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PEAT MOSS DEPOSITS IN EASTERN CANADA
Investigations in 1941.

by
H. A. Leverin
Industrial Minerals Division

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A survey of the peat moss deposits in Eastern Canada offering industrial possibilities was started in 1939. Two reports on this investigation have been published in mimeograph form, memorandum series Nos. 76 and 80, covering 1939 and 1940. The territory covered in those years was large and the investigations had to be of cursory nature, the areas of the bogs being estimated by inspection or from information submitted by the owners of the deposits or by land surveyors familiar with the localities. A later check-up shows that with few exceptions these estimates were fairly accurate. Time did not permit a thorough sampling of the deposits investigated and samples in all cases were collected on a line run over the summit from drill-holes 800 to 1000 feet apart to a maximum depth of 15 feet. The samples thus collected from each deposit were made into a composite sample and were analyzed. Records were kept of the depth of the deposit up to 15 feet where sampled. Prints of the various maps prepared may be obtained on application, at a cost of fifty cents each.

The following bogs are herein reported upon:- in Prince Edward Island, the East Bideford bog in Prince County; in Nova Scotia, the Black Point bog near Beaver River village, Digby County, and Big Plain bog, Twin Plain bog and two bogs at Long Lake in Cumberland County on the isthmus between Cumberland Basin and Baie Verte; in New Brunswick, three bogs on the same isthmus at the Jolicure Lakes in Westmorland county; and in Quebec, the large bog in Bergeronne and Les Escoumains townships in Saguenay County.

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Time did not permit the completion of the investigation of Les Escoumains bog, as the area is large, (from two to three square miles), weather conditions were unfavourable, and the limit in funds allotted to the summer field work about reached. The work done on this deposit, however, was enough to give a fair idea of its value.

A few other bogs were given cursory examination. These included the St. Anaclet bog, south of Father Point, and the Farnham bog in Quebec; the Alfred and Newington bogs in eastern Ontario.

The newly constructed peat moss baling factories at Rivière du Loup and Isle Verte were visited.

As the results of analyses by outside chemists of samples collected in New Brunswick in 1939 appeared to be of doubtful accuracy, fresh samples were collected from the most important of these deposits, namely, the Shippigan, Lamek, Pokemouche, Escuminac, Eel River, Tabusintac, Miscouche, and St. Stephen bogs.

PEAT MOSS PLANT: NEW CONSTRUCTION

Since the beginning of this investigation in the Fall of 1939 a great activity in the exploitation of peat moss has developed. Before that a few small plants in Eastern Canada operated baling presses by hand and the output of moss was insignificant. In the western provinces, Alberta and British Columbia, production of moss has increased; heat insulating material, boards and loose moss are produced in Alberta near Edmonton, and a fairly large industry has developed in British Columbia, principally in the export to the Pacific Coast States of peat moss for agriculture and poultry litter.

Three large plants have now been erected in Quebec, and one large and one medium-sized plant in Ontario, all equipped with two baling presses, mechanically operated. A third plant, built in Ontario in Wentworth County, manufacturing limy, humidified peat, "Hu-Mar", began operations last summer, an output of 4,000 tons being reported in 1941.

Several deposits have also been acquired for exploitation by newly-formed companies. In Prince Edward Island work has started on the drainage of the large bog at East Bideford; in Nova Scotia two bogs have been acquired, one between Aylesford and Berwick (the Caribou bog) and the other on the isthmus in Cumberland County; in New Brunswick, the Jolicure bogs, and those at Shippigan, Pokemouche, Escuminac, and Eel river. In Quebec a company was formed to work the St. Anaclet bog south of Father Point, and in Ontario, the Grand Valley Peat

Moss Company completed the drainage of the Luther bog, cut an appreciable quantity of moss and is preparing for the erection of a baling plant. The drainage of the Fort Frances bog by the Arctic Peat Moss Company is reported to be in progress.

In British Columbia, on the Byrnes bog near New Westminster, a very large plant is planned, probably one of the largest in the world, to supply peat moss required in the metallurgy of magnesium.

Besides these, a number of prospects, most of them small bogs, are more or less in process of development. Such projects deserve every encouragement, especially those in agricultural districts supplying local markets.

Market for Canadian Peat Moss

The rapid expansion of the Canadian peat moss industry has created the risk of reaching the saturation point of the existing market. It will be recalled that the industry was given an impetus by the cessation of European imports of peat moss into the United States as a result of the war. These imports in 1939 amounted to 78,000 short tons or 1,560,000 bales of 100 pounds each, of which Canada contributed about 7,000 tons compared with 4,000 tons in 1938. At present, with five modern plants in operation in Eastern Canada of an average output of 5,000 tons each, besides several smaller producers and those of the western provinces, Alberta and British Columbia, as well as the plants now in the course of construction, the United States demand for Canadian peat moss should soon be filled. Recent demand, however, from the United States for large deliveries of Canadian peat moss to be used in metallurgy for the reduction of metallic magnesium should for the time being dissipate such fears. As there is the tendency towards the use of lighter metals in mechanical engineering this market may prove to be permanent and may consume still larger quantities of peat moss after the cessation of hostilities. Furthermore, the use of peat moss in the United States has been steadily growing and there is every likelihood that this growth will be maintained when people in general become aware of the many uses for this commodity and of the benefits to be derived therefrom.

The present investigation of our peat moss deposits by the Bureau of Mines was begun with the object of fostering production on a large scale to capture the United States market which, before the war, had been supplied by European countries, and thereby to improve our exchange with the United States. The industry, however, should not be dependent on export trade. After the war, European competition again may have to be faced. The managers of some of the larger plants have expressed their confidence in being able to meet the European competition, especially as the United States importers are fully satisfied with the Canadian peat moss and find it of very good quality. This is also borne out by the pre-war trade; Canadian moss, about 4,000 tons, exported in 1938, owing to its superior quality, was sold

at \$26.00 per ton against \$16.00 for German, and \$21.00 for Swedish moss. A certain demand for peat moss exists in Canada and is increasing, but a much wider market could be developed once the public is educated to its many uses and the beneficial results to be derived therefrom. As a parallel case Sweden may be cited, which has developed a very large peat moss industry with a yearly production of somewhat over four million bales. Industrially, Sweden and Canada are comparable because the industries of both countries are based mainly on the same natural resources, water power, forest products and minerals, supported by agriculture on a large scale. Sweden's population is somewhat more than half that of Canada's, yet of her production of peat moss of over four million bales, she exported only 600,000 bales; the large remainder was absorbed for home consumption. With Canada's vastly greater production of industrial and agricultural products and the potential market for export to the United States, there would appear to be no limit in sight for the expansion of the Canadian peat moss industry for many years to come. Even to maintain the same output of peat moss as Sweden, four million bales per annum, would mean forty plants, each of 100,000 bales capacity, employing 8,000 to 9,000 workers for eight months in the year. Of these, an appreciable number of men would have employment all the year round in the baling factory and on the field for the transportation of the dried peat sods to the baling plant. Labour in a peat moss plant is employed for an appreciably longer time than is most seasonal labour. Furthermore, a peat moss factory is self-contained, and all equipment and machinery can be obtained from Canadian machine shops and building trade.

In order to build up such an industry an educational campaign is needed to reach the prospective consumers of peat moss. Farmers and gardeners should be made to realize that peat moss is an exceptionally good soil conditioner; it makes the soil hold the moisture longer if it is light and sandy, and a heavy, clayey soil becomes lighter, thus allowing a circulation of air and more rapid movement of the water to the plant roots. For stable and pen bedding, one ton of peat moss litter lasts as long as two and a half tons of straw; work in the stables is lightened and less storage space is needed. The animals rest on a warm, clean and dry bed, and so less grooming is needed because the bedding can easily be kept dry and clean if only the damp parts be removed and replaced by fresh litter moss. Such bedding is durable and lasts a month before an entire change is necessary. Peat moss absorbs the nitrogen and retains the valuable constituents in the animals' droppings and, owing to its high adsorptive property the atmosphere in the stables and pens is rendered pure and odourless, gases such as carbonic acid, ammonia and offensive odours being adsorbed in the moss, and the sanitary conditions in the stables improved both for the employees and the animals. Peat moss manure is a valuable fertilizer. It also acts as a soil conditioner. As it commands a much higher price than straw manure, the purchaser of moss litter bedding gets more than his money back when he disposes of the manure.

Poultry men should be told that besides the above advantages over straw or sawdust, peat moss retards bacterial growth, and lice, mice, and other vermin do not thrive in it. It is claimed that the flock will be healthier with fewer of those losses through sickness and death, so prevalent in poultry raising, and healthier birds naturally produce more eggs and put on weight, and the quality of the poultry meat is improved.

Shippers find peat moss an excellent packing material for certain perishable goods such as fruit and vegetables, and as it is nature's best heat-insulating material, it protects them against frost in winter or, if they are chilled in summer, they keep cool for an appreciable time. The present shortage of paper could be relieved to a certain extent, if peat moss were used as packing material. It forms an ideal packing for overseas shipment of articles that absorb moisture, fragile goods such as glass and crockery, and roots, bulbs etc. Ordinary packing material is a nuisance to the recipient, a fire hazard if kept, and irksome to dispose of, but peat moss, owing to its many uses, would be a welcome by-product to the receiver of goods in many cases.

Horticulturists already recognize the advantages of the use of peat moss; they get better lawns, more luxuriant flowers and stronger and more advanced plants and shrubs; they use it as a packing material in the shipment of flowers, shrubs and tubers, in making compost and as a diluent in the application of artificial fertilizers, which otherwise are likely to "burn" the plant.

It has already been mentioned that peat moss is nature's most efficient insulator. Although there are many insulating materials on the market, peat moss is used in the building trade for insulation and for sound-proofing. It is not a fireproof material but does not easily ignite and by impregnation with chemicals it could be made to conform to civic building regulations.

Extensive use of peat moss in agriculture and the other ways enumerated above would be of national importance, it would increase the field and market garden crops, improve the health and productivity of the stock in stables, sties, and pens, when used as packing would save wastage of food and save fuel by insulating buildings. A thriving peat moss industry assures much indirect as well as direct employment.

A bulletin on 'Peat Moss' and its uses is in preparation by the Bureau of Mines.

Operation of Peat Moss Plants

Newly constructed peat moss plants have been in operation to full capacity throughout 1941. In some parts of Eastern Canada the weather during the summer was unfavourable for drying, so that part of the sods cut did not become sufficiently dry for processing and had to be left out on the drying

field for the winter. This does not cause a loss to the operators or injure the quality of the moss; on the contrary, it is accepted as a sound principle in the manufacture of peat moss that one year's supply of drying or dried moss should be kept ahead of the requirement of the baling plant. The sods excavated during the latter part of the season and sods which, because of rain, high humidity and cold, do not become sufficiently dry during the summer for baling, always form an appreciable part of the year's cut and have to remain on the field through the winter. The freezing of the sods improves the quality of the peat moss, because it makes it lighter and more porous, thus increasing its absorptive value; furthermore, the sods benefit from the favourable drying weather of spring, when high winds of low humidity prevail.

The new plants are on the whole identical in design, consisting of a conveyer to bring the sods into the mill, shredder, bucket elevator, screen, and baling presses. In the Riviere du Loup plant a pneumatic conveyer is used for carrying the shredded moss to the screen. It functions silently and efficiently, and as the fine material is carried right through to the dust collector it relieves the load on the screen, which can be made smaller than the standard size. The collection of peat dust in the factory, by means of suction intake pipes placed near the baling presses, cleans the atmosphere, and saves a quantity of peat dust that is added to the product of mull grade.

The moss is screened into three or more sizes according to the requirement of the trade; peat mull, fine size; poultry litter, medium size; and stable litter, the coarse size for stable bedding, are the sizes in greatest demand. Of these, the mull has the widest market, it is used for gardens, lawns, horticulture, packing material and insulation; next, poultry litter and, last, stable litter. Changes in the ratio in the production of these sizes can be obtained by adjustment of the teeth in the shredder. The peat moss is put up in bales of 100 pounds, in paper bags and cartons. The bales are packed in lath and wire, covered with burlap. Owing to the present high price of burlap and the difficulty obtaining it, a suitable substitute is needed. Culled veneer is now used nailed to the laths and bound with wire. The ends of the bales are covered with burlap or heavy waxed paper. This method of packing is expensive and not altogether satisfactory as the veneer is easily broken in rough handling especially if hooks are used. In European countries and in British Columbia poultry and stable litter for home consumption and for shipment to places fairly close is packed in bales with lath and wire only, omitting the burlap cover. The bales, however, must then be pressed harder than is the practice at the eastern baling plants.

Peat Moss Deposits

The East Bideford Bog

The East Bideford peat moss deposit (Map No. 1.*)

* See comment on maps in first paragraph of this report.

is situated at the East Bideford hamlet half a mile from a country road running close to the north shore of the northwest arm of Malpeque Bay in Halifax township, Prince County, Prince Edward Island. The bog can be entered from Russell Ellis' farm by trail one-half mile long, so very little road construction would be necessary.

Description of the Bog

The bog, over one square mile in area, is of the high moor type, one large dome covering almost the entire surface rising slowly towards the centre, the summit running in a north-easterly direction with a slight bend northward, about the centre of the bog. A second, smaller dome is situated in the northeast part of the bog separated by an abrupt dip of the main dome from 13 to 7 feet and rising again 15 and 12 feet in the small dome. At the south end, the bog begins 3,000 feet from the shore line with a depth of 2 feet of black, well-humified peat with only a very light cover of moss. This cover gradually increases to 2 feet in thickness for the next 1,200 feet where there is a sudden rise to 11 feet and a gradual increase following the summit to 29 feet of good moss. The greatest depth of the deposit lies in the north end and continues virtually to the very edge of the bog, which ends abruptly in a sand bank. The southeast part of the bog runs into an impassable marsh, possibly the remnant of a lake. In general, humified peat occurs at the edges of the bog but seldom to any appreciable depth, usually one or two feet, with a stratum of a mixture of humified and unhumified peat and a light cover of unhumified moss. In the western part of the bog the moss stratum tapers very gradually to a thin cover resting on a foot or two of humified peat. The shape of the part of the bog workable for peat moss is almost circular with a protuberance at the southeast end. The whole area is open land with no spruce islands, lakes, pools, or other interference. The growth on the bog is mainly sphagnum moss with occasional bunches of Eriophorum (cotton grass), Labrador tea on the more shallow sections of the bog, occasional clumps of dwarf spruce, and the usual bog plants, cranberry and crow-berry vines and aquatic plants.

Drainage

Notwithstanding the unfavourable weather in the Maritime Provinces during the summer of 1941 the bog was dry and passable in most parts, with only occasional small pools of surface water. The fall of land from the highest point of the bog to the level of Malpeque Bay at high tide is 42 feet and consequently the bottom of the bog lies well above the drainage level. The bog can, therefore, be well drained in several directions especially towards the southwest and east, but for developing the bog from the south by working northward, following the summit, the best drainage is from the southwest, where there is a natural drain. The cleaning out of this and its extension into the bog was under way during the past summer.

Quality of the peat moss

The East Bideford bog contains peat moss of very good quality to considerable depth. Representative samples collected from two areas, separated by the base line running over the summit, yielded on analysis the following results:*

Sample collected from	Ash % Dry Basis	Nitrogen % Dry Basis	Absorptive Value Dry Basis	25% Moisture Basis
<u>Northwest part of the bog</u>				
Average from 0 to 5 feet	3.6	0.7	21.1	15.6
" " 10 to 15 "	3.9	0.7	17.1	12.5
and over				
<u>Southeast part of the bog</u>				
Average from 0 to 5 feet	3.6	0.8	21.5	15.9
" " 10 to 15 "	3.4	0.7	17.5	12.6
and over				

The quality of the moss is uniform throughout the strata of the deposit. As regards the probable analysis of the stratum at 5 - 10 feet, the samples from which, unfortunately, were lost in transit, they would probably have yielded almost the same results as that from 0 - 5 feet, because observations in the field showed no apparent change in the quality above the 10 foot-level. In regard to the stratum from 10 - 15 feet and over, some intermixture with black peat was noted and it had a darker colour. This, however, does not seem to have appreciably affected the quality, for according to the analysis it should yield a good marketable moss. On the whole, the deposit contains a very good moss, light in colour and weight, low in ash and of high absorptive value. Towards the edges of the bog mostly humified or partly humified peat occurs. The centre of the bog, especially for a distance of over 4,600 feet ranging in depth from 13 to 28 feet, shows a remarkable uniformity in the quality of the peat moss, which is unusual as is shown in the following analysis of a sample representing a stratum of 15 feet depth.

Absorptive value dry basis	23.4
" " 25% moisture basis	17.3
Ash, dry basis	3.2 %

The floor of the bog ranges from clay to sand. Sand occurs in the centre extending to the northeast end, where the bog ends abruptly in a sand bank, and clay forms the bottom towards the southwest and east, extending to the edges of the bog.

Area

The area of the bog is 850 acres, of this
36 acres has a depth of 25' - 29'
56 " " " " 20' - 25'
115 " " " " 15' - 20'
160 " " " " 10' - 15'
160 " " " " 5' - 10'

or a total workable area of about 500 acres.

* All analyses made in the Fuel Research Laboratories.

The contours shown on map No. 1 as well as those on other maps prepared for this report are approximate because time did not permit running more lines and making more drill holes. This applies especially to the outer contours.

Available peat moss

In estimating the peat moss available in this and the other deposits described in this report it is assumed that:-

1. The stratum 0' - 5' in depth is of doubtful value, and is disregarded, although part may yield an appreciable quantity of good moss.
2. The bog has been properly drained.
3. When drained the bog will settle two feet, which amount is deducted from the average depth represented by each contour.
4. One cubic yard of drained moss yields 250 pounds of standard commercial peat moss containing 30 per cent moisture.

On these assumptions calculations yield the following values:-

Depth	Average Depth when Drained	Content
36 acres of 25'-29'	27'	1,450,000 cu. yd.
56 " " 20'-25'	20'	1,500,000 " "
115 " " 15'-20'	15'	2,800,000 " "
160 " " 10'-15'	9'	2,300,000 " "
160 " " 5'-10'	5'	<u>1,300,000 " "</u>

or 9,350,000 cubic yards or 1,160,000 tons of standard commercial peat moss.

Transportation

The East Bideford bog lies close to a good country road and only half a mile of road would have to be built through the bush from Russell Ellis' farm, which is three miles from Ellerslie railway station. It is a long way to the United States market and freight rates are high. Under normal conditions, however, when bottoms become available the baled moss could be shipped by water and ships could load in the arm of Malpeque Bay, which has a depth of 17 feet at low tide.

The Black Point Bog

The Black Point bog is situated on the shore of the Bay of Fundy, in Digby County, Nova Scotia, near the Yarmouth County M.S.

line, about a half mile from Beaver River village. It is the southernmost of a chain of bogs that extend northward following the Salmon river as far as Meteghan.

Description of the bog

The part of the bog near the Bay of Fundy contains peat moss of good quality but runs into more humified peat moss at its northern end and, across the highway, into black, well humified fuel peat.

The peat moss bog proper is a high bog with one dome. It contains no spruce islands, lakes or pools but is open land with no obstruction. The growth is chiefly sphagnum moss, some Eriophorum, cranberry and crowberry vines, and some of the usual bog plants.

Drainage

Notwithstanding very heavy precipitation during the summer of 1941 and during the inspection, the bog could be entered from several directions without difficulty and was passable in all parts. At the east and northeast end it becomes shallow and marshy. It lies high and can be drained to the Bay of Fundy and to Bartletts creek.

Quality of the moss

The Black Point bog contains peat moss of good quality and will yield a good grade marketable product. The best moss is in the area from the south end of the bog 2,000 feet north and eastward; somewhat darker and more humified moss was noted farther north and westward.

From the better area the analyses of a general sample of the stratum of 15 feet depth yielded the following results:-

Absorptive value dry basis	17.9
" " 25% moisture basis	13.2
Ash, dry basis	5.6

Analyses of three strata of peat moss for the entire area of the bog yielded the following values:-

Average sample of	Ash	Nitrogen	Absorptive Value	
	% Dry Basis	% Dry Basis	Dry Basis	25% Moisture Basis
0' - 5' depth	5.1	0.8	16.7	12.3
5' -10' "	5.0	0.9	15.7	11.5
10' -15' and over	5.4	0.7	12.3	9.0

The bog for years had been a nesting place for aquatic birds in very large numbers, so that an appreciable increase in the nitrogen content of the peat might have been expected from their guano. The analyses, however, do not bear this out.

Area of Deposit

The area of the peat moss bog is 250 acres of which

8	acres	has	a	depth	of	20'
43	"	"	"	"	"	15' - 20'
45	"	"	"	"	"	10' - 15'
47	"	"	"	"	"	5' - 10'

or a total workable area of about 140 acres.

Available Peat Moss

Calculations of available peat moss from the drained bog yield the following values:-

Depth	Average Depth When Drained	Content
8 acres of 20'	18'	240,000 cu. yds.
43 " " 15'-20'	15'	1,050,000 " "
45 " " 10'-15'	10'	720,000 " "
47 " " 5'-10'	7'	550,000 " "

a total of about 2,500,000 cubic yards or 310,000 tons of standard commercial peat moss.

Transportation

The bog is favourably situated for shipment of baled peat moss to the United States and to the fruit growing district of Annapolis Valley, where a local market might be established. The Digby-Yarmouth highway runs near and parallel with the deposit and from it two fair country roads run to the north and south ends of the bog. The nearest shipping port for small sea-going craft is Port Maitland about two miles away, and a deep sea harbour lies thirteen miles distant at Yarmouth, with regular bi-weekly sailings in the winter and daily in the summer to Boston and New York, besides frequent freight service to several United States and Canadian ports. Yarmouth is also likely to be the most convenient for the railway, whereas a smaller railway station somewhat nearer, entails using the country road. Shipping rates from the Black Point bog to the United States market are favourable.

The Black Point peat moss deposit should be a good prospect for a medium-sized plant of an initial annual output of 50,000 bales; it has many points in its favour. It is compact, with no obstructions, is easily worked, and drainage of the bog should be inexpensive with a natural slope to the Bay of Fundy. The peat moss is of good quality, of appreciable depth, and the quantity available is sufficient to keep such a plant in operation far beyond the duration of its depreciation. Labour is normally plentiful, transportation facilities are good by rail and water, and the rates by water are low.

The continuation of the Black Point bog northward along the Salmon River contains mainly black peat or fuel peat, which might, in combination with the peat moss plant, be worked for

peat fuel in quantity sufficient for the power requirement of the baling plant. This is the usual procedure in many European countries where it has proved economical, and should apply to Black Point, where electric power is expensive. It is true that the manufacture of peat fuel on a large scale in Canada has met with failure, but it is equally true that several small plants are producing a few thousand tons at a profit. The main difficulties confronting the manufacture of peat fuel are the loss of fine peat in handling, the cost of handling, and the freight rates. Every time peat fuel has to be handled there is a loss of 10 per cent in fines. The fuel is bulky and the blocks of peat will not run through a chute like coal but interlock, hence carters delivering peat fuel demand as much as twice the price for handling a ton of peat fuel as for a ton of coal. As peat has only half the calorific value of that of coal, these charges become onerous. It was found that peat fuel delivered 45 miles from a bog by rail and carter, costing \$4.00 f.o.b. at the bog, cost the consumer more than twice that amount. These objections, however, do not arise, when peat fuel has a local market within a radius of a few miles. Farmers calling at the bog load their wagons from the storage pile and pay for the peat either by cubic content or by weight, depending on weighing facilities, so that a plant on the Black Point bog could supply all the fuel requirements for the peat moss baling plant for heat and power and have some left over for the local market.

Black Point bog is one of a chain of bogs continuing along the Salmon River, some of which contain peat moss. The others were not investigated, but cursory examination of one immediately south of Meteghan station of an area estimated at 200 acres contained a high grade moss, light in colour, and might prove an important reserve.

Bogs on the Chignecto Isthmus near the Boundary Line of Nova Scotia and New Brunswick

On the isthmus between Cumberland basin and Baie Verte is an abundance of low land, big grass marshes, large floating bogs, and several sphagnum moss bogs, the latter situated mostly on the Nova Scotia side of the provincial boundary. Little attention has in the past, been paid to these deposits, probably because they are not easily accessible from the highway. Some can be reached by way of the abandoned Marine Railway, and for most of them it would not require much road building to connect with railway or highway.

The unfavourable weather of the summer of 1941 generally caused little hindrance to the investigatory work, but made the work on the isthmus very difficult. The fall of land in these areas is small and natural drainage slow; in consequence large areas abutting some of these bogs were flooded to a depth of one to two feet, and in some cases this extended to the low level of the bogs, causing great difficulty in finding an entrance to some of them. The writer is, therefore, indebted to Mr. E. F. Goodwin, D.L.S. of Baie Verte, who gave him invaluable assistance and on several occasions, accompanied him to the bogs.

The Big Plain Bog

This bog is situated in Cumberland County, Nova Scotia, on the height of land between Tidnish river and Missaguash river about one third of a mile from the Marine Railway. It can be reached by forest trail from the Tyndale road crossing the Marine Railway and strikes the eastern end of the bog. The direction usually followed from the north by trail from Uniacke Hill, was very wet and soft, and owing to high water in the swamps at the bog, great difficulty was experienced in finding an entrance to the bog. The bog, once reached, was fairly dry and passable.

Description of the Bog

The Big Plain is a fair-sized high bog of wide open surface. A large spruce island penetrates the bog east and west through two thirds of the workable part of the deposit (Map No. 3). A large area of the west end was flooded and the part of the bog south of where the spruce island tapers to a narrow strip, becomes soft and shallow and passes into a bog of the floating type. The summit of the deposit runs east and west, rising towards the centre to form a small dome towards the north end of the bog. The surface was fairly dry, with only occasional surface water pools. The growth is almost entirely sphagnum moss, with a few small patches of dwarf spruce less than a foot high. A former thicker growth of spruce or larch is indicated by some dead trees from 6 to 8 feet high.

Drainage

The deposit can be drained in three directions. From the west into Goose Lake with outlet to the Missaguash river, from the southeast to Little West Brook, tributary to Tidnish river, and from the northeast to the west branch of the Tidnish river. Goose Lake at the head of the bog is about 15 feet above low tide level, which ensures good drainage of the bog.

Quality of the Moss

The moss of the Big Plain bog is of very good quality, light in weight, and of light yellowish brown colour, only slightly humified, and uniform in quality. It should yield a very good grade of marketable peat moss.

Analysis of a composite sample representing the best part of the bog taken from the summit and the average of a 15-foot stratum, yielded the following results:-

Absorptive value dry basis	18.7
" " 25 % moisture basis	13.2
Ash, dry basis	3.2 per cent.

Analyses of the strata for the entire area of the workable bog gave the following values:

Depth of stratum	Ash % Dry Basis	Absorptive Value	
		Dry Basis	25 % Moisture Basis
0' - 5'	2.9	20.5	15.1
5' -10'	2.6	16.1	11.8
10' -15'	3.8	15.5	11.4

Area of Deposit

The area of the bog is about 300 acres, of which about 130 acres has a depth of over 5 feet and is workable for peat moss. Of this area

3 acres	has a depth of	20' - 22'
25 "	" " " "	" 15' - 20'
27 "	" " " "	" 10' - 15'
77 "	" " " "	" 5' - 10'

Available Peat Moss

Calculations of available peat moss from the bog when drained yield the following values:

Depth	Average Depth When Drained	Content
3 acres of 20' - 22'	20'	90,000 cu. yds.
25 " " 15' - 20'	13'	510,000 " "
27 " " 10' - 15'	10'	440,000 " "
77 " " 5' - 10'	5'	620,000 " "

or about 130 acres of a total of 1,660,000 cubic yards or 200,000 tons of standard commercial peat moss.

Transportation

In the exploitation of the Big Plain bog little road construction would be necessary, only one and a half miles of road would have to be built to the Tyndale road, or about a third of a mile to the Marine Railway, the old road bed of which latter would have to be reconditioned for about three miles northeastward until it strikes the Tyndale road; or a road could be made to Uniacke Hill, two and a half miles to the north, connecting with the Tidnish road, in all, five and a half miles to Baie Verte railway station. This latter project entails more road construction but would much shorten the distance to the Baie Verte railway station.

Between the Big Plain bog and Goose Lake is a chain of bogs not easily accessible and also a small bog one and a half miles south from the southern end of the bog. By draining the Big Plain bog they may become more accessible and serve as reserve deposits for an eventual manufacture of peat moss.

The Twin Plain Bog

The Twin Plain bog is situated in Cumberland County, Nova Scotia, south of the abandoned Marine Railway and about two

miles from the southeast end of the Big Plain. It can be reached by way of a logging road of one mile connecting with the Tyndale road. The road is used at present for trucking cordwood and ends at an abandoned saw mill at the west end of the bog. The road was found to be dry, somewhat rough but passable, and could be reconditioned at a small outlay.

Description of the bog.

The Twin Plain bog, also named the Spectacle bog, on account of its outline suggesting a pair of spectacles, consists of two lobes joined by a narrow strip of bog a couple of hundred feet in breadth. The deposit runs lengthwise almost north and south. The north lobe constitutes the main part of the deposit and is of the high moor type; it is dome-shaped with the summit about the centre, and ends abruptly northeastward at a small creek (Map 4.). The deposit is of some depth sloping towards the edges to a shallow bog.

The south lobe of the bog at the time of the writer's visit was soft and impassable. Under normal atmospheric conditions this would probably not have been the case and this part of the deposit should, therefore, not be ignored but should be investigated when more favourable weather prevails. The growth on the bog is similar to that of the Big Plain, chiefly sphagnum moss, some of the usual bog plants and occasional clumps of spruce a few feet high. The bog has an open area with no obstructions, lakes, pools, or spruce islands.

Drainage

The surface of the bog, notwithstanding heavy rains immediately before the survey, was dry with no lakes or pools of surface water, and could be traversed dry-shod in most places. A creek cuts the north part of the bog and forms a natural drain. The depth of the moss bordering this creek is $3\frac{1}{2}$ feet deep and may be considered the northern end of the workable bog. If this creek, which drains into Little West Brook, a tributary of the Tidnish river, were cleaned out, good drainage could be had by running the main drain through the summit, and parallel with it lateral ditches 300 feet apart, the cutting lanes running at right angles to these.

The south lobe, it was reported, drains in a southeasterly direction to Long Lake, but owing to the condition of the bog, this could not be verified.

Quality of the Moss

The moss of the Twin Plain bog is of good grade, light yellowish brown in colour, light in weight, only slightly humified, and low in ash content. It should yield a good commercial peat moss.

Analyses of the strata of moss yield the following

results:-

Average Depth	Ash % Dry Basis	Absorptive Value	
		Dry Basis	25 % Moisture Basis
0' - 5'	3.5	17.7	13.0
5' - 10'	3.7	15.0	11.0
10' - 15' and over	4.3	13.3	9.7

Area of the Deposit

The area of the north lobe of the Twin Plain bog is about 145 acres of which some 90 acres has a depth of over 5 feet and may be considered the workable part of the bog. Of this area

5	acres	has	a	depth	of	20' - 27'
34	"	"	"	"	"	15' - 20'
24	"	"	"	"	"	10' - 15'
29	"	"	"	"	"	5' - 10'

It will be noticed from the above that the bog has an unusually great depth for its area.

Available Peat Moss

Calculations of available peat moss from the bog when drained yield the following values:-

Depth	Average Depth When Drained	Content
5 acres of 20'-27'	25'	185,000 cu. yds.
34 " " 15'-20'	14'	770,000 " "
24 " " 10'-15'	9'	340,000 " "
29 " " 5'-10'	4'	175,000 " "
or about 90 acres of an approximate total of		1,470,000 cubic yards or 184,000 tons of standard commercial peat moss.

Transportation

The Twin Plain bog lies about the same distance from Baie Verte as from the city of Amherst. Little road building would be necessary to connect the bog with the Tyndale road. As already mentioned, a logging road of one mile runs from the Tyndale road to the southern edge of the bog; it is in regular use for trucking cordwood and could at small expense be reconditioned for transport of baled moss, which requires a good and even surface, because of the height of the load carried. It would be advantageous to operate the Big Plain and the Twin Plain bogs as a unit. This would ensure sufficient raw material for some time even for production on a large scale. A road would then have to be built to the two bogs. Such a road would involve reconditioning the Marine Railway roadbed for a distance of about one and a half miles, and the building of an eighth of a mile of new road from the north end of the bog.

Two Bogs at the Head of La Planche River

Two bogs in Cumberland County, Nova Scotia, at the head of La Planche river, are separated by a narrow strip of dense growth of wood and bush, 300 feet in width, on very soft and wet ground that is almost impassable. One bog abuts the Long Lake and is crossed by the Marine Railway, the other lies due west.

Description of the Bogs

Both bogs are almost circular in shape. The east end of the west bog passes into a marshy meadow covered with marsh grass. That part of the east bog south of the Marine Railway is low marshy land and impassable. The surface of both bogs is open, with a growth chiefly of sphagnum moss, some dwarf spruce, and scattered common bog plants. The floor of the bogs is hard blue clay with a stratum of well humified black fuel peat, underlying sphagnum moss of fair depth.

Drainage

The bogs can be drained to a four to five foot level into Long Lake and to the adjacent Round Lake, which are connected by a creek, but this does not ensure good drainage. Better drainage would necessitate the lowering of the levels of the two lakes, and although possible, this would be too expensive for relatively small deposits.

Area of the Deposits

The area of the west bog is 110 acres and of the east bog, 83 acres, of which only 44 acres and 30 acres respectively, have a depth over 5 feet. Of the 193 acres, 12 acres are 10'-12' in depth and 32 acres 5'-10'. (Map No. 4.).

Quality of the Moss

The moss of these bogs is of an inferior grade especially for the 10' stratum. Analyses of the strata of the two bogs yield the following results:-

Average of	Ash % Dry Basis	Absorptive Value	
		Dry Basis	25 % Moisture Basis
5' - 10'	4.4	14.6	10.7
10' - 12'	4.8	8.9	6.4

Available Peat Moss

Calculations of available peat moss from the bogs when drained yield the following values for:-

The West Bog

Depth	Average Depth When Drained	Content
12 acres of 10'-12'	9'	187,000 cu. yds.
32 " " 5'-10'	4'	200,000 " "

or approximately 390,000 cubic feet or 49,000 tons.

The East Bog

Depth	Average Depth When Drained	Content
30 acres of 5'-10'	5'	245,000 cu. yds. or 30,000 tons.

Transportation

Road construction required for the exploitation of these bogs involves either reconditioning the Marine Railway and connecting with the Tyndale road, or linking up with the Fort Lawrence road. The former alternative would require the construction of 2 miles and the latter of 3 to 4 miles of new road.

The smallness of the deposits, the difficulty of proper drainage, the rather low grade of moss, and the large amount of road building, render these deposits less attractive than any other bogs examined on the Chignecto isthmus.

The Jolicure Bogs

The Jolicure bogs are situated in Westmorland County, New Brunswick, at the head waters of the Tantramar and the Aulac rivers between Midgic and Jolicure. The district is usually designated as the Jolicure Lakes. The bogs, which are marked Nos. 1, 2, 3, and 4 on the Map No. 5, can be reached by a good country road running within half a mile of No. 1 bog. This road connects with No. 16 highway, two miles away. Under normal conditions of weather, No. 1 bog can be entered by crossing the marshy strip of land between Long Lake and Large Lake. During the summer of 1941, the level of the lakes had risen 4 feet, and a boat was needed to reach the bogs; the most convenient way of reaching the bog is from the landing leading to Joe Hall's farm. No. 4 bog could not be entered, the water-way leading to it having been choked by a heavy growth of reed.

Description of the Bogs

A narrow channel connecting Large Lake with a small lake, separates the main deposit into two bogs, No. 1 and No. 2. If the bogs were to be worked, this gap of about 500 feet would have to be bridged. On No. 1 bog a spruce island extends over two thirds of the north half of the bog. Between this and Long Lake, especially the eastern part, the bog is soft and marshy, with numerous surface water pools. The two bogs are nearly level, and the depth of peat moss is uniform almost to their edges. At the cross section running close to the top of the spruce island the level of the bottom rises for about 500 feet westward. Notwithstanding the exceptionally high level of the lakes, the bogs were passable, with only scattered soft and impassable areas and pools of surface water. The growth on the bogs is chiefly sphagnum moss with some Eriophorum, occasional clumps of dwarf spruce a foot or two in height, and a few aquatic plants.

Bog No. 3 is oval, a slightly dome-shaped high moor, with six small lakes. The surface is wet and soft and can be traversed only with difficulty. It is fringed with spruce trees except at the north end, where the land becomes higher and abuts the fields of a farm. The bog is open land and the growth is sphagnum moss with some Eriophorum and aquatic plants.

Drainage

The level of the Jolicure lakes was abnormally high during the summer of 1941 and as the surrounding country is flat and marshy, proper drainage of these bogs, whose surface is barely two feet above the level of the lake, would appear almost hopeless. Nevertheless, judging from the records in possession of a Dominion Land surveyor at Baie Verte, drainage to a depth of eight feet is possible by lowering the level of the lakes. A system of drainage canals and ditches exists, the principal avenues being by means of Midgic canal to the Tantramar river and ditches from Front Lake, Long Lake, and Large Lake, which connect with La Coupe river tributary to the Aulac river. For many years these canals and ditches have been allowed to become clogged with a heavy growth of reeds, aquatic plants, and mud, and by cleaning them, not only could the main deposits Nos. 1 and 2 be drained to the depth of eight feet, but also Nos. 3 and 4. This, however, would not drain them below 6 or 7 feet, as the ditches would have to be one or two feet above the lake level, to carry away the water. To drain to a depth of 12 to 13 feet might be possible but at some expense.

Quality of the Moss

Analysis of the strata of the Jolicure bog yielded the following values:-

No. 1 Bog

Average of	Ash % Dry Basis	Absorptive Value	
		Dry Basis	25 % Moisture Basis
0' - 5'	4.9	21.00	15.5
5' - 10'	4.3	18.1	13.3
10' - 13'	10.6	17.7	13.0

No. 2 Bog

0' - 5'	3.8	21.5	15.9
5' - 10'	5.3	15.9	11.7
10' - 13'	19.0	17.0	12.5

No. 3 Bog

0' - 5'	5.0	22.2	16.4
5' - 13'	9.9	11.1	8.1

These analyses show that the Jolicure bogs should yield good commercial peat moss. It is fairly light in colour, M.S.81

light in weight and of high absorptive value, and only slightly humified. Below the 10' stratum in Nos. 1 and 2 the moss has a very high content of ash as is the case of the 5'-13' stratum in No. 3 bog where the moss is of inferior value. It is questionable, therefore, whether the drainage of the bogs below 8 feet would be justifiable.

Area of the Deposit

Nos. 1 and 2 bogs have nearly uniform depth throughout, even close to the edges of the bogs. They have the following areas:-

No. 1 bog depth	0'-13'	175 acres
No. 2 " "	0'-13'	155 "
No. 3 bog has a total area of 75 acres of which 56 acres is workable.		

Available Peat Moss

On the assumption of effective drainage of the bogs, calculations of the peat moss available yield the following values:

Depth	Average Depth When Drained	Content cu. yds. or tons
No. 1 bog 175 acres 0'-13'	10'	2,800,000 350,000
No. 2 " 155 " 0'-13'	10'	2,500,000 310,000
No. 3 " 28 " 10'-13'	10'	450,000 56,000
26 " 5'-10'	5'	210,000 26,000

or a total of 5,960,000 cubic yards or 750,000 tons of standard commercial peat moss.

Transportation

The deposits are favourably situated as regards transportation. A country road runs close to No. 1 bog and connects with No. 16 highway, 2½ miles from Aulac railway station, or a road of half a mile could be built from No. 2 bog to connect with the Brooklyn road, a total distance of about one mile to Midgic station on the Canadian National Railways.

For the exploitation of the bogs on the Chignecto isthmus there are two alternatives, to work the Big Plain bog with adjacent small bogs, keeping the Twin Plain bog as a reserve, and to work the Jolicure bogs. The quality of the moss is of the same grade in both cases. The Big Plain can be well drained in several directions. The construction of roads, however, calls for some capital expenditure because good roads are needed for trucking baled moss, which, because of bulkiness, piles high. The region is sparsely populated and to attract labour it might be necessary to construct a permanent camp.

The Jolicure bogs present a problem of drainage. Even supposing good drainage can be obtained at eight feet, which has

not been definitely established, the bottom of the bog would still be 4 feet below the drainage level. Under these circumstances, it would not be practicable to work the bog below 6 to 7 feet, as the rise of land is insignificant and there must be enough fall to carry off the water; the tonnage of the three bogs would, therefore, be about the same as that of the Big Plain and the Twin Plain. On the other hand, the bogs are favourably situated for transportation and only short new roads would be necessary to connect with nearest railway. The surrounding country is well populated, many farms abutting the bogs, so that the hire of labour should not offer any special problem.

Les Escumains Bog

The bog is situated one and a half miles west of Baie des Escumains on high ground, the southwest end abutting the Maritime highway. It is accessible from the south by means of a small road branching from the highway, and by a rough narrow road connecting the northeast end of the bog with a country road running northwest from Baie des Escumains along the boundary line of the Bergeronne parish. The bog occupies in Escumains parish, R.I., lots 1 to 8, and in Bergeronne parish, R.II, lots 1 to 9, and R.III, lots 3 to 10, Saguenay County, Quebec.

Description of the Bog

Les Escumains bog is estimated to cover two to three square miles but the precise area was not determined. It is of the high moor type, maintaining a fairly uniform depth of 11' to 18' and ending abruptly at the northwest and northeast ends, but rising gradually from the southeast. The growth on the bog is chiefly sphagnum moss, with a fair growth of Labrador tea, abundance of blueberry bush and occasional small spruce islands and scattered clumps of spruce trees. There are many lakes, most of them small, but a few large; in some parts of the bog they lie close together. Such a number of small lakes is rather exceptional, for in most bogs the accumulation of water is usually confined to one or more larger lakes. As even the small lakes are of appreciable depth, they may have an adverse effect on the laying out of the working plan of the bog and of the field railway, so that good drainage of the bog would leave a pitted surface. The area of the bog, however, is so large that there should be sufficient clear surface for a large manufacture of peat moss. The surface of the bog was generally dry, even close to some of the lakes; around some of them, however, in depressions, it was very wet, soft, and impassable.

A line, No. 1, was run from the highway close to and parallel with the parish boundary line to the trail as it enters the north part of the bog and from there a cross line, No. 2, parallel with the No. 1 range line. Samples were collected for every 500 feet of three strata and composites made, one for the No. 1 line, a second for half the cross line east, No. 2, and a third for the west half, No. 3.

Quality of the Moss

Analyses of the moss from these three strata yielded

the following results:-

Depth	Ash % Dry Basis	Absorptive Value	
		Dry Basis	25 % Moisture Basis
No. 1 0'-5'	3.9	13.6	9.9
	5'-10'	3.1	14.2
	10'-15' and over	4.0	13.8
No. 2 0'-5'	---	14.4	10.6
	5'-10'	6.3	13.7
	10'-15' "	3.7	13.7
No. 3 0'-5'	4.0	14.4	10.6
	5'-10'	4.1	14.4
	10'-15' "	3.1	15.8

The quality of the peat moss is not of a particularly good grade, being lower in absorptive power than what is usually rated as a standard commercial peat moss. The part of the deposit represented by the above analyses shows an unusual regularity in the composition of the peat moss.

Drainage

At the north end of the bog are two natural drains, tributaries to the Grand River of Escumains extending well into the deposit; each is somewhat less than a mile long. The current in these brooks was appreciable even a short distance from the edge of the bog, indicating a fair drainage. At the northwest end a brook skirts the bog for a mile or more and connects with a lake at the head of the bog. A ditch has been dug on lot 3, R.I, in Escumains parish to a depth of about 5 feet and at right angles to the highway. It extends only 400 feet into the bog without lateral ditches and its drainage is poor. It is, however, well placed as, farther west, the land rises, and a rock ledge would need to be blasted. If this ditch were extended farther into the bog, with a westerly deflection and a total length of about half a mile, and lateral ditches were dug at right angles with cutting lanes between them, a sufficient area could be drained to maintain production for a considerable time. Elsewhere in the bog, advantage should be taken of the natural avenues of drainage eastward and westward. Operations should, however, begin near the provincial highway, which is the best site for the baling factory.

Transportation

The road leading into the bog from the provincial highway could be improved for a small outlay. A baling plant erected on the firm ground near the highway would be two miles from the wharf on the Baie des Escumains. All shipping would have to be by water, on medium-sized ships, of light enough draught to be able to load at the pier. The nearest railway station is at Nairn Falls, 61 miles by gravel road and by ferry across the Saguenay river from Tadoussac to Baie Ste. Catherine,

which would not be economical for such bulky material as baled peat moss, nor would transport by water in ships of restricted size from a port ice-bound for four and a half months be regarded as very favourable. The average length of the season of navigation, 1929-1939, for ocean-going vessels on the St. Lawrence river was 231 days, the date of first arrival at Montreal, April 21st, and the date of final departure December 7th. The latest date of first arrival at Montreal is May 3rd and the earliest date of departure December 1st.* This would be a distinct handicap in operating a peat moss plant at Les Escumains, because the heaviest transport of moss occurs in early spring, and storage would have to be provided at a point near the railway on the opposite shore of the St. Lawrence river at Trois Pistoles or Riviere du Loup. The charges for storage and extra handling of the baled moss would add appreciably to the cost.

Les Escumains bog is the largest of its kind known in the province of Quebec; it can be effectively drained; the numerous lakes of various sizes may restrict field operation, but ample areas should be available to keep a large production going for a long time. The labour situation is favourable, but shipment of the products would have to be by water and would be restricted as regards size of ships and season. The quality of the moss is below standard commercial grade.

Other Peat Moss Deposits

Visits were made to several bogs in Eastern Canada that were previously investigated by A. Anrep, as requests had been received for further information regarding them. Earlier examinations were made at a time when almost no market existed for peat moss, and its presence in some parts of peat fuel bogs was deemed unimportant. Many requests were received for analyses representative of separate parts of the larger bogs, and in the case of smaller bogs for that of the part most suitable for development for peat moss which is generally the area along the summit of the deposit. In comparing the results of the analyses of the present samples with those collected in 1923 and 1928, they were found, as might be expected, to give appreciably higher values since only the better parts of the bogs were sampled.

The Shippigan Bog

The Shippigan peat moss deposit is situated at the northeast point of land of Gloucester County, New Brunswick, about two-thirds of a mile due south of the Shippigan station of the Canadian National Railways.

Description of the Bog

The bog is the high moor type of wide expanse, free from obstructions, lakes and spruce islands, the land rising towards the centre to a large dome having moss 20 feet in depth

* The St. Lawrence Survey, Part II. Shipping Service in the St. Lawrence River, p. 14.

and southeast of this a similar but smaller dome of the same depth. There is only one lake in the southwest part of the bog, which is also partly wooded.

The Quality of the Moss

The bog contains exceptionally good moss, almost pure sphagnum with hardly any intermixture of other plant remains, light in weight, of light yellowish colour, and there is virtually no humification to a depth of 10 feet. A line was run over the summit in a southeasterly direction. In the depression between the two domes, the peat moss is darker and more humified below 8 feet for a distance of 1,000 feet. This stratum was not included in the sample. Analysis of the 10-foot stratum from a composite of 20 drill holes yielded the following values.

Ash %	Nitrogen %	Absorptive Value	
		Dry Basis	25 % Moisture Basis
3.6	0.7	35.6	26.4

Quantity of Moss

The bog has an area of about 1,300 acres more than 5 feet deep, workable for peat moss, and has been estimated to contain 20 million cubic yards, corresponding to $1\frac{1}{2}$ million tons of peat moss, having 20 per cent of moisture.*

Drainage

The bog lies fairly high and can be easily drained in several directions, the most convenient, assuming that the bog be worked from the north, is into the bight of Indian Point of the Shippigan Strait, or, if from the southern end of the deposit, to the creek into the Gulf of St. Lawrence (Map No. 6).

Transportation

The bog is well situated in regard to transportation. It lies within $\frac{3}{4}$ of a mile of Shippigan railway station, of the Caracuet division of the Canadian National Railway, the track skirting the west end of the bog; and is one mile from Shippigan Harbour, which is deep enough to accommodate ocean-going vessels. A good road, within a short distance, encircles the bog.

The Pokemouche Bog

The Pokemouché peat moss bog is situated four miles southwest of Shippigan, between Pokemouche Gully and the St. Simon inlet. The Canadian National Railway and New Brunswick Highway, running parallel, traverse the deposit lengthwise. (Map No. 7).

Description of the Bog

The bog is fairly level, with a slight rise toward

* Geol. Survey of Canada, Sum. Report 1923, part C II, p. 18C
by A. Anrep.
M.S.81

the southwest end. The two domes are separated by a small lake in a depression where the moss is rather shallow. The growth on the bog is mainly sphagnum moss with some Labrador tea and rarer small spruce trees.

Quality of the Peat Moss

The moss is of very good quality, slightly darker in colour than that from the Shippigan bog, light in weight, and only slightly humified. A line was run 500 feet south of and parallel with the road, and a cross line over the summit between Pokemouche gully and St. Simon inlet, and samples were collected from drill holes 10 feet deep and 500 feet apart.

Analyses of these samples yielded the following results:

	Ash	Nitrogen	Absorptive Value	
	% Dry	% Dry	Dry	25 % Moisture
	Basis	Basis	Basis	Basis
Base line	5.5	0.8	23.2	17.2
Cross line	6.3	---	22.2	16.4

Quantity of Moss

That part of the bog over 5 feet in depth covers about 500 acres, and has a total content of 7 million cubic yards, or about half a million tons of peat moss of 20 per cent content of moisture.*

Drainage

The bog is partly drained by a ditch parallel to the road, and by a cross ditch running at right angles a short distance into the bog south of the road and draining northward into St. Simon inlet. The ditches were built to afford drainage for the highway and railway; they would be of distinct advantage in the exploitation of the bog, for which purpose extension of the cross drain alone would be needed and some lateral ditches at right angles to it. Good drainage could also be obtained into Pokemouche gully.

Transportation

The deposit is well situated in regard to shipping; it is four miles from a deep sea harbour at Shippigan and is near railway and highway.

As the bog is in sparsely settled country, labour would have to be drawn from Shippigan or neighbouring villages, a distance of 3 or 4 miles.

The Lamek Bog

The Lamek peat moss deposit is situated in the south-

* Geol. Survey Sum. Report 1923, Part C II, p.19, C II, by
A. Anrep.
M.S.81

ern end of Shippigan Island and occupies most of the point of land between Lamek bay and the Gulf of St. Lawrence. Entrance may be had at several places from the highway connecting with the ferry that cuts the bog at three points.

Description of the Bog.

The Lamek bog is a large deposit and begins a third of a mile from the ferry landing; the main deposit extends over 4 miles eastward, and one arm is $2\frac{1}{2}$ miles long with a bend northward. The bog is of the high moor type with four dome-shaped elevations, one at the southwestern end, a second in the centre, a third about one and a half miles east of this, and a fourth at the northeast end on the north side of the road crossing the island from Lamek village in southeasterly direction. (Map No. 8).

The growth on the bog is sphagnum moss with some Eriophorum and dwarf spruce and a few aquatic plants. The main part is open; it has no spruce islands and only one lake, which is at the southeast end of the bog and drains into the Gulf of St. Lawrence.

Quality of the Moss

The moss is of very good quality, light in colour, only slightly humified, light in weight, and should yield a high-grade commercial moss. The quality of the moss is uniform throughout the workable part of the bog.

Two lines were run, one east and west, over the summit from the road at the southwest end, the other north, bending northeast at the road crossing the bog over the summit on the north arm of the deposit. Holes were drilled at every 1,000 feet and two composite samples were made of the stratum of 10 feet in depth.

Analyses of these yielded the following values:

	Ash	Nitrogen	Absorptive Value	
	% Dry Basis	% Dry Basis	Dry Basis	25 % Moisture Basis
North arm	7.4	0.8	23.1	17.1
Main deposit	3.5	0.7	20.2	14.9

Quantity of Moss

The bog is one of the largest high-grade peat moss deposits in Canada. It has workable area of about 3,000 acres and a depth of moss of over 5 feet. It is estimated to contain 54 million cubic yards or about 4 million tons of peat moss, of 20 per cent moisture content.*

Drainage

The bog can be drained in several directions, the

* Geol. Survey, Sum. Report 1923, Part C II, p.20 C II, by A. Anrep.

northeast part in the direction of Legrand lake by deepening the natural drain to the Gulf of St. Lawrence, and the main part of the deposit in southerly and westerly directions to the Lamek bay and to the strait between the island and the main land. The surface is generally dry and passable.

Transportation

The bog is fairly well situated for shipping, good roads almost encircling the deposit, but is at some disadvantage as compared with the Shippigan bog, because a factory on the island would have to ferry its output across the strait to Shippigan Harbour or to the railway on the mainland.

The Shippigan Island and the districts across the strait have a normal population, sufficient to maintain a large production of peat moss.

The Green Point Bog

The Green Point bog lies one and a half miles south of Inkerman station in Inkerman parish, Gloucester County, New Brunswick. It can be reached by two good roads, one of which crosses the eastern end and the other skirts the northwest edge of the bog. Parallel with the latter road runs the Canadian National Railway track. (Map No. 9).

Description of the Bog

The deposit is of the high moor type with a gradual rise towards the centre, the summit forming a large oblong dome. The surface is open, with no obstructions such as spruce islands, lakes, or depressions of shallow depth of moss. The growth on the bog is mostly sphagnum moss with some Labrador tea, some dwarf spruce and Eriophorum. The bog is fairly dry and generally passable.

Quality of the Moss

The moss is of a very good quality, especially in the western half, is light in weight, only slightly humified, and of light yellowish brown colour. Towards the edges the moss becomes more humified. Two composite samples were collected from drill-holes on a line run from the bend of the road, and crossing the east end of the bog along the summit to within 600 feet of the railway track. (Map No. 9). At this point the moss stratum becomes shallow, dark in colour and more humified. Drillholes were made at every 1,000 feet to 10 feet in depth, and two composite samples were made representing the east and the west halves of the bog.

	Ash	Nitrogen	Absorptive Value	
	% Dry	% Dry	Dry	25 % Moisture
	Basis	Basis	Basis	Basis
East half of bog	3.5	0.6	19.6	14.5
West half of bog	3.4	0.6	23.7	17.5

Quantity of Moss

The bog has an area of about 1,300 acres of over 5 feet of moss and contains 22 million cubic yards or $1\frac{1}{2}$ million tons of peat moss of 20 per cent content of moisture.*

Drainage

The bog can be drained, the most convenient direction being towards the Gulf of St. Lawrence.

Transportation

Transportation facilities are good; two good roads strike the bog east and west, and a railway track skirts the west end. About 8 miles of trucking is needed to the deep-sea harbour at Shippigan.

The Tabusintac Bog

The Tabusintac peat moss deposit is situated close to No. 11 highway, a short distance north of Tabusintac village between the Tabusintac lagoon and the Neguac lagoon in Northumberland County, New Brunswick. The best part of the bog is reached most conveniently by crossing the Tabusintac lagoon, and landing opposite Crab Island. (Map No. 10).

Description of the Bog

The bog extends from the highway for a distance of three miles to the edge of the seashore, where a peat stratum 3 to 12 feet thick is visible along the shoreline for about 7 miles. The deposit is of the high moor type with two large domes, the larger at the southeast end and a smaller at the southern end of the bog, separated by a depression about 1,500 feet wide of rather shallow bog, with a small lake draining southward into the Gulf of St. Lawrence. From the summit northwards the moss bed gradually tapers off until it reaches the edge of the bog about 1,000 feet from the highway. The growth is mainly sphagnum moss with some Eriophorum and aquatic plants. The floor of the bog is blue clay and sand. The surface is open, with no spruce islands or other obstruction.

Quality of the Moss

A line was run over the summit from a point opposite Crab Island across the southern end of the bog, and samples were collected from drillholes 1,000 feet apart, to a depth of 10 feet. Analysis yielded the following results:-

	Ash	Absorptive Value	
	Dry	Dry	25 % Moisture
	Basis	Basis	Basis
Composite Samples from 20 drillholes	2.3	18.1	13.3

* Geol. Sur. Sum. Report 1925, Part C, p. 151 C, by A. Anrep.
M.S.81

The peat moss is of good quality; it is only slightly humified, somewhat darker in colour than those from the Gloucester County, light in weight, and should produce a good standard grade of commercial peat moss.

Quantity of Moss

The Tabusintac deposit is one of our largest bogs; it has a workable area of over 3,200 acres and a depth of moss of over 5 feet. The estimated volume is $62\frac{1}{2}$ million cubic yards, corresponding to $4\frac{1}{2}$ million tons of peat moss of 20 per cent content of moisture.*

Drainage

Natural drainage is to be had by a creek running south-east in the depression between the two large domes. The deposit can, however, be drained in several directions to both lagoons, as there is a slope shoreward for the entire shoreline.

Transportation

Shipping facilities are not advantageous, which is unfortunate for such a large deposit of good quality peat moss. The lagoons are shallow and lack facilities for loading; even small vessels would have to anchor off-shore and be loaded from scows which would entail additional handling and cost. Otherwise, products from the bog would have to be shipped by truck 18 miles to Tracadie, the nearest railway station, or 30 miles to Newcastle, the nearest deep-sea harbour.

The Escuminac Bog

The Escuminac bog is situated about $2\frac{1}{2}$ miles east of Escuminac village, occupying almost the entire peninsula between the estuary of Escuminac river and Miramichi river in Northumberland County, and extending over a mile into Kent County. The bog can be reached by the wagon road from Escuminac village that traverses the bog to Point Escuminac light-house.

Description of the bog

The bog is a high moor of wide open areas with no obstructions such as spruce islands or lakes, and is wooded only along the southwest and the west borders. The surface was generally dry and passable. The growth is mostly sphagnum moss, Labrador tea, and a few small areas with Eriophorum and carex grass in the shallow part of the southern area. The north part of the bog ends abruptly at the Miramichi bay in an exposure of peat moss 12 feet thick caused by the erosion of the sea.

Drainage

The bog can be well drained to the Gulf of St.

* Geol. Survey Sum. Report Part C p. 144 C, by A. Anrep.
M.S.81

Lawrence and the Miramichi bay. Natural drainage is obtainable by the Escuminac river at the south end but is not likely to be important as this part of the bog is shallow and the moss of inferior quality.

Quality of the Moss

A line was run through the centre of the deposit over the summit from the entrance of the road to the bog, to the light-house, a distance of about 2 miles. Samples from the drillholes 1,000 feet apart were made into a composite sample representing a moss stratum 10 feet thick. The moss is of good quality, light in weight, of light yellowish brown colour and only slightly humified. Analysis yielded the following values:-

Ash	Absorptive Value	
% Dry	Dry	25 % Moisture
Basis	Basis	Basis
6.0	19.4	14.3

Quantity of Moss

The Escuminac bog is large; 2,000 acres have over 5 feet of moss. It is estimated to contain $41\frac{1}{2}$ million cubic yards of moss corresponding to 3 million tons of peat moss of 20 per cent content of moisture.*

Transportation

The road leading through the deposit could be re-conditioned at small cost, otherwise transportation facilities are not particularly good because the moss would have to be trucked to Loggieville, the nearest railway and deep-sea harbour, 26 miles distant.

The Eel River Bog

The Eel River bog, the largest of industrial importance so far investigated, is only a short distance southwest of the Escuminac bog and 20 miles from Loggieville on the peninsula between Bay St. Anne, Miramichi Bay and the Gulf of St. Lawrence.

Together with the Escuminac, the two bogs occupy about one half of the peninsula. A third of the bog lies in Northumberland County and the other two-thirds in Kent County.

The north end of the bog can be reached by forest trail via a branch road from Hardwood settlement, and the southeast end by the Escuminac-Point Sapin road. The Escuminac and Eel river bogs lie only about two miles apart. (Map No. 11).

* Geol. Sur. Sum. Report 1923, Part C II, p. 15, by A. Anrep.

Description of the Bog

The bog is of the high moor type; the north part of the deposit is oval in shape and at the south end branches into two large protuberances running east and west. On the north lobe, are three domes with depth of moss over 20 feet and a large wooded island, "Coffee Island", southwest of the second dome. On the western lobe the land rises gradually to two domes with only a slight intervening depression and a heavy deposit of moss. On the east lobe there is also a gradual rise of land to an elongated dome. All three lobes are large, the north lobe having a length of $5\frac{1}{2}$ miles and a width of over 3 miles, the east lobe, 6 miles and $1\frac{1}{2}$ miles, and the west lobe 5 miles and over 1 mile respectively. The growth is mainly sphagnum moss, some spruce, and other aquatic plants. On the bog, especially on the north and east lobes, are many small and a few large lakes as well as pools of surface water, not, however, comparable in number with those on Les Escumains bog described earlier in this report.

Drainage

When visited, the north lobe was wet, soft and impassable in many places, as was also the case during the visit in 1939, when normal weather prevailed. This state of the surface may therefore be considered normal. Both east and west lobes were fairly dry and generally passable. All the lobes have natural drains; the Eel river in Northumberland County and its tributary Two Mile Brook, both almost across the west lobe, the former in the northwest, and the latter in a due north direction, both having outlets into Bay St. Anne; the Portage brook crosses the north lobe and connects with a small lake, to enter Bay St. Anne; and the Eel river in Kent County which connects with Eagle Lake and has an outlet to the Gulf of St. Lawrence, and its tributary run through the east lobe for a distance of one and a half miles.

The proper drainage of a deposit of such large dimensions as the Eel River bog needs careful investigation, particularly in regard to the great number of lakes and surface waters. The east lobe probably offers the best solution for drainage into the Gulf of St. Lawrence.

Quality of the Moss

For sampling, two lines were run, one from the end of the trail leading to Hardwood Settlement to the lakes northwest of Coffee Island; beyond which the bog became impassable, and a second line from the Point Sapin road over the summit on the east lobe. Samples were collected from drillholes 1,000 feet apart and a composite was made for each lobe representing a stratum to 10 feet depth. Analyses yielded the following values:-

	Ash	Absorptive Value	
	% Dry Basis	Dry Basis	25 % Moisture Basis
North lobe	3.1	21.0	15.5
East lobe	3.0	21.5	16.0

The moss is therefore of very good grade, high in absorptive value, low in ash and runs surprisingly uniform in quality for such a large deposit. The colour was fairly light brown and the moss only slightly humified and should yield a very good commercial article.

Quantity of Moss

The area of the bog workable for peat moss over 5 feet in depth is 15,500 acres with a cubic content estimated at 280 million cubic yards or 21 million tons of peat moss of 20 per cent moisture content.*

Transportation

The deposit is not very well situated as regards shipping; the peat moss would need trucking 20 miles to Loggiewille, the nearest railway station, where there is also a deep-sea harbour. Good roads, however, lead to the bog, especially to the eastern lobe. Working the bog from the Point Sapin road would, however, increase the distance to Loggiewille by 8 or 9 miles.

In view of the very large combined tonnage of the Eel River and Escuminac bogs and their close proximity, they form a reserve of moss equal to any of the large European deposits, and a production of a million bales or 50,000 tons per year could be maintained for hundreds of years, and for its exploitation the extension of the railway within reach of the bogs might be warranted and a site found for the building of a deep-sea harbour.

The two bogs form an economic unit, and, if worked on a large scale, the proper method of procedure would be to work the Escuminac deposit first and to keep the Eel River bog in reserve. Before depletion of the moss of the Escuminac bog, nature would have much improved the condition of the surface of the Eel River bog by a growth of moss filling many of the surface water pools and small lakes.

The St. Stephen Bog

The St. Stephen bog, also named the Todd bog, lies near the highway, four miles north of St. Stephen in Charlotte County, New Brunswick. It can be entered by a wagon road, which continues across the bog following a drainage ditch on which there are several old workings. The bog was worked experimentally several years ago, when a small plant was erected for dewatering the raw peat by means of a pressing process. During the past year a quantity of peat moss was dug at the far end of the road crossing the bog. (Map No. 12).

A sample collected from the working face of 5 feet

* Summary Report, 1923, Part C II, p. 17, Geol. Sur. by A. Anrep.

depth yielded on analysis the following results:-

Ash	Absorptive Value	
% Dry	Dry	25 % Moisture
Basis	Basis	Basis
2.9	12.8	9.4

The moss is dark in colour, with intermixture of humified peat, and is not of particularly good quality, the absorptive value being below that of the standard of commercial moss. It could be used as a soil conditioner, in compost, as a fertilizer filler and as surface dressing, but the humified peat would cause dust, objectionable if used as stable or pen bedding or as packing material.

The area of the bog is estimated at 150 acres containing both fuel peat and peat moss, of which 70 acres carries peat moss to a depth varying from 12 to 30 feet.* No estimate, as far as can be learned, has been made of the cubic content and the tonnage of marketable peat moss.

The bog is well situated for transportation, being four miles from the United States boundary, to railway, and to deep-sea wharf.

The Musquash Bog

The Musquash bog is situated 2 miles east of Prince of Wales station on the Canadian Pacific Railway, and 11 miles from the city of Saint John in St. John County, New Brunswick. It can be entered from No. 1 Highway which skirts the north end of the bog for about a mile. (Map No. 13).

The bog is of medium size with two slight elevations, one near the highway and the other on the west side between two small lakes; the area is about 300 acres.** It is cut up by one large and two small lakes, by old workings filled with water and pools of surface water. The growth is mainly sphagnum moss and some spruce and aquatic plants.

The bog was worked some years ago and two pits at the south end witness to an appreciable production. Four ditches at the south end drain into the largest lake, which in turn is a tributary to Spruce Lake (Map No. 12). Notwithstanding this drainage, the bog was soft and impassable in several places.

Samples were collected along a line run over the centre of the bog north and south, and along a cross line at right angles from drillholes made 500 feet apart. Analysis of the composite of this representing a depth of 10 feet yielded

* Summary Report, Mines Branch, 1917, p. 56, by A. Anrep.

** Summary Report, Mines Branch, 1917, p. 56, by A. Anrep.

the following results:-

Ash	Absorptive Value	
% Dry	Dry	25 % Moisture
Basis	Basis	Basis
3.1	15.6	11.4

The moss is of somewhat better quality than that of the St. Stephen bog, but does not compare in quality with those on the Gulf of St. Lawrence. It is rather dark in colour and is intermixed with humified peat.

The workable area of the bog has been estimated at 300 acres,* over which the moss has a thickness of 5 to 14 feet; no estimate in regard to cubic content and tonnage of peat moss has been made. The bog is well situated in regard to shipping, being close to paved road and railway, and if properly drained could be worked to supply a local market.

The St. Anaclet Bog

The St. Anaclet bog is situated one mile south of Father Point in the Seigneuries of Lessard and Le Page-Thibierge. It can be entered by three roads running south from the Riviere du Loup—Rimouski highway.

The deposit is large, over 7 miles long, and consists of two lobes connected by a long narrow strip of bog. The western lobe, west of the road that connects St. Anaclet station with Father Point, contains a good grade of moss to a depth of 5 to 13 feet, but the rest of this bog eastward becomes shallow, of maximum depth of 5 to 6 feet, more or less wooded, and the moss is of inferior grade passing into well humified fuel peat. The peat moss deposit west of the St. Anaclet road occupies the centre of that part of the bog, with a slight elevation towards its centre, roughly estimated at one square mile. Anrep places the amount of peat moss at about 325,000 tons of standard commercial moss. Five samples collected on a line run due west for a distance of 3,000 feet from the road over the summit, to a depth of 5 feet, yielded on analysis the following results:-

Sample marked	Ash	Absorptive Value	
	% Dry	Dry	25 % Moisture
	Basis	Basis	Basis
No. 1 100' west of road	4.4	15.7	11.5
No. 2 800' " " "	3.5	22.6	16.7
No. 3 1500' " " "	3.3	27.5	20.4
No. 4 2200' " " "	5.6	25.1	18.5
No. 5 3000' " " "	4.2	22.8	16.8

Judging from the above analyses the deposit contains a very high grade of moss and should yield the best grade of standard commercial peat moss.

These samples, however, represent only a small area,

* Summary Report, Mines Branch, 1917, p.58, by A. Anrep.
M.S.81

and of that, only the upper stratum, and sampling of the whole deposit along similar lines might not yield as favourable results on analysis.

Transportation

The deposit is very favourably situated in regard to shipping; a good road about a mile and a half north leads to a deep-sea wharf at Father Point, and the Canadian National Railway crosses the bog to the south, with the St. Anaclet station almost at its edge.

The Farnham Bog

A visit was made to the Farnham bog at the request of the owner, to whom the occurrence of large areas of peat moss had been reported. Although all reports both of earlier investigations as well as of development of the bog made no reference to this, a further survey was deemed advisable;

The Farnham bog is situated a short distance west of the city of Farnham, and can be entered by good country roads from several directions. It consists of three lobes; the northern end of the north lobe has been acquired by the Department of National Defence. The southern end of the northern lobe was once worked for peat fuel, the plant being situated on the west border of the bog at the Canadian Pacific Railway track. Canals half a mile long run south from the track and are presumably old workings. The north lobe of the bog contains no peat moss.

The southwestern lobe is the largest in area and is crossed by two good country roads; one through the centre of the bog and the other on the boundary to the southeastern lobe. A line was run southwest about 3,000 feet, beyond which the bog was on fire, in fact, when visited, fires were burning on several parts of the bog. Along this line a heavy growth was found of sphagnum moss, among small poplar and birch trees. The underlying stratum, however, is well humified and is a good fuel peat. No evidence was found of any stratum of dead moss, the raw material in the manufacture of standard commercial peat moss. The reported occurrence of peat moss therefore probably originated from the live moss being mistaken for peat moss. The surface of the eastern lobe is somewhat softer than the rest of the deposit, the peat is less humified but it quite unsuitable for the manufacture of marketable peat moss. At the northeast end of this part are numerous stumps, and the bog becomes shallow and almost impassable. The peat in this part is less humified but negligible as to quantity, and the quality is inferior.

...That peat moss might be found in those areas that were on fire would appear unlikely.

Five samples were collected from different parts of

the bog at 3 feet depth and analysed with results as below:

Sample taken from	Mois- ture %	Ash %	Vola- tile matter %	Fixed Carbon %	Sul- phur	B.T.U. per lb. gross	Absorp- tive Value
Line between highway and C.P.R. track							
As received	9.8	3.4					
Dry	---	3.7					
SE section							
As received	10.3	5.1					
Dry	----	5.7					
SW section							
S of road							
As received	8.2	8.4					
Dry	---	9.1					
SW section							
N of road							
As received	9.3	3.3					
Dry	---	3.6					
Composite of the above samples							
As received	25.0	5.3	46.5	23.2	0.5	7.270	4.2*
Dry	----	7.1	62.0	30.0	0.7	9.700	5.9

* Chemist's remark. The sample was analysed when dried after the determination of absorptive value, the values being quite different from those to be expected with air-dried peat. Accordingly, the values were re-calculated to the basis of 25 per cent moisture or a representative figure for air-dried peat.

The samples represent very good fuel peat. The very low absorption value precludes the use of the material as peat moss.

The Newington Bog

The Newington bog described in Memorandum Series No. 80 was visited. The development of the bog and the erection of the machinery were in progress. The plant is expected to be in production in 1942, using an improved hydro-peat method in the manufacture of peat humus.

The Beverly Bog

The Beverly bog was described in Memorandum Series No. 80. The plant was visited in the spring of 1941, at which time the work on the field equipment had been almost completed. Track was laid from the drying field to the end of the bog and additional cars and tractors had been acquired.

The plant went into production during the summer. At the close of the season the company reported much excavated peat marl spread out for drying, the product of which should be available shortly, and estimated that the first year's production will be 4,000 tons..

The peat marl is excavated and brought by rail to the drying field, where it is spread for drying and is harvested. The dried material is conveyed by cyclone conveyer to the mill, where it is ground in a hammer mill, screened and bagged.

The company has bought a large building in Dundas for storage and distribution of its product, which is sold under the trade mark Hu-Mar.

The Alfred Bog

The Alfred bog owned by Kennedy Stinson was in operation at full capacity during 1941. Fires, during the late summer, however, destroyed a large quantity of the peat moss stacked in the field. The plant, with two newly erected mechanical presses, shredder, and screen, escaped damage.

The area of the deposit in the Alfred bog is estimated at about 40 acres, of which half, having a depth of 8 feet of unhumified moss, is workable for peat moss.

The bog has been in production for three years and in another year or two the supply of moss will be nearly depleted. Plans are under way for moving the plant to a bog in the Eastern Townships that is being prepared for cutting peat sods this year.

The Alfred peat moss is of a very good quality. Samples collected from the stock pile of air-dried peat moss sods yielded on analysis the following values:-

Absorptive value	dry basis	23.4
"	" 25 % moisture basis	17.3
Ash,	dry basis	5.5 per cent.