APPENDIX B

SOIL SURVEYS IN THAT PART OF NORTH WESTERN CANADA INCLUDED IN THE NORTH PACIFIC PLANNING PROJECT

A. Leahey 1/

The area in Canada coming within the scope of the North Pacific Planning Project, constituting as it does a very appreciable portion of our country, is naturally of great interest to us. From the viewpoint of agriculture, this area is of interest because:

1. Important farming areas have been developed in this region.
2. The possibility and importance of producing farm produce to satisfy local market requirements where transportation costs are high.
3. Scientific curiosity as to the crops that can be successfully produced in high latitudes.
4. The fact that within this region lies our greatest reserve of virgin lands suitable for settlement in Canada.

Agriculture is dependent on climate and soils. Other factors that I need not mention to you govern whether agricultural development is desirable or not and the type of agriculture that should be followed within the limits of climate and soil; but without suitable climate and soil agriculture is impossible.

Weather stations in our northwest, while few, give us a fair picture of climatic conditions, especially along the rivers. With regard to climate I would only say that the region is characterized by fairly short growing seasons, by rather dry summers and by long hours of daylight during the growing period.

The best criticism of climate from the agricultural viewpoint is whether or not crops can be grown. In this regard we have some useful information of a qualitative nature. Apart from the well established farming districts in the southern part of the region under consideration, records of experience and experiments show that grain crops can be grown more or less successfully as far north as Simpson, i.e. north latitude 62 degrees, while garden crops have been grown for many years as far north as Aklavik. On the western side of our northwest both grain and garden crops have and are being grown as far north as Dawson, just north of the 64th latitude.

Unfortunately, we have little information with regard to growing conditions back from the rivers north of the provincial boundaries. Gardening and such farming as has been tried were conducted along the rivers. Whether growing conditions on the uplands at higher altitudes, and away from the possible ameliorating effects of the water, would be as good is a matter of conjecture.

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Soil conditions are limiting factors in importance equal to climatic conditions. To obtain a quantitative picture of the possibilities of the region we must first have some idea of the amount of land suitable for agriculture, even providing climatic conditions are suitable. To obtain this information we must have field surveys conducted by trained observers. The purpose of this talk is to describe what has been already done in regard to field surveys, the information that such surveys have provided, and to mention the scanty information we have on areas that have not been explored in this manner.

Field Surveys - Three types of soil surveys have been conducted in northwestern Canada to date. These are:

1. Reconnaissance soil surveys conducted jointly by the Dominion and the provincial governments in the railway belt of the Central Interior part of British Columbia. Traverses were conducted about one mile apart so we have a fairly detailed map of the soils insofar as general farming is concerned. The survey of this area is almost completed.

2. Preliminary land classification surveys conducted in the Peace River area of Alberta by the government of that Province during the years of 1929 to 1931. These surveys were broader than that being conducted in British Columbia, inasmuch as their purpose was to find out the blocks of land suitable for settlement rather than to record soil conditions on each parcel or section of land. These surveys were conducted almost entirely in virgin lands around then settled areas in the Peace, and along both sides of the river as far north as Fort Vermilion.

3. The exploratory soil survey the Dominion Government made this past summer along the Alaska Highway and in the Yukon. This survey, in some respects at least, was the broadest survey of the three as it was almost entirely a linear one.

All these surveys have provided useful information as to the nature of the soils and the possibilities of agricultural development insofar as soils are concerned in the areas they covered. Since the time that can be devoted to this topic is necessarily limited, I will not discuss the nature of the soils to-day, but rather confine my remarks to the amount and location of lands deemed suitable for cultivation. In this connection, I think it also advisable to make some mention of the present extent of agricultural development in the respective areas.

One general remark can be made with respect to the virgin areas of land suitable for settlement in northwestern Canada, and that is that nearly all such lands are wooded to a greater or lesser degree. The percentage of open grassland suitable for cultivation is small. Clearing of these lands represents one of our major problems in land settlement.

The Canadian Northwest may be broadly divided into two regions:

A. A broad plain, broken by hills, lying east of the Rocky and Mackenzie mountains. This plain dips to the north and it lies entirely in the Arctic watershed.

B. The mountain and intermountain areas lying to the west of the fore-mentioned plain. There are some interior plateaus in this region and many mountain valleys. Drainage is into the Pacific, the Bering Sea and the Arctic.

This broad picture indicates that large areas of agricultural land will only be found east of the mountains, although some areas of considerable size may be found west of the mountains.

A. The Plains East of the Mountains

1. The Upper Peace - Farming in the Upper Peace has been carried on for many years and has achieved a position of considerable importance. By 1936 there was a total of 10,772 farmers occupying some 2,917,193 acres, of which 1,071,600 acres or 39 per cent were improved. About 90 per cent of this development was in Alberta. In 1940 this Alberta part of the area produced over 11,000,000 bushels of wheat, nearly 12,000,000 bushels of oats and 3/4 of a million bushels of barley.

Agricultural development in the Upper Peace is still proceeding at a good pace. Some idea of this development during the past twenty years can be gained from the fact that in 1921 the Upper Peace River area in Alberta had 170,000 acres under field crops and 700,000 acres by 1940.

The Upper Peace River area is serviced by the Northern Alberta Railway, running from Edmonton to Dawson Creek, with a branch line to Hines Creek on the north side of the river. Development is hindered to a considerable extent by lack of branch railways and by lack of good roads.

Most of the land adjacent to the present main settled areas in the Peace River Area in Alberta was covered by the preliminary soil surveys of the Province of Alberta. These surveys, together with information I obtained this summer in travelling through the British Columbia part of the area, indicate that there is at least about 4,000,000 acres in the Upper Peace suitable for settlement and cultivation.

2. The Lower Peace or Fort Vermilion - While the Lower Peace is accessible only by boat or air and hence agricultural development has been largely limited to local requirements, considerable information is available regarding the possibilities of this area. From the work of the Agricultural Experimental Sub-Station, which has been in continuous operation since 1908, we know that climatic conditions are suitable for garden crops and for general farm crops. In fact, despite the rather dry climate, in no season has there been a crop failure. This Station is located in 58 degrees 24' north latitude, 116 degrees west longitude.

The possibilities of agricultural development in this area insofar as soils are concerned were explored by the Alberta Government in 1930. Some 4,678,000 acres were surveyed in preliminary manner between Keg River and Fort Vermilion east of the 6th meridian, 118 degrees longitude. The classification of lands in this area is as follows:

Park land soils	37,000 acres	.8 per cent
1st class wooded soils	441,000 "	9.4 " "
2nd class wooded soils	2,106,000 "	45. " "
3rd class wooded soils	1,414,000 "	30.2 " "
Eroded	49,000 "	1. " "
Muskegs	555,000 "	11.9 " "
Lakes and Rivers	76,000 "	1.7 " "
		100.0 per cent

Considering only the parkland and the first and second class wooded soils to be agricultural lands, we have, in the Fort Vermilion area some 2½ million acres of possible arable land.

Preliminary soil surveys were also conducted between township 85 and township 98 - that is from the settled portion of the Peace River Country to the large Fort Vermilion country along both sides of the Peace River. Little or no good land was found along the east side of the Peace, but on the west side over 200,000 acres of agricultural land was found - chiefly in the Notikewin, Hotchkiss, Meikle rivers area. While not a large area, it is of importance because it means that a railroad to the Fort Vermilion area along the west side of the Peace would not be traversing an entirely unproductive area.

3. The Fort Nelson Area - It has long been rumored that considerable areas of possible agricultural lands lay in the vicinity of Fort Nelson. However, it was not until this year that an opportunity to look over the area arose.

The possible agricultural lands in this area fall into two distinct groups.

a. The river flats or floodplains along the Prophet, Muskwa and Nelson rivers.
b. The upland plateau

The soil on the flats vary from gravels and sands of questionable value to silts of high fertility. Growing conditions on these flats are very good as attested by the rank growth of trees and the excellent gardens that have been raised at Fort Nelson for many years. However, any extensive settlement on these flats is impossible for none of them is very large and, while numerous, they occur in scattered parcels along the rivers. Clearing on these flats is very heavy and there is grave danger of extensive flood damage at periodic intervals.

The Upland Plateau from the bridge across the Muskwa to Mile 50 west of Muskwa is, in my opinion, mostly an area of potential farm land. The soil is generally quite heavy and, although it is a wooded soil, it is not leached to any damaging extent. In fact, from observations and from such analyses that I have been able to secure to date I would say that it is a superior soil to the arable clay soils in the Prince George area of British Columbia. How much of this potential agricultural land lies on the Fort

Nelson plateau no one can say, but I have placed a preliminary estimate on its extent as being a half million acres.

The agricultural possibilities of this upland plain, apart from what can be deduced from the nature of the soils, are absolutely unknown. However, from the meteorological observations made at the airfield over the past five years, it would seem that the climate is as favourable or even more favourable than the climate at Fort Vermilion.

4. Nelson - Hay Lakes Area - There are other areas in northern Alberta and British Columbia that should be at least explored in a preliminary manner. Probably the most important of these areas as far as size is concerned is the land lying between Fort Nelson and the Hay Lakes. About the only thing we know about this area is that its altitude is such that it is likely to have a suitable climate for the successful growth of crops. One point of interest is that, through a visit by Alberta surveyors in 1930, we know that there is at least 100,000 acres of grassland and parkland on the north side of the Hay Lakes. This is one of the largest blocks of virgin grassland that has been found in our north.

5. The Northwest Territories or Mackenzie Basin - Present agricultural development in the North-West Territories is limited to a few farms and a number of gardens located along the Slave, Hay, Liard and Mackenzie rivers, extending as far north as Aklavik. The total acreage under cultivation probably does not exceed one to two thousand acres.

While gardens have been grown more or less successfully along the Mackenzie river we have little idea of how much land could be utilized for this purpose. Probably the total acreage is small as the land back from the river is mostly covered with poorly drained muskegs which are permanently frozen to within 8 to 10 inches of the surface. Along the river itself a limited amount of agriculture would seem to be possible if suitable land exists in any appreciable quantity.

Possibly the only sections where any agricultural settlement might be feasible lies in the valleys of the Slave, Hay and Liard Rivers. Albright suggests in "Gardens of the Mackenzie" Geographical Review, Vol. XXIII, No. 1, Jan. 1933, that the whole region of the Liard may be as favorable for cultivation as the Peace. All I can say that gardens and small patches of grain have been raised on the river flats in isolated areas. The area would appear to be worth investigating at an early date.

B. The Region West of the Rocky and Mackenzie Mountains

1. The Railway Belt in Central British Columbia - Farming has been carried on to some extent in this area since the railway was built. However, development has been rather slow as at present there are only about 50,000 acres of cultivated land in the area. However, general agriculture is quite practical in the area as shown by the results obtained by the better farmers and by recently established Dominion Experimental Stations located at Smithers and Prince George.

Up to the end of 1942 the soil survey had mapped 1,835,000 acres in this area. About 39 per cent of this acreage, or 700,000 acres, were classified as arable land. Preliminary estimates of the remainder of the area together with that portion already mapped indicates that there are approximately 1,000,000 acres of arable land, the greater portion of which is available for settlement. Nearly all this land is wooded but a considerable portion of it could be easily cleared.

All this land lies reasonably adjacent to the railroad and a fair main highway traverses the area.

2. The Alaska Highway West of the Summit to Mile 256 West of Whitehorse - The exploratory soil survey made along the highway this summer provided an excellent opportunity to see many soils that are distinctly different from those that I have previously examined in Canada. While this fact added decidedly to the interest of the trip, it made the problem of assessing the agricultural merits of the soils more difficult, and I may also say a more treacherous problem. With the exception of a few gardens at Lower Liard Post, and the gardens at Whitehorse and at one or two other points, no agriculture exists along the Highway so one had to judge the merits of the soils entirely on their appearance and on the native vegetation.

With regard to the acreage figures I will give you for the different areas, I would ask you to bear in mind that they are estimates only and are merely given for comparative purposes.

(a) The Racing River - Along the west bank of the Racing River which lies about 30 miles west of the Summit and within the mountains there is a strip of land comprising about 1,000 acres which could be tilled if it was drained. In addition there are several thousand adjacent acres that would provide good grazing.

(b) The Terraces of the Liard - Between the two bridges across the Liard there are three terraces that would appear to be suitable for agriculture. These are:

1. A small area of about 1000 acres on the north side of the new bridge at Mile 213.
2. The terrace between the Smith River and the Relay Station west of Coal River. This terrace is about 30 miles long and varies in width from 1/4 mile to upwards of 2 miles. The estimated acreage is 15,000.
3. The terrace around Lower Liard Post comprising about 1000 acres.

(c) Lake Teslin District - There is about 20,000 acres around Lake Teslin that appears to have a fair soil. However, both the soils and the native vegetation indicate that the area is rather droughty. For this reason I think we should place a large question mark after this area until we obtain further information.

(d) The Tagish Flats - The flats at the north end of Tagish and Little Atlin Lakes, while not first class, are possible farm lands. There may be danger from extensive flooding in some years as the flats lie only a few

feet above the lakes. The combined acreage of these two flats has been estimated at 9,000.

(e) The Takhini - Dezadeash Valleys - In this valley or valleys west of Whitehorse lie the best soils in the southern Yukon. This valley runs from the Lewes river to the Shakwak valley - a distance of approximately 100 miles and averages in width about three or four miles to the mountains on either side. The main type of soil in this valley is a soil with a heavy loam to clay loam surface underlain by granular clay. This soil is an upland soil, well drained and unfrozen to a depth of at least forty inches (Examined on July 1st).

There are other types of soils in the valley such as immature clay soils along the lower benches near the river, sands and gravels along the stream courses, and a stretch of sand at Champagne which covers the valley floor to a distance of five to six miles.

The general topography of the valley floor is suitable for cultivation except possibly the more rolling area near Whitehorse.

Much of this valley has a parklike appearance. It was estimated that spruce either in solid stands or clumps occupied about half the valley, while aspen, poplar, willow and open grassy areas covered most of the remainder. The eastern end of the valley carries considerable pine, but this tree extends westward only a few miles, from the temporary bridge across the Takhini River.

The agricultural possibilities of this area of land are difficult to assess. As far as the most of the land is concerned I feel quite certain that the soils will prove to be fairly fertile. However, the elevation of the valley 2200-2400 feet may be too high to avoid damaging late spring and early fall frosts and then there is the ever present danger of drought. The entire area, at least on the heavy type of soil, is a virgin one. Gardens, however, have been raised at Champagne on sand which may have reached some seepage.

The area of possible good soil in this valley has been estimated at about 120,000 acres. This is by far the largest block of possible agricultural land that I saw west of the mountains during the Alaska Highway soil survey.

3. The Flats along the Yukon River and Its Tributaries - The other agricultural lands I saw in the Yukon this summer were the river flats along the Yukon, Pelly, Stewart and Klondyke rivers. These river flats have, generally speaking, a more fertile soil than the upland soils of the Takhini-Dezadeash valleys, and they may be in a more favoured location insofar as climate is concerned, as they are at a lower altitude, and the rivers may have a favorable effect on the climate in the fall. While totalling a considerable acreage, they are in scattered parcels along several hundred miles of river front, are fairly heavily wooded and probably for the most part the soils back from the river are permanently frozen. Nearly all the

present agricultural development in the Yukon is on these flats.

4. Interior Valleys in Northern British Columbia - West of the Rocky Mountains present knowledge indicates that large blocks of agricultural land will not be found as the only places where arable lands will be found is in the valleys. Only guesses can be made regarding the extent of such lands. The largest block appears to be in the Parsnip-Findlay valley where there is supposed to be about 500,000 acres of arable land. This area is of particular interest as it is not remote from present areas of developed farm land, although at present it is almost inaccessible.

No doubt there are many other valleys with agricultural possibilities which can be used if mining development proceeds in their vicinity.

C. Agriculture in the Yukon

Agriculture in the Yukon on farms has been on the decline for many years. For example, the farm population in 1941 totalled 42 persons, while in 1931 it totalled 72. From my observations many of these 42 persons living on the farms could not be seriously considered as farmers. On the other hand, gardening in the few towns is probably on the increase.

Gardening is fairly well established in the Yukon, particularly in the towns, but general agriculture is in its infancy. While no doubt improvements could be made in horticultural crops by the introduction or development of new and more suitable varieties, the problems associated with horticulture insofar as truck crops are concerned are not acute. However, serious problems exist with regard to production and marketing in the field of general farming.

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