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REPORT ON THE SLATE IN THE PROVINCE OF QUEBEC

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Énergie et Ressources
naturelles

Québec 

SLATE

in the

PROVINCE OF QUEBEC

H.W. McGerrigle

March, 1938

QUEBEC DEPARTMENT OF MINES

.....JUN 5 - 1956.....

MINERAL DEPOSITS BRANCH

No G M- 4095

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<u>Township</u>	<u>Range</u>	<u>Lot</u>	<u>Name of Quarry</u>
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SLATEProvince of QuebecProperties and Prospects

There is here presented a summary of what is recorded of the characteristics of the various individual slate properties and prospects. This is based on the report of Parks (1), to

(1) Parks, W.A.- Report on the Building and Ornamental Stones of Canada. Vol III, Quebec. Chapter IX, pp. 235-252.

Map on scale of 35 miles to one inch showing the main "slate belts".
Canada, Dept. of Mines, Mines Branch, 1914.

which the reader is referred for details of equipment and development.

Eight main belts of slate are recognised, namely:

1. Melbourne-Cleveland area.
2. Danville area, probably a continuation of 1..
3. Kingsey area.
4. Acton "
5. Garthby "
6. Granby "
7. Orford-Brompton area.
8. Temiscouata area.

1. Melbourne-Cleveland area quarries.

(a) Melbourne, R.V., lot 24, Prince Albert quarry. The quarry is located about two miles southwest of the New Rockland quarry (see below) and is in material similar to the latter: Little work has

been done. (1)

(b) Melbourne R. IV, lot 23. New Rockland quarry.

New Rockland Slate Co., New Rockland, Quebec..

This quarry was opened in 1868.

The main good band of slate has a width of 200 feet in a formation which as a whole is cut up and rendered useless by numerous quartz stringers. The stone is dark gray, uniformly coloured mica slate with good cleavage and clear ring. Small papillose elevations occur in places caused by grains of hard siliceous matter. Considerable pyrite is present in small grains although apparently absent in some of the slate. The slate darkens on long exposure.

35 men were employed in 1912. 1,833 squares of roofing slate were produced in 1911 in 17 sizes varying from 24" x 12" to 10" x 8". The haul to Kingsbury is about one mile. (1)

R.W. Ells (1889) compares this slate with Welsh slate, stating that it is "equal in every respect" to the latter. The output is stated to include "roofing slate, billiard table tops, mantels, wash tubs, etc; the demand fully keeping pace with the supply". The average production per month in 1888 was about 2,200 squares of roofing and 3,300 feet B.M. of slate slab work. (Ells) Obalski (1897) reviewed operations briefly. 120 men were employed in 1897. The annual production was stated to be 10,000 - 15,000 squares.

Analyses and Tests.

Chemical analysis by Dr. J.B. Harrington of McGill University (Ells)

Silica.....	65.39	
Alumina.....	15.97	
Ferrous oxide.....	4.66	
Manganese oxide.....	0.39	Specific gravity - 2.75
Lime.....	0.67	
Magnesia.....	2.99	
Potash.....	3.60	
Soda.....	3.33	
Loss by ignition.....	<u>3.26</u>	
	100.26	

Physical properties (Parks)

Weight per cubic ft., lbs.....	170.97
Pore space.....	0.481%
Ratio of absorption, one hour.....	0.0125%
" " " , two hours.....	0.0223%
" " " , slow immersion.....	0.105%
" " " , in vacuo.....	0.1273%
" " " , under pressure.....	0.178%
<i>coefficient of saturation.... omitted</i>	
Crushing strength, lbs., per sq. in, dry.....	34,000
" " " " " " , wet.....	32,350
" " " " " " , wet after freezing....	28,080
Transverse " " " " " 	13,125

Physical Tests by Dominion Bridge Co., on an emery testing machine (Ells)

1 st. test - Crushing, Strain perpendicular to lamination -	26,514
2 nd. test - " " " " " " -	32,069
3 rd. test - " , Strain parallel to lamination but perpendicular to grain -	36,531
4 th. test - Breaking, Strain perpendicular to lamination -	

(a) A piece of slate 3' x 4" x 1" on bearers 30" apart,

failed by splitting at 950 lbs. = Modulus of rupture = 10,000

(b) A beam 1' x 1" x 1" supported at both ends, and located in the center failed at 556 lbs.

5 th. test - Breaking, Strain perpendicular to lamination

As above (a), failed by splitting at 1,092 lbs =

Modulus of rupture = 11,667

As above (b), failed at 558 lbs.

Deflection with pressure at 690 lbs was 7/10"

(c) Melbourne, R. IX, lot 24

The quarry was opened in 1920 by New Rockland Slate Co. to exploit purplish and green slate (Mines and Minerals, Quebec, 1920 p. 78)

(d) Melbourne, R.V., lot 24

Near New Rockland quarry.

The National Slate Co. was formed in 1897 to exploit a slate whose colour is reported as lighter than that of New Rockland. Operations ceased in 1898. The quarry was put down 30 feet over a surface 50 feet square.

(Mining operations, Quebec, 1897; 1898).

(e) Melbourne, R.V, part of lot 22.

R.VI, lots 21-24; Melbourne or Walton quarry, lot 22.

R.VIII, lots 21 - 22

The Melbourne Slate Co., Coulston, Philadelphia, Pa.....

The Melbourne or Walton quarry was opened in 1860 and was worked for about 18 years. A large quantity of slate similar to that of New Rockland was taken out. Operations ceased owing to lack of market and lack of capital. These slates are believed to continue across the

Saint Francis river into Cleveland and Shipton. (Ells, 1889).

Sizes from 24" x 14" to 12" x 6" were produced. The colour is described as "bluish-purple" (Logan, 1883).

(f) Cleveland, R. XV, lot 6. Steele or Bedard quarry.

The quarry is located about 3 miles southeast of Richmond near the line of the Canadian National Railway.

This is the oldest slate quarry in Quebec and was opened in 1854. It is 50 feet square and was put down in dark to silvery gray slate. There was evidently too much waste for profitable operations. (1)

(g) Brompton, R.X, lot 18. Jenkin's quarry.

A small opening was made near Mud Pond in 1891, about 7 miles southwest of the New Rockland quarry. The rock is a purple slate not considered to be sufficiently durable. (1) Ells stated that this slate appeared to be of excellent quality but production was hindered by lack of shipping facilities (1894)

(h) Griffith's Estate, Granville, N.Y..

"A belt of light green slate about 50 feet wide runs parallel to the New Rockland belt at about half a mile to the southeast. A small excavation about 10 feet deep was made but no marketable material was obtained. The slate holds its colour well but it is soft and liable to decay". (1)

2. Danville Slate Area

Shipton, R. IV, lot 7. Danville School Slate quarry.

This quarry was first opened for roofing slate; later for school slate. Its dimensions are 400' x 100' x 15' - (deep).

Slate of different colours occur but the prevailing tint is dark gray with a purplish cast which becomes more pronounced on weathering.

Irregular columnar cleavage and the presence of considerable pyrite detract from the value of the quarry. It would appear from a short examination that "an unlimited quantity" of stone is procurable along the belt in this vicinity. (1)

Chemical Analyses (Ells 1895)

	<u>No.1</u>	<u>No.2</u>
Silica.....	55.75	67.85
Alumina.....	17.87	9.10
Ferrous oxide.....	9.05	11.14
Manganous oxide.....	0.70	0.79
Lime.....	1.14	0.98
Magnesia.....	5.81	3.23
Soda.....	1.12	1.50
Potash.....	2.97	0.44
Loss on Ignition.....	5.26	4.55

3. Kingsey Slate area

Kingsey, R. I, lots 4 - 5.

A quarry was opened here in 1857 and closed two years later.

Roofing slates occur in a band of argillite associated with dolomite. Good slates are obtained here, of reddish-purple colour and not quiteⁿhard as those of Melbourne. (Logan, 1863).

The slate is principally purple although some green and mottled varieties appear. The colour is well preserved on slates split at about the year 1857, showing that they belong to the "unfading" class. The deposit is large and apparently the working conditions are favourable. The haul to the railway is about four miles. (Dresser, 1911).

A very large body of slate doubtless occurs on this property. Quarries were opened along the bank of the Saint Francis river; the bank rises to 125 feet above the water. Deep purplish gray, purplish, dark red, and light green slates occur. Quartz veins and pyrite crystals were not observed but occasional green blotches occur. The somewhat

irregular cleavage and the strong tendency to part at right angles detract from the possibilities of the deposit. (1).

Chemical analysis of a "purplish blue slate" (Logan, 1863)

Silica.....	54.80
Alumina.....	23.15
Ferrous oxide.....	9.58
Lime.....	1.06
Magnesia.....	2.16
Potash.....	3.37
Soda.....	2.22
Volatile Matter.....	3.90
	<u>100.24</u>

4. Acton Slate Area.

Acton R.V, lot 26. Rankin Hill quarry.

This quarry was opened in 1875 and closed in 1878. It is located about 4 miles east of Acton Station on the Canadian National Railway. The rock belongs to the Sillery formation and consists of red slate with large patches of green. (1)

It is easily quarried. Low prices and lack of market prevented profitable operations.

600 squares were produced in 1877. The quarry measured 150' x 60' x 35'. (Ells 1889).

Physical tests made on red slate exposed for 30 years to weathering (1):-

Sp. gravity.....	2.801
Wt. per cu.ft., lbs.....	173.045
Pore space.....	1.034%
Ratio of absorption, one hour.....	0.141%
" " " , two hours.....	0.168%
" " " , slow immersion.....	0.2815%
" " " , in vacuo.....	0.345%

Ratio of absorption, under pressure.....	0.373%
Coefficient of saturation, one hour.....	.37
" " " , two hours.....	.45
" " " , slow immersion.....	.76
" " " , in vacuo.....	.92
Crushing strength, lbs. per sq. in., dry.....	30,550
Transverse " " " " " " 	4,245
Shearing " " " " " " 	1,620
Loss on corrosion, grams per sq. in.....	0.000364

The corrosion test resulted in a slight darkening of the colour.

5. Garthby Slate Area.

(Possibly R, VII, lot 15)

Garthby R's VIII - IX, lot 15 (abandoned quarries)

The location is about 4 miles from Garthby Station on the road to Ham; on the Quebec Central Railway. The quarry of R. IX, is in the Sillery red and green slate. (Ells 1889).

West of Lake Aylmer a broad band of slate crosses the country E. 30°N. No work has been done but it is a reasonable assumption that workable belts occur. In general, the slate is gray in colour. (1).

6. Granby Slate Area.

(a) Granby, on the line between lots 15, R. VII, IX. Moise Robert, Granby.

Red slate was once quarried here. The belt is about 300 feet wide and has been traced for 1000 feet, along the strike. The material on the dump seems to show an excessive number of fine diagonal partings which doubtless was one cause for abandoning the quarry. With a better location better material might be found. (1).

(b) Granby R. IX, lot 14. J. Aubin, Granby.

A small quarry now abandoned was put down here in "brilliant deep red" and "light greenish" slate (1).

7. Orford-Brompton Slate Area.

This belt may be seen on the Saint Francis river below Brompton Falls from whence it extends southwest perhaps as far as Webster lake (1).

(a) Orford, R.V, lot 2, W. Berwick, Sherbrooke.

Dark blue slates were mentioned by Logan (1863) as occurring on this lot. The slates at the small quarry opened around 1860 or 1870 and described by Parks as gray are considered to be durable both as to colour and wear (1). Occasional crystals of pyrite occur. The slate is strongly jointed. A large amount of good slate is thought to be present (1).

(b) Orford, R. VII, lots.....

Dark blue slates occur on the property of the Fletcher Pulp and Lumber Co., Sherbrooke, Que... A pit was sunk and a few samples were taken out but no further work was done. The slate is similar to that of lot 2, R.V. but apparently is of less desirable quality. (1).

(c) Brompton R.V. lot 29, -- Valcourt, Bromptonville, Que...

The slate here is probably a continuation of that of Orford, R.V, lot 2, and that on the railway north of Windsor Mills. Apparently a good body of gray slate is available here. Quarry - 20' x 20' x 20' (1).

Flagstones were obtained here (Ells; 1889).

The slates of this area or belt were said by Logan (1862) to be "not unlike-those of Melbourne, although less smooth in their cleavage".

(d) Brompton, R.X, lot 18.

Coloured slates have been opened at this locality. (Dresser, 1911)

8. Brome Area.

Call Bros. The owners in 1896.

Fissile, smooth greenish slates occur in the stream below the woolen mill on the south branch of the Yamaska river. Irregular veins and bunches of quartz cut the slates in places. They are associated with the green chloritic schists of the Brome area. A ledge of similar slates occurs in the woods near the road leading to Sweetsburg, about three-eighths mile west of this stream. (Ells, 1896)

In this vicinity a small quarry was opened some years ago on the property of H. Church of Sutton Junction and a small quantity of slate was obtained for local consumption. About 80 acres of workable slate are said to occur. Little more than surface work has been done but fairly solid blocks were nevertheless obtained. The stock splits easily and is smooth. (1).

9. Miscellaneous Areas in Southern Quebec.

(a) Tring, R. III, lot 18

"Fine-grained, dark, bluish-gray sandstones" that "divide with the bedding into layers sufficiently thin for roofing slates" occur on this lot, and along the Rivière-du-Loup for some miles above its junction with the Chaudière (Logan 1863).

Red slates and red and green sandstones occur in Cranbourne, Standon and Tring. (Logan 1863)

Another band outcrops in St. Mary, Joliette and Saint Gervaise seigneuries. In the last it lies between Saint Lazarre and the north line of Frampton (Logan 1863).

(b) Frampton, R.X. lot 2.

A "long abandoned" quarry is mentioned as being located in "purple rock" (Ells, 1889)

(c) Halifax, R.I, lot 14.

(d) Slates occur on the Saint Francis river at Westbury in Westbury township (Logan 1863).

(10). Temiscouata Area.

Botsford R. VIII, parts of lots 39, 40, 41

R. IX, lots 39 - 42 Frazier and Davies New Rockland, Que..

Attention was first called to this area by Dresser (1908); (1912).

An extensive slate formation crosses the country in a southwest direction. A quarry was opened on the shore of Long Lake immediately adjacent to the Canadian National Railway.

Work was begun in 1910 and stop~~ped~~^{ped} in 1915.

Production - 1910..... 150 squares.

1910 - 13..... 200 squares (about) (r'ly not in operation 1913)

1914 - 15..... ?

The owners estimate that the band of workable slate is 145 feet wide and extends far to the southwest. (A 250-foot width was estimated by McGerrigle, 1923)

The slate is very uniform in colour and slightly darker than that of New Rockland. No pyrite was observed. (1)

Physical tests (1):-

Sp. gravity.....	2.802
	2.601
Weight per cubic foot.....	173.588
	173.413
Pore space.....	0.783%
	0.825%
Ratio of absorption, one hour.....	0.0593%
	0.0591%
" " " , two hours.....	0.0772%
	0.0617%
" " " , slow immersion.....	0.233%
	0.196%
" " " , in vacuo.....	0.289%
	0.27%
" " " , under pressure.....	0.29%
	0.28%
Coefficient of saturation, one hour.....	.24
	.21
" " " , two hours.....	.27
	.22
" " " , slow immersion.....	.8
	.7
" " " , in vacuo.....	.99
	.99

Chemical analysis by Leverin (1):-

Silica.....	57.62
Alumina.....	21.66
Ferric oxide.....	0.14
Ferrous oxide.....	7.20
Calcium oxide.....	.90
Magnesian oxide.....	3.94
Combined water.....	4.06
Carbonic acid and undetermined matter.....	4.34
Sulphur.....	0.144

The slate splits smoothly and evenly and slabs up to at least 3' x 4' are obtainable. While 5 slabs to an inch can be procured some of the material does not split readily to less than three-quarters of an inch thickness. When freshly exposed the slate has a black or every dark gray colour. On weathering it becomes uniformly grayish without spotting or staining. Operations ceased in 1915. (McGerrigle, 1933).

11. South Shore of Saint Lawrence river, Lévis to Cape Rosier.

Black, red, and green slates, with associated sandstones, quartzites, limestones, and limestone conglomerates occur along the south shore of the Saint Lawrence river and for varying distances inland from Lévis to Cape Rosier, Gaspé peninsula. These deposits are mainly of Ordovician age, with some Cambrian and possibly some Silurian included.

While little has been said about the economic possibilities of the slate in this belt the occurrence and extent of the slates has been noted several times. Logan, 1963 summarised the geology as known up to that time for the entire belt. Richardson (1869) reported on the belt from Lévis to and beyond Rivière-du-Loup. Ellis, in 1888, dealt mainly with the area between Lévis and L'Islet.

Dresser (1908; 1912) made a reconnaissance survey from the Etchemin river, south of Lévis, to Temiscouata County. Young (1913) described the Lévis, Rivière-du-Loup, and Bic localities in some detail. McGerrigle (1933) described generally the slates in the area about Rivière-du-Loup.

The possibilities of obtaining dimensional slate in economic quantities in this belt are probably not great in view of the sharp folding generally experienced by the strata. However, one locality where such possibly may be obtained has been described (Richardson, 1858) and others may occur. Richardson stated that roofing slates might be obtained on Henley's brook, about two and a half miles above its junction with the Marsoui, or about four miles from the Saint Lawrence. "The slates might be obtained in thicknesses varying from an eighth to a quarter of an inch and in slabs of eight or ten feet square, with very smooth surfaces. Some part of the rock gave thicker slabs, measuring from two to three inches, and would serve as excellent flagstones. The color of the rock is dark bluish-gray or black. Some bands of the slate are calcareous....".

The conclusion arrived at by McGerrigle (1933) for the red, green, and black slates of the Rivière-du-Loup area perhaps has general application for this belt: "In general, these slates are too highly folded to permit of structural use, and probably they would find their greatest value when employed.....either as small slabs or as pulverized products".

Transportation could be effected by rail or by water from the area between Lévis and Matane and by water from the area between Matane and Cape Rosier.

Analyses of Slates by T.S. Hunt(Report of Progress 1852-53)quoted by Ellis (1898):-

	Kingsey	Westbury	Wales	Angers
Silica.....	54.80	65.85	60.50	57.00
Alumina.....	23.15	16.65	19.70	20.10
Prot. iron....	9.58	5.31	7.83	10.98
Lime.....	1.06	0.59	1.12	1.23
Magnesia.....	2.16	2.95	2.20	3.59
Potash.....	3.37	3.74	3.18	1.73
Soda.....	2.22	1.31	2.20	1.30
Water.....	3.90	3.10	3.30	1.40
	100.24	99.50	100.03	100.13

Slate Granule operations

(Mining operations in the Province of Quebec)

In 1921 demand for slate granules created new interest in the slate industry and during the year the following companies, some newly formed, intended exploitation of deposits:-

1. The British Canadian Marble Company, Limited.
2. Canada Slate Corporation.
3. Slate Products Company of Canada, Limited.
4. Mystic Slate Company, Limited.

1. The British Canadian Marble Company, Limited.

Saint Joseph de Beauce, lots 422-424. A shaft 5' x 10' and 70' deep was put down in bright red slate. Five crosscuts, from 70' to 100' long were made at 60' depth. A crushing mill was built in 1920. (1921)

In the report on Mining operations for 1922 the following information was given: A vertical shaft 11' x 6' was sunk to a depth of 60 feet. From the bottom of the shaft two drifts, each 100 feet long were driven in red slate. A 100-foot cross-cut was also driven and three drifts were opened at right angles to this. The band of slate is 10 to 11 feet wide. A three-quarter mile spur connects the plant and quarry with the Quebec Central Railway.

2. Canada Slate Corporation.

Saint Anselme de Dorchester, lots 238,239. A crushing plant was built here in 1921 and is served by a 350-foot railway siding.

"The intention is to work on a large deposit of schistose slates of the Sillery formation.....These slates consists of red bands separated by small green bands". A trench 150 feet long with a working face at right angles to this 25 feet long and 12 feet high has been opened (1921).

3. Slate Products Company of Canada, Limited.

Melbourne R. IV, lot 14.

A crushing plant was built here in 1921 to exploit green slate. The quarry measures 80' x 35' x 45' (deep). (1922)

4. Mystic Slate Company, Limited.

Stanbridge, R. VII, lot 20, 21. Bert Watson's farm.

A pit 45' x 10' x 18' (deep) was put down on a sharp synclinal

fold in deep dark blue slate (1921; 1922).

5. The New Rockland Slate Company opened a quarry on Melbourne, R. IX, lot 24, where bands of green and purplish slates occur (1920).

Some crushed green slate was produced (1923).

From 1924 to 1932, inclusive, no production is recorded.

1933 - 439 tons valued at \$828. "Several shipments of red slate were made last year from Sainte Hénédine, in Dorchester county, and also from Granby, to a pulverizing plant located in Montreal".

1934 - 470 tons valued at \$703. "Red and gray shale was shipped from the Sainte Hénédine quarry of the Broughton Soapstone and Quarry Co., Ltd., and from the property of the Citadel Brick Co. at Boischatel".

1936 - Gray slate rubbish, 700 tons valued at \$700. Shipped to Pulverizing Products, Montreal, by Williamson and Crombie, Kingsbury.

1937 - Gray slate rubbish, 300 tons valued at \$300. Shipped to Pulverized Products by Williamson and Crombie.

Uses of Slate

Dimensional.

Roofing; Blackboards, Bulletin boards, School slates; Electric switchboards - The quality of slate for electrical use is modified by moisture, carbon, and iron. A three-months seasoning period removes most of the moisture. Minute grains of iron-bearing minerals disseminated through the slate are not as deleterious as carbonaceous bands or ribbons.

Billiard and other table tops; Grave covers, Vaults, Tombstones; Floor tiles, ornamental floors and walks, - "Inlaid"; Flagstones; Lavatory slabs; Steps; Baseboards; Window sills, Hearths; Vats;

Sinks; Laundry tubs; Flour bins; Mantles.

Partition Slabs - The Building Research Station at Carston England, has calcined certain varieties of waste slate and produced a light weight aggregate of cellular structure. The material formed will float on water. It is suggested that it might be used for lightweight partition slabs.

(Slate Trade Gazette, Slate Waste. Vol. 39, 1933, P. 78)

Granules

Granules of slate and of some other varieties of rock are used on asphalt impregnated paper for roofing purposes. Slate-roofing-granules have been in use since 1908 in the United States and importantly so since 1916.

Slate-roofing-granules were introduced when a more pleasing appearance was desired than that given by the old kind of roll roofing surfaced with talc. Many different crushed materials were tried, but it was definitely proved by the manufacturers that surfacing made of non-fading slate met with the most uniform success (Mineral Resources of the U.S., 1920, Pt. II, P. 142).

However, granules are made also in the United States from altered (more or less schisted) diabase, and, to a lesser extent from serpentine. Other rocks tried (e.g. dunite or olivine rock and rock composed largely of epidote) yielded granules that were too hard and that cut the asphaltic base on which they were rolled. Red and green slate are used for the most part although gray and black are also employed when needed for color harmony.

The average size specifications are as follows:

100% to pass a 10 - mesh sieve

40% - 65% to be retained on a 20 - mesh sieve

25% - 50% " " " " 40 - mesh sieve

None should pass a 60 - mesh sieve. - "Dust" is detrimental because it adheres to the asphalt coating before the granules could come into contact with it and so prevents the adhesion of the granules to the coating.

Coarse material than suggested above is used, however, a 1/8" - 3/4" size being fairly common. There are also "roofing gravels".

Note 1. Pulverized Products Limited (4820 4th Ave. Rosemont, Montreal) submitted a 59 pound bag of gray slate (locality not stated) to the Ottawa laboratory for testing. The slate is described as blue-gray, with a tendency to split into long flat needles rather than flat flakes. The granules produced seemed to be suitable as roofing granules. (Canada Dept. of Mines, Mines Branch, Ore Dressing & Metallurgy, 1932, pp. 128 - 129).

Note 2. The Company mentioned above submitted in 1936 three bags of gray slate from Kingsbury and three bags of red slate from Saint Hénédine. Tests were made for crushing methods rather than suitability for slate granules.

(Idem, 1936, p. 182)

Slate "Flour"

Filler for paint, linoleum, oil-cloth, asphalt, rubber, plastic roofing slate shingles, plastic electric insulators.

Slate flour with a high iron oxide and alkali content is suitable as a constituent material for paving bricks and stoneware pipes, and

that having a high alumina content is used in refractories.

Waste slate is being used in Europe in the ceramics industry.

Flour and Granules

Surfacing tennis courts.

Ingredient in artificial stone.

Notes on Production

Roofing slate was produced in Quebec practically continuously from 1854, the date of the opening of the first quarry, until 1921. Maximum production was in 1889: 695 tons, valued at \$119,160. In the years 1919, 1920, and 1921 the dimensional slate produced, mainly roofing, had the respective values of \$10,853., \$16,038., and \$4,624. In 1921, 5,000 tons of granules valued at \$37,500 (\$7.50 per ton) were produced by the Slate Products Company operating at Kingsbury. Also in 1921, 883 tons of granulated material, including red slate, valued at \$6,642 were produced by the British Canadian Marble Company, Saint Joseph de Beauce.

Slate production since 1921 has been limited to pulverized slate products, including granules and flour.

In 1922, the Slate Products Company produced 1,816 tons valued at \$14,234., and the British Canadian Marble Company produced 83 tons valued at \$529..

In 1923, the Slate Products Company put out 550 tons valued at \$4,251 and the British Canadian Marble Company 1,286 tons valued at \$13,038.

For the years 1924 to 1933, inclusive, there is no recorded production, and from 1934 to 1937 small quantities only of granules and flour were produced from slate rubbish.

Imports from the United States, by Kinds

It will be noted from the accompanying table that the average value of imports of slate products from the United States from 1919 to 1931 was about \$200,000.. The year showing the lowest value of such imports was 1919 when \$59,619 worth was brought in from the United States. The years showing the highest values were 1929 and 1930 when, in each year, slate to the value of \$280,000 was imported. General imports of slate products have fallen off greatly since 1931.

IMPORTS SLATE PRODUCTS TO CANADA FROM UNITED STATES

(Mineral Resources of the United States and Minerals Yearbooks. U.S.G.S.)

Year	Roofing	Electrical	Structural	Blackboards	Billiard tables	School	Granules	Total
1919	\$ 43,774	\$ 7,555	\$-----	\$ 7,259	\$ 1,031 & Structural	\$-----	\$-----	\$ 59,619
1920	91,992	8,752	-----	-----	5,949	28,379	-----	135,072
1921	74,546	13,370	365 Others	52,016	31,882	24,672	-----	196,851
1922	74,031	12,086 &Structural	32,490		27,940	35,168	-----	181,715
1923	74,357	81,647	-----	29,338	19,721	30,109	-----	241,172
1924	69,411	23,414 &Structural	-----	38,998	150	26,425	54,400	212,799
1925	38,328	10,642	-----	68,086	5,790	21,882	100,300	245,034
1926	40,204	28,000 (Approx)	20,800	47,520	12,000 (Approx)	Several thousand	45,000 (Approx)	200,000
1927	70,974	8,000 "	8,000 (Approx)	45,000 (Approx)	24,000 "	"	60,000 "	225,000
1928	79,952	13,500 "	3,500 "	63,526	30,000 "	"	80,000 "	271,000
1929	102,053	10,000 "	15,000 "	73,000 (Approx)	?	?	80,000 "	280,000
1930	54,069	13,000 "	4,600 "	59,810	Some	Some	15,000 "	280,000
1931	37,816	3,200 "	6,000 "	60,000 (Approx)	6,000	10,000 (App)	75,000 "	198,000
1932	11,124							
1933	5,498							
1934	9,672							
1935	9,739							
1936	1,074							

NO INFORMATION

APPROXIMATE

Total Imports of Slate Products, Canada

1921.....	\$245,274	1929.....	\$296,638
1922.....	256,353	1930.....	205,978
1923.....	248,537	1931.....	155,008
1924.....	220,402	1932.....	57,931
1925.....	205,507	1933.....	30,931
1927.....	206,063	1934.....	40,966
1928.....	239,296	1935.....	36,388
		1936.....	34,155

Note: it will be noted that the above figures of total imports from the United States and total general imports are out of line. This may be accounted for by the approximate nature of the figures representing the total of the imports from the United States. Also, the statistics have been had from two sources, - those of the first table from the Mineral Resources of the United States and Minerals Yearbook (U.S.) and those of the second from the annual reports of the Mineral Production of Canada.

Present Status of the Industry

Deposits from which dimensional slate, particularly roofing slate, could be procured are not rare in the slate belts south of the Saint Lawrence. Many of these deposits have been exploited to a greater or lesser degree. However, there is no production of dimensional slate at the present time nor has there been any production since 1921. Discontinuance of production apparently was caused by adverse economic conditions combined with severe competition with other roofing materials and with other slates imported chiefly from the United States.

While it is possible that at the present time production of dimensional slate alone could not be reinitiated and economically continued in the province it is also possible that combined quarrying of dimensional slate and of slate for granules would meet with success. That there is a Canadian market for both dimensional and granulated slate is shown by the import statistics. It may be that the production of slate roofing granules will be the mainstay of a revised slate industry. With a resumption of building a strong demand could develop for such slate granules. In this connection it is worth noting that in 1935 a mill was erected near Madoc, Ontario to produce slate granules and flour, structural and roofing slate.

Slate granule production in the United States has averaged about 232,000 tons, valued at \$2,089,000 (average) since 1920. The peak year was in 1924 when 512,810 tons valued at \$3,178,454, were produced. The average price per ton in the United States from 1920 to 1936 has been \$6.00 or a little better.

General Considerations (*)

(*) Taken largely from the paper by J.A. Dresser, on The Slate Industry In Southern Quebec. Canadian Mining Institute Journal, Vol. 14, 1911, pp. 149-163.

On the east side of the Sutton range of hills a belt of serpentine and related intrusive rocks occur along or near the contact of sedimentaries that are mainly of Ordovician age. It is near the contact with the serpentine that several of the most important slate deposits are found. There are other slate deposits "that are not situated near

intrusive rocks; but hitherto all the production of commercial importance has been from those deposits near the serpentine".

"The New Rockland, Melbourne and Steel quarries are so close to the contact of the serpentine intrusion that the slate is probably affected in some measure thereby. The Danville quarry, which appears to be in slate of the same original composition, is sufficiently distant from the contact to be probably unaffected by the intrusion.

"The slate of Danville, judging from evidences now available, is softer and not so strong as that from the other quarries. The original bedding planes may be detected in places and in trimming the slate often 'scallops' along them. On the other hand it seems to be excellent material for school slates and other manufactures on account of its greater softness. Also the quarry itself is freer from quartz veins, which latter in the other quarries are more numerous near the contact with the serpentine than at a short distance from it.

"Nearness to the contact is thus both a favourable and an unfavourable feature. Dykes and quartz veins are more numerous near it and where the alteration has been too great, the slate becomes 'sharp' or is nearly a hornstone. On the other hand slates beyond the effects of the contact have less hardness and strength. The most favourable location for slate seems to be in the outer part of the contact zone, near enough the intrusion to secure strong slate and far enough away from it that the spaces between the 'flints' are sufficiently large to be advantageously worked".

"The slates usually referred to as 'coloured' are red, green, mottled or purple, and are prevaillingly coarser in texture and do not split as finely as the black slates".

The slates of southern Quebec, following the classification of Dale (*), are classified by Dresser as black, red, green and purple unfading mica slates of aqueous sedimentary origin.

(*)Dale, T.N. and others, Slate Deposits and Slate Industry of the United States, U.S. Geol. Survey, Bull. 275, 1906.

BIBLIOGRAPHY

- Dresser, J.A., Canadian Mining Institute Journal , Vol. 14, 1911,
pp. 149 - 163. (General)
- Dufresne, A.O., Mining Operations in the Province of Quebec
General Reports for 1920, 1921, 1922, 1923, 1924,
- Ells, R.W., Geological Survey of Canada, Annual Report, 1889. (General)
Annual Report, 1894. (General).
- Logan, Sir William., Geology of Canada. Geological Survey of Canada, 1863.
- McGerrigle, H.W., Quebec Bureau of Mines, Annual Report, 1923, Part D.
(Temiscouata area)
- Obalski, Mining Operations in the Province of Quebec. (General)
Report for 1897. Report for 1898.
- Parks, W.A., Canada, Department of Mines, Mines Branch, 1914, Review
most of the known worked slate deposits.
- Richardson, J., Geological Survey of Canada, Report of Progress, 1858.
(Marsoui river area, Gaspé).