

# **GENERAL REPORT**

**of the**

**MINISTER OF MINES**

**of the**

**PROVINCE OF QUEBEC**

**FOR THE YEAR ENDING MARCH 31st**

**1 9 6 0**



Quebec, October, 1960

To the Honourable  
Onésime Gagnon, P.C., Q.C.,  
Lieutenant-Governor of the  
Province of Quebec.

Sir:

I have the honour to submit to you, in accordance with Section 229 of the Quebec Mining Act, a summary report of the work carried out by the Department of Mines during the fiscal year ending March 31st, 1960.

Your respectful servant,

Paul Earl,  
Minister of Mines.

Quebec, October, 1960

To the Honourable Paul Earl,  
Minister of Mines,  
Quebec, Que.

Sir:

In compliance with Section 229 of the Quebec Mining Act, Chapter 196, Revised Statutes of Quebec 1941, I have the honour to present a summary report on the work carried out by the staff of the Department of Mines, during the fiscal year of April 1st, 1959, to March 31st, 1960.

Your obedient servant,

B.-T. Denis,  
Associate Deputy Minister.

TABLE OF CONTENTS

	<u>Page</u>
THE MINING INDUSTRY OF THE PROVINCE OF QUEBEC IN 1959-60 .....	1
Table I - Subdivision of the annual value of the mineral production of Quebec, 1953-1959 .....	1
Table II - Mineral production of the Province of Quebec, in 1958 and 1959 .....	3
LEGAL BRANCH .....	6
Division of mining claims disputes and investigations .....	7
MINERAL RIGHTS BRANCH .....	7
Table III - Number of various titles issued by the Department of Mines - fiscal years 1958-59 and 1959-60 .....	9
Table IV - Mining titles issued since 1949-50 .....	9
Table V - Comparative statement of exploration work on mining claims under licenses, during calendar years 1949 to 1959 .....	10
MINING OPERATIONS BRANCH .....	10
Mines inspection division .....	11
Collection of dues on mines .....	17
Division of mineral statistics .....	18
New mining companies .....	21
GEOLOGICAL SERVICES .....	25
LIST OF GEOLOGICAL FIELD PARTIES, IN 1959 .....	25
GEOLOGICAL SURVEYS BRANCH .....	28
MINERAL DEPOSITS BRANCH .....	36
Division of the economy of the laws .....	41
Table VI - Comparative totals of the number of reports received during the years 1955 to 1960 .....	41
Division of technical documentation .....	42
GROUNDWATER, GAS AND PETROLEUM BRANCH .....	43
DIVISION OF EDITION AND PRINTING .....	45
DIVISION OF DISTRIBUTION OF PUBLICATIONS .....	47
LABORATORIES BRANCH .....	48
I - Research laboratories .....	48
II - Laboratories for analyses and assays .....	51
Table VII - Summary of analyses and assays .....	52
Division of mineralogy and petrography .....	52
Table VIII - Collection of rocks and minerals .....	53
Division of physics .....	54
Division of chemistry .....	55
Division of metallurgy .....	55

	<u>Page</u>
III - Courses on mineral Prospecting .....	55
Table IX - Elementary courses on mineral prospecting given between 1947 to 1960 .....	56
PILOT-PLANT BRANCH .....	56
Table X - Ores received for sampling at pilot-plant ..	57
Table XI - Ores received for treatment at pilot-plant	57
DRAUGHTING AND CARTOGRAPHY BRANCH .....	58
CIVIL ENGINEERING BRANCH .....	60
Division of mine roads .....	60
Table XII - Summary of projects of the mine roads division, for the last three years ....	61
Division of mine villages .....	63
Peat bog drainage .....	65
SECRETARIATE .....	65
Division of equipment .....	65
Division of publicity .....	66
Division of purveyor .....	70
Library .....	70
Scholarships .....	71
Table XIII - Comparative statement of revenues .....	73

#### ILLUSTRATIONS

Figure I - Diagram showing the mineral production of the Province of Quebec in 1958 and 1959 .....	2
Figure II - Geological field parties in 1959 .....	26

GENERAL REPORT OF THE MINISTER OF MINES OF THE  
PROVINCE OF QUEBEC  
FOR THE FISCAL YEAR ENDING MARCH 31st, 1960

THE MINING INDUSTRY  
OF THE  
PROVINCE OF QUEBEC  
IN  
1959-60

During the calendar year 1959, the value of the mineral production of the Province of Quebec amounted to \$469,906,265. This total, subject to slight revisions, surpasses by \$80,463,280 the sum of \$389,442,985 reached in 1958.

This increase may be attributed largely to a greater production in nearly half of the mineral substances extracted in Quebec. The disparity between the Canadian and the American dollar was another factor which contributed to this increase, though at times it militated against, and at other times favoured, our producers. The rate of exchange, although always in favour of Canada, varied widely during the fiscal year, from a high of 5.7 per cent to a low of 1.8 per cent. During the last quarter of the fiscal year, there should be notable gains for those of our producers who export to the United States that part of their production that the Canadian market can not absorb.

Table I. - Subdivision of the Annual Value of the  
Mineral Production of the Province of Quebec,  
1953 to 1959

Year	Metals	Per Cent	Industrial Minerals	Per Cent	Building Materials	Per Cent	Total
1953	\$103,278,622	41	\$ 96,392,456	38	\$52,683,103	21	\$252,354,181
1954	137,780,968	48	94,092,032	32	56,475,399	20	288,348,399
1955	215,781,654	56	105,890,962	27	66,990,217	17	388,662,833
1956	278,440,867	60	114,939,075	25	70,301,026	15	463,680,968
1957	238,173,290	54	120,606,214	27	85,029,476	19	443,808,980
1958	200,136,390	51	104,372,724	27	84,933,871	23	389,442,985
1959	261,479,648	56	119,582,730	25	88,843,887	19	469,906,265 *

\* Subject to revision.

# MINERAL PRODUCTION

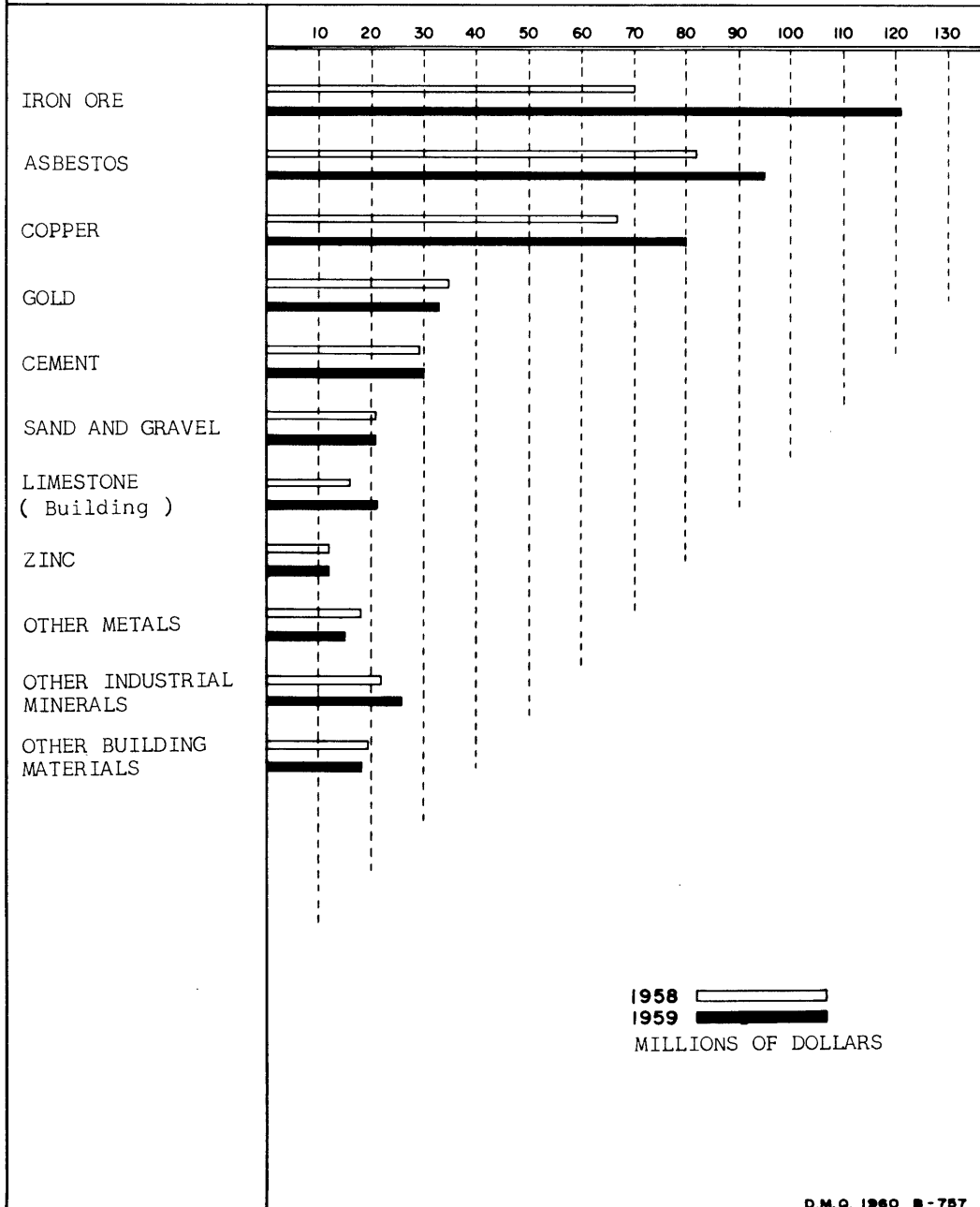


Table II. - Value of the Mineral Production  
of the Province of Quebec for Calendar Years 1958 and 1959

<u>METALLICS</u>	Value 1959 Subject to revision	Value 1958 Final
Bismuth .....	\$ 264,228	\$ 436,420
Copper .....	79,894,820	66,826,788
Gold .....	(b) 33,472,446	(b) 35,484,736
Iron .....	7,187,434	5,120,620
Iron ore (a) .....	121,293,859	70,300,573
Lead .....	617,412	715,620
Magnesium .....	1,103,930	1,317,070
Molybdenum .....	940,596	1,152,838
Selenium .....	1,359,631	1,345,478
Silver .....	3,607,558	3,391,506
Tellurium .....	3,573	50,077
Titaniferous iron ore .....	214,367	1,608,324
Zinc .....	11,519,794	12,386,340
Total metallics ...	\$ 261,479,648	\$ 200,136,390
<u>NON-METALLICS</u>		
I - Industrial Minerals		
Asbestos .....	\$ 95,226,769	\$ 82,028,700
Feldspar .....	301,372	359,966
Industrial lime .....	4,040,274	3,388,843
Industrial limestone .....	1,536,660	1,404,635
Lithium .....	1,422,153	2,047,880
Magnesitic dolomite and brucite .....	3,050,779	2,529,161
Marl .....	195,563	216,651
Mica .....	62,045	85,045
Mineral water .....	203,333	170,622
Ochre and iron oxide .....	108,286	113,390
Peat (moss and humus) .....	1,282,081	1,056,811
Quartz .....	1,533,206	1,412,802
Soapstone and talc .....	185,951	194,074
Sulphur .....	1,927,109	2,780,223
Titanium dioxide (in slag) and other products .....	8,507,149	6,583,921
Total industrial minerals	\$ 119,582,730	\$ 104,372,724
II - Building Materials		
Building lime .....	\$ 486,615	\$ 574,264
Building limestone .....	21,019,799	15,526,302
Cement .....	29,520,710	28,686,095
Clay products - {Brick .....	8,135,595	8,634,102
{Other products .....	2,204,031	2,039,813
Granite .....	5,277,255	6,628,518
Marble .....	111,932	115,519
Sand and gravel .....	21,017,625	20,570,574
Sand-lime products - {Brick .....	489,281	295,656
{Blocks .....	30,664	33,512
Sandstone .....	501,399	1,767,494
Slate and shale .....	48,981	62,022
Total building materials ...	\$ 88,843,887	\$ 84,933,871
GRAND TOTAL .....	\$ 469,906,265	\$ 389,442,985

(a) In view of the uncertainty of the boundary line between Quebec and Newfoundland, shipments from Sept-Îles represent ore extracted from Ungava and Labrador by **Iron Ore Company**.

(b) Value in Canadian funds. The standard value at the rate of \$20.671834 per ounce troy is \$20,611,762 for 1959 and \$21,587,245 for 1958.



Iron Ore

The proportionate value of iron ore to the total value of the mineral production of the Province has been on the increase since 1954. Iron ore will soon show an important increase.

During 1959, the two Quebec producers, Iron Ore Company of Canada and Hilton Mines, operated at full capacity. It is mainly in the development field, however, that the fiscal year in review stands out.

Besides operating at its full rated capacity of 50,000 tons of iron ore pellets per month, Hilton Mines was engaged in an expansion programme that will raise its output to 60,000 tons of pellets per month.

Hull Iron Mines Limited and subsequently its successor, Quebec South Shore Steel Corporation, did some important development work in a magnetite deposit in Hull township. In addition, the company announced that it has signed a contract with Koppers Company of Pittsburgh for the preparation of plans and specifications for a steel plant. The plant to be built near Montreal will produce cast iron and semi-finished steels.

However, Quebec Cartier Mining Company holds the first place insofar as the size and costs of development work done during the year is concerned. With a production date line set at January 1961, the company has been pushing its construction work. Six large projects have been and are still in progress.

These are: -

Construction of an 8,000,000-ton-per-year concentrator;

Preparation of three open-pit mines in the Lake Jeannine deposit, which will supply 20,000,000 tons of ore per year to the concentrator;

Building a 193-mile railway from Port Cartier and Lake Jeannine;

Construction of a 60,000-horse-power hydroelectric plant;

Construction of a seaport on the St. Lawrence river;

Construction of two modern towns: Gagnon and Port Cartier.

### Copper

All our copper producers operated at full capacity. The main features of progress in this sector of the mining industry of the Province are the following:

The mine of Copper Rand Chibougamau Mines Limited began production;

Campbell Chibougamau Mines Limited placed its Koppo Creek mine in production and initiated underground development work at its Henderson mine;

Opemiska Copper Mines (Quebec) Limited completed an expansion programme started in 1957. This project has made it possible to increase the production rate from 800 to 2,000 tons of ore per day;

The discovery, in Stratford township, Wolfe electoral district, of an important copper deposit which could result in the creation of a copper mine in that area.

### Zinc

The production of zinc concentrates, which has been waning for the past few years, might regain its former stature, thanks to the discovery and the development work done on the Lake Matagami deposits. Access to the area has been made easier owing to a winter road built by the Department of Mines. An all-weather road will soon replace this temporary access road.

### Gold

Two old mining properties have been brought back to life under new management, namely: Norlartic Mines Limited and Akasaba Gold Mines Limited. The first ships its ore to the Malartic Gold Fields mill; the second, to the Bevcon mill. A third one, Marbertor Malartic Mines Limited was rehabilitated under the name of Marban Gold Mines Limited; a shaft has been sunk to develop drill-indicated ore.

### Asbestos

A slight oversupply of asbestos fibres on the world markets forced a few companies to suspend operations for short periods.

Murray Mining Corporation Limited has announced the discovery of good-grade asbestos-bearing zones in the extreme north of Ungava.

#### Titanium Oxide

The year 1959 was a record year for Quebec Iron and Titanium Corporation. For the first time, the company sold titanium oxide slag on the European markets.

#### Cement

During the fiscal year under review, Miron et Frères completed the construction of and started operating a cement manufacturing plant on its Ville St. Michel property near Montreal.

#### LEGAL BRANCH

The main function of the Legal Branch, under the direction of Robert Langevin, lawyer, is to supervise the general application of the Quebec Mining Act and other related Acts. In this respect it advises the officers of the various branches of the Department as to the interpretation to be given to the provisions of these Acts. The personnel of the Branch is comprised of three lawyers.

In fulfilling its duties, the Branch collaborates in solving legal problems concerning mining villages, and problems arising from the staking of mining claims, the issuance or renewal of development licenses, the transfer of mining rights and the sale of mining concessions.

It is also responsible for the application of those provisions of the Quebec Mining Act that concern the revocation of mining concessions and of mining rights, and the issuance of special exploration and mining licenses granted following such revocation. It compiles a list of the mining rights that have reverted to the Crown through sales of lands for non-payment of municipal or school taxes.

The Legal Branch prepares or revises the memoranda drawn prior to the enactment of Orders in Council approved under provisions of the Quebec Mining Act.

The Branch advises on all matters concerning transactions that may involve the Department and the public and keeps the latter informed on all questions arising from the enforcement of the Act.

Finally, the Division of Mining Claim Disputes and Investigations is under the jurisdiction of the Branch, which studies the reports submitted by the Division and advises the authorities of the Department on the decisions that should be made in each case.

#### Division of Mining Claims Disputes and Investigations

The main function of this Division, which is under the direction of J.-René Dallaire, is to make investigations and inspections to settle disputes on ground held as mining claims or under development licenses.

The Division has, as either permanent or part-time personnel, five investigators in Rouyn, two in Montreal and two in Quebec.

The Rouyn office investigators dealt with 34 disputes which arose in the recording districts of Amos, Rouyn and Chibougamau. They had to travel 13,780 miles by plane, railway or car to make investigations and to carry out claims inspections, and walked some 740 miles in the woods to inspect claims and to verify the statutory work done.

The Quebec and Montreal investigators handled 14 disputes distributed in the Quebec, Montreal, and Chibougamau districts. Their travelling included 6,310 miles by plane, railway, autobus and car to make investigations and carry out inspections, and they walked about 340 miles in the woods to inspect claims or to verify statutory work performed.

#### MINERAL RIGHTS BRANCH

F. U. Roux, chief registrar, reports that, during the fiscal year 1959-60, there was a decrease in the number of claims registered in the Province of Quebec; the total reached was 31,788, whereas, during the 1958-59 period, a record of 60,704 claims had been recorded.

There was a proportional decrease in the number of miner's certificates sold; during the fiscal year under review, 9,149 certificates were sold, compared with 16,963 for the fiscal year 1958-59.

The following figures reveal that, in every other section, the activities of this Branch in 1959-60 may be favorably compared with those of 1958-59.

The Branch issued 4,736 development permits and renewed 5,200, compared with 3,222 issuances and 5,986 renewals for the year 1958-59.

Reports of development work performed show that, in 1959-60, the number of man-days reached 1,552,335, whereas it was 1,335,888 in 1958-59; there was 741,907 feet of diamond drilling done, compared with 624,106 feet for the previous fiscal year.

The Branch also granted eight mining concessions, covering a total area of 2,932 acres, whereas, during the corresponding previous period, it had granted ten, representing a combined area of 2,500 acres.

There were 4,511 transfers of mining rights, compared with 5,239 for 1958-59.

In addition, the Branch granted eight exploration licenses for all minerals in New Quebec, covering a combined area of approximately 480 square miles and four licenses for petroleum and natural gas in the St. Lawrence valley and in the Gaspé peninsula for a total of about 2,475,000 acres. In addition, a special exploration license for all minerals, gold and silver excluded, was granted for a 200-acre area in Brompton township, Richmond electoral district. Another special exploration license for all minerals covering an area of 400 acres in Laussedat township, Saguenay electoral district, was also granted. Finally, a special mining license for marl was issued for Lake Levasseur in Cap-Chat township, Gaspé-North electoral district.

By Order in Council, dated December 15th, 1959, and bearing number 1415, a tract of ground located in Letellier and Arnaud townships, was withdrawn from the staking of mining claims, by reason of the proposed construction of a railway by la Compagnie de Chemin de Fer Arnaud.

Another Order in Council, dated September 30th, 1959, and bearing number 1029, amended Order in Council number 789, dated July 27th, 1955 (relating to withdrawal from the staking of mining claims in New Quebec), by allowing the staking of mining claims in an area south of latitude 53°00'33", between longitudes 72°28'57" and 67°27'47".

Table III. - Number of Various Titles Issued

by the Department of Mines

(Fiscal years 1958-59 and 1959-60)

Designation of titles	1958-59	1959-60
Mining claims registered at Amos .....	32,739	19,345
Mining claims registered at Noranda .....	7,373	4,339
Mining claims registered at Quebec .....	7,096	4,431
Mining claims registered at Chibougamau .....	11,761	2,697
Mining claims registered at Montreal .....	1,735	976
Total .....	60,704	31,788
Miner's certificates issued .....	16,963	9,149
Development licenses issued .....	3,222	4,746
Development licenses renewed .....	5,986	5,200
Mining concessions granted .....	10	8
Transfers of titles registered .....	5,239	4,511
Reports of work: man-days reported .....	1,335,888	1,552,335
Reports of work: diamond drilling in feet ....	624,106	741,906
Number of assay coupons delivered .....	32,177	36,019

Table IV. - Mining Titles Issued since 1949-50

Fiscal Year	Number of Miner's Certificates	Number of Mining Claims Recorded	Number of Development Licenses	Concessions		Transfers of Mining Rights
				Number	Acres	
1949-50	4,608	14,398	5,168	6	994	1,115
1950-51	6,594	19,787	5,407	9	3,717	1,513
1951-52	7,531	22,807	5,407	8	1,019	2,396
1952-53	7,577	21,912	6,562	9	2,042	2,410
1953-54	10,558	23,667	6,905	8	908	2,154
1954-55	10,987	31,702	6,739	3	211	3,102
1955-56	20,193	60,315	9,564	14	2,674	5,402
1956-57	15,686	51,259	11,180	4	1,318	5,244
1957-58	13,608	45,901	9,395	7	2,220	4,861
1958-59	16,963	60,704	9,208	10	2,500	5,239
1959-60	9,149	31,788	9,946	8	2,932	4,511

Table V. - Comparative Statement of Exploration Work  
on Mining Claims under Licenses during  
Calendar Years 1949 to 1959

Year	Number of Work Days (Man-days)	Diamond Drilling (In feet)
1949	595,581	345,818
1950	498,460	317,558
1951	956,451	705,570
1952	871,307	590,788
1953	672,900	394,194
1954	664,447	295,221
1955	1,107,712	417,144
1956	2,338,452	1,321,429
1957	2,298,128	1,511,580
1958	1,335,888	624,106
1959	1,552,335	741,907

MINING OPERATIONS BRANCH

The Mining Operations Branch is concerned with problems directly affecting the operations of mines and quarries in the Province, and includes the following divisions:

1. - Inspection of Mines
2. - Collection of Dues on mines
3. - Mineral Statistics

R.H. Taschereau is Chief, and E.-E. Bérubé is Assistant Chief of this Branch. In addition to the duties of its three divisions, the Branch is responsible for:

1. - Preparation of periodical reports on the development and operations of mines and quarries and on the state of the mining industry in general.
2. - Application of the Unwrought Metal Sales Act and the regulations enacted thereunder.
3. - Studies and Investigations of special problems arising from the operation of mines.

Separate reports on the functions and activities of each Division follow.

Mines Inspection Division

This Division, under M.-O. Lafontaine, Chief Inspector of Mines, and D.A. Farnsworth, Assistant Chief Inspector of Mines, is comprised of sixteen mining, electrical, mechanical and ventilation engineers, four technicians, fourteen clerks and stenographers, all employed on a full-time basis.

Duties:

A. - In connection with the safety and protection of workmen in mines and quarries

In accordance with Section 198, Chapter 196, of the Quebec Mining Act, it is the duty of the engineers of this division to make such inspections of mines, quarries and workshops for the reduction of minerals as may be necessary to ensure the observance of all regulations made under Section 197 by the Lieutenant Governor in Council, so as to protect the life and health of workmen. These responsibilities involve the following:

- 1) Co-operation with national and international organizations devoted to the maintenance of the health and safety of workers in the mining industry.
- 2) Regular safety inspections at mines, pits and quarries.
- 3) Inspection of electrical installations.
- 4) Inspection of mechanical installations.
- 5) Conducting ventilation and dust surveys; testing of samples of dust and poisonous gases or fumes.
- 6) Enforcement of legislation requiring yearly X-ray examinations of all workmen engaged in dust exposure occupations.
- 7) Making recommendations regarding revisions to the "Regulations for the Safety and Protection of Workmen in Mines and Quarries" in order that these regulations may be in line with new mine and quarry operating techniques.
- 8) Investigation of serious accidents, or other unusual occurrences which might affect the health or safety of workmen, preparation of detailed reports thereon and distribution of such reports throughout the industry to assist in the prevention of similar accidents or occurrences.



- 9) Compilation and interpretation of statistics on accidents at all mines and quarries as a guide to improving accident prevention work.
- 10) Organization and direction of the Mine Rescue Training Plan and the Annual Mine Rescue Competition.
- 11) To carry out such other duties as the Minister may from time to time direct.

B. - In connection with other relevant sections of the Quebec Mining Act as follows:

- 1) This Division has the responsibility of carrying out regular inspections of all mines and quarries and of gathering on the site data on current and future mining operations. Technical reports with respect to the fulfilment of the provisions of Chapter 196 of the Quebec Mining Act are made to the Minister (Section 201).
- 2) Underground plans for the exclusive use of the Inspectors of Mines are obtained once a year from all mines requiring underground work (Section 200).
- 3) Inspection of mining lands prior to the issuance of letters patent (Section 49).
- 4) Examination of proposed tailings sites prior to their approval by Order in Council, or by the Minister, and inspection of existing sites to prevent damages to surrounding properties (Sections 37 and 123).
- 5) Examination of every proposed ore treatment plant site at mines, prior to their approval by the Lieutenant-Governor in Council (Section 13).
- 6) Smelter plans and specifications to be approved by the Chief Inspector of Mines to avoid damage claims from fumes (Section 122).
- 7) The Inspector of Mines ascertains that party passages respecting mining, either on public or private land, shall not be abolished without his permission (Sections 118 and 119).

- 8) The Inspector of Mines shall settle and decide disputes arising between owners of mining lands concerning water courses and excavations (Sections 124-125-126).
- 9) The Inspector of Mines shall supervise the procedures to allow the owner of mining rights to work on private lands. Failing agreement, he has the power to appoint arbitrators and to collect and distribute the amounts of damages (Sections 89 to 109).

Activities:

For administrative purposes, the activities of the Division may be classified under six sections:

1 - Section of Mining Engineering. All problems related to operating mines and quarries of the province come under the direct or indirect jurisdiction of six district inspectors of mines who are mining engineers with at least five years of experience in their profession. They are: -

Geo. Courtemanche, P. Eng., Noranda and Matagami regions.

Guy Duchesne, P. Eng., Val-d'Or and Malartic regions.

Henri Rinfret, P. Eng., Chibougamau region.

C. Moscu, P. Eng., Montreal and Quebec regions.

Guy Dubé, P. Eng., Hull and New Quebec regions.

Fernand Cloutier, P. Eng., Thetford Mines region and the Gaspé Peninsula.

During the year, they have carried out 328 inspections at mines and quarries. In addition, they have investigated 20 fatal mining accidents, as well as numerous investigations of other special occurrences. Detailed reports of such investigations have been prepared and printed for public distribution in both French and English.

Reports of all compensable accidents are forwarded by the mining companies. Such reports are studied and classified as to their causes by the inspectors to establish the official statistics of our Department.

2 - Section of Electrical and Mechanical Engineering. All problems related to the installation and use of electrical and mechanical equip-

ment in mines and quarries are studied by four specialist engineers: Messrs. Lucien Trudel, Senior Electrical Engineer; V.E. Dawson, Mechanical Engineer; J.G. Bronsard and Yves Galibois, Electrical Engineers.

Their work involves not only numerous visits of existing installations, but also the detailed study of electrical and mechanical plans before new mines and quarries proceed with their construction programmes.

During the past year 79 inspections of electrical and 38 of mechanical installations were carried out by these engineers.

It is a pleasure to note that, as the result of a study by the engineers of this section, our Department has now authorized the use of friction hoists in Quebec and two large mining companies have now installed such equipment on their property.

### 3 - Section of Mine Ventilation and Dust Control

Three engineers, namely, Roger Turgeon, M.A. Bock and J.-Y. Lalonde, have continued to investigate the problems of mine ventilation and dust control. One hundred and three ventilation surveys were carried out, and 596 dust counts were completed under the microscope from samples obtained from every mine and quarry in the Province. It is gratifying to note that the dust situation throughout the industry has been greatly reduced during the last few years. This is especially true around certain large limestone quarries in the proximity of Montreal. It is a pleasure to acknowledge the co-operation received from the industry on this dust control problem. Several large operators have hired the services of their own engineers for this purpose.

All workmen exposed to dust in the mines must hold a special medical certificate renewable every year. During 1959-60, we received reports of 13,880 X-ray examinations of miners.

### 4 - Section of Rope Testing

The hoisting ropes used in mines deserve special attention because the lives of numerous workmen may be involved. All mines forward to this Division specifications of new hoisting ropes being put in service and every six months a sample of such hoisting ropes is being sent to a rope testing laboratory approved by the Chief Inspector of Mines. During the past year we received 245 reports from

the mines of the installation of new ropes and 357 reports of hoisting rope breakage tests from the Rope Testing Laboratory. These reports are being studied in relation to the ropes' safety factor, their corrosion ratings and other safe operating conditions, by the mechanical engineer and the district inspectors.

5 - Section of Mine Rescue Training

In accordance with Order in Council No. 404 enacted April 25, 1956, key men in all underground mines are being trained once a month in mine rescue and recovery operations. The cost of the plan is paid for by the industry, but the Department of Mines has the responsibility of organizing and supervising the training. Mr. G.S. Grant, P. Eng., Inspector of Mine Rescue Stations, is in charge of this section. He is assisted by Marc Foy, as General Superintendent. Three main stations are located as follows:

- a) Noranda Station: W. St-Laurent, Superintendent,
- b) Bourlamaque Station: L. Babin, Superintendent,
- c) Thetford Mines Station: R. Houde, Superintendent.

Regular sub-stations completely equipped with oxygen breathing apparatus are located at the following mines:

Normetal Mining Corporation.  
New Calumet Mines Limited.  
Canadian Johns-Manville Company Limited.  
Gaspé Copper Mines Limited.  
Campbell Chibougamau Mines Limited.  
Opemiska Copper Mines (Quebec) Limited.  
Anacon Lead Mines Limited.  
Canadian Refractories Limited.

Since 1948, 1,014 men have been trained in Mine Rescue operations. The situation during 1959 was as follows:

	<u>Metal Mines</u>	<u>Asbestos Mines</u>	<u>Total</u>
New men trained	56	0	56
Active Mine Rescue Personnel	311	48	359
Number of Mines at which training was given	25	4	29

The majority of the active Mine Rescue personnel receive monthly refresher courses.

The Annual Provincial Mine Rescue Competition was held in Noranda on September 26, 1959. Five teams qualified for this competition after a preliminary examination of twenty-one teams representing mines in North Western Quebec, the Eastern Townships, the Chibougamau district, and Gaspé Copper Mines.

The results were as follows: -

- 1st East Malartic Mines Limited
- 2nd Noranda Mines Limited
- 3rd Johnson's Company Limited
- 4th Lamaque Mining Company Limited
- 5th Quemont Mining Corporation Limited

These competitions have done much to increase the interest of Mine Rescue Personnel and Mine Operating Staffs in the work of Mine Rescue Training. This is reflected by the satisfactory performance of most of the teams in the preliminary tests and final competition.

#### 6 - General

The following special projects were undertaken during the year in addition to the regular activities of the staff of this Division.

- a) The proposed revision, by a special committee, of the Regulations for the Safety and Protection of Workmen in Mines and Quarries was well on the way to completion by year end.
- b) In December 1959, during a five-day meeting of all engineers of the Division, proposals for revisions of the Quebec Mining Act were formulated and presented to the Commission appointed to study and recommend amendments to the Quebec Mining Act.
- c) Special investigations were carried out concerning the use of diesel equipment in underground workings.

Preliminary estimates would seem to indicate that for 1959 the accident frequency rate in mines and quarries of Quebec is one

of the lowest in Canada. This low accident frequency reflects the continued efforts and co-operation of the workmen, the officers of the mining companies and our engineers.

This success was officially recognized in Toronto, in April 1960, during the Annual Meeting of the Canadian Institute of Mining and Metallurgy, when the Dominion John T. Ryan Safety Trophy for Metalliferous Mines was jointly awarded to three mining companies having experienced no compensable accident in 1959. Two of these companies were from Quebec, namely, the Johnson's Company, in Thetford Mines, and New Calumet Mines Limited, of Calumet Island.

A summary of the work carried out by this division, for the period under review, is presented in the following table, with comparative figures for the preceding year:

	<u>1958-59</u>	<u>1959-60</u>
Inspections of mines and quarries .....	346	340
Inspections of electrical installations	81	79
Inspections of mechanical installations	-	38
Underground ventilation surveys .....	102	103
Dust counts .....	961	596
Mine Rescue certificates issued .....	68	56
Active mine rescue personnel .....	359	359
Mine rescue station reports received ...	208	176
Hoistmen's medical certificates issued	264	272
Hoisting rope records received .....	209	245
Hoisting rope breakage tests .....	351	357
Pressure vessel inspection reports .....	94	160
X-ray examinations of miners .....	13,556	13,880

Collection of Dues on Mines

Sylvio Drouin, in charge of this Division submits the following report:

During the fiscal year 1959-60, the Department

collected \$3,308,376.78.\* This amount was paid by 37 mining companies who supplied sworn statements covering their profits, together with supporting vouchers. This sum was collected by the Department on the net profits of the companies, as defined under Division III of the Quebec Mining Act.

In addition, the statutory tax of ten cents per acre was paid by 142 holders of mining concessions who remitted a total of \$4,522.81. Affidavits were received from 162 holders of mining concessions, stating that expenditures amounting to at least \$200.00 had been incurred in the performance of development work on each mining concession.

#### Division of Mineral Statistics

The main task of this Division, under C-O. Beaudet, is to compile statistics on the activities of the mining industry of the Province, mainly on the mineral production, but also on other pertinent facts, such as the number of persons employed, the man-hours worked, the wages and salaries paid, the electricity, combustible and other supplies consumed, etc. It also answers questions related to the information it has on file.

To accomplish its work, the Division must keep as complete a list as possible of all the operators of mines and quarries. It must also maintain, to fit changing needs, numerous forms of inquiry, covering reports that operators are requested to supply, and the sources of its information.

The greater part of the result of its surveys is presented elsewhere in this report, in the Department's annual report entitled "The Mining Industry of the Province of Quebec" and in regular monthly and quarterly bulletins. The other part, of lesser interest, is kept for the information of officers of the Department, or other persons who may request it.

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\* The difference between the figures given by the Assessor and the Accountant stems from the different accounting methods used. The Assessor bases his accounting on "receipts", whereas the Accountant bases his on "revenues".

Following an agreement between the Department of Mines and the Dominion Bureau of Statistics, the Division has been working in close collaboration with the federal office since 1925. The latter prints the forms. The Division sends them to the mine and the quarry operators, ascertains that they are filled and returned, that they are complete and, when necessary, endeavors to have the errors corrected. When the reports, which are received in duplicate, are deemed satisfactory, it forwards one copy to Ottawa. The contents of those reports are compiled by both offices and production data are compared.

The main reasons that lead to this collaboration are, first of all, the highly desirable and commendable wish to have and to publish identical figures, and, secondly, to reduce the number of reports that operators are obliged to send to government agencies.

During the fiscal year 1959-60, the Division first completed the surveys related to the 1958 calendar year, work begun during the last month of the preceding fiscal year. To compile the statistics pertaining to that period, the Division received the following reports:

<u>Annual reports</u> on activities of operators of mines and quarries:	<u>Number</u>
Reports on shipments of products .....	1,513
Reports on exploration and development work, done at non-producing mining properties .....	413
Reports on inactive mining properties .....	1,458
<u>Monthly reports</u> on mineral production .....	691
<u>Annual reports</u> from building contractors on raw materials used .....	67
<u>Reports</u> from mine operators on timber used in mines .....	84
<u>Reports on expenditures</u> by mine operators, for the welfare of their employees and families .....	47
<u>Reports on capital</u> obtained by mining companies, from various sources .....	947
Total ....	5,220



During the latter part of the fiscal year, the Division began gathering similar information, for the 1959 calendar year. On March 31st, 1960, requests for reports, with appropriate forms, were sent to about 4,000 operators or owners of mineral deposits, 2,800 of whom have answered. This work is in progress and should be completed during the first half of the 1960-61 fiscal year.

The reports mentioned previously, covering the capital received by mining companies, are gathered to give an idea of the amounts available for prospection, exploration and development work. They give the amount received by the companies, through the following financial transactions; sale of capital stock; sales of bonds or other titles; long-term loans contracted. Compilation of reports submitted for the year 1958 gives a total of \$46,700,000 received from the above three sources. A similar survey, for 1957, had shown a total of \$66,200,000 received. Information for 1959 is not complete yet, but data on hand indicate that the total will be close to \$57,000,000, some \$10,000,000 higher than the 1958 figure.

There was no great variation in the number of companies incorporated in 1959. During this period, 63 were incorporated by Quebec charter, as compared with 57, for the preceding year. In addition, 15 companies incorporated by Ontario charter and one by Federal charter acquired mining rights in the Province of Quebec, as compared with 20 and one respectively, for the preceding year. In all, 79 companies were organized to operate in the Province of Quebec in 1959; there had been 78 in 1958.

Following is the list of these new companies, with their head office location, date of incorporation and capitalization.

Mining Companies Incorporated by  
Quebec Charter in 1959

Company	Head Office	Date of Incorporation	Capital	
			Number of Shares	Par Value
Adams Quarts and Crystal Mining Limited .....	Lawrenceville	Sept. 29	50,000	\$ 1.
Amalgamated Mining Development Corporation Limited ...	Montreal	Feb. 2	4,000,000	\$ 1.
Anglo American Molybdenite Mining Corporation .....	Val d'Or	Aug. 17	5,000,000	\$ 1.
Beauce Valley Company Ltd. (Compagnie Vallée de la Beauce Limitée) .....	Notre-Dame du Bon-Conseil	June 30	40,000	\$ 1.
Beauport Exploration Inc. ....	Lac Beauport	Nov. 17	4,000,000	\$ 1.
Beebe Granite Works Limited ..	Beebe	March 13	1,000 (a) 3,000	\$ 10. \$ 10.
Border Granite Co. Ltd. (The	Beebe Plain	Dec. 10	400 (a) 100	\$100. \$100.
Bourbon Mining Co. Ltd. ....	Montreal	March 26	3,000,000	\$ 1.
Brique American Brick Inc. ...	Boischatel	March 31	400	\$100.
Brique Beauport Brick Inc. ...	Beauport	March 31	400	\$100.
Brique Boischatel Brick Inc...	Boischatel	March 31	400	\$100.
British American (Quebec) Inc.	Montreal	June 2	1,000	None
British Titan Products (Canada) Limited .....	Montreal	July 27	500	\$100.
Bruneau Mines Limited .....	Montreal	Dec. 14	5,000,000	\$ 1.
Canadian Pink Granite Ltd. ...	Lac des Ecorces	July 14	1,000	\$100.
Carrières St-Paul Quarries Inc. ....	St-Paul d'Abbotford	May 21	100 (a)30,000	\$100. \$100.
Champlain Terrazzo and Marble Products Limited ....	St-Armand West	Feb. 11	500 (a) 500	\$100. \$100.
Debien et Fils Limitée .....	Rivière Gagnon	Oct. 14	100	\$100.
Eastern Explorers Corporation .....	Montreal	July 21	(a) 900 3,000,000	\$100. \$ 1.
Elgo Mines Limited .....	Montreal	Oct. 29	5,000,000	\$ 1.
Fort McKenzie Mines Limited ..	Montreal	May 14	5,000,000	\$ 1.
Garney Mines Limited .....	Montreal	March 16	5,000,000	\$ 1.

(a) Preferred shares

Company	Head Office	Date of Incorporation	Capital	
			Number of Shares	Par Value
Gatineau Sand and Gravel Ltd.	Gatineau	Feb. 12	400	\$100.
Grey Knight Mining Company ..	Montreal	Jan. 21	5,000,000	\$ 1.
Habitant Gas and Oil Ltd. ...	Quebec	Dec. 14	40,000	\$ 1.
Kelley Mining Corporation ...	Quebec	Sept. 3	3,000,000	\$ 1.
Kentaco Gas and Oil Co. Ltd..	Montreal	July 29	4,000	\$ 10.
Kingsbury Asbestos Mines Ltd.	Quebec	June 8	3,000,000	\$ 1.
La Grande Rivière Explora- tion Co. Ltd. ....	Montreal	March 16	50,000	\$ 1.
Lakeshore Gravel Co. Ltd. ...	Montreal	Aug. 10	4,000	\$ 10.
Lambert et Bergeron Asphalte Limitée .....	Quebec	Dec. 2	200 (a) 200	\$100. \$100.
Marland Mines Limited .....	Montreal	May 8	5,000,000	\$ 1.
Massawippi Mining Co. Ltd. ..	Montreal	Feb. 9	350,000	\$ 1.
Massval Mines Limited .....	Montreal	Nov. 10	5,000,000	\$ 1.
Miron Cement Inc. .... Miron Ciment Inc.	St. Michel	Apr. 27	10,000 (a) 9,000	\$ 10. \$100.
Montcalm Mines Limited .....	Montreal	Dec. 11	2,000 (a) 2,000	\$ 10. \$ 10.
Morin Mining Exploration Ltd.	Montreal	July 2	3,000,000	\$ 1.
Moulin Silice et Brique Ltée. Silica and Brick Mills Ltd.	Montreal	Dec. 10	400	\$100.
New Associated Developments Limited .....	Montreal	April 2	6,000,000	\$ 1.
Nordex Development Limited ..	Montreal	March 18	5,000,000	\$ 1.
Northeast Exploration Company (The .....	Montreal	July 28	4,000,000	\$ 1.
Olympia Mining Exploration Limited .....	Montreal	Oct. 19	4,000	\$ 1.
Pavages Laurentiens Inc. (Les .....	Sacré-Coeur	Jan. 29	100 (a) 300	\$100. \$100.
Provincial Graphite Co. Ltd..	Laval-des- Rapides	Nov. 13	2,000,000	\$ 1.
Provincial Molybdenum Corporation Limited .....	Montreal	Jan. 14	4,900,000 (a) 100,000	\$ 1. \$ 1.

(a) Preferred shares

Company	Head Office	Date of Incorporation	Capital	
			Number of Shares	Par Value
Quebec Clay Mining Limited ..	Quebec	Nov. 5	3,000,000	\$ 1.
Quebec Gas Transmission Lines Inc. ....	Montreal	Sept. 16	100,000	\$ 1.
Quebec South Shore Steel Corporation .....	Montreal	Feb. 27	4,000,000	\$ 1.
Robar Mining Corporation ....	Montreal	Jan. 19	6,000,000	\$ 1.
Rouanda Mining Co. Ltd. ....	Montreal	Oct. 3	40,000	\$ 1.
Rusty Lake Mining Corporation	Montreal	April 2	4,000,000	\$ 1.
Silica Sainte-Clotilde Canada Limitée .....	Pont Viau	March 31	7,500 (a)22,500	\$ 10. \$ 10.
Standard Iron Mining Co. Ltd.	Montreal	Nov. 2	1,002	\$ 1.
Stratford-Cyprus Mines Corporation Limited .....	Montreal	Aug. 21	3,000,000	\$ 1.
Swiss Mining Exploration Ltd.	Montreal	Sept. 14	40,000	\$ 1.
Technical Producers Limited .	Montreal	May 28	40,000	\$ 1.
Transbec Explorers Limited ..	Montreal	Aug. 17	1,000,000	\$ 1.
Transworld Explorers Inc. ...	Montreal	Feb. 13	40,000	\$ 1.
Tyrone Mines Limited .....	Montreal	May 12	100,000	\$ 1.
Waite Lake Mines Limited ....	Montreal	June 25	3,000,000	\$ 1.
Yellow Mountain Mines Limited	Montreal	Aug. 24	5,000,000	\$ 1.
Yorbec Mining Company Limited	Montreal	May 11	5,000,000	\$ 1.
Yuma Mines Limited .....	Montreal	May 25	100,000	\$ 1.

(a) Preferred shares

Mining Companies Incorporated by Ontario Charter in 1959  
and Holding Mining Rights in Quebec

Company	Head Office	Date of Incorporation	Capital	
			Number of Shares	Par Value
Airemaque Explorers Limited ..	Toronto	June 25	200,000	\$ 1.
Alrose Mining Company Limited	Toronto	July 17	5,000,000	\$ 1.
Canperu Mining Corporation Limited .....	Toronto	Aug. 14	5,000,000	\$ 1.
Conagami Mines Limited .....	Toronto	Sept. 29	3,000,000	\$ 1.
Federal Chibougamau Mines Ltd.	Toronto	Aug. 24	3,000,000	\$None
Gunnex Limited .....	Toronto	Apr. 21	40,000	\$ 1.
Hydra Explorations Limited ...	Toronto	Nov. 16	5,000,000	\$ 1.
Jomac Mines Limited .....	Toronto	Apr. 14	5,000,000	\$ 1.
La-Chib Mines Limited .....	Toronto	March 6	3,000,000	\$ 1.
Lenmac Mines Limited .....	Toronto	April 13	3,500,000	\$ 1.
Macon Mining Company Limited .	Toronto	July 17	500,000	\$ 1.
Mile 18 Mines Limited .....	Toronto	April 3	3,000,000	\$ 1.
Noranglo Mines Limited .....	Toronto	Feb. 17	2,000,000	None
Norsco Mines Limited .....	Toronto	Oct. 27	5,000,000	\$ 1.
Strathcona Mines Limited .....	Toronto	Jan. 29	3,000,000	\$ 1.

Mining Companies Incorporated by Dominion Charter in 1959  
and Holding Mining Rights in Quebec

Company	Head Office	Date of Incorporation	Capital	
			Number of Shares	Par Value
Carrières Varennes Limitée ... Varennes Quarries Limited	Varennes	June 22	130,000 (a)520,000	\$ 1. \$ 1.

(a) Preferred shares

GEOLOGICAL SERVICES

The three branches and two divisions forming the Geological Services, under the general direction of I.W. Jones, continued to expand with the growing mineral industry of the Province. With increased personnel and scope of operations, the fiscal year 1959-60 was one of record activity.

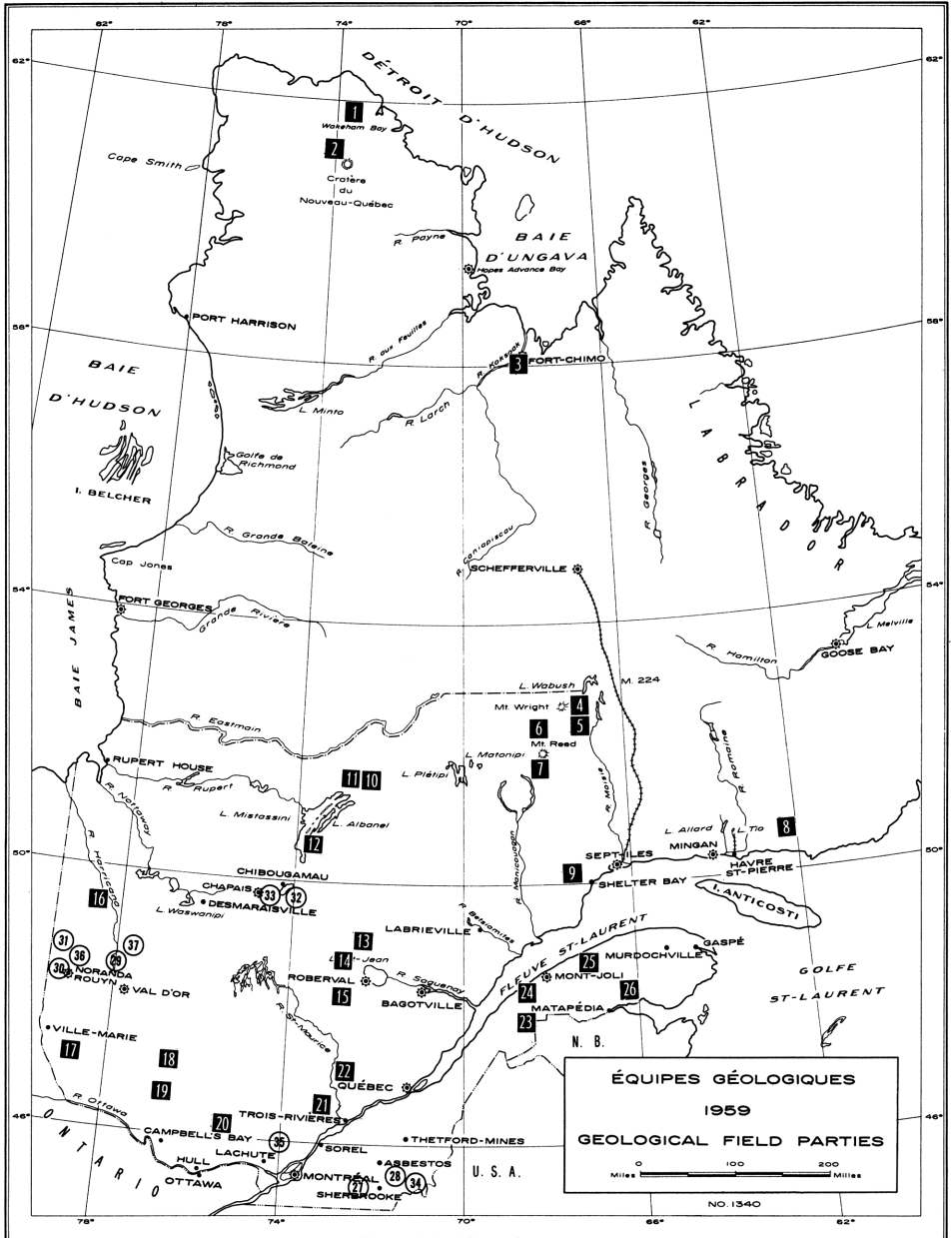
These branches and divisions - the Geological Surveys Branch, the Mineral Deposits Branch, the Groundwater, Gas and Petroleum Branch, the Division of Editing and Printing, and the Division of Distribution of Publications - are under the immediate direction of, respectively, H.W. McGerrigle, J.-E. Gilbert, Roland DeBlois, Maurice Brunet and Noé Lamontagne, whose separate reports on their branches or divisions follow.

LIST OF GEOLOGICAL FIELD PARTIES - 1959

(Numbers refer to adjoining map)

A - Geological Surveys Branch

1 - Raglan Lake Area, New Quebec .....	D.P. Gold
2 - Timmins Lake Area, New Quebec .....	G.H. Beall
3 - Fort Chimo Area (East Half), New Quebec .....	Léopold Gélinas
4 - Normanville Area, Saguenay Electoral District	P.J. Clarke
5 - Carheil - Gentilhomme Lakes Area, Saguenay Electoral District .....	D.L. Murphy
6 - Georget Lake Area (East Half), Saguenay Electoral District .....	A.J. Sinclair
7 - Barbel Lake Area (East Half), Saguenay Electoral District .....	B.E. MacKean
8 - Michaud Lake Area (East Half), Saguenay Electoral District .....	D.S. McPhee
9 - Vermette Lake Area (West Half), Saguenay Electoral District .....	P.-L. Gauvin
10 - Toco-Témiscamie Area, Mistassini Territory ...	Jean Bérard
11 - Papachouésati River Area, Mistassini Territory .....	E.H. Chown
12 - Guyon-Dorval Area, Mistassini Territory .....	P.T. Moyer
13 - Antoine - Pelletier Area, Roberval Electoral District .....	J. P. Berrangé
14 - Chomedey - Paquet Area (East Half), Roberval Electoral District .....	F.-W. Benoit
15 - Raimbault River Area, Roberval Electoral District .....	J.V.G. Bray
16 - Harricana - Turgeon Area, Abitibi-West and Abitibi-East Electoral Districts .....	J.H. Remick



17 - Pommeroy - Bellefeuille Area, Témiscamingue Electoral District .....	R.-J.-E. Sabourin
18 - Turquetil - Emard Area, Pontiac Electoral District .....	A.-F. Laurin
19 - Lorraine - Flandre Area, Pontiac Electoral District .....	R.-A. Marleau
20 - Rocheblave Area, Labelle and Papineau Electoral Districts ...	D.W. Pollock
21 - Saint-Gabriel-de-Brandon Area (East Half) Berthier, Maskinongé and Saint-Maurice Electoral Districts .....	René Béland
22 - Carignan - Hackett Area, Laviolette and Portneuf Electoral Districts	Jehan Rondot
23 - Squateck Area (East Half), Témiscouata and Rimouski Electoral Districts .....	P.-J. Lespérance
24 - Matapédia - Rimouski Region, Matapédia and Rimouski Electoral Districts (1" = 2 miles)	Jacques Béland
25 - Cuoq - St-Vianney Area, Matane and Matapédia Electoral Districts .....	N.C. Ollerenshaw
26 - Rivière Angers Area (East Half), Bonaventure Electoral District .....	W.B. Skidmore

B - Mineral Deposits Branch

27 - Stukely-East Area, Shefford and Stanstead Electoral Districts .....	Pierre St-Julien
28 - Gould Area, Compton and Wolfe Electoral Districts .....	Gilles Duquette
29 - Southeast Quarter LaMotte and Southwest Quarter Lacorne, Abitibi-East Electoral District .....	P.R. Brett
30 - Southwest Quarter Montbray Township, Rouyn-Noranda Electoral District .....	Camille Thibault
31 - South Half Desmeloizes Township, Abitibi-West Electoral District .....	W.F. Gilman
32 - South Half Lemoine Township, Chibougamau District .....	Pierre Demontigny
33 - Southeast Quarter Lévy Township, Opemisca Region .....	L.E. Wolhuter
34 - Mount Megantic Area, Compton and Frontenac Electoral Districts .....	A.M. Reid
35 - Sainte-Adèle Area, Terrebonne and Montcalm Electoral Districts .....	J.I. McGerrigle
36 - Duprat and Clericy Townships, Rouyn-Noranda Electoral District .....	Wm.A. Hogg
37 - Duvernoy and Fiedmont Townships, Abitibi-East Electoral District .....	J.I. Sharpe



GEOLOGICAL SURVEYS BRANCH

H.W. McGerrigle, chief of this Branch, reports as follows on the activities of the 1959-60 fiscal year:

At March 31, 1960, the resident staff at Quebec City comprised 17 geologists, 3 technical assistants and clerks, and 6 secretaries and stenographers. During the fiscal year 5 geologists - Jean Bérard, P.J. Clarke, Léopold Gélinas, Claude Leclerc, and D.W. Pollock - joined the full-time staff; on the other hand one geologist, P.T. Moyer, resigned in order to continue post-graduate university studies. The Branch's professional body is now at an all-time high in numerical strenght.

The Branch had another active year in carrying out its principal function, which is to map the geology of the Province. In this work, the nature, distribution, structural relations, and economic mineral potentialities of the rock formations in various sections of the country are examined by qualified geologists who subsequently prepare geological reports and maps giving the results of their investigations. These maps and reports are used by prospectors as guides in their search. Furthermore, especially for little-known regions, the reports and maps serve as useful references to those engaged in other pursuits - especially road and railway builders, hydroelectric and forestry engineers, the military forces, agronomists, and sportsmen. Such work in some instances has led directly to the finding of mineral deposits of commercial value, and in others has indicated where further search would be advisable.

The 1959 field programme of the Branch comprised 26 mapping parties, thus equalling the all-time record set in 1958.

This year only one party carried out reconnaissance mapping, compared with two in 1958. This group covered about 750 square miles, in territory lying south of St. Lawrence river between the Métis and Rimouski river-valleys, at a scale that will permit the publication of maps at 2 miles to 1 inch. The coverage of this type of mapping is a decrease of 3,735 square miles from the 4,485 square miles mapped in 1958.

The other 25 parties mapped a total of some 8,500 square miles (about 1.4 per cent of the Province), at a scale that will allow the publication of maps at 1 mile to 1 inch. This figure, an all-time record, is an increase of 1,600 square miles over the 6,900 square miles mapped in 1958, a rise of more than 23 per cent.

Twelve of the 26 parties were led by geologists of the permanent staff; the other 14 by geologists on part-time employment, mainly post-graduate research students at various universities. In addition to the regular mapping parties, one part-time geologist carried out some checking of the geology of the St. Lawrence lowlands, and another supervised and aided in certain investigations in the southern part of the Province.

Besides the 28 geologists who headed the above investigations, the field-parties collectively employed 38 other graduate geologists as assistant-chiefs and senior assistants, 74 university and 14 secondary school students as junior assistants, and 66 other men (for varying periods of time) as canoemen, packers, or cooks.

The chief of Branch and 5 other geologists of the permanent staff were engaged in administrative, supervisory, and other duties. During the course of the summer, most of the mapping parties were visited at least once by one or another of this group.

The areas examined and the geologists in charge of investigations in 1959 were as follows:

Northern Ungava (New Quebec)

Cape Smith - Wakeham Bay Belt

Two parties carried on one-inch-equals-one-mile mapping in the Cape Smith-Wakeham Bay mineralized belt which extends across the entire northern tip of the Province, about 1,100 miles north of Montreal. This was a continuation of investigations of the belt begun in 1957 by reconnaissance mapping.

Geologically, the belt is underlain by Precambrian sedimentary, volcanic, and intrusive rocks. Interesting mineralization occurs at many places within the belt, and some nickel-copper zones have been outlined by mining companies investigating the region. Moreover, in February, 1960, one company announced the discovery of large tonnages of good-quality asbestos ore.

D.P. Gold mapped the Raglan Lake area, which covers 380 square miles in the east-central part of the belt, between latitudes 61°30' and 61°45' and longitudes 73°00' and 73°40'.

G.H. Beall covered the Timmins Lake area, comprising 380 square miles between latitudes 61°15' and 61°30' and longitudes 73°40' and 74°20', immediately southwest of Gold's area. An interesting topographic feature within the area is the widely-known New Quebec crater, first investigated scientifically in 1951.

#### Fort Chimo Region

(\*) Léopold Gélinas mapped the east half of Fort Chimo area, which comprises 160 square miles bounded by latitudes 58°00' and 58°15' and longitudes 68°00' and 68°15'. He covered also some 50 square miles in the northern part of the map-sheet adjacent on the east. The terrain examined lies east of the Labrador geosyncline; it is underlain by Precambrian gneisses and schists which, however, may have been deformed at the same time as were the rocks of the geosyncline.

#### Electoral District of Saguenay

#### Mount Wright - Mount Reed Region

Continuing a programme of mapping begun in 1957, four parties investigated separate areas within a relatively new iron-bearing region that lies in the northern part of Saguenay electoral district, roughly between 125 and 190 miles northwest of Sept-Iles. Geologically, the region is underlain mainly by Precambrian gneisses, schists, and altered sedimentary rocks, the latter including iron-bearing formations which, in places, contain large deposits of concentrating-type iron ore. Some of these deposits are at present being rapidly developed for large-scale production by Quebec Cartier Mining Company.

(\*) P.J. Clarke mapped the Normanville area, which extends from longitude 67°00' eastward to the approximate limit of the Province, between latitudes 52°45' and 53°00', and covers about 260 square miles.

D.L. Murphy mapped the Carheil-Gentilhomme Lakes area, which comprises 310 square miles bounded by latitudes 52°30' and 52°45' and longitude 67°00' and the approximate eastern limit of the Province.

A.J. Sinclair covered the east half of Georget Lake area, which includes 185 square miles limited by latitudes 52°15' and 52°30' and longitudes 68°00' and 68°15'.

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(\*) Indicates full-time, staff geologist.

B.E. MacKean investigated the southernmost sheet, the east half of Barbel Lake area, covering 185 square miles between latitudes 51°45' and 52°00' and longitudes 68°00' and 68°15'. Jeannine Lake and the new Gagnon townsite are within this area.

#### North Shore Region

D.S. McPhee examined the east half of Michaud Lake area, which comprises 190 square miles bounded by latitudes 50°30' and 50°45' and longitudes 62°00' and 62°15'. The map-area lies about 25 miles inland from the north shore of the St. Lawrence at a point about 190 miles east of Sept-Iles.

P.-L. Gauvin mapped some 120 square miles of the west half of Vermette Lake area, which is enclosed by latitudes 50°00' and 50°15' and longitudes 67°15' and 67°30'. The map-area lies about 30 miles northwest of Shelter Bay, a village on the north shore of the St. Lawrence about 300 miles below Quebec. It straddles the route of the Port Cartier - Jeannine Lake railroad at present being constructed to tap the large iron deposits found at the latter place.

#### Mistassini Territory

A programme of regionally mapping the relatively little-known country around and northeast of Mistassini Lake, first begun in 1947 and carried on intermittently since then, was again resumed in 1959. Three parties were assigned to this work - two in areas lying some 25 miles northeast of Mistassini Lake, the third to an area bordering the east shore of the lake towards its southern end.

(\*) Jean Bérard mapped the Toco-Témiscamie area, which comprises 370 square miles bounded by latitudes 51°30' and 51°45' and longitudes 72°00' and 72°30'.

E.H. Chown covered the Papachouesati River area, which lies between latitudes 51°30' and 51°45' and longitudes 72°30' and 73°00' and includes 370 square miles.

P.T. Moyer investigated the Guyon-Dorval area which is limited by latitudes 50°30' and 50°45' and longitudes 73°30' and 74°00'. The map-rectangle comprises 380 square miles but a considerable part of this is Mistassini Lake. The area lies about 55 miles northeast of the town of Chibougamau.

### Lake St-Jean Region

Three parties carried out mapping assignments in this district, which during recent years has been receiving increased attention from prospectors and mining companies. In 1959 the investigations were all within Roberval electoral district.

J. P. Berrangé examined the Antoine-Pelletier area, which covers 195 square miles between latitudes 49°00' and 49°15' and longitudes 72°15' and 72°30'. The map-area lies about 25 miles north-northwest of Lake St-Jean and includes parts of Hémon, Antoine, Beaudet, Pelletier, and La Trappe townships.

(\*) F.-W. Benoit mapped the east half of Chomedey-Paquet area (Dumais-Quesnel area), between latitudes 48°45' and 49°00' and longitudes 72°45' and 73°00'. The map-area straddles the St-Félicien-Chibougamau highway some 25 miles northwest of St-Félicien, as well as the recently completed C.N.R. railway line that was opened to traffic late in October 1959 and links those towns. This investigation is part of a programme of mapping a strip of territory along the route of the highway, begun some years ago at the Chibougamau end. The map-area covers 195 square miles and includes parts of Chomedey, Paquet, Ramezay, Quesnel, Girard, Dumais, Dufferin and De Lamarre townships.

J.V.G. Bray investigated the Rimbault River area, which lies about 30 miles west-southwest of Roberval and is bounded by longitudes 72°45' and 73°00' and latitudes 48°15' and 48°35' approximately. The map-area covers 255 square miles, all in unsubdivided territory except for a small part of Drapeau township.

### Matagami Region

(\*) J.H. Remick headed a large-scale project which mapped about 2,115 square miles of the westward extension of the Matagami - Chibougamau greenstone belt. This belt, in several places, contains ore bodies and elsewhere is mineralized in varying degrees.

During the past two years this district has been the scene of widespread exploration activity. Various companies have carried out extensive programmes, including both airborne and ground geophysical surveys, surface geological mapping and prospecting, and diamond drilling of promising anomalies. The work has been somewhat handicapped in many parts owing to the scarcity of bedrock exposure and the considerable depth of overburden.

The area investigated by Mr. Remick - designated the Harricana - Turgeon area - is in the northern part of Abitibi-East and Abitibi-West electoral districts. It lies between latitudes 49°30' and 50°00' and extends from longitude 78°00' westward to the Ontario boundary at longitude 79°30'. The operation was supported by a Bell 47G-2 helicopter chartered for a period of 3 1/2 months during which it totalled nearly 260 hours of flying. The work was carried out from a permanent base-camp on Harricana river in the northern part of Montgolfier township. In addition to the chief, the party included two sub-party chiefs, two other geologists, six students and five other men.

#### Electoral District of Témiscamingue

R.-J.-E. Sabourin mapped the Pommeroy - Bellefeuille area, which extends between latitudes 47°00' and 47°15' and from longitude 78°30' westward to Ostaboningué lake. The map-area is about 35 miles northeast of Témiscamingue, a town on Ottawa river near the south end of Témiscamingue lake. It covers 300 square miles, including all of Pommeroy township and parts of Bellefeuille, Lanoue, Couturier, Darveau, Guay and Bruchési townships.

#### Electoral District of Pontiac

(\*) A.-F. Laurin mapped the Turquetil - Emard area, between latitudes 47°00' and 47°15' and longitudes 76°15' and 76°45', about 120 miles northwest of Hull and 90 miles southeast of Val-d'Or. The map-area covers 410 square miles, including all of Turquetil township, most of Sbarretti, Cardinal, and Emard, and parts of Charbonnel and Harris townships.

(\*) R.-A. Marleau examined the Lorraine - Flandre area between latitudes 46°30' and 46°45' and longitudes 76°30' and 76°45', about 85 miles northwest of Hull and 60 miles west of Mont Laurier. The area covers 210 square miles, including parts of Hainaut, Orleanais, Lorraine, Picardie, Flandre and Isle-de-France townships. Dr. Marleau also mapped about 50 square miles in the area immediately to the southeast.

#### Electoral Districts of Labelle and Papineau

(\*) D.W. Pollock investigated the Rocheblave area, which lies about 50 miles north-northeast of Hull and is bounded by latitudes 46°00' and 46°15' and longitudes 75°15' and 75°30'. The area occupies 205 square miles, including parts of Papineau, Wells, McGill, Rocheblave, Rivard and Dudley townships.

Electoral Districts of Berthier, Maskinongé and St. Maurice

René Béland examined the east half of Saint-Gabriel-de-Brandon area, between latitudes 46°15' and 46°30' and longitudes 73°00' and 73°15'. The map-area is about 20 miles north of Sorel and 30 miles west of Trois-Rivières. It covers about 205 square miles, including most of Hunterstown township, as well as parts of other townships and of several seigniories. Dr. Béland also mapped an additional 100 or so square miles in areas adjacent on the north and on the south.

Electoral Districts of Laviolette and Portneuf

(\*) Jehan Rondot mapped the Carignan - Hackett area, bounded by latitudes 47°00' and 47°15' and longitudes 72°30' and 72°45'. The map-area is about 25 miles south-southeast of La Tuque and covers 205 square miles, chiefly in Laviolette electoral district. It includes parts of Carignan, Hackett, Pothier, Lapeyrère, Boucher, Mékinac and Marmier townships. Mr. Rondot also mapped the east half of the area adjacent on the south - that is, 100 square miles bounded by latitudes 46°45' and 47°00' and longitudes 72°30' and 72°37'30".

Electoral Districts of Témiscouata and Rimouski

P.-J. Lespérance mapped the east half of Squateck area, which lies between latitudes 47°45' and 48°00' and extends from an irregular line at approximate longitude 68°45' eastward to the meridian of the Quebec - New Brunswick boundary at approximate longitude 68°23'. The map-area is 150 miles northeast of Quebec City and 50 miles east of Rivière-du-Loup. It comprises about 250 square miles, including all of Asselin, Auclair, Ango and Rouillard townships, as well as parts of Biencourt and Robitaille townships and of Madawaska seigniory.

Matapédia - Rimouski Region

(\*) Jacques Béland continued a programme, begun in 1958, of one-inch-equals-two-miles reconnaissance mapping in territory lying south of St. Lawrence river between Gaspé peninsula and the Témiscouata Lake valley. This investigation was initiated in order to obtain a general picture of the geology of the folded Palaeozoic sedimentary rocks of that segment of the Appalachian sub-province, knowledge of which was previously rather limited. During 1959 Dr. Béland mapped some 750 square miles lying between Métis and Patapédia rivers on the east and Rimouski river on the west.

Dr. Béland also gave comprehensive supervision to two other parties that mapped areas in the same general district at the one-inch-to-one-mile scale; namely, those led by P.J. Lespérance and N.C. Ollerenshaw.

Dr. Béland also organized and conducted through the southwestern corner of Gaspé peninsula a two-day (Sept. 4-5) field-trip for a group of Canadian and American geologists. Formations along the lower part of the Matapédia river-valley and bordering the north shores of Ristigouche river and Chaleurs bay from Matapédia to Carleton were studied. Dr. Béland was assisted by two other representatives of the Department of Mines, Dr. W.B. Skidmore and Mr. P.-J. Lespérance.

Immediately after this, Dr. Béland joined for two days (Sept. 6-7) the 'Palaeobotanical Excursion to Eastern Canada', being held as part of the Ninth International Botanical Congress, which body was meeting in Canada for the first time. Some 40 palaeobotanists from several countries were on this guided tour. During the two-day period the group visited a number of localities along the north shore of Ristigouche river between Matapédia and Chaleurs bay where Devonian rocks containing fossil plants are exposed. Dr. Béland had been asked by the tour officials to explain the geology of the country visited and of the formations studied, and his assistance was much appreciated.

#### Gaspé Peninsula

N.C. Ollerenshaw carried out mapping at the western end of Gaspé peninsula in a section some 20 miles east-northeast of Matapédia lake. He covered about 160 square miles of the area bounded by latitudes 48°30' and 48°45' and longitudes 67°00' and 67°30', which comprises parts of Matapédia and Matane electoral districts. The territory covered was mainly in the northern two-thirds of Cuoq area and the northern quarter of St. Vianney map-sheet.

(\*) W.B. Skidmore mapped the east half of Rivière Angers map-sheet, between latitudes 48°15' and 48°30' and longitudes 66°00' and 66°15'. The area covers 200 square miles in the south-central part of Gaspé peninsula, straddling Cascapédia river about 20 miles north of Carleton on Chaleurs bay. It lies almost entirely within Bonaventure electoral district, and includes most of Clapperton and Angers townships, as well as small segments of several others.

#### Other Work

I.H. Clark carried out some checking of the geology of the St. Lawrence Lowland which has been almost completely mapped by him during a long-term programme of investigation for the Branch.



F.F. Osborne served in a supervisory and advisory capacity for geological investigations in the Appalachian region north-east of Quebec City, and also in the Laurentian, or Grenville, section of the Province. He also critically reviewed certain of the geological reports and maps.

The following five other geologists assisted the chief of the Branch in administrative, supervisory, editorial and other duties: Robert Bergeron(\*), Marcel Morin(\*), M.M. Ritchie(\*), Pierre Sauvé(\*) and Claude Leclerc(\*).

Some of the Branch's geologists rendered assistance to the Mineral Deposits Branch by examining and reporting on various mineral occurrences, prospects and showings in different parts of the Province.

Geologists of the Branch represented the Department and presented papers at meetings of geological, engineering, prospecting and other scientific organizations. Some of these contributions, as well as other articles, have been published in a variety of scientific journals.

At the end of June 1959, the Royal Society of Canada elected Dr. F.F. Osborne as president of Section IV (geological sciences). In November, Dr. Pierre Sauvé was elected president of the Geological Society of Quebec and Drs. R.-A. Marleau and W.B. Skidmore were chosen as members of the administrative council of this same society.

During the course of the field-work, many of the mapping parties were visited by geologists, engineers and prospectors. Throughout the year many others interested in the mining industry visited the Branch's offices in Quebec City. From the staff they were able to obtain much information concerning the geology of many different parts of the Province. Moreover, many inquiries and requests for information were answered by correspondence.

#### MINERAL DEPOSITS BRANCH

J.-E. Gilbert, chief of the Mineral Deposits Branch, reports the following activities for his Branch during the 1959-60 fiscal year.

On March 31st, 1960, the professional personnel of the Mineral Deposits Branch consisted of 15 full-time geologists and mining engineers. This personnel was assisted by 41 technical assistants, clerks, draughtsmen, secretaries, and stenographers. One graduate geologist, G.-G. Grondin, joined the permanent staff as assistant to the chief of the Branch during the fiscal year and another geologist, J. Beauregard,

was hired for a 6-month period during the year. One engineer resigned from the permanent staff.

The principal responsibility of the Mineral Deposits Branch is to carry out detailed studies of mineral occurrences, mining properties, and mining districts with a view to helping the development of the mineral industry in the Province. To facilitate the accomplishment of that purpose, eight graduate geologists are stationed in the five resident geologists' offices located at Bourlamaque, Chibougamau, Montreal, Quebec and Rouyn; two mining engineers and one geologist specialized in industrial minerals technology are stationed in Quebec, and nine part-time geologists were engaged during the year in detailed geological mapping of economically important mineral-bearing areas or on other projects.

The Mineral Deposits Branch is also responsible for the study of prospectuses and reports as officially requested by governmental or other agencies; the acceptance of reports, plans, and diamond drill logs submitted for credit towards statutory assessment work; the study of reports submitted in support of applications for mining concessions; and property examinations in connection with revocation of mining rights.

The Division of Technical Documentation of the Department also comes under the jurisdiction of the chief of the Mineral Deposits Branch, and the description of its functions and of its activities during the fiscal year 1959-60 appears below under a separate sub-heading. The Technical Library Section is likewise under his administration and the report of the activities of that Section is given on page 70.

The 1959 field work of the Branch consisted of 20 different projects including geological mapping, mining property examinations and special studies. Eleven of these were undertaken by members of the permanent personnel and nine others were under the direction of part-time geologists, mainly post-graduate students doing research work in various universities. In addition, one full-time geologist helped on the editing of geological and other reports and was with the chief of the Branch engaged in administrative and other duties. The field programme provided employment, in addition to the geologists and engineers whose work is mentioned above, to eight graduate geologists or engineers and 23 students who acted as geological assistants and to seven other men employed as cooks or canoemen.

J.-R. Assad, resident geologist for the Chibougamau district, continued the compilation of the available geological information related to his district and reported on 20 mining properties on which exploration or development work was done during 1959. He also supervised the work of two field parties doing detailed geological mapping in his district.

P.-E. Bourret, senior mining engineer in charge of Industrial Minerals Technology Division, visited 75 quarries or mining properties in the exploration, development or production stages, collecting information and giving advice to prospectors, developers, and mine operators on the development of their deposits, their mining or ore-dressing problems, and the marketing of their products.

P.R. Brett continued during the year the detailed geological mapping of the LaMotte - Lacorne area in Abitibi-East and covered at 1,000 feet to the inch the southeast quarter of LaMotte and the southwest quarter of Lacorne township. The molybdenite-bismuth producing mine of the Molybdenite Corporation of Canada Limited is located in the area covered by Mr. Brett and a considerable amount of prospecting work for spodumene and beryl has also been done in the southwest quarter of Lacorne township.

A.-N. Deland, resident geologist for the district of Montreal, visited and reported on 28 mining properties in his district. He also supervised the work of one geological field party operating in his district and completed various compilations of mineral occurrences in the Montreal and adjacent areas.

P. DeMontigny mapped at 1,000 feet to the inch most of the south half of Lemoine township, east of the southern part of Chibougamau lake. A zone of anorthosite somewhat similar to the one in which base metal mineralization occurs in the district of Chibougamau was studied by Mr. DeMontigny.

Jean Dugas, resident geologist for the district of Rouyn-Noranda, reported on 24 mining properties in his district on which exploration or development work was done during the year. He also completed the compilation maps, at 1,000 feet to the inch, of the northeast quarter of Dufresnoy township, the southwest quarters of Duprat, Preissac and Beauchastel townships, and the northwest quarter of Preissac township. He, furthermore, supervised the work of two field parties doing detailed geological mapping in his district.

Gilles Duquette continued, during the summer of 1959, a programme of geological mapping at the scale of 500 feet to the inch initiated in

1958 in the general region of Weedon Centre, in the electoral districts of Wolfe and Compton. This programme should contribute to a better understanding of the geological, structural and mineralogical features of the region.

W.F. Gilman continued the detailed geological study of the township of Desmeloizes, electoral district of Abitibi-West, in which is situated the producing property of Normetal Mining Corporation Limited. The south half of the township was covered by Mr. Gilman during the summer of 1959.

P.-E. Grenier, resident geologist for the district south of the St. Lawrence, reported on 23 properties visited by him in his district and north of the St. Lawrence river. He also supervised the field work of three field parties doing geological mapping in the Eastern Townships and helped in the editing of their reports. Dr. Grenier, furthermore, undertook various studies and compilations and performed some administrative and other duties in co-operation with the chief of the Branch.

W.A. Hogg continued during 1959 the detailed geological mapping of Duprat, Cléricy and Beauchastel townships, electoral district of Rouyn-Noranda, which had been partly covered by previous studies. Dr. Hogg reported on seven mining properties which he visited during the year and helped Dr. Dugas in various compilations of the geology of the Rouyn-Noranda district.

M. Latulippe, resident geologist for the Val-d'Or district, visited 33 mining properties in his district and completed the compilation maps at 1,000 feet to the inch of the geology of the whole of Duverny township, the northwest quarter of Dalquier and of the southeast and northwest quarters of Lamorandière township. He also supervised the work of one geological party doing field work in his district.

J.I. McGerrigle, junior geologist attached to the Montreal office, continued his programme of detailed geological mapping of the iron-titanium-bearing district north of Montreal and covered during the field season of 1959 the Sainte-Adèle area (latitudes 45°55' - 46°00', longitudes 74°05' - 74°10'). He also visited five mining properties in the Montreal district and worked on compilations and mapping of various mineral occurrences in the district.

Raymond Paquet, geologist attached to the Industrial Minerals Technology Division, visited 38 mining properties in various stages of exploration, development, or production in the Province. He also organized and

supervised the annual series of elementary lectures on general geology and prospecting given at various localities throughout the Province.

Conrad Paré, mining engineer attached to the Industrial Minerals Technology Division, visited 26 properties during the year. His other main work was a compilation of the available information on building materials and the planning of his future field activities.

A.M. Reid made during the summer of 1959 a geological examination of the intrusive rocks of Mégantic Mountain, in Compton and Frontenac electoral districts, and of the adjacent metamorphosed sedimentary and volcanic formations. Some of the rock of Mégantic Mountain is used for building purposes.

Pierre St-Julien continued, during the summer of 1959, the detailed geological mapping undertaken in 1956 in the vicinity of Magog, Eastern Townships, and covered during the summer the Stukely-East area (latitudes  $45^{\circ}20'$  -  $45^{\circ}25'$ ; longitudes  $72^{\circ}10'$  -  $72^{\circ}15'$ ). Copper, asbestos and chrome mineralization was discovered during the mapping.

J.I. Sharpe, junior geologist in the Bourlamaque office, carried out some detailed mapping in Duvernoy and Fiedmont townships, electoral district of Abitibi-East. In addition, he reported on 20 mining properties visited by him and, together with Mr. Latulippe, he closely followed the considerable mining developments which took place during the year in the Matagami Lake district.

C. Thibault continued during 1959 the detailed geological mapping undertaken in 1958 by W.A. Hogg in Montbray township, electoral district of Rouyn-Noranda. Mr. Thibault covered most of the southwest quarter of the township in which a considerable amount of exploration work is being presently done.

G.W. Waddington, mining engineer and part-time employee of the Branch, helped in the editing of three geological reports for the Branch. Mr. Waddington also completed a comprehensive compilation of all the known occurrences of iron in the Province.

L.E. Wolhuter continued during 1959 the geological mapping at the scale of 1,000 feet to the inch of the vicinity of Chapais, Chibougamau district. Mr. Wolhuter covered the southeast quarter of Lévy township, immediately east of the producing property of Opemiska Copper Mines (Quebec) Limited. Valuable information was obtained during the survey.

Division of the Economy of the Laws

J.-L. Pouliot, mining engineer, chief of this Division, reports that during the year under review, 71 geological and 458 geophysical plans and reports and 288 diamond drilling reports were examined for credit towards statutory assessment work. In addition, 139 reports and prospectuses were studied upon request from the Quebec Securities Commission. Eight reports submitted by engineers in support of applications for mining concessions were also examined. The following table, which gives the number of reports received annually by the Department since 1956, shows an appreciable increase of activities in mining exploration in the Province during the 1959-60 fiscal year.

Table VI. - Comparative Totals of the Number of Reports  
Received during the Years 1956 to 1960

Types of Reports	1956	1957	1958	1959	1960
Geological .....	109	194	93	121	71
Geophysical .....	248	567	270	301	458
Diamond drilling .....	264	491	312	236	288
Quebec Securities Commission .....	101	207	144	189	139
Mining concessions .....	13	3	4	4	8

Prospecting Courses

To arouse greater interest in the search for economic minerals throughout the Province, a series of lectures on general geology and prospecting was given in French or in English in nine different localities of the Province.

At each place, nine lectures were given of which four were on identification of rocks and minerals. The lecturers were J.-R. Assad, A.-N. Deland, Jean Dugas and Raymond Paquet, geologists of the Branch, and Fernand Benoit and Raymond Roy respectively geologists for the Geological Surveys Branch and for the Groundwater, Gas and Petroleum Branch.

The following list gives the average attendance in each of the localities where the course was given.

Arundel .....	21	Huberdeau .....	26
Beauceville .....	16	Malartic .....	19
Cabano .....	30	Parent .....	14
Forestville .....	14	Saint-Félicien .....	7
Gracefield .....	22		

Four lectures on the Mining Act of the Province were also given by P.-E. Grenier at the Department of Geology of the Faculty of Sciences, Laval University, to the group of prospectors attending the annual courses on mineral prospecting at that place.

#### Division of Technical Documentation

The Division of Technical Documentation is responsible for the safe-keeping of all the technical data pertaining to mineral deposits, to development work done by operators, as well as of other information concerning the mineral industry of the Province. It also supplies prospectors, mine operators and others with technical information on these subjects.

François Baby, chief of this Division, submits the following report on its activities:

- a) Number of requests for information on mine operators .. 882
- b) Number of requests for technical information concerning the mineral industry of the Province ..... 331
- c) Number of requests pertaining to mineral technology ..... 76
- d) Number of requests related to mining properties in the Province ..... 670

During the period under review, the revision of the classification of the already filed reports and plans pertaining to exploration and development work done in the Province, which had been undertaken in 1957, was continued and about 1,500 such documents were re-classified.

For the purpose of obtaining a collection as complete as possible of the publications prepared by mine operators for the benefit of their shareholders, requests were made to 908 operators, who directly or through subsidiary companies, hold mining rights in the Province.

The edition of monthly notes summarizing the progress of the mining industry in the Province was continued by the Division. These notes are distributed to the officers of the Department for their personal information. An accurate system of compilation of information for the preparation of these notes was organized in the course of the year.

There was a considerable increase in the number of documents received by the Division during the year under review and they comprise the following:

a) Documents pertaining to mining properties .....	
	reports 1,513
	plans 2,119
b) Mining company annual reports to shareholders	623
c) Reports of inspection by officers of the Department .....	310
d) Documents concerning minerals technology .....	369

The Technical Documentation Division also prepared during the 1959-60 fiscal year the texts for five advertisements and of eight articles which were published in various technical newspapers and magazines and in the national or foreign press. Most of the literature and the rock specimens used in the various exhibits displayed by the Department in industrial or regional exhibitions held in the Province during the year were also provided by the Division.

#### GROUNDWATER, GAS AND PETROLEUM BRANCH

Roland DeBlois, chief of this Branch, submits the following report for the fiscal year 1959-60.

On March 31st, 1959, the technical personnel of the Quebec office comprised four engineer-geologists, one geologist and two technical assistants. During the year, a geologist, Michel Houde, was hired as a full-time employee. Another geologist, employed on a part-time basis, studied the samples obtained through drilling for gas and petroleum. Finally, three special officers followed, in the field, the various types of work involved in the search for petroleum and natural gas, besides making surveys of water and gas wells privately operated in certain areas. They interviewed water well drillers to secure their collaboration in filling our log forms. If the collaboration thus obtained becomes general, the Branch will eventually accumulate information and knowledge on the general hydrographic facies



of the Province. This, in turn, will help everybody and, more so, the well drillers who will find their work much easier to do.

### Groundwater

This Division conducts groundwater surveys and does experimental and theoretical work. Its technical personnel comprises three engineer-geologists, specialists in groundwater technology.

The main function of the Division is to help municipalities, aqueduct operators and public institutions find an adequate underground water supply, whether for new installations or for existing ones that no longer satisfy present needs.

In order to give the required services, the personnel follows, in the field, a two step procedure:

- a) A geological map of the areas concerned is compiled in order to find adequate water storing strata, with emphasis, in most cases, on the study of Pleistocene formations.
- b) Tests are conducted to ascertain the potential of the aquiferous formations.

During the year, emphasis was placed on experimental and theoretical research. Extensive studies were conducted, during the winter months, on the transmissibility and permeability of aquiferous formations, in order to obtain a greater degree of accuracy, in predicting the permanent flow of water wells.

The Division was equipped, during the year, with a mechanical drill, which is a great help to the engineers in their groundwater surveys.

Raymond Roy, Claude Grenier and Roland DeBlois made 36 groundwater surveys in the following electoral districts: Arthabaska, Beauce, Bonaventure, Champlain, Frontenac, Kamouraska, Labelle, Lac-Saint-Jean, Laval, Lévis, L'Islet, Lotbinière, Missisquoi, Nicolet, Portneuf, Québec, Rivière-du-Loup, Rouville, Saguenay, Témiscamingue, Terrebonne and Trois-Rivières.

### Petroleum and Natural Gas

The main function of this Division is to guide, in their search, all those who are drilling for petroleum and natural gas.

To this end, drill cores and samples are studied to establish some correlation between the various geological formations encountered. Engineers measure all important flows of gas, both as to volume and pressure. They follow the operations closely and make sure that all the regulations are adhered to. All the drilling data is recorded and indexed; this procedure makes it possible to obtain, in the minimum of time, all the information, either on one drilling operation or on all of them.

The Division has prepared a report, giving the most pertinent information on all the wells drilled to date, for petroleum and natural gas in the St. Lawrence Lowlands, and a map showing the well sites. Both documents were published during the year.

During 1959-60, five companies drilled a total of eight wells, for an aggregate of 14,996 feet of drilling. In addition, two companies had geological survey parties in the Gaspé region.

Paul-P. Simard and Michel Houde followed the drilling operations and gave all the technical assistance requested; in addition, they examined the samples of many drilling operations and indexed the data covering all the work done. During the winter season of 1959-60, Paul-P. Simard was granted leave of absence to study for his Master's degree in Petroleum Engineering, at the University of Tulsa, Oklahoma. Michel Houde devoted a lot of time to the revision of the geology of the St. Lawrence Lowlands, and of the areas of the Province that hold the interest of petroleum companies.

I.H. Clarke made a detailed geological analysis of the samples obtained from drilling operations, in the St. Lawrence Lowlands.

Three special officers watched the drilling operations and gathered information on gas flows in many localities.

#### DIVISION OF EDITING AND PRINTING

Maurice Brunet, chief of this Division, submits the following list of the publications of the Department of Mines edited and printed during the fiscal year 1959-60. All the publications have been issued in French and in English; the Division is responsible for the translation of these publications.

Geological Reports

- No. 84 - Fancamp - Haury Area, S.W. Holmes
- No. 85 - Brongniart - Lescure Area, H.B. Lyall
- No. 86 - Rohault Area, J.-E. Gilbert
- No. 87 - Hazeur - Druillettes Area, A.-N. Deland and P.-E. Grenier
- No. 88 - Chaste - Mazarin Area, M. Tiphane
- No. 89 - Céloron - Carqueville Area, S.H. Ross
- No. 90 - Richard - Gravier Area, C. Carbonneau
- No. 91 - New Glasgow - Saint-Lin Area, F.F. Osborne and T.H. Clark
- No. 92 - Rawdon Area, René Béland
- No. 93 - Chertsey Area, P.-E. Côté
- No. 94 - Doncaster Area, M.A. Klugman

Preliminary Reports

- No. 392 - Povungnituk Range Area, Robert Bergeron
- No. 393 - The Saint-Hippolyte Area, J.I. McGerrigle
- No. 394 - Margry - Prévert Area, J.H. Remick
- No. 395 - Matawin - Mékinac Area, J. Rondot
- No. 396 - Cross Lake Area, G.H. Beall
- No. 397 - Vermette Lake Area (East Half), P.T. Moyer
- No. 398 - Upper Deception River Area, P.-A. DeMontigny
- No. 399 - Leaf Bay Area, Pierre Sauvé
- No. 400 - General Report of the Minister of Mines of the Province  
of Quebec for the Year Ending March 31, 1959
- No. 401 - Peppler Lake Area, East Half, L.S. Phillips
- No. 402 - Sample Preparation Techniques for X-ray Fluorescence  
Analysis, F. Claisse
- No. 403 - Aguanish Area, D.S. McPhee
- No. 404 - La Trappe - Hudon Area, J.P. Berrangé
- No. 405 - West Half of LaMotte Township, W.R. Leuner
- No. 406 - Description of Mining Properties Examined in 1958,  
Officers of the Department of Mines
- No. 407 - Gabriel Lake Area (East Part) and Fort Chimo  
Area (West Part), L. Gélinas
- No. 408 - Rocheblave Area, D.W.T. Pollock
- No. 409 - Iron Ore Deposits of the Province of Quebec,  
G.W. Waddington

Preliminary Reports (Cont'd.)

- No. 410 - SE. Quarter of Fiedmont Township, Paul R. Van Loan
- No. 411 - Toco - Témiscamie Area, Jean Bérard
- No. 412 - Carheil and Le Gentilhomme Lakes Area, D.L. Murphy
- No. 413 - Normanville Area, P.J. Clarke
- No. 414 - Georget Lake Area (East Half), A.J. Sinclair
- No. 415 - The Papachouésati River Area, E.H. Chown
- No. 416 - Weedon Area, Gilles Duquette
- No. 417 - Carignan - Hackett Area, J. Rondot
- No. 418 - Fort Chimo Area (East Part), L. Gélinas
- No. 419 - SW. Quarter of Lévy Township, G.M. Archibald
- No. 420 - Lorraine - Flandre Area, R.-A. Marleau

Special Publications

- S-47 - Descriptive Notes To Accompany the Compilation of the Geology of the NE. Quarter of Dufresnoy Township, Jean Dugas
- S-48 - Ungava, Robert Bergeron
- S-49 - Data on Wells Drilled for Oil and Gas in the St. Lawrence Lowlands, Roland DeBlois
- S-50 - Outline of Progress of the Mining Industry of the Province of Quebec for the Year 1959, E.-E. Bérubé  
The Mining Industry of the Province of Quebec for the Year 1958

This Division was also responsible for the printing of 487 forms and circulars representing a grand total of 446,310 copies.

DIVISION OF DISTRIBUTION OF PUBLICATIONS

The personnel of this Division, under Noé Lamontagne, sent out 85,724 publications in answer to requests for information concerning the geology and the mineral resources of the Province. In addition, 27,375 publications were distributed, according to our regular mailing list, making a grand total of 113,099 publications sent out.

This last number is 20 per cent over the total of 94,299 publications distributed during the fiscal year 1958-59.

LABORATORIES BRANCH

The Laboratories Branch comprises the following divisions:

- I - Laboratories for mineralogical and metallurgical research;
- II - Laboratories for analyses and assays, established at Quebec and Montreal;
- III - Elementary courses in prospecting, given to university students in the Province.

The director of this Branch is Maurice Archambault and his assistants are: Henri Boileau, chief chemist; Jean Girault, mineralogist and chief petrographer; and Fernand Claisse, chief physicist, employed on a part-time basis.

I - Research Laboratories

The mineralogical and metallurgical research work carried out during the year was centered on:

- a) technical assistance to prospecting;
- b) chemical extraction of columbium;
- c) perfection of different processes of extracting lithium from its ores;
- d) production of mineral salts of lithium;
- e) use of ultrasonic vibrations in flotation;
- f) chemical utilization of peat;
- g) elimination of magnesia from titanium concentrates;
- h) concentration of complex ores of columbium and rare earths.

Project No. 8:- Claude Frémont pursued his research work on the construction of a magnetometer, small enough to be lowered into a diamond drill hole and possessing an unusual sensitivity and stability. To reach his goal, he had to elaborate a more complete theory of the detecting element of this magnetometer and he had to modify the impulse generating circuit, so as to increase its power. This is a very difficult type of work, because such an elaborate instrument must occupy a small volume.

Project No. 108:- Silien Dessureaux\* and Jean Girault\* studied the behavior of the ore of Molybdenum Company of America as it underwent mechanical concentration. This is a complex ore containing columbium, tantalum, titanium, and rare earths. The concentrates obtained by S. Dessureaux were produced by a combination of gravity, electromagnetic and flotation methods.

Project No. 116:- Fernand Claisse, with the help of Claude Samson, conducted research to increase the field of application of the method of quantitative analysis by X-ray diffraction, which had been developed in the laboratories of the Department.

Project No. 118:- Fernand Claisse is working on the interpretation of the results of a few thousand spectrographic analyses, to find a geo-chemical relation between elements found at various levels in the wells drilled for oil in the Province.

Project No. 122:- P.-E. Gagnon, Y. Laflamme\* and F. Simonyi\* have pursued their study on the chemical extraction of columbium from ores found in the Oka area. Results obtained so far appear interesting. Their report includes 452 new references, 252 of which pertain to columbium and 200, to tantalum. Four treatment processes were tried: two wet and two dry processes.

Project No. 128:- L.-P. Bonneau has obtained a number of patents covering the air separator which he invented; these patent rights have been transferred to the Department of Mines. The main field of application of this separator is to remove dust from asbestos fibers previous to the bagging operations. However, it may eventually be used to obtain an easier and more complete concentration of many mineral substances. The following patents have been secured: United States, No. 2,910,178; Belgium, No. 571,021; France, No. 1,216,294. The Canadian and British patents should be granted soon.

Project No. 129:- Maurice Archambault\*, J.U. MacEwan and Charles-A. Olivier\* have continued their studies of the spodumene sulphatation processes that they invented and perfected. Up to date, they have secured the following patents: Canada, No. 592,353; United States, No. 2,923,600; Germany, No. 1,064,935; France, No. 1,183,727; and Belgium, No. 560,581. The inventors have alienated all their rights in favor of the Department of Mines. This invention deals with the treatment of ores or concentrates of lithium in contact with a gaseous

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\* Denotes a permanent member of the personnel.

mixture of water vapor, air and catalytically activated sulphurous gas at a temperature between 125°C. and 600°C. This very economical process can make use of the gas obtained in the burning of pyrite.

Project No. 130:- Maurice Archambault\* and C.-A. Olivier\* did research work on ways of transforming ores of lithium into lithium sulphides.

Project No. 131:- Henry V. Zaruba\* continued the investigations started previously on the use of ultrasonic vibrations in flotation. Ultrasonic emulsification gives excellent results. There is a marked improvement not only in the case of collectors but also in the case of frothers. Conditioning time is shortened and reagents consumption, decreased.

Project No. 132:- Maurice Archambault\*, Paul Fortier\*, H.-P. Lemay\*, C.-A. Olivier\*, J.-J. Panneton\* and M. Savard\* have continued to study the most economical means to assure the exchange of sodium for lithium in spodumene. They have studied the conditions that would permit the production of different by-products from the same reaction mixture. One of the aims of this research is to find a commercial outlet for the tailings of the milling of spodumene ore.

Project No. 133:- Maurice Archambault\*, H.-P. Lemay\*, and M. Savard\* have studied the behavior, at different temperatures, of natural spodumene and of spodumene calcined in suitable gaseous atmospheres with or without the presence of alkaline or alkaline-earth salts. Decomposition reactions are involved here.

Project No. 140:- Maurice Archambault\* and H.-P. Lemay\* have pursued the study initiated last year on the treatment of titanium ores, to improve their treatment in the electric furnace.

Project No. 141:- Silien Dessureaux\* and Jean Girault\* have studied the behavior of the ores from St. Lawrence River Mines, as they underwent mechanical concentration. S. Dessureaux obtained good pyrochlore concentrates by combining cell and table flotation. Excellent concentrates were also obtained, when both flotation and gravity concentration were used.

Project No. 142:- Joseph Risi and Raymond Brindamour\* undertook a qualitative and quantitative study of the products obtained through oxydation of peat with nitric acid. They are trying to obtain the basic materials required in the manufacture of plastics, textile fibres, adhesives and

detergents, materials which have to be imported at a high cost. The Quebec peat is a potentially excellent raw material, from which these products could be prepared, in the Province, at an interesting cost price. This research is a follow up of the chemical inventory previously made by Dr. Risi, of the main peat bogs of the Province.

Project No. 143:- Maurice Archambault\*, J.-J. Panneton\* and P. Fortier\* have studied the possible straight line production of high purity lithium carbonate from spodumene concentrates. The process sought should lower considerably both the cost of producing the carbonate and the capital investment needed to equip the manufacturing plant.

Project No. 144:- Maurice Archambault\*, H.-P. Lemay\* and M. Savard\* have concentrated their efforts in searching for a process that would permit the economical extraction of the sodium contained in certain wastes of the chemical treatment of spodumene, so as to regenerate and recycle the chemical products that have been used in the treatment. This cyclical process would lower considerably the cost of the metallurgical treatment of lithium ores.

Project No. 145:- Maurice Archambault\* and C.-A. Olivier\* have undertaken research to extract gallium and alumina from certain residues of the treatment of spodumene.

Project No. 146:- H. Boileau\* and N. Zaprianoff\* have succeeded in perfecting a method of chemical analyses which makes it possible to do in two hours the same work that requires four days to accomplish by using the conventional methods of quantitative analysis.

## II - Laboratories for Analyses and Assays

During the fiscal year 1959-60, the laboratories for analyses and assays received 12,296 samples, on which 57,611 analyses and determinations were performed. These include quantitative chemical and flame photometric analyses, determinations by microscope, by spectrograph (optical and fluorescent X) and radioactivity measurements. These analyses and assays are distributed as follows:



Table VII.- Summary of Analyses and Assays

	Laboratories		Total
	Quebec	Montreal	
Samples received .....	11,221	1,705	12,926
Quantitative analyses .....	15,807	3,834	19,641
Semi-quantitative analyses .....	4,336	-	4,336
Research analyses .....	13,555	-	13,555
Mineralogical and petrographic determinations .....	15,728	-	15,728
X-ray examinations .....	4,297	-	4,297
Radioactivity tests .....	54	-	54
Total .....	53,777	3,834	57,611

The laboratory at Montreal, located in Ecole Polytechnique, 2500 Guyard Street, performed 3,834 analyses, as compared with 3,662 during the preceding fiscal year.

Laboratories at Quebec

The main laboratories of the Department are located at Quebec. In addition to the mineralogical and metallurgical research division mentioned above, they include: 1 - a division of mineralogy and petrography; 2 - a division of physics; 3 - a division of chemistry; 4 - a division of metallurgy.

Division of Mineralogy and Petrography

After two years with the Division of Mineralogy and Petrography, Reverend Henry Derville, S.J., tendered his resignation; he has been replaced by Stephen Lakatos.

During the fiscal year 1959-60, 11,221 samples were submitted to the laboratories. The study of these samples required 15,728 mineralogical determinations. The mineralogists studied 159 thin sections and polished sections of rocks and ores under the microscope. In addition, they answered 473 verbal inquiries and 948 written ones. Of the latter total, 886 letters dealt directly with submitted samples; most of them were detailed reports on the mineralogy and economic value of the samples.

Samples submitted for analysis are examined by the mineralogists, who afterwards channel them to the various other laboratories, according to their nature and the analyses required.

The preparation of rock and mineral collections is also the responsibility of the Division of Mineralogy and Petrography, and is under the supervision of René Bureau. In 1951, it was decided that the Department prepare its rock collections instead of obtaining them from outside sources as previously done. This produced satisfactory results both as to the quality and regularity of the specimens. The chronic difficulty of maintaining an adequate supply was also eliminated. Labels showing the locality of samples are printed as needed. It is thus an easy matter to make the desired changes when the source of supply becomes exhausted, or when a sample is replaced by a more satisfactory one. In other words, this manner of selection tends constantly for better quality collections.

To get an idea of the scope of the work involved, it must be remembered that since 1952, 9,832 standard collections of rocks and minerals were produced (to this, must be added 6,088 collections of small fragments of rocks); this involved the cutting, numbering and wrapping of 358,750 samples. To do this work, the Division uses two 5-ton stone splitters and one 50-ton stone splitter. The consumption of rocks and minerals is tremendous; to obtain good specimens, it is necessary, more often than not, that the choice be made in the field, by competent persons. Thus, during the 1959-60 fiscal year, Reverend Fr. Derville, but mostly his successor, S. Lakatos, collected about 27,000 pounds of samples during 13 trips to various sections of the Province. In addition, 6,505 pounds of samples were received from other sources (resident geologists and suppliers), thus making a grand total of more than 33,000 pounds of rocks and minerals.

Table VIII - Collection of Rocks and Minerals

	Years 1952-1959	Year 1959-60	Total
Mineral collections .....	5,179	1,200	6,379
Rock collections .....	2,953	500	3,453
Small fragments of minerals .....	2,733	400	3,133
Small fragments of rocks .....	2,755	200	2,955
Total .....	13,620	2,300	15,920

Amongst the various special projects undertaken by the Division of Mineralogy and Petrography, the following should be mentioned:

- Mineralogical study of 87 pulverized samples, sent by a mining company, to explain the results obtained by chemical analysis; apparent anomalies were due to the presence of unusual minerals, and the calculated chemical compositions based on data supplied by the mineralogical

study completely agreed with the results of the analysis.

- A series of microscopic measurements aimed at establishing the distribution of particles in relation to their size, in a sample of lubricant-grade molybdenite.

- The mineralogical study of crushed samples of molybdenum and of niobium ore, with the aim of showing the magnitude of losses caused by insufficient grinding, because of flakes of useful minerals attached to gangue particles.

#### Division of Physics

During the fiscal year 1959-60, the laboratory of physics performed 13,346 analyses, of which 4,961 were related to various research projects and 157, at the request of the Department of Health. These analyses were distributed as follows:

Spectrography .....	7,883
Radioactivity .....	54
X-ray diffraction .....	4,297
X-ray fluorescence .....	1,112

The spectrography laboratory was equipped with a "Respectra", an instrument that permits faster calculations of analyses and decreases to the barest minimum the chances of errors.

The main subjects that were studied in our laboratories in order to improve the service and the methods of analysis are the following:

- a) Spectrographic analysis of boron in ores of lithium.
- b) Adaptation of the fusion method to the analysis of alloys by X-ray fluorescence. The fusion method, developed in our laboratory, cannot be used as such to analyse metallic samples; a preliminary chemical treatment of the samples makes it possible to analyse metals and alloys.
- c) Mutual stimulation of the X-ray fluorescence in samples prepared by fusion with borax. This research was aimed at increasing the fluorescing intensity of a chosen element, by incorporating in the sample a suitable element.
- d) Use of high frequency induction, heating with simultaneous agitation in the preparation of samples by the fusion method. An apparatus has been built that agitates the sample as it is being melted by high frequency induction. Sample preparation thus becomes more rapid, more economical, and easier, as compared with the one where fusion was obtained by means of gas burners.

e) Analysis of liquid solutions by X-ray fluorescence.

Our laboratory, upon request from the U.S. Naval Research Laboratory, in Washington, was and is still engaged in tests aimed at studying the precision of various methods of analysis by X-ray fluorescence. Two series of tests have been completed, to date.

#### Division of Chemistry

The activities of the Division of Chemistry, for the year ending March 31st, 1960, show an increase of about 50 per cent in the number of analyses, as compared with the preceding fiscal year. The number represents 24,703 quantitative analyses in duplicate, of which 8,391 were current analyses, 11,550 research analyses and 4,762 analyses for precious metals.

The personnel was also actively engaged in the research and development of new methods of chemical analysis of silicates. The work done, so far, has given excellent results and shows the possibility of analysing with precision, and in one day, alkaline metals, alumina, lime, magnesia, manganese and a few other metals.

#### Division of Metallurgy

The building of a refinery by Quebec Lithium Corporation has led us to undertake studies of reactions under superatmospheric pressures and also studies of corrosion, filtration and crystallization. Three of our metallurgists have been on loan from time to time to Quebec Lithium Corporation, to inspect on the site the progress made in the installation of the refinery and to study with the Company's engineers the best ways to solve their problems. The company has already spent \$1,200,000.00 in the construction of a plant, equipped to use a process discovered and perfected by the personnel of the Division of Metallurgy.

#### III - Courses on Mineral Prospecting

The courses on mineral prospecting, given at the Faculty of Sciences of Laval University and at l'Ecole Polytechnique in Montreal, are still attracting numerous students. In 1959-60, 27 students took part in the courses at Laval, from March 8th to March 31st, 1960, and 29 others followed the complete course at l'Ecole Polytechnique, from March 29th to April 30th, 1960.

It has been reported to us that these courses have been found useful.

Table IX. - Elementary Courses on Mineral Prospecting  
Given between 1947 and 1960

Fiscal Year	Number of Students		Total
	Quebec	Montreal	
1947 .....	28	-	28
1948 .....	17	21	38
1949 .....	9	15	24
1950 .....	-	23	23
1951 .....	29	28	57
1952 .....	23	17	40
1953 .....	-	27	27
1954 .....	29	20	49
1955 .....	32	-	32
1956 .....	40	24	64
1957 .....	25	35	60
1958 .....	25	41	66
1959 .....	22	31	53
1960 .....	27	29	56
Total ..	306	311	617

PILOT-PLANT BRANCH

The new Pilot-plant Branch is under the direction of Paul-E. Pelletier, assisted by B.J. Walsh and J.-P. Bolduc.

Housed in a building with a floor area of 47,000 square feet, located in the No. 5 Industrial Centre of Quebec, this centre of applied research in ore dressing comprises two sections: a) the pilot-plant itself, equipped to handle and to treat a few tons of ore per day; b) the laboratories where the treatment methods are determined and the pilot-plant operations are controlled.

The pilot-plant is made up of three units, each with a well defined function: a) the sampling plant; b) the milling plant; c) the asbestos treatment plant. The last is unique in North America.

Most of the year was devoted to complete the installation of machinery and services (electricity, ventilation, compressed air, water and sewer lines and other service connections).

The Minister of Mines presided at the official inauguration of the plant on February 26th, 1960. This function was attended by some 200 guests representing various provincial departments, mining companies, scientific societies and Laval and Montreal universities, as well as numerous other distinguished guests.

The establishment of this research centre has created a wide interest in various circles. Even while the plant was still in the completion stage, many mining companies submitted study projects which were completed during the year. In fact, the plant received 141 lots of ores weighing 119,178 pounds, of which four lots were for sampling and 137, for treatment purposes.

Table X. - Ores Received for Sampling at Pilot-plant

Shipper	Number of Lots	Weight (pounds)	Type of Ore
Houston Aggregates Limited .....	1	2,571	Iron, titanium
Quebec Silica Mines Limited .....	1	4,154	Silica
Saguenay Exploration and Mining Inc. ....	2	2,998	Iron, titanium
Total .....	4	9,723	

Table XI. - Ores Received for Treatment at Pilot-plant

Shipper	Number of Lots	Weight (pounds)	Type of Ore
Adhémar Gagnon, Quebec .....	2	3,055	Pyrophyllite
Asbestos Corporation Limited .....	106	70,368	Asbestos
Canadian Refractories Limited .....	1	19,525	Asbestos
Clément Dussaut, Black Lake .....	2	323	Asbestos
D and B Associates .....	1	3,660	Uranium
Flintkote Mines Limited .....	1	276	Asbestos
Ghislau Mining Corp. Limited .....	3	3,261	Lead, zinc, gold, silver
Golden Age Mines Limited .....	2	133	Asbestos
J.-E.-L. Morin, Lauzon .....	3	127	Asbestos
Lachance Mines Limited .....	3	690	Asbestos
Laurentian Titanium Mines Ltd. ...	1	440	Iron, titanium
Lyndhurst Mining Co. Ltd. ....	1	692	Asbestos
Murray Mining Corp. Limited .....	7	3,628	Asbestos
Quebec Iron and Titanium Corp. ...	2	200	Iron, titanium
Russell and Landry, Cap Chat .....	1	2,768	Lead, zinc, gold, silver
Wilfrid Poulin, Masonville .....	1	309	Asbestos
Total .....	137	109,455	

DRAUGHTING AND CARTOGRAPHY BRANCH

Léon Valois, P. Eng., is chief of this Branch and A. Blanchette is assistant chief. The Branch employs thirteen draughtsmen.

The Draughting and Cartography Branch supplies the documents needed by the geological survey parties of the Department; namely, aerial photos and compilations, to the desired scale, of base maps made from topographical surveys and aerial photos. In some instances, areas are photographed and mapped to supply an adequate basis of information to these geological parties.

The Branch keeps up to date two sets of tracings on linen of the various townships. On one are drawn all the stakings of the mining claims; on the other, all the boundaries of lands held by mining companies. The first series, showing the staked claims, consists of 1,020 tracings on which were outlined the boundaries of the 31,788 new claims staked during the fiscal year; the second series contains 639 tracings. From all these tracings, 20,701 blue prints were struck off to fulfill requests from the public.

The following geological maps were prepared by the Branch, which also supervised their printing.

Final Maps (coloured)

a) Completed during the year:

- No. 1235 - Dollier - Charron Area
- No. 1236 - Queylus Area
- No. 1237 - Fancamp - Haury Area
- No. 1238 - Brongniart - Lescure Area
- No. 1239 - Rohault Area
- No. 1240 - Gamache Area
- No. 1241 - Surprise Lake Area
- No. 1242 - Gradis - Machault Area
- No. 1243 - Céloron - Carqueville Area
- No. 1244 - Chaste - Mazarin Area
- No. 1253 - Richard - Gravier Area
- No. 1254 - Richard - Gravier Area (Sections)
- No. 1263 - Chertsey Area
- No. 1264 - Rawdon Area
- No. 1265 - Doncaster Area
- No. 1270 - New Glasgow - Saint-Lin Area

Final maps (coloured:Cont'd.)

b) In the press:

- No. 1292 - Southwest of McKenzie Township
- No. 1293 - Southeast of McKenzie Township

c) In preparation:

- No. 1299 - Wacouno River Area
- No. 1300 - Waco Lake Area
- No. 1328 - Grenville Sub-province

Preliminary Maps

a) Completed:

- No. 1074 - Mineral map of the Province of Quebec  
(6th Edition)
- No. 1255 - Southeast of Roy Township
- No. 1267 - Cross Lake Area
- No. 1268 - Matawin-- Mékinac Area
- No. 1269 - Leaf Bay Area
- No. 1273 - Squateck Area
- No. 1275 - Gaillard - Lorrain Area
- No. 1277 - Lyonne Area
- No. 1278 - McLachlin - Booth Area
- No. 1279 - Povungnituk Range Area
- No. 1280 - Saint-Hippolyte Area
- No. 1281 - Margry - Prévert Area
- No. 1285 - Upper Deception River Area
- No. 1286 - Vermette Lake Area (East)
- No. 1288 - Drilling, petroleum and gas,  
St. Lawrence Lowlands
- No. 1289 - Aguanish Area
- No. 1290 - Peppler Lake Area
- No. 1291 - La Trappe - Hudon Area
- No. 1294 - Northwest of LaMotte Township
- No. 1295 - Southwest of LaMotte Township
- No. 1309 - Gabriel Lake - Fort Chimo Area
- No. 1310 - Iron ore deposits of the Province  
of Quebec
- No. 1311 - Southeast of Fiedmont Township
- No. 1312 - Rocheblave Area
- No. 1313 - Toco - Témiscamie Area
- No. 1314 - Carheil and Gentilhomme Lakes Area
- No. 1315 - Weedon Area
- No. 1316 - Georget Lake Area



No. 1317 - Normanville Area  
No. 1318 - Papachouesati River Area  
No. 1320 - Carignan - Hackett Area  
No. 1321 - Fort Chimo Area (East)  
No. 1325 - Lorraine - Flandres Area

b) In preparation:

No. 1319 - Southwest of Lévy Township  
No. 1326 - Raimbault River Area  
No. 1329 - Stukely Area  
No. 1333 - Southeast of Barlow Township  
No. 1334 - Turquetil - Emard Area  
No. 1335 - Pommeroy - Bellefeuille Area  
No. 1336 - Chomedey - Paquet Area  
No. 1337 - Guyon Area

Our draughtsmen traced on linen thirteen other geological plans, twelve figures to illustrate reports published by the Department, and nineteen various plans such as graphs, special maps, etc. A few of these documents have been lithographed for the use of the Department.

CIVIL ENGINEERING BRANCH

This Branch, under L.-A. St-Pierre, P. Eng., is made up of two distinct divisions: a) Division of Mine Roads; b) Division of Mine Villages.

a) Division of Mine Roads

During the fiscal year 1959-60, 52.3 miles of new mine roads were built, bringing to 1,617.0 miles the total length of gravel roads built to date by the Department of Mines. In addition, to insure winter communication, a 39-mile stretch of winter road was built to complete the road link, from Senneterre to Chibougamau, by way of Beattyville, Desmaraisville and Chapais. The expenditures, during the year, for the construction, improvement and completion of mine roads, including bridges, amounted to \$3,151,685.97, bringing to \$35,062,134.12 the total spent since 1925.

During the year under review contributions from mining companies for the construction of roads amounted to \$147,328.60.

Table XII. - Summary of Projects of the Mine Roads

Division for the Last Three Years

Designation of Project	1956-57	1957-58	1958-59
New construction, distance in miles:			
a) gravel roads .....	26.17	24.20	52.3
b) winter roads .....	-	50.0	39.0
Improvement to roads:			
distance in miles .....	31.00	-	15.6
Wooden bridges, number .....	-	-	4
Maintenance by the Department, distance in miles .....	266.00	278.18	309.0

Construction of new roads

Electoral District

Designation of new roads

Abitibi-East	From Chapais, westward, in the township of Daubrée and Dolomieu
Abitibi-East	Portage Island mine road, township of Roy
Abitibi-East	Henderson mine road, township of Roy
Abitibi-East	A 20-mile stretch of the Amos - Matagami road
Abitibi-East	Consolidated Vauze mine road, township of Dufresnoy
Abitibi-East	From Desmaraisville eastward, in the townships of Lesueur and Boyvinet
Charlevoix	Leclerc peat-bog road, Ile-au-Coudres
Gaspé-North	Link road between Murdochville and the Sainte-Anne-des-Monts Cascapedia road (additional sections)
Rivière-du-Loup	Saint-Arsène peat bog road
New Quebec	Link road between Fort Chimo and Stewart Lake

Construction of wooden bridges

<u>Electoral District</u>	<u>Township</u>	<u>Name of River</u>	<u>Length of Span</u>
Abitibi-East	Boyvinet	Waswanipi	600 feet
Abitibi-East	Saussure	Chibougamau	400 feet
Gaspé-North	Duchesnay	Marsoui	2 x 30 feet

List of roads maintained in 1959-60

a) Continuous maintenance from April to December

<u>Electoral District</u>	<u>Designation of roads</u>
Abitibi-East and Roberval	From Notre-Dame-de-la-Doré to Chibougamau and other trunk roads around Chibougamau
Abitibi-East	Senneterre - Desmaraisville road north of the Taschereau river
Gaspé-North	Link road from Murdochville to the Sainte-Anne-des-Monts - Cascapedia road

b) Occasional maintenance

<u>Electoral District</u>	<u>Locality</u>	<u>Designation of roads</u>
Abitibi-East	Beauchastel Township	Ascot mine winter road
Abitibi-East	Dubuisson Township	Norlartic and Marban road
Abitibi-East	Lauvicourt Township	Akasaba mine road
Abitibi-East	Preissac Township	Preissac Molybdenite mine road
Gaspé-North	Tourelle Township	Lac Levasseur road
Mégantic	St-Antoine-de Pontbriand	Ranges 3 and 4 township of Thetford
Papineau	Portland (West) Township	Cameron mine road

Projects under study

Reconnaissance, preliminary and final surveys, plans and costs estimates were made for the following road projects in the electoral district of Abitibi-East.

- Desmaraisville - Chapais road; from the Waswanipi river to the town of Chapais.
- Access road to the property of Sulphur Converting Corporation; Roy township.
- Access road to the property of Chesbar Chibougamau Mine; Bossé township.

#### b) Division of Mine Villages

As a whole, the economic situation in the mine villages improved to some extent during the year. The following is a short summary of the situation in these villages.

##### Belleterre

For over twenty years, Belleterre Quebec Mines Limited mined and milled gold ores in this region. Unfortunately, the deposits appear exhausted and the company regretfully reached the decision to suspend all their operations as of March 1st 1959. The mine was employing 50 people. To alleviate the situation, the Government of the Province endeavoured to bring a new industry to the town: a plywood manufacture. Bill No. 300 was adopted during the last session, authorizing the Lieutenant-Governor-in-Council to grant a timber reserve to Canada Veneers of Quebec Limited. This company will proceed, in the very immediate future, to build a plywood manufacturing plant.

##### Bourlamaque and Val-d'Or

The population of these twin cities numbers over 13,000 people. Four mining companies are operating in the area, mining and milling gold and copper ores.

Home and business construction was fairly active throughout the year.

##### Cadillac and Malartic

The gold-bearing zone extending from Rouyn to Val-d'Or crosses the territory of Cadillac and Malartic, towns that are 15 miles apart. Mining operations around Malartic employ more than 1,500 workers.

Bright perspectives are in store for the people of

Cadillac because Preissac Molybdenite Mines Limited began sinking a shaft preparatory to mining an ore that has an increasing commercial value.

#### Chapais

Opemiska Copper Mines (Quebec) Limited has increased its mining operations considerably, boosting its milling rate to 2,000 tons of ore per day. This in turn was reflected in an increased home building programme. Further subdivision of land into building lots is being considered. A new post office building has been constructed during the year. There are now more than 2,000 people living in the town

#### Chibougamau

During 1959, building construction included a church by the Anglican Church of Canada, a school by the Protestant School board, a new post office, and numerous private dwellings. Improvements were made to the streets, and the water and sewer systems were enlarged. The municipal council established a park with sanitary facilities large enough to accommodate 50 mobile homes. In October 1959, the Canadian National Railways completed its Saint-Félicien - Chibougamau line; the Senneterre - Chibougamau line was completed in March 1957.

#### Murdochville

The only mine in operation in the Gaspé area is at Murdochville, namely Gaspé Copper Mines Limited. There was great activity in the home building field during the year.

#### Noranda and Rouyn

The population of these twin cities now aggregates close to 30,000 people. The annual budget of Noranda is over half a million dollars, whereas Rouyn's nears the three-quarter million dollar mark. Home building was active during the year. In 1957, the Department of Mines sold, for \$1.00 to the congregation of "Les Soeurs Grises de la Croix d'Ottawa", a parcel of land where a Normal School for girls was completed in 1959, at a cost of more than \$1,000,000.

#### Schefferville

Every year, Iron Ore Company of Canada builds new houses for its ever increasing personnel. Among the new constructions

completed during the year are: a Catholic school, a hospital, a thirty-five dwelling apartment building, a research laboratory and numerous installations to handle petroleum products. The town population is close to 4,500 people made up of 600 families and 2,000 workers living in company-owned boarding houses. A park capable of accommodating 100 mobile homes has been set up.

#### Peat Bog Drainage

During the year peat bogs were operated in the following electoral districts: Charlevoix, Matane, Portneuf, Rimouski, Rivière-du-Loup and Chicoutimi.

A total contribution of \$15,000 was appropriated in the budget and distributed among the various peat bog operators who did a total of 183,320 cubic yards of drainage.

During 1959, more than 55,000 tons of peat was extracted. The product was valued at approximately \$1,375,000.

#### SECRETARIATE

Under the direction of Raymond Cormier, assistant deputy-minister, this Branch is responsible for the personnel of the Department, and the Divisions of Equipment, Publicity, Purveyor and the Library.

#### Division of Equipment

C.R. Staniforth, chief of this Division, reports that, during the fiscal year 1959-60, forty-three parties were equipped for the Geological Surveys Branch, the Mineral Deposits Branch and the Resident Geologists Division, as well as three parties for the Civil Engineering Branch. Three hundred and sixteen men were equipped and supplied with instruments for field work and material necessary for camping: tents, outboard motors, kitchen utensils, etc.

The Department of Mines operated a fleet of 50 motor vehicles, and all these, comprising station-wagons, jeeps, trucks and tractors, were kept in good condition for the staff of the Department.

Each year, the Department of Mines takes part in various industrial and regional exhibitions held in the Province. During the fiscal year 1959-60, displays of minerals were presented at:

The International Trade Fair in Montreal Show Mart	May 1959
The Lachute Fair	June 1959
The Val-d'Or Fair	August 1959
The Rouyn Fair	August 1959
The Trois-Rivières Fair	August 1959
The Granby Fair	August 1959
The Sherbrooke Fair	August 1959
The Saint-Jérôme Fair	October 1959

#### Division of Publicity

A new Division was added to the Department of Mines during the fiscal year 1959-60. In the fall of 1959, Adalbert Trudel was named Director of Information and made responsible for the direction and the co-ordination of the Department's publicity. The function of the Division is to keep the public informed on the activities of the mining industry and on current developments.

For this purpose, the Division of Publicity has issued 18 press releases on items of news in addition to supplying to newspapers and publications, upon request, information on specific subjects related to the mining industry. The Division also helped with the production of six special radio and television programmes.

Mention should also be made of the papers and talks prepared by the technical personnel of the Department for publication in scientific reviews for presentation at certain meetings.

#### Speeches Delivered by Honourable W.M. Cottingham

##### 1959

- May 18th - C.B.M.-T.V. - "Provincial Affairs"
- October 10th - Association patronale des nettoyeurs,  
Lachute.
- October 15th - Quebec Iron and Titanium Corporation,  
Sorel.

1960

- January 28th - C.K.M.I.-T.V. - "Provincial Affairs"  
February 4th - Montreal Real Estate Board:  
"Our Underground Real Estate"  
February 6th - C.K.M.I.-T.V. - "Provincial Affairs"  
February 24th - Meeting of the Council of Public  
Education  
February 26th - Inauguration of the Department's  
Pilot plant  
March 24th - C.K.M.I.-T.V. - "Provincial Affairs"

Other Articles and Lectures

By Jacques Béland, Geologist:

"Ressources Minérales de la Gaspésie": talk given  
to the Chamber of Commerce, Chandler, P.Q.,  
June 6, 1959.

"Géologie de la Région de Rimouski - Matapédia":  
lecture to the Société Géologique de Québec,  
at Quebec, March 30, 1960.

By Jacques Béland and Robert Bergeron, Geologists:

"Esquisse Géologique du Québec Méridional":  
article published in "Mélanges Géographiques  
Canadiens offerts à Raoul Blanchard", pp. 131-138,  
Laval University Press, 1959.

By René Béland, Part-time staff geologist:

"Prolongement de la Faille Rawdon - Sainte-Mélanie",  
paper presented to the 27th Congress of l'Asso-  
ciation Canadienne-Française pour l'Avancement  
des Sciences, at Montreal, October 31, 1959.

By Jean Bérard, Geologist

"Géologie de la Région du Lac aux Feuilles,  
Nouveau-Québec": lecture to the Société  
Géologique de Québec, at Quebec,  
December 17, 1959.

By Robert Bergeron, Geologist:

"Les Serpentinites de la Zone de Cape Smith -  
Wakeham Bay, Nouveau Québec": paper presented to



the 27th Congress of l'Association Canadienne-Française pour l'Avancement des Sciences, at Montreal, October 31, 1959.

"L'Ungava": lecture to the Société des Mines, Géologie et Métallurgie, Ecole Polytechnique, at Montreal, March 11, 1960.

By T.H. Clark, Part-time staff Geologist:

"Stratigraphy of the Trenton Group, St. Lawrence Lowland, Quebec": presidential address to the 12th Annual Meeting of the Geological Association of Canada; published in Geological Association of Canada Procedures, Vol. 11, December, 1959.

By P.J. Clarke, Geologist:

"A Comparison of Jointing in Precambrian and Palaeozoic Rocks near Kingston, Ontario": lecture to the Société Géologique de Québec, at Quebec, January 28, 1960.

By R.A. Marleau, Geologist:

"Age Relations in the Lake Megantic Range, Southern Quebec": paper published in Geological Association of Canada Procedures, Vol. 11, December, 1959.

By F.F. Osborne, Part-time staff Geologist:

"Turbidity Current Deposits": lecture to the Société Géologique de Québec, at Quebec, April 2, 1959.

"Géologie de la Région des Apalaches dans la Province de Québec": paper read by René Béland to the 27th Congress of l'Association Canadienne-Française pour l'Avancement des Sciences, at Montreal, October 31, 1959.

By D.W. Pollock, Geologist:

"Sulphide Paragneisses in the Eastern Metals Deposit, Montmagny County, Quebec": paper published in Eco. Geol., Vol. 54, No. 2, March-April, 1959.

"Structures in the Boston Mountains, Arkansas":

lecture to the Société Géologique de Québec,  
at Quebec, February 25, 1960.

By J.H. Remick, Geologist:

"Exploration in the Harricana - Turgeon Area,  
Western Quebec": paper presented to the 28th  
Annual Convention of the Prospectors and  
Developers Association of Canada, at Toronto,  
March 8, 1960.

By R.-J.-E. Sabourin, Part-time Staff Geologist:

"La Minéralisation Radioactive de Hunters Point,  
Comté de Témiscamingue, Québec": paper read by  
Pierre Sauvé to the 27th Congress of l'Asso-  
ciation Canadienne-Française pour l'Avancement  
des Sciences, at Montreal, October 31, 1959.

By Pierre Sauvé, Geologist:

"Roches Eruptives Basiques du Géosynclinal du  
Labrador à l'Ouest de Fort Chimo": paper presented  
to the 27th Congress of l'Association Canadienne-  
Française pour l'Avancement des Sciences, at  
Montreal, October 31, 1959.

By Gilles Duquette, Part-time Staff Geologist:

"Le Groupe de Québec et le Groupe de Gaspé, du  
lac Weedon"; paper published in the Le Natura-  
liste Canadien, volume 86, pp. 243-263, 1959.

By J.-E. Gilbert, Chief, Mineral Deposits Branch:

"Distribution and General Characteristics of the  
Massive Sulphide Deposits of the Province of  
Quebec"; paper presented at the symposium on  
occurrences of massive sulphides in Canada  
during the 1959 annual meeting of Canadian  
Institute of Mining and Metallurgy,  
Montreal, April 14th, 1959.

By J.E. Sharpe and Maurice Latulippe, Resident Geologists-  
Val-d'Or District;

"The Distribution of Sulphide Deposits in the Val-  
d'Or - Matagami Lake Area"; paper presented at  
the annual meeting of the Prospectors and Developers  
Association of Canada, at Toronto, March 8th, 1960.

Division of Purveyor

The Purveyor of the Department of Mines, J.-Roland Tanguay, acts as liaison officer between the Department and the Purchasing Division of the Executive Council. He is responsible for the work necessary for the issuance of purchasing orders.

Through the Purveyor's office, the Department of Mines has issued purchasing orders, payable by its own accounting division, valued at \$495,698.60.

In addition, the Department has issued other purchasing orders payable by the accounting division of the Executive Council, for an amount of \$308,433.60.

Total purchasing orders issued during the fiscal year 1959-60 were valued at \$804,132,20.

Library

The Department librarian, A. Champagne, reports that, during the fiscal year 1959-60, 3,520 items were added to the library stock, bringing the total to 20,533 units. The new acquisitions can be classed as follows: 534 books, 1,634 periodicals or magazines, 620 reports and bulletins, 390 pamphlets and 338 maps.

The purchase of 254 books, during the year, has brought the total to 6,920. The library is the recipient also of books and of about thirty reports and publications, through an exchange system with other governments. During the year in review, 338 maps, geological as well as topographical, were received, bringing our total to 2,626 maps.

Through its collection of periodicals, reviews, magazines and other mining publications, the library is able to keep the personnel of the Department well informed on the latest mining developments. The library subscribes presently to 32 newspapers and periodicals and to 106 reviews or magazines.

During the financial year, four books, 37 reviews and 24 publications were bound and 218 maps were mounted on linen.

The main purpose of the library is to help the personnel of the Department. In addition to numerous consultations in the library

itself, 534 items were loaned. The public can always be assured of a warm welcome at the library, to look up our reference books on the mining industry. Publications are not available for loan to individuals, but they may be examined at leisure. Mining subjects seem to interest the general public as much as ever, for more than 200 visitors came to consult our sources of information.

In addition to a large choice of technical books on mining, geology, mineralogy, chemistry and metallurgy, the library contains publications, reports and maps published by the Department of Mines of Quebec, of Ottawa, of various provincial governments and similar items originating in the United States, Europe, and many foreign countries.

To facilitate research, the library has a card index where all the material is classed, according to the Dewey system, by subject, title and author.

A special committee, including representatives of the technical services of the Department holds regular meetings to select books and to recommend their purchase.

#### Scholarships

Once again, this year, the Minister of Mines had at his disposal a sum of \$60,000.00 with which he was able to grant scholarships to students in geology, metallurgy and mining.

The committee appointed by the Minister to recommend to his attention the most deserving candidates was composed as follows:

Chairman: Eugène Larochelle, General Secretary,  
Quebec Metal Mining Association;

Ignace Brouillet, President,  
Corporation de l'Ecole Polytechnique;

J.U. MacEwan, Director,  
Department of Metallurgy,  
McGill University;

Reverend J.-W. Laverdière, Director,  
Department of Geology,  
Faculty of Sciences,  
Laval University;

Gérard Letendre, Director,  
Department of Mining and Metallurgy,  
Faculty of Sciences,  
Laval University;

H.G. Young, Inspector General,  
Protestant School Board;

Secretary: Miss Gisèle Landreville.

Following its well established practice, the committee studied first, applications of students wishing to undertake advanced studies; second, applications for renewal of scholarships, and, lastly, requests of new candidates.

The Minister of Mines granted in 1959-60 eighty-four scholarships distributed as follows:

Candidates to post-graduate courses .....	27
Students entering final year in Science Faculties .....	18
Students in less advanced years .....	39

The members of the scholarship committee wish to thank the Government of the Province of Quebec and in particular the Minister of Mines, for the generous help given to students in the mining field.

Table XIII. - Comparative Statement of Revenue  
 Collected by the Department of Mines during  
 the Fiscal Years 1957-58 to 1959-60\*

	1957-58	1958-59	1959-60
Miner's certificates .....	\$ 135,635.00	\$ 167,545.00	\$ 94,490.00
Development licenses .....	704,100.27	764,252.16	773,239.46
Exploration licenses .....	323,405.79	162,257.16	180,443.15
Exploitation leases .....	100,000.00	100,000.00	100,000.00
Sales of mining concessions .....	25,678.13	9,784.54	71,368.18
Acreage tax on mining concessions .....	3,522.94	3,587.79	4,522.81
Fees for transfer of mining titles .....	46,955.00	68,897.00	43,994.00
Rights on townsite lots ...	10,111.54	12,899.82	15,085.64
Annual rental on townsite lots .....	5,442.00	1,817.00	2,657.00
Rentals of land:			
a) on townsite lots ....	2,152.00	100.00	1,150.00
b) others .....	-	7,994.00	20,968.81
Dues on yearly profits ....	6,706,749.01	4,161,604.57	3,360,680.44
Sales of permits for unwrought metals .....	2.00	6.00	4.00
Sales of maps, blueprints, etc. ....	7,012.85	8,607.88	2,653.49
Sales of mineral collections .....	2,656.60	3,165.00	2,965.50
Fees for assays .....	3,352.90	4,788.50	1,773.65
Miscellaneous .....	17,431.67	-	-
Fees for abstracts of records .....	-	1,001.10	799.15
Provincial tax on gasoline .....	-	6,419.76	5,982.70
Sale and excise tax .....	-	5,384.08	9,235.97
Exchange on cheques .....	-	35.27	11.85
Expenses of preceding years	40,335.24	2,960.08	10,417.89
	\$8,134,542.94	\$5,493,106.71	\$4,702,443.69

\* Prepared by Gérard Gagnon, Chief Accountant