: production and imports.
- Mineral water:—  
Production and imports.
- Natural Gas:—  
Production in Quebec, Ontario, and Alberta; legislation regulating export.
- Peat.
- Petroleum:—  
Bounty; production in Ontario; production of oil refineries; exports and imports.
- Phosphate:—  
Production in Quebec and Ontario; exports.
- Pyrites:—  
Production in Quebec and Ontario; exports; imports of brimstone and sulphur.
- Salt:—  
Production in Ontario; exports, imports, and consumption; operating companies.
- Miscellaneous:—  
Arsenic, calcium carbide, chalk and whiting, feldspar, fluorspar, magnesite, quartz, and talc.

*Structural Materials and Clay Products.*

- Cement:—  
Production, exports, imports, consumption, operating companies.

## Clay products:—

Building, paving and ornamental brick; fireclay [and fireclay products; pottery, sewerpipe, tiles, etc.

## Lime:—

Production by provinces; exports and imports.

## Sand-lime brick:—

Production.

## Sands and gravels:—

Exports and imports.

## Slate:—

Production, exports and imports.

## Stone:—

Granite and other igneous rocks, limestone, marble and sandstone.

McLEISH, JOHN, B.A.

102. Preliminary Report on the Mineral Production of Canada during the calendar year 1910.
114. The Production of Cement, Lime, Clay Products, Stone, and other Structural Materials in Canada during the calendar year 1910.
115. The Production of Iron and Steel in Canada during the calendar year 1910.
116. The Production of Coal and Coke in Canada during the calendar year 1910.
117. A General Summary of the Mineral Production in Canada during the calendar year 1910.

McLEISH, JOHN, B.A.

143. Annual Report on the Mineral Production of Canada during the calendar year 1910.

## CONTENTS.

Letter of transmission.

Explanatory notes:—

Definition of the terms "ton" and "year" used.

Basis of valuation and compilation.

Mineral Production of Canada:—

General Summary:—

Mineral Production in Canada 1909 and 1910, comparative table

General Tables of Exports and Imports.

Metallic Ores and products.

Non-Metallic products.

Structural Material and Clay Products.

Production by Provinces, 1909 and 1910.

Mine Production.

Smelter Production.

## METALLIC ORES.

Copper:—

Production in Canada: prices, exports and imports; production in Nova Scotia, Quebec, Ontario, British Columbia, and Yukon; operating companies.

Gold:—

Refined metal: Production in Canada 1858—1910. Production in Nova Scotia, Quebec, Ontario, Alberta, British Columbia, and Yukon; operating companies.

Iron:—

Iron ore: production in Canada and by provinces; list of operators; exports and imports.

Pig iron and steel: production in Canada, and by provinces ferro-products; bounties; exports and imports; operating companies.

## Lead:—

Production in Canada: refined pig lead; prices, bounties, exports and imports; production in Ontario and British Columbia.

## Nickel:—

Production in Ontario: exports and imports; prices.

## Silver:—

Production in Canada: prices; refined silver; production in Quebec, Ontario, British Columbia, and Yukon.

## Zinc:—

Production: imports.

## Miscellaneous:—

Aluminium, antimony, cobalt, mercury, molybdenum, platinum, palladium, tin, and tungsten.

## NON-METALIC PRODUCTS.

## Abrasive Materials: Production, Exports and Imports:—

Corundum: Ontario.

Grindstone: Nova Scotia, and New Brunswick.

Tripolite: Nova Scotia.

## Asbestos:—

Production in Quebec: prices, exports and imports; world's production; list of operators.

## Chromite:—

Production in Quebec: exports; consumption in United States; list of operators.

## Coal:—

Production in Canada: exports and imports; consumption; production in Nova Scotia, New Brunswick, Saskatchewan, Alberta, British Columbia, and Yukon; labour statistics.

## Coke:—

Production in Canada: exports and imports; production in Nova Scotia, Alberta, and British Columbia.

## Feldspar:—

Production in Canada: exports; buyers in United States and Canada; uses. Feldspar deposits; operating companies.

## Graphite:—

Production in Canada: exports and imports; artificial graphite; list of operators.

## Gypsum:—

Production in Canada: exports and imports; production in Nova Scotia, New Brunswick, Ontario, and Manitoba; operating companies.

## Manganese:—

Production: exports and imports.

## Mica:—

Production in Quebec and Ontario: exports; consumption in United States; operating companies.

## Mineral Pigments:—

Ochres: production; exports and imports.

Barytes: production and imports.

## Mineral Water:—

Production and imports; list of operators.

## Natural Gas:—

Production in Quebec, Ontario, and Alberta; list of operators.

## Peat.

## Petroleum:—

Bounty; production in Ontario, and New Brunswick, refined oils inspected; exports and imports.

## Phosphate:—

Production in Quebec and Ontario; exports.

## Pyrites:—

Production in Quebec and Ontario; exports; imports of brimstone and sulphur; operators.

## Salt:—

Production in Ontario; exports, imports, and consumption; operating companies.

## Miscellaneous:—

Arsenic, Calcium carbide, chalk and whiting, fluorspar, magnesite, quartz, and talc.

## STRUCTURAL MATERIALS AND CLAY PRODUCTS.

## Cement:—

Production; exports; imports; consumption; operating companies.

## Clay Products:—

Building, paving, and ornamental brick; fireclay, and fireclay products; pottery, sewerpipe, tiles, etc. Clay deposits of Alberta and British Columbia.

## Lime:—

Production by provinces; exports and imports.

## Sand-Lime Brick:—

Production.

## Sands and Gravels:—

Exports and imports.

## Slate:—

Production; exports and imports.

## Stone:—

Granite and other igneous rocks, limestone, marble, and sandstone.





## PART IV.

# RECORDS OF CHEMICAL LABORATORY TESTS AND ANALYSES: SPECIAL SCHEDULE OF CHARGES FOR ANALYSES, EXAMINATIONS, ETC.

NOTE.—Unless otherwise indicated, a charge of 10 cents will be made for each of the following reports; but a single copy will be sent free to any *bona fide* applicant in Canada who may be specially interested in the district to which the report refers.

WAIT, F. G., M.A., F.C.S.

59. Report of Analyses of Ores, Non-Metallic Minerals, Fuels, Etc., made in the Chemical Laboratories during the years 1906, 1907, 1908.\*

### CONTENTS.

#### I. ROCK ANALYSES.

1. Crushed granodiorite—Osoyoos lake, B.C.
2. Porphyritic olivine-syenite—Baker creek, B.C.
3. Harzburgite—one mile northwest of Monument 172, B.C.
4. Augite-biotite syenite porphyry, between Sophie mountain and Kettle river, B.C.
5. Augite-biotite latite—Record Mountain ridge, west of Rossland.
6. Augite-olivine (-biotite) latite flow, associated with preceding specimen.
7. Hornblende-augite minette dyke—west bank of Columbia river, B.C.
8. Alkaline biotite granite—east of Lake mountain, B.C.
9. Granodiorite—two miles west of Trail, B.C.
10. Monzonite—one mile west of Coryell station, B.C.
11. Dunite intrusion—four miles and a half west of Coryell station, West Kootenay, B.C.
12. Porphyritic missourite dyke—west of Rossland, B.C.
13. Augite latite—three miles N.N.E. of Record mountain, near Rossland.
14. Hornblende augite latite—east of Sayward station at Columbia river, B.C.
15. Kersantite dyke—one mile north of Lost creek, B.C.
16. Monzonite stock—two miles north of Lost creek, B.C.
17. Olivine-augite minette—summit of Selkirk range, B.C.
18. Basic granodiorite—six miles and a half north of Irene mountain, B.C.
19. Augite minette dyke—two miles and a half N.N.E. of North Star mountain.
20. Crushed biotite (muscovite) granite—Port Hill, B.C.
21. Granodiorite—along Similkameen river, B.C.
22. Biotite granite—summit of Bannerman ridge, B.C.
23. Gneissic biotite granite—two miles southwest of Cathedral peak, B.C.
24. Augite-hornblende-biotite gabbro—four miles and a half west of Cathedral Mountain ridge, B.C.
25. Quartz mica diorite—five miles west of Cathedral peak, B.C.
26. Granodiorite—two miles N.N.E. of Castle Mountain summit, B.C.
29. Rhomben feldspar—Rock creek, Kettle river, B.C.

#### II. COALS AND LIGNITES.

Lignites from:—

1. North and west of Cumberland lake, Sask.
2. Bow river, twenty miles south of Brooks, Alta.
3. Sec. 9, Tp. 17, R. 17, W. of 4th meridian, Alta.
4. Sec. 30, Tp. 28, R. 23, W. of 4th meridian, Alta.
5. Bore hole No. 2, on Jasper Ave., Edmonton, Alta.
6. River lots 22 and 24, Edmonton, Alta.

\*Prior to April 27, 1907, the various chemical analyses were made under the auspices of the Geological Survey, and the records of these will be found scattered throughout the publications of that Branch of the Department of Mines.

7. River lot 26, Edmonton, Alta.
8. River lot 7, Strathcona, Alta.
9. River lot 19, Strathcona, Alta.
10. Sec. 18, Tp. 48, R. 19, W. of 4th meridian, Alta.
11. Sec. 28, Tp. 46, R. 20, W. of 4th meridian, Alta.
- 12, 13. Sec. 12, Tp. 38, R. 22, W. of 4th meridian, Alta.
- 14, 15. Sec. 34, Tp. 38, R. 23, W. of 4th meridian, Alta.
16. Sec. 22, Tp. 31, R. 24, W. of 4th meridian, Alta.
17. Sec. 26, Tp. 31, R. 24, W. of 4th meridian, Alta.
- 18, 19. N.W.  $\frac{1}{4}$ , Sec. 24, Tp. 55, R. 24, W. of 4th meridian, Alta.
20. N.E.  $\frac{1}{4}$ , Sec. 23, Tp. 55, R. 24, W. of 4th meridian, Alta.
- 21, 22. S.E.  $\frac{1}{4}$ , Sec. 8, Tp. 55, R. 24, W. of 4th meridian, Alta.
- 23, 24, 25. Sec. 25, Tp. 51, R. 25, W. of 4th meridian, Alta.
26. N.W.  $\frac{1}{4}$ , Sec. 7, Tp. 23, R. 53, W. of 4th meridian, Alta.
27. Boulder on S.E. cor of Strathcona townsite.
28. Sec. 7, Tp. 23, R. 5, W. of 5th meridian (Bragg creek), Alta.
- 29, 30. Sec. 25, Tp. 21, R. 7, W. of 5th meridian, Alta.
31. Sec. (?), Tp. 52, R. 7, W. of 5th meridian, Alta.
32. Jocks Crossing, Tp. 53, R. 7, W. of 5th meridian, Alta.
33. Sec. 27 and 28, Tp. 53, R. 7, West of 5th meridian, Alta.
34. S.E.  $\frac{1}{4}$ , Sec. 33, Tp. 53, R. 7, W. of 5th meridian, Alta.
- 35, 36. N.E.  $\frac{1}{4}$ , Sec. 33, Tp. 53, R. 7, W. of 5th meridian, Alta.
37. Wolf creek, Tp. 52, R. 15, W. of 5th meridian, Alta.
- 38-41. Foothills of the Rockies, 200 miles west of Edmonton.
42. Similkameen river, B.C.
43. Sourdough mine, Coal creek, Yukon.
- 44-47. Tantalus butte, Yukon.
- 48, 49. Opposite 69th mile-post on Whitehorse and Dawson wagon road, Yukon.

Lignitic coals from:—

50. Genest's first stake on Coal creek, Alta.
51. Coal creek, Prairie creek, Alta.
52. N.  $\frac{1}{4}$  of Sec. 28, Tp. 15, R. 27, W. of 4th meridian, Alta.
53. Foothills of the Rockies, 200 miles W. of Edmonton, Alta.
54. Subsec. 3, Sec. 16, Tp. 6, R. 30, W. of 4th meridian, Alta.
55. East of Elk lake, B.C.
56. Collins gulch, near Granite creek, Tulameen river, B.C.
57. Caribou cove, Cape Breton co., Nova Scotia.
58. Mabou coal mine, Inverness co., Nova Scotia.
59. Big Marsh, Antigonish co., Nova Scotia.
60. Richmond mine, Richmond co., Nova Scotia.
61. "The W. Gamble" claim, in Sec. 10, Tp. 40, R. 19, W. of 5th meridian, Alta.
62. "The Daly" claim, Sec. (?), Tp. 40, R. 19, W. of 5th meridian, Alta.
63. "The Big" seam (S.E. of), in Sec. 2, Tp. 40, R. 19, W. of 5th meridian, Alta.
64. "The H. B. McGivern" claim, Sec. 27, Tp. 39, R. 17, W. of 5th meridian, Alta.
65. Sec. 9, Tp. 7, R. 3, W. of 5th meridian, Alta.
66. Sec. 28, Tp. 42, R. 19, W. of 5th meridian, Alta.
67. Wapiabi creek, in Sec. 34, Tp. 40, R. 18, W. of 5th meridian, Alta.
68. Crownest Pass, two miles south of Frank, Alta.
69. S.W. of Frank, along the line of the C. N. P. Ry.
70. Thorn mine on Sec. 8, Tp. 23, R. 6, W. of 5th meridian, Alta.
71. Shaw's mine on N.W.  $\frac{1}{4}$  of Sec. 7, Tp. 22, R. 3, W. of 5th meridian, Alta.
72. Sheep creek, Sec. 30, Tp. 19, R. 4, W. of 5th meridian, Alta.
73. " Sec. 36, Tp. 19, R. 5, W. of 5th meridian, Alta.
74. " Sec. 30, Tp. 19, R. 4, W. of 5th meridian, Alta.
75. Foothills of the Rockies, 200 miles W. of Edmonton, Alta.
76. A 24 ft. seam, near McEvoy's trail.
- 77-79. "Dockrill" coal, Morice river, Skeena mining division, B.C.
80. West side of Okanagan lake, B.C.

81. Northwest quarter of the Indian Reserve, in Nicola valley, B.C.
82. From banks of stream flowing into Elk river, on east side of Fox Mountain, B.C.
83. Goat creek, Omineca mining division, B.C.
84. Aldrich creek, Elk river, B.C.
85. Whitehorse coal fields, near Dugdale siding, Yukon.
- 86-88. Tantalus coal mine, Lewes river, Yukon.
- 89-91. Five Fingers mine, Lewes river, Yukon.

## Anthracite coal from:—

92. Bragg creek, Alta.
93. Seam No. 6, Canmore mine, Alta.
94. Coxcomb mountain, on Sec. 34, Tp. 2, R. 7, W. of 5th meridian, Alta.
95. Sec. 1, Tp. 25, R. 11, W. of 5th meridian, Alta.
96. Hudson Bay mountain, B.C.
- 97-98. Whitehorse coal fields, twelve miles W. of Dugdale, Yukon.
99. Opposite 114th mile-post on Whitehorse and Dawson road, Yukon.

## Semi-anthracite from:—

- 100, 101. P. Burns' mine on Sec. 11, Tp. 19, R. 7, W. of 5th meridian, Alta.

## Anthracite from—

102. Whitehorse coal fields, twelve miles west of Dugdale, Yukon.

## III. PEAT—

1. Mer Bleu, Carleton and Russell counties, Ont.
2. Alfred, Prescott county, Ont.
3. Welland county, Ont.
4. Newington, Stormont county, Ont.
5. Perth, Lanark county, Ont.
6. Victoria Road, Victoria county, Ont.

## IV. LIMESTONES AND DOLOMITES—

## British Columbia—

1. Texada island.
2. Vancouver island.
3. Vicinity of Trail.

## Ontario—

4. Glengarry county, lot 27, con. V, of Kenyon tp.
- 4a. Timagami dist., lot 3, recorded number 1347.

## Quebec—

5. Argenteuil county, lots 9-13, range II, of Montcalm.
- 6, 7. Wolfe co., lot 22, range VII, of Canton of Weedon.
- 8, 9. Wolfe co., lots 194, 195 and 196, of village of Lake Weedon.

## Nova Scotia—

10. Morrison's mill, near East Bay, Cape Breton county.
11. Churchill quarry, Hants county.
11. Stephens manganese mine, Hants county.
- 12, 13. Antigonish county.
- 14-57. Cape Breton county.
- 59-64. Colchester county.
- 65-67. Cumberland county.
- 68-71. Guysborough county.
72. Hants county.
- 73-157. Inverness county.
- 158-167. Richmond county.
- 168-183. Victoria county.

## V. IRON ORES—

## Yukon—

1. Vicinity of Takhini spring.

## British Columbia—

## Magnetite from:—

Vancouver and Texada islands.

## Limonite from:—

Vancouver island, Quatsino sound.

## Alberta—

## Magnetite from:—

Two miles north of Burmis siding.

## Limonite from:—

Red Deer river, east of Kneehill.

## Clay ironstone from:—

Bow river.

Bellevue, on Crowsnest Pass railway.

## Saskatchewan—

## Clay ironstone from:—

Pas mountain.

## Manitoba—

Hematite from near Deepdale, on C. N. Ry.

## Ontario—

## Magnetite from:—

Eighty miles west of Port Arthur, on C. N. Ry.

Lot 1, con. IV, of Homer township, Thunder Bay district.

Lot 1, con. II, of Homer township, Thunder Bay district.

Ten miles west of Savant lake, Thunder Bay district.

Huron Mountain mine, Timagami district.

## Hematite from:—

Gunflint lake, Thunder Bay district.

Somerville township, Victoria county.

Wabamush river at N.W. part of Lake Nipigon.

## Limonite from:—

Lot F, con. XIX, of Tiny township, Simcoe county.

" 26, " III, of Oakley,, Muskoka district.

" 27, " III, " "

" 28, " III, " "

" 29, " III, " "

" 29, " V, " "

" 17, " III, of Draper, "

## Quebec—

Missisquoi county.

Pontiac county.

Ottawa county..

Pontiac county.

## New Brunswick—

## Gloucester county—

At Austin brook, on lot 12, range XVII, of Bathurst

## Nova Scotia—

Annapolis county: hematite from

" " magnetite "

Antigonish " hematite "

Cape Breton " hematite "

" " magnetite "

Colchester " hematite "

" " magnetite "

Cumberland	"	hematite	from
Guysborough	"	hematite	"
"	"	limonite	"
Hants	"	hematite	"
"	"	limonite	"
"	"	clay ironstone	from
Inverness	"	magnetite with hematite	from
Richmond	"	hematite	from
Westmoreland	"	hematite	"

#### VI. CHROME IRON ORES—

Megantic county, Black lake—			
Township of Coleraine.			
Lot	6, range	B, of Coleraine.	
"	7, "	B,	"
"	26, "	B,	"
Lots 25 and	26, "	II,	"
Lot	26, "	II,	"
"	8, "	XIII,	"
"	5, "	IV,	"
"	19, N.W.		"
Block A			
Lot 28, range II, of Ireland township.			

Wolfe county—  
Lots 36 and 37, range V, of Garthby.

#### VII. COPPER ORES—

British Columbia—  
Moresby island

Ontario—

Algoma district—  
Lot 10, con. V, of Cobden.  
Nipissing district—  
Lot 2, con. VI, of James.  
S.E.  $\frac{1}{4}$  of lot 6, con. VI, of James.  
Lot 2, con. III, of Field.

Quebec—

Megantic county—  
S.W.  $\frac{1}{4}$  of Lot 14, R. 14, and the S.W.  $\frac{1}{4}$  of Lot 14, R. 'B' of Leeds

#### VIII. GOLD AND SILVER ASSAYS—

Yukon district.  
British Columbia.  
Saskatchewan.  
Ontario.  
Quebec.  
New Brunswick.  
Nova Scotia.

#### IX. NATURAL WATERS—

From a spring on the bank of Shuswap river, eight miles north of Enderby, B.C.  
From Vancouver island.  
From a brine spring on left bank of Carrot river in Tp. 52, R. 2, W. of 2nd meridian, Sask.  
From lot 22, con. X, of Clarence, Russell county, Ont.  
" 9, " I, of Finch, Stormont county, Ont.  
" 28, " VI, of Cambridge, Russell county, Ont.  
" the Timagami spring, near Cobalt, Ont.  
" an artesian well at or near the corner of Duvernay and Levis sts., in Ste. Cunegonde, a suburb of Montreal, Que.

- From L'Epiphanie spring, L'Assomption county, Que.  
 " Lot 7, range V, of Eardley, Ottawa county, Que.  
 " Lot 6, range VIII, of Eardley, Ottawa county, Que.

#### X. BRICK AND POTTERY CLAYS—

- Cascade mountain, B.C.  
 Morden Estate on Sec. 22, Tp. 30, R.—W. of 4th meridian, Alta.  
 Sec. 9, Tp. 31, R. 23, W. of 4th meridian, Alta.  
 Sec. 15, Tp. 29, R. 23, W. of 4th meridian, Alta.  
 North bank of the South Saskatchewan, six miles above Medicine Hat, Sask.  
 Crockford mines, south bank of South Saskatchewan, six miles above  
 Medicine Hat, Alta.  
 Underclay from a coal seam on the south bank of the South Saskatchewan,  
 three miles and a half above Medicine Hat, Alta.  
 Sec. 32, Tp. 30, R. 3, W. of 4th meridian, Alta.  
 Twenty miles south of Moosejaw, Sask.  
 Roche Percee, near Souris Coal mine, Sask.  
 North and west of Cumberland lake, Sask.  
 Sec. 14, Tp. 2, R. 8, west of the 2nd meridian, Sask.  
 N.E.  $\frac{1}{4}$ , Sec. 28, Tp. 36, R. 7, W. of 3rd meridian, Sask.  
 E.  $\frac{1}{4}$ , Sec. 28, Tp. 12, R. 24, W. of 2nd meridian, Sask.  
 Vicinity of Riding mountain, Man.  
 Sec. 12, Tp. 5, R. 20, E. of principal meridian, Man.  
 LaRivière, Lisgar county, Man.  
 E.  $\frac{1}{4}$  lot 9, con. XI, of Greenock township, Bruce county, Ontario.  
 Whitefish river, ten miles and a half north of Lake Abitibi, Ont.  
 Lot 17, con. III, of March, Carleton county, Ont.  
 West of Bell river, on the line of the G.T.P.  
 Lot 14, R. IX, of Hull tp., Ottawa county, Que.  
 From a lake bottom in Salisbury parish, Westmoreland county, N.B.  
 Vicinity of the Minto mining district, Sunbury county, N.B.  
 Underlying a seam of coal on the farm of Fred. Sypher, Flowers cove, Grand  
 lake, Queens county, N.B.  
 Underlying a seam of coal in shaft No. 2 of the Rothwell Coal Company's  
 mine, Queens county, N.B.  
 Diogenes brook, River Denys district, Inverness county, N.S.  
 John McDonald's farm, Cross Roads, Leitch creek, Cape Breton county, N.S.

#### XI. MISCELLANEOUS EXAMINATIONS—

- Quartz sand—from lots 48 and 49, con. I, of Oneida, Haldimand county, Ont.  
 Graphitic shale—from Frenchvale, Cape Breton county, N.S.  
 Graphitic shale—vicinity of West bay, Cape Breton county, N.S.  
 Carbonaceous shale—Stewart brook, Pictou county, N.S.

#### Appendix—

- Description of commercial methods and apparatus for analysis of oil-shales,  
 by H. A. Leverin.  
 List of Mines Branch Publications.

#### ILLUSTRATIONS.

##### Photographs.

- Plate I. Apparatus for determination of Crude Oil.  
 " II. " " " Ammonium Sulphate.

**Chemical Laboratories and Assay Offices, Ottawa—**

**SCHEDULE OF CHARGES**

(Revised, Dec. 1, 1911.)

Free chemical analyses and assays of metallic and non-metallic minerals have been discontinued, and the charges indicated in the following schedule were duly authorized on June 29, 1909.

Specimens will be dealt with in the order of their arrival: at such times as do not interfere with regular departmental research work.

TERMS:—Money in payment of fees—sent in by registered letter, Post Office Order, Postal Note, or Express Order, etc., and made payable to the Director of Mines—must invariably accompany the samples, as no examination will be commenced until the regulation fee is paid.

Specimens should be addressed as follows:—

To—

DIRECTOR OF MINES BRANCH,  
DEPARTMENT OF MINES,  
OTTAWA.

**TARIFF OF FEES FOR ANALYSES AND ASSAYS.**

**1. ASSAYS:—**

Gold.....	\$ 2 00
Silver.....	2 00
Platinum.....	4 00
Gold and silver in one sample.....	2 50
Gold and platinum in one sample.....	5 00
Gold, silver, and platinum in one sample.....	6 00
Iridium, palladium, and osmium—each.....	5 00

**2. IRON ORES—**

Determination of:—

i. Iron—metallic.....	2 00
ii. Iron, and insoluble residue.....	2 50
iii. Ferrous oxide.....	3 00
iv. Sulphur.....	2 00
v. Phosphorus.....	3 00
vi. Titanium.....	3 00
vii. Iron, sulphur, phosphorus, and insoluble matter.....	5 00
viii. Manganese.....	2 00
ix. Complete analysis—determination of ferrous oxide, ferric oxide, total metallic iron, silica, manganese, alumina, lime, magnesia, sulphur, phosphorus, titanium, water.....	20 00

**3. LIMESTONES, DOLOMITES, AND MARLS—**

Determination of:—

i. Insoluble matter, oxide of iron and alumina together, lime, and magnesia.....	5 00
ii. Insoluble residue and magnesia (qualitative test only).....	1 50
iii. Insoluble residue and magnesia (quantitative determination).....	3 50
iv. Phosphoric anhydride.....	3 00
v. Carbonic anhydride (carbonic acid gas).....	3 00

**4. CLAY, CLAY SHALE, AND CEMENT STONE:—**

i. Qualitative examination of clay as to its adaptability for manufacture of porcelain, bricks, and refractory ware.....	2 00
ii. Examination of clay, shale, or cement stone, for cement manufacture—determination of silica, iron oxide, alumina, lime, magnesia, and volatile matter.....	10 00
iii. Complete analysis of clay, shale, etc., including determination of: silica, free and combined, ferric oxide, ferrous oxide, alumina, lime, magnesia, titanate oxide, carbonic anhydride, carbon, sulphur, and combined water.....	25 00

## 5. COALS, LIGNITES, AND COKE—

## Determination of:—

i. Water, volatile matter, fixed carbon, and ash.....	\$ 5 00
ii. Sulphur.....	2 00
iii. Phosphorus.....	3 00
iv. Calorific value.....	5 00
v. Ultimate analysis—determination of carbon, hydrogen, oxygen, nitrogen, and sulphur.....	25 00

## 6. MINERAL WATERS:—

i. Qualitative examination—giving amount of saline matter per gallon, and a general idea of the chemical nature of its constituents.....	3 00
ii. Quantitative analysis.....	25 00
according to number of constituents determined.	and upwards.

## 7. ORES AND MINERALS—

## Determination of:—

i. Alumina.....	3 00
ii. Antimony.....	3 00
iii. Bismuth.....	3 00
iv. Carbonic anhydride.....	3 00
v. Chromium.....	3 00
vi. Cobalt.....	4 00
vii. Copper.....	2 00
viii. Ferrous oxide.....	3 00
ix. Ferric oxide.....	2 00
x. Lead.....	3 00
xi. Lime.....	2 00
xii. Magnesia.....	3 00
xiii. Manganese.....	3 00
xiv. Nickel.....	4 00
xv. Silica.....	3 00
xvi. Water—combined.....	3 00
xvii. Zinc.....	3 00
Non-metallic minerals: asbestos, gypsum, etc., complete analysis of.....	Prices on application.

## 8. ROCKS—complete analysis..... Prices on application.

## 9. METALS AND ALLOYS—

## Determination of:—

i. Aluminium.....	3 00
ii. Antimony.....	3 00
iii. Arsenic.....	3 00
iv. Bismuth.....	3 00
v. Cadmium.....	3 00
vi. Chromium.....	3 00
vii. Cobalt.....	4 00
viii. Copper.....	3 00
ix. Gold.....	2 00
x. Iridium.....	5 00
xi. Iron.....	2 00
xii. Lead.....	3 00
xiii. Manganese.....	3 00
xiv. Mercury.....	5 00
xv. Molybdenum.....	5 00
xvi. Nickel.....	4 00
xvii. Osmium.....	5 00
xviii. Palladium.....	5 00
xix. Phosphorus.....	3 00
xx. Platinum.....	4 00
xxi. Silicon.....	3 00



METALS AND ALLOYS—*Concluded.*

xxii. Silver.....	\$ 2 00
xxiii. Sulphur.....	2 00
xxiv. Tellurium.....	5 00
xxv. Tin.....	4 00
xxvi. Titanium.....	3 00
xxvii. Tungsten.....	3 00
xxviii. Vanadium.....	5 00
xxix. Zinc.....	2 00
10. IRON AND STEEL—	
Determination of:—	
i. Total carbon.....	5 00
ii. Graphite.....	3 00
iii. Combined carbon.....	2 00
iv. Sulphur.....	2 00
v. Phosphorus.....	3 00
vi. Silicon.....	2 00
vii. Manganese.....	1 00
11. FERRO-ALLOYS—	
Ferro-silicon, Ferro-chromium, Ferro-manganese, and Ferro-titanium—	
Determination of:—	
i. Silicon, sulphur, phosphorus, manganese, chromium, titanium, each.....	3 00
12. SLAGS AND FIRE-SANDS—	
Determination of:—	
i. Silica, iron oxide, alumina, lime, magnesia, and loss on ignition.....	10 00
ii. Complete analysis.....	15 00
13. GAS ANALYSIS..... Prices on application.	
14. OIL-SHALES—	
Determination of:—	
i. Crude oil content.....	4 00
ii. Ammonium sulphate.....	6 00
15. Identification of minerals and rocks not requiring chemical analysis..... Free.	

## DIRECTIONS.

## ORES.

For analysis it is necessary that the sample sent in should weigh from 2 to 5 pounds; and consist of a number of small fragments rather than one large piece.

## MINERAL WATERS.

Sample waters should be sent in clean, stoppered, glass bottles, containing, at least, one-half gallon for qualitative, and two gallons for quantitative examination. The bottles must be well rinsed with the same water as the sample itself, and have a label attached stating whether the respective samples are from a boring, spring, or stream.

## LOCALITY.

In every instance, specimens and samples should be accompanied by a statement specifying the precise locality from whence they were taken.



## PART V.

### MAGNETOMETRIC SURVEY MAPS, WORKING PLANS, SKETCH MAPS, ETC.

6. †Magnetometric Survey of Calabogie mine, Bagot township, Renfrew county, Ontario. Vertical Intensity, scale 1 inch = 60 feet. By E. Nystrom, M.E., 1904.
13. †Magnetometric Survey of Belmont iron mine, Lot 19, Concession I, Belmont township, Peterborough county, Ontario. Vertical Intensity, scale 1 inch = 60 feet. By B. F. Haanel, B.Sc., 1905.
14. †Magnetometric Survey of Wilbur mine, Lavant township, Lanark county, Ontario. Vertical Intensity, scale 1 inch = 60 feet. By B. F. Haanel, B.Sc., 1905.
15. \*Magnetometric Survey of Iron Ore Deposits at Austin brook, Lot 12, Range XVII, Bathurst township, Gloucester county, N.B. Vertical Intensity, scale 1 inch = 240 feet. By E. Lindeman, M.E., 1906.
33. †Magnetometric Survey: Lot 1, Concession VI, Mayo township, Hastings county, Ontario. Vertical Intensity, scale 1 inch = 60 feet. By Howells Fréchet, M.Sc., 1909.
34. †Magnetometric Survey: Portions of Lots 2 and 3, Concession VI, Mayo township, Hastings county, Ontario. Vertical Intensity, scale 1 inch = 60 feet. By Howells Fréchet, M.Sc., 1909.
35. †Magnetometric Survey: Portions of Lots 10, 11, and 12, Concession IX, and Lots 11 and 12, Concession VIII, Mayo township, Hastings county, Ontario. Vertical Intensity, scale 1 inch = 60 feet. By Howells Fréchet, M.Sc., 1909.
36. Survey of Mer Bleue Peat Bog, Gloucester township, Carleton county, and Cumberland township, Russell county, Ontario. By Erik Nystrom, M.E., and A. Anrep, Jr., Peat Expert. (Accompanying Report No. 30.)
37. Survey of Alfred Peat Bog, Alfred and Caledonia townships, Prescott county, Ontario. By Erik Nystrom, M.E., and A. Anrep, Jr., Peat Expert. (Accompanying Report No. 30.)
38. Survey of Welland Peat Bog, Wainfleet and Humberstone townships, Welland county, Ontario. By Erik Nystrom, M.E., and A. Anrep, Jr., Peat Expert. (Accompanying Report No. 30.)
39. Survey of Newington Peat Bog, Osnabruck, Roxborough, and Cornwall townships, Stormont county, Ontario. By Erik Nystrom, M.E., and A. Anrep, Jr., Peat Expert. (Accompanying Report No. 30.)
40. Survey of Perth Peat Bog, Drummond township, Lanark county, Ontario. By Erik Nystrom, M.E., and A. Anrep, Jr., Peat Expert. (Accompanying Report No. 30.)
41. Survey of Victoria Road Peat Bog, Bexley and Carden townships, Victoria county, Ontario. By Erik Nystrom, M.E., and A. Anrep, Jr., Peat Expert. (Accompanying Report No. 30.)
48. Magnetometric Map of Iron Crown claim at Klaanch river, Vancouver island, B.C. Vertical Intensity, scale 1 inch = 60 feet. By E. Lindeman, M.E., (Accompanying Report No. 47.)
49. Magnetometric Map of Western Steel iron claim, at Sechart, Vancouver island, B.C. Vertical Intensity, scale 1 inch = 60 feet. By E. Lindeman, M.E. (Accompanying Report No. 47.)
50. Vancouver island, B.C. (Key Map.) By E. Lindeman, M.E. (Accompanying Report No. 47.)
51. Iron Mines, Texada island, B.C. By E. H. Shepherd, C.E. (Accompanying Report No. 47, by E. Lindeman, M.E.)
52. Sketch Map of Bog Iron Ore Deposits, West Arm, Quatsino sound, Vancouver island, B.C. By L. Frank. (Accompanying Report No. 47, by E. Lindeman, M.E.)
53. Iron Ore Occurrences, Ottawa and Pontiac counties, Quebec, 1908. By J. White and Fritz Cirkel, M.E. (Accompanying Report No. 23, by Fritz Cirkel, M.E.)
54. Iron Ore Occurrences, Argenteuil county, Quebec, 1908. By Fritz Cirkel, M.E. (Accompanying Report No. 23.)
57. †The Productive Chrome Iron Ore district of Quebec. By Fritz Cirkel, M.E. (Accompanying Report No. 29.)

60. Magnetometric Survey of the Bristol mine, Pontiac county, Quebec. Scale, 1 inch = 200 feet. By E. Lindeman, M.E. (Accompanying Report No. 67.)
61. Topographical Map of Bristol mine, Pontiac county, Quebec. By E. Lindeman, M.E. (Accompanying Report No. 67.)
64. †Index Map of Nova Scotia: Gypsum. By W. F. Jennison, M.E. (Accompanying Report No. 84.)
65. †Index Map of New Brunswick: Gypsum. By W. F. Jennison, M.E. (Accompanying Report No. 84.)
66. †Map of Magdalen islands: Gypsum. By W. F. Jennison, M.E. (Accompanying Report No. 84.)
70. †Magnetometric Survey of Northeast Arm Iron Range, Lake Timagami, Nipissing district, Ontario. Scale, 1 inch = 200 feet. By E. Lindeman, M.E.
72. Brunner Peat Bog, Ellice township, Perth county, Ontario. By A. Anrep, Jr., Peat Expert. (Accompanying Report No. 71.)
73. Komoka Peat Bog, Caradoc and Lobo townships, Middlesex county, Ontario. By A. Anrep, Jr., Peat Expert. (Accompanying Report No. 71.)
74. Brockville Peat Bog, Elizabethtown township, Leeds county, Ontario. By A. Anrep, Jr., Peat Expert. (Accompanying Report No. 71.)
75. Rondeau Peat Bog, Harwich township, Kent county, Ontario. By A. Anrep, Jr., Peat Expert. (Accompanying Report No. 71.)
76. Alfred Peat Bog, Alfred township, Prescott county, Ontario. By A. Anrep, Jr., Peat Expert. (Accompanying Report No. 71.)
77. Alfred Peat Bog, Alfred township, Prescott county, Ontario. Main ditch profile. By A. Anrep, Jr., Peat Expert. (Accompanying Report No. 71.)
78. †Map of Asbestos Region, Province of Quebec, 1910. By Fritz Cirkel, M.E. (Accompanying Report No. 69.)
86. Map showing general distribution of Serpentine in the Eastern Townships. By Fritz Cirkel, M.E. (Accompanying Report No. 69.)
87. Key Map for Mica Report. By Hugh S. de Schmid. (Accompanying Report No. 118.)
94. Map showing Cobalt, Gowganda, Shiningtree, and Porcupine districts. By L. H. Cole, B.Sc. (Accompanying Summary Report, 1910.)
95. General Map of Canada showing Coal Fields. (Accompanying Report No. 83, by Dr. J. B. Porter.)
96. General Map of Coal Fields of Nova Scotia and New Brunswick. (Accompanying Report No. 83, by Dr. J. B. Porter.)
97. General Map showing Coal Fields in Alberta, Saskatchewan, and Manitoba. (Accompanying Report No. 83, by Dr. J. B. Porter.)
98. General Map of Coal Fields in British Columbia. (Accompanying Report No. 83, by Dr. J. B. Porter.)
99. General Map of Coal Field in Yukon Territory. (Accompanying Report No. 83, by Dr. J. B. Porter.)
106. Austin Brook iron bearing district, Bathurst township, Gloucester county, N.B. By E. Lindeman, M.E. (Accompanying Report No. 105.)
107. Magnetometric Survey Map of Austin Brook iron bearing district, Vertical Intensity, scale 1 inch = 200 feet. By E. Lindeman, M.E. (Accompanying Report No. 105.)
108. Index Map showing iron bearing area at Austin brook. By E. Lindeman, M.E. (Accompanying Report No. 105.)
109. Sections of Diamond Drill holes in iron ore deposits at Austin brook. By E. Lindeman, M.E. (Accompanying Report No. 105.)
112. Sketch plan showing Geology of Point Mamainse, Ont. By Professor A. C. Lane.
113. Holland Peat Bog, Ont. By A. Anrep, Peat Expert.
- 119-137. Mica: Townships maps, Ontario and Quebec. By Hugh S. de Schmid. (Accompanying Report No. 118.)
138. Mica: Showing Location of Principal Mines and Occurrences in the Quebec Mica Area. By Hugh S. de Schmid. (Accompanying Report No. 118.)
139. Mica: Showing Location of Principal Mines and Occurrences in the Ontario Mica Area. By Hugh S. de Schmid. (Accompanying Report No. 118.)
140. Mica: Showing Distribution of the Principal Mica Occurrences in the Dominion of Canada. By Hugh S. de Schmid. (Accompanying Report No. 118.)
141. Southwest part of Torbrook iron-bearing district, Annapolis county, N.S., scale 1 inch = 400 feet. By Howells Fr chet te, M.Sc. (Accompanying Report No. 110.)

NOTE.—1. Maps marked thus \* are out of print.

2. Maps marked thus † have been printed independently of reports, hence can be procured separately by applicants.

# INDEX

No.	Page.	No.	Page.	No.	Page.
I	13	44	114	94	26, 134
II	14	45	114	95	106, 134
III	15	46	114	96	106, 134
IV	15	47	81	97	106, 134
V	16	48	82, 133	98	106, 134
VI	17	49	82, 133	99	106, 134
VII	17	50	82, 133	100	
1		51	82, 133	101	
2	27	52	82, 133	102	119
3	28	53	71, 133	103	24
4	31	54	71, 133	104	Catalogue of Publications
5	34	55	82	105	
6	133	56		106	134
7	36	57	133	107	134
8	38	58	114	108	134
9	38	59	123	109	134
10	40	60	134	110	
11	42	61	134	111	
12	42	62	116	112	134
13	133	63	22	113	134
14	133	64	109, 134	114	119
15	133	65	109, 134	115	119
16	48	66	109, 134	116	119
17	50	67	84	117	119
18	51	68	85	118	
19	56	69	86	119	134
20	59	70	134	120	134
21	19	71	92	121	134
22	68	72	93, 134	122	134
23	69	73	93, 134	123	134
24	71	74	93, 134	124	134
25	77	75	93, 134	125	134
26	113	76	93, 134	126	134
27	114	77	93, 134	127	134
28	20	78	92, 134	128	134
29	78	79	116	129	134
30	80	80	116	130	134
31	114	81		131	134
32	80	82	93	132	134
33	133	83	94	133	134
34	133	84	107	134	134
35	133	85	116	135	134
36	133	86	92, 134	136	134
37	133	87	134	137	134
38	133	88	117	138	134
39	133	89	109	139	134
40	133	90	110	140	134
41	133	91		141	134
42	114	92	110	142	
43	114	93	111	143	119