CANADA

DEPARTMENT OF MINES AND TECHNICAL SURVEYS

GEOLOGICAL SURVEY OF CANADA

PAPER 55-15

SURFICIAL GEOLOGY OF EDMUNDSTON MADAWASKA AND TEMISCOUATA COUNTIES NEW BRUNSWICK AND QUEBEC

(Preliminary Report and Map)

By

Hulbert A. Lee

OTTAWA

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Price, 50 cents

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INTRODUCTION

Field work on which this report is based was done in the 1950 field season. The map-area covers 309 square miles situated in northwestern New Brunswick, county of Madawaska, with a small corner in the province of Quebec. More than five-sixths of the area is forest covered, there being approximately 48 square miles of land cleared or partly cleared of trees. Access to most of the area is provided by roads, spaced at about 3-mile intervals, except in the northeast corner where there are only bush trails. The largest town is Edmundston, and it has a population of 10,753 (1951 census, Canada Year Book 1952-53). Economically, the forests are first in importance, a pulp-mill owned by Fraser Companies Limited providing the main employment both in the woods and mill. Mixed farming and some potato farming are combined with pulp-wood cutting to form the basic economy.

Acknowledgments

Walter Thorpe was a valuable assistant in field mapping. The Edmundston district branch of the Forest Service, New Brunswick Department of Lands and Mines, made available their ranger's cabin in the northeastern part of the map-area. It is a pleasure to acknowledge this and other courtesies of the Forest Service.

Physiography

The region, a former plateau, has been dissected by streams of the Saint John drainage basin, leaving numerous hills. Local relief next to the river valleys is between 300 and 500 feet and the total relief is about 1,200 feet, varying from an elevation of approximately 425 feet at Ste-Anne-de-Madawaska to 1,590 feet at Green River triangulation point.

Many of the pre-glacial V-shaped bedrock valleys are partly filled with glacial drift, and over this a mantle of silt was deposited when streams overflowed their banks. Drift and loose rock, removed from hill tops and steep slopes by slopewash, slump, and solifluction, is redistributed on hillsides and valley bottoms.

Bedrock Features

The accompanying map shows many, but not all, of the outcrops, as only cursory attention was given to the bedrock geology. Grey slate, which changes to interbedded slate and limestone in the southeastern part, underlies most of the area and has been assigned a Silurian age by Bailey and McInnes (1889, p. 38M)[1] on the basis of

[1]Names and dates in parentheses are those of references cited on page 3.

fossils found in similar rocks in surrounding areas. Alcock (1949), on a geological map of the Maritime Provinces, places rocks of this type northwest of St - Jacques in the Lower Devonian, and those to the southeast in the Silurian. The slates have a strong northeast trending cleavage. A common constituent of the slates is disseminated pyrite, and a black stain of a manganese oxide is present in the outcrop of interbedded slate and limestone north of Ste - Anne-de-Madawaska. In places the weathered surface of the slate bedrock was not completely removed by glacial erosion and an exposure of 3 feet of slate weathered in situ can be seen along a farm road 1/4 mile west of highway No. 2 and 1 mile south of the Quebec-New Brunswick boundary.

A conglomerate in the northwestern part of the map-area contains well-rounded, elongated pebbles of quartz and chert. Only one outcrop of diabase was mapped, but from the presence of diabase rock fragments concentrated along linear zones it is suspected that diabase dykes are present in other places below the drift.

Glacial Features

The most important glacial phenomena in the region are the positions of the former ice-fronts; one passed through Grand Falls 18 miles southeast of the map-area, and the other through St-Jacques, situated 5 miles north of Edmundston. The one at Grand Falls is marked by a kame moraine, consisting of a belt of gravel and till hills that crosses Saint John River and is bordered on the south by a large area of outwash marked by scores of abandoned stream channels. The position of the ice-front at St - Jacques is marked by a small moraine, a series of moulin kames, and proglacial lake features. Behind these frontal features there is a more or less continuous blanket of ablation till.

A glacial lake was formed in the Saint John River Valley and in tributary streams by the dam of drift across the old river channel at Grand Falls. Lacustrine features were first recognized by Chalmers (1885, p. 37GG), who concluded that there were two former lakes, one extending from Grand Falls to Edmundston along

Saint John River and the other lying north of Edmundston along Madawaska River. In 1950, Kiwiet de Jonge (1951) confirmed the existence of a lake by levelling along raised bars and deltas, and concluded that one lake, not two, had existed from Grand Falls to Lac Temiscouata. He named this 'Glacial Lake Madawaska'. The writer in the same year mapped the numerous bars and deltas and studied sections through the bottom sediments of the lake (Lee, 1953).

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INDICATORS OF ICE MOVEMENT

Some bedrock hills are smoothed by glacial abrasion and exhibit grooves parallel with their sides, as seen 2 miles southeast of Patrieville, 1/4 mile northeast of Plourd, and west of St-Joseph. These grooves strike southeast and indicate former glacial ice flow along this line.

Stoss-and-lee phenomena are developed on the bedrock west of Levesque and indicate an ice motion to the southeast. Crescentic gouges were noted south of Patrieville and at Lavoie Corner. The floor of these gouges dips to the southeast, which is the direction of the former ice movement.

Glacial Striations

Directions of glacial striae west of Madawaska River vary from south 25 degrees east to south 70 degrees east and have an arithmetric average of south 42 degrees east. Between Madawaska and Iroquois Rivers the variation in direction is from south 20 degrees east to south 65 degrees east and the arithmetric average is south 54 degrees east. A slight shift towards a more easterly direction is shown east of Iroquois River, especially in the region of reduced local relief. This shift is apparently due to a decrease in topographical control of the former ice movement after it passed out of the deep southeasterly trending valleys. Striae decrease rapidly in number east of Green River where the rock surface is shattered by several intersecting cleavages, indeed the degree to which the bedrock is shattered is an important factor in the present distribution of glacial striae.

Two sets of intersecting striations are recorded near Biard and near Second Falls. At many localities individual striae begin in a wide scratch that narrows, becomes shallower, and fades out. The tapered striae could be due to uniform, rapid crushing of slate pebbles against the slate bedrock surface, or to retraction of the abrading pebbles into the ice-sheet. In most cases the former explanation is favoured because of the weak nature of the slate forming the main ice load and the considerable volume of crushed material in the till.

Provenance of Erratics

Grey slate is the dominant type of rock fragment and together with its oxidized equivalent, brown slate, comprises between 70 and 95 per cent of the pebbles in the drift between 2 and 4 inches long. Grey sandstone is second in abundance and generally comprises about 10 per cent of the pebbles in the drift. Quartzite and vein quartz are present in significant amounts. Numerous other rock types make up about 1 per cent of the drift. Of these, red shale, although not numerically significant, is an important indicator pebble. It can generally be found everywhere in the drift in small proportions and increases in abundance towards the source, about 25 miles northwest of the area. Fragments of granite, granite-gneiss, diorite, and pegmatite are also present, and are significant because the only known bedrock source is north of the St. Lawrence River. The presence of these erratics in the area, even on the uplands, is taken as proof of Laurentide glaciation. Fragments of fossiliferous limestone, similar to the limestone that outcrops at Mount Wissick, were found about 40 miles south of their apparent source.

The ice-sheet that transported drift into the Edmundston area is interpreted from the foregoing evidence as having moved

southeastwards, deriving its load in part from north of the St. Lawrence River and in part from south of the river along the northward dipping watershed, but mainly from the grey slate area of northwestern New Brunswick and adjacent Quebec.

DESCRIPTION OF DEPOSITS

The retreat of the ice-sheet across the area was not uniform but was interrupted by times when the ice front was stationary or even advanced slightly. The retreat may thus be considered cyclic, a cycle consisting of the events that took place while the ice front was stationary or advancing and then retreating to the next such position. The glacial and related deposits of the Saint John Basin, of which the map-area is a part, may, therefore, be divided into a succession of 'drifts', each laid down during one of these cycles.

Ideally each 'drift' would be in three parts, deposits formed at and near the ice margin, those formed beyond (south of) the margin, and those behind (north of) it. The deposits near the margin would consist of till in the form of end moraine; gravel, sand, and till as kame moraine; and gravel and sand as moulin kames and some kame terraces. Beyond the margin would be gravel and sand as outwash apron and valley train. Behind the margin, although partly formed during its retreat, would be till as both ground moraine and ablation moraine, their relative abundance depending on how the ice-sheet wasted. Resting on this till would be gravel and sand as eskers, kames, kame terraces, and outwash, and over these in turn clay and silt deposited in local lakes formed by drift dams.

Normally the outer part of each drift overlaps the inner part of the preceding one, in a succession northward up the Saint John Valley so that gravel and sand in the outwash apron and valley train overlies the earlier deposited clay and silt beds, and till in the forms of end moraine, kame moraine, and ground moraine overlies the earlier deposited gravel, etc., of the previous drift. In these ways the stratigraphic relationships of the separate drifts are recognized.

In field mapping it is difficult to distinguish the ground moraine tills of the separate drifts. Moreover, in places where the distinctive lake beds pinch out and sand and gravel of the valley train of one drift lies directly on similar material of another, it is not everywhere possible to separate the drifts.

The sedimentological characteristics, relationships, and origins of the two types of till, moulin kames, and probable end moraines found in the map-area are discussed fully in a detailed study by the writer (Lee, 1953).

Grand Falls Drift (1-3)

The Grand Falls Drift is marked near its southern limit 18 miles southeast of the area by a well-developed moraine at Grand Falls after which it is named, and a large outwash apron and valley train south of the moraine. Its northern limit is near St - Jacques, New Brunswick. It is overlain by St. Jacques Drift near Biard (Section 1) and near Ste - Anne-de-Madawaska (Section 5).

The area mapped as lodge moraine (1) is dominantly composed of till, but also contains boulder erratics scattered over the surface, small areas of exposed bedrock, and some material weathered in situ. The till occurs in patches 2 to 3 feet thick. It is greyish blue, unoxidized, and has a compact structure with a horizontal platy parting. The rock fragments of pebble and cobble size have been subrounded and a few striated. The elongated rock fragments are arranged with the dominant orientation of the pebbles southeasterly, approximately parallel with the glacial striae. A minor secondary orientation is northeasterly. Size distribution of rock fragments in the till varies considerably over the map-area. Along through-valleys[1], such as that of Madawaska, Iroquois, and Green Rivers, the till has been ground fine and, consequently, contains a relatively low percentage of pebble and sand size particles with a correspondingly high percentage of silt and clay sizes. Areas of high local relief impeded ice flow and became source areas for loading the ice-sheets. To the southeast of most hills there is a relatively high percentage of coarse rock fragments in the till, which are replaced by finer and finer fragments with increased distance from the hill source. In the upland areas where there has been effective ice abrasion, as around Patrieville, the till contains a relatively low percentage of particles in the coarse sand, pebble, and boulder range.

The esker (2A) along Three Mile Brook has two different shapes, that part south of Ennemond is sinuous and has a bell-shaped profile, but the ridge at Ennemond is low and sharp-crested with numerous segments that are composed of till as well as of gravel. The latter part was apparently a crevasse filling formed during a late stage of downwasting.

St. Jacques Drift (4-8)

The St. Jacques Drift was named here after the village of St. Jacques, New Brunswick. Its southern boundary is represented on the uplands by what is probably a small moraine, moulin kames, and the limit of ablation moraine, and in the valleys by gravel and

[1]Through-valleys are those parallel with former ice movement. They were avenues for active ice that vigorously eroded and partly shaped the valleys.

sand in the form of valley train. The northern boundary of the drift lies beyond the map-area. The St. Jacques Drift rests directly on the Grand Falls Drift near Biard (Section 1) where till of the ablation moraine (6) overlies gravel of the outwash deposits (2B), and again near Ste - Anne-de-Madawaska (Section 5) where valley train gravel (9A) of the St. Jacques Drift rests on early Madawaska lake beds (3) of the Grand Falls Drift.

On Thibodeau Brook about 3 miles above its junction with Green River, there is a sharp-crested ridge of end moraine (4) about 30 feet high and 50 feet wide, which is continuous for 1/2 mile. The ridge consists of a series of joined segments and is composed of till containing subrounded pebbles and bedded silt. In most places it trends at right angles to the direction of former ice movement. The silt beds dip steeply but are not contorted. Northwest of the main ridge are several low, parallel ridges and between the ridges are numerous local pockets of stratified drift. These ridges are interpreted as push-moraines and are indicative of active ice. Another possible push-moraine is situated about 1 mile southwest of Jalbert where there is an arc-shaped ridge of dense till about 5 feet high and 20 feet wide.

A kame (5) occurs on the uplands between elevations of 850 and 1,125 feet, and is restricted to a relatively narrow zone that, on the surface, separates the ablation till from the lodge till. It occurs in two forms, one being remarkably circular in plan and symmetrical in cross-section and the other being drumlinoid in shape. The former resembles a flat cone with the apex about 20 feet high and the base 120 feet in diameter. The latter is characterized by low, smoothly rounded hills about 20 feet high, 100 feet long, and 30 feet broad. Both forms are composed of angular gravel and sand particles. For a deposit that appears to be glacio-fluvial, the angularity is striking, but is readily explained as a moulin kame formed by subaerial deposition into holes in a thin ice-sheet, with a minimum of water action.

The area mapped as ablation moraine (6) is dominantly till, with small areas of exposed bedrock, some material weathered in situ, and some frost-shattered rock. The till is yellowish brown and oxidized throughout. It has a loose structure and contains angular rock fragments, many of which show little or no shaping by ice action. It is only 1 foot to 3 feet thick and generally rests on the slate bedrock. In two places only was the ablation till found to rest on the lodge till.

The pond deposits (7A) are in part related to the Grand Falls Drift but are shown on the map as a single unit in the St. Jacques Drift. Two patches of silt beds formed as pond deposits are perched on a hillside near Ste - Anne-de-Madawaska. To judge from their position, the valley must have been filled with ice to provide a containing wall for the small lake in which they were formed. The two

patches of silt along Three Mile Brook were laid down either as outwash or as a lake deposit. Local ponds, as indicated by silt beds along Trout and Green Rivers, were formed by ice walls when the ice margin stood near St - Jacques.

Beaches and bars (8B) are most numerous near the 525-foot contour level in the basin of extinct Lake Madawaska, but are absent at higher elevations. The position of the 525-foot contour thus represents the inferred position of the highest Lake Madawaska strand line. A well-developed beach ridge about 5 miles northwest of St - Jacques is 1/4 mile long, 10 feet high, and about 50 feet wide, and is composed of slate pebbles shaped like pumpkin seeds.

Grand Falls Drift and St. Jacques Drift Undivided (9)

Included within this assemblage of deposits are those glacio-fluvial sediments that, owing to insufficient evidence, cannot be assigned to one or other of the two drifts.

Kame terraces (9B) are present at various elevations along the valley walls, the higher terraces generally being more continuous and better developed. The higher terraces along Madawaska River have flat tops, average 150 feet in width, and stand about 70 feet above the present valley bottom. Gravel beds in the terraces are horizontal or inclined up to about 4 degrees. In places, mainly along Madawaska River Valley, the lower terraces lack ice-contact slopes, and may thus represent remnants of a higher level of valley train (9A). Deposition of some of the lower terraces has been controlled by spurs of bedrock that jut out into the valley.

Kames (9C) are found in the low parts of valleys between elevations of 500 and 700 feet. Where typically developed, the deposit has a rudely circular outline, is 20 to 50 feet high, and is 100 to 200 feet across. It has the characteristics of an ice-contact deposit with one irregular side, knob and kettle topography, and confused tumultuous bedding.

Till, on the steeper slopes, has mass-wasted downhill to form considerable areas of slope wash and slump deposits (10), especially in the more rugged reaches of many streams. Included within this map-unit are small amounts of sand and gravel in valley bottoms. Mass-wasting was probably most active under a periglacial environment immediately following retreat of the ice from this region.

Alluvial flood-plain deposits (11A) include an extensive area of very fine sand and silt about 3 feet thick that lies on the valley floors. The silt is unstratified with a blotchy brown colour due to iron stain and iron concretions. The material falls dominantly within the silt-very fine sand range with a small percentage in the

clay-size fraction. It has certain characteristics of loess, yet its position in valley bottoms rather than at higher elevations suggests river action rather than wind action as the latest mode of transportation. The Saint John and its tributary rivers of today carry a heavy load of silt in suspension during spring run-off and after heavy rains. At such times these rivers commonly flood their banks and spread their muddy water over the adjacent low flat land. This gives rise to unstratified, iron-stained deposits of very fine sand and silt. Such a process has been more or less continuous since the inception of post-glacial drainage in the area.

RIVER VALLEYS

Prominent kame terraces occur along most of the valley walls and below these are deltas, alluvial fans, and beach bars that fringe a valley plain. Incised into the plain are river terraces exposing flood-plain and glacial-lake silts, valley train gravel and sand, and, in places, the underlying till and bedrock.

Saint John River Valley

The Saint John is a youthful river flowing in a broad mature valley. Kame terraces are well displayed on the valley walls, and at a slightly lower elevation there are beach bars, occasional spits, wave-washed and boulder-strewn terraces, deltas, and alluvial fans. The kame terraces are best displayed near St-Basile, Iroquois, and Albertine on the New Brunswick side of the river and near Frenchville on the Maine side.

Madawaska River Valley

The Madawaska is a slow-flowing river in a broad, flat-bottomed valley, but tributary streams enter the valley in rapids and waterfalls. Kame terraces occur at various elevations along the valley walls, with the higher terraces being more continuous and better developed. Till forms the valley wall and also appears to pass underneath the terrace gravels. Beach bars, deltas, and alluvial fans occur at about the same elevations as the lower kame terraces.

An excavation into the valley plain near the town hall in Edmundston showed 5 feet of brown massive silt over 1 foot of spherical, well-rounded cobbles.

In another section, exposed in the bank of an abandoned river channel near the eastern town limits of Edmundston, the sequence shown in the following table is revealed:

SECTION EXPOSED AT EDMUNDSTON

Deposit	Thickness (feet)	Depth (feet)
Very fine sand	3	0-3
Bluish grey, silty sand; some organic matter	few inches	3-9
Grey clay; willow branches, marsh plant (myriophyllum)	3½	
Massive, fine-grained sand and clay; some organic matter	2	
Gravel, in nearly horizontal beds	12	9-21

The 3 feet of fine sand (11A) at the surface is an alluvial flood-plain deposit, the 6-foot clay complex (3) represents the bottom deposits of a late stage of Lake Madawaska, and the underlying gravel (9A) is valley train.

In a third section exposed about a mile south of St-Jacques, fine sand (11A) of flood-plain origin overlies gravel. There are two contradictory pieces of evidence for the direction of flow of the glacial stream in the Madawaska River Valley that deposited the gravel, a southward flow is indicated by pebbles in the gravel, which have been transported from an outcrop (B) about 7 miles to the north, yet a northward flow was indicated by cross-beds inclined to the north but only exposed in this section. The indicator pebbles in the gravel could have been carried south by the ice-sheet and then re-transported north by a northward flowing stream; however, this is unlikely as a high degree of selective concentration of the indicator pebbles would be required to concentrate less than 1 per cent of these (chert, quartz, and quart-pebble conglomerate), which represents the proportion present in the lodge till, to the high percentage (47 per cent of all pebbles) present in this gravel. On the other hand, the northward dip of the beds may be due to deposition by back-water, and, therefore, be local. The gravel in this section is tentatively considered to be valley train (9A) deposited by streams flowing southward from the retreating ice-sheet.

Trout River Valley

Trout River flows in a narrow, deeply incised valley and empties into Madawaska River at St-Jacques. A glacial lake occupied part of the Trout River basin as indicated by a compound delta (7B) with kettle-holes, and by stratified silt beds (7A).

Iroquois River Valley

The Iroquois is a small, rapidly flowing river lying in a deeply incised valley. Meander scars and ox-bow lakes are common. Kame terraces on beach ridges lie along its lower valley walls and solitary kames occur at a higher elevation. Along the tributary, East Iroquois River, the valley is U-shaped and the spurs are facetted. At Iroquois village, several flat-topped hills of laminated silt and sand (8A) stand as remnants of the former lake plain of the late stage of Lake Madawaska.

Green River Valley

Green River is a youthful stream that lies in a broad U-shaped valley. Along its eastern valley wall are numerous solitary kames, some kame terraces, deltas, and alluvial fans, and one probable beach ridge. The valley is floored with silt, although in some places valley train is exposed at the surface. A section in a gravel pit about 2 1/2 miles from the river's mouth showed 12 feet of gravel (9A) overlying till (1). Former channels in the gravel surface are filled with silt. Five miles north of the gravel pit, a bluff displays 15 feet of laminated silt and sand. As the beds can be traced back from the bluff to a level that is several hundred feet higher than any known elevations for Lake Madawaska, they record a local ponding rather than a widespread lake. The pond was held in by ice that crossed the valley at the position of Thibodeau Brook and prevented drainage to the north. At the same time solitary kames show that stagnant ice, disconnected from the main ice, remained in the lower valley and blocked drainage to the south.

Quisibis River Valley

Quisibis River has many rapids and flows in a youthful valley. Along its course are numerous meander scars and ox-bow lakes and behind these are undrained swamps. Late glacial drainage in the valley is represented by kame terraces, deltas, and alluvial fans at various elevations, and local high-level, thick beds of silt. The former presence of Glacial Lake Madawaska in the lower end of the valley is indicated by beach bars at an elevation of 525 feet. A section in a cut on the west bank of the river about 200 feet south of highway No. 2 (Section 5) exposes the sequence shown in the following table:

SECTION EXPOSED AT STE- ANNE-DE-MADAWASKA

Deposit	Thickness (feet)	Depth (feet)
Brown massive silt	3	0-3
Alternating layers of thinly laminated brown and white sand, with a thin basal ortstein layer	2½	3-5½
Bluish grey, massive clay. A thin layer at the base contains wood, plant remains, beetles, and freshwater shells[1]	10	5½-15½
Alternating layers of gravel with medium-grained sand	5	15½-20½
Bluish grey, organic clay and silt containing numerous clams and snail shells[1]	4½	20½-25

[1] A list of the fossils found in the above section follows.

FOSSILS FROM GLACIAL LAKE MADAWASKA[2]

Pelecypoda

Pisidium cf. P. abditum Haldeman. -- P. abditum is found in ponds, lakes, and streams. It is widespread in north-eastern North America.

Gastropoda

Succinea ovalis Say. -- A terrestrial gastropod found in Labrador and the Maritime Provinces. Lives close to water and is commonly found on flood-plains of rivers.

Gyraulus arcticus Möller. -- Found in lakes. Distribution is Greenland and Labrador.

[2] The shells were identified by Dr. Frances Wagner, Geological Survey of Canada, and the beetle by Mr. W. J. Brown, Division of Entomology, Department of Agriculture. Areal distribution in some instances is more widespread than indicated. Only occurrences pertinent to the area are mentioned.

Lymnaea cf. L. arctica Lea. -- Found in rivers. Present day range is southern James Bay area, Labrador, and Newfoundland.

Valvata sincera Say. -- A northern species. Inhabits lakes.

Family Elateridae (click beetle)

Probably Ctenicera appropinquans Rand. -- This species occurs in coniferous forests from Manitoba eastward.

The organic clay and silt (3) in the lowest part of the section indicates shallow-water conditions and is interpreted as representing an older stage of Glacial Lake Madawaska. Next upwards in the sequence is a gravel and sand member believed to be valley train (9A) of the St. Jacques Drift. A second stage in the history of Glacial Lake Madawaska is shown by a bog layer overlying the gravel and sand. Deep-water conditions at this stage are indicated by the thick bed of massive clay (8A), with later shallowing to produce the laminated beds of overlying sand (8A). The top 3 feet is flood-plain silt (11A).

ECONOMIC GEOLOGY

Gravel

Valley train gravel underlies the area mapped as alluvial flood-plain deposits (11A) along Madawaska, Iroquois, and Green Rivers, and to a lesser extent Quisibis River. The overburden of fine sand is about 3 feet thick. The gravel underneath, as indicated from a few pits, is approximately 10 feet thick and rests on till or bedrock. The gravel is at the surface in the northern reaches of Green and Quisibis Rivers.

Gravel occurs in local hills in the kames (5 and 9C), kame terraces (9B), eskers (2A), and deltas (7B and 11B). Its average thickness in these deposits is between 15 and 30 feet. Till or bedrock forms the floor.

The most extensive use of the gravel is in road surfacing. Concrete blocks are made of gravel from a pit in the delta 1 mile northwest of St- Jacques, from the kame terrace 1 mile southeast of Boucher, and from the kame terrace 1 mile northwest of Theriault Station. There is a high proportion of slate pebbles in all gravel deposits within the map-area, which may at times be undesirable.

Sand

The laminated younger Lake Madawaska sands (8A) are used as fine aggregate in concrete. The sands underlie the flood-plain silt (11A) in places along Saint John River. A pit near the eastern town limits of Edmundston and south of highway No. 2 and another pit east of the Edmundston Radio Station are currently in use.

Clay

Clay is exposed near the mouth of Quisibis River on the west bank (Section 5). It is below 10 feet of fine sand overburden and the bed is 3 feet thick. Tests by the Ceramic Section, Mines Branch, Department of Mines and Technical Surveys (Report C-3070), indicate that this material has a possible use for common brick or tile, if drying can be accomplished without cracking.

Limestone

Limestone outcrops within the area and just east of it, at the following localities: (a) 3 1/4 miles southeast of Montagne-de-la-Croix on the north side of the road and 100 yards east of a school. This limestone is generally fine grained and has abundant replacement zones of calcite crystals several inches thick. (b) 2 1/2 miles east of Ste - Anne-de-Madawaska on the north side of highway No. 2 is an outcrop of limestone pebble conglomerate with a silt-size matrix. (c) About 1/4 mile northwest of Ste - Anne-de-Madawaska is an outcrop of interbedded limestone and slate. The beds of limestone there are approximately 4 inches thick.

Limestone in the above deposits has a possible use as aggregate in railway ballast and some for production of lime.

Manganese

Bog manganese that at present has no economic value forms the cement and fills the interstices in open-work gravel on the west bank of Quisibis River about 4 miles from its mouth. The slates of the area are manganiferous, as noted in an outcrop about 1 mile northwest of Ste - Anne-de-Madawaska.

EDMOND CLOUTIER, C.M.G., O.A., D.S.P.
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