INTERIM REPORT ON THE SOILS INVENTORY OF THE AOSERP STUDY AREA

by

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for

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ABSTRACT

The soils inventory of the AOSERP study area using the ecological approach to land classification was continued during 1979. All field checking and soil sampling was completed during the 1979 summer field season. Samples were taken from eight mineral and eight organic soil profiles. In addition, samples of parent materials from eight mineral soil sites were taken for analysis. Of the samples taken during 1978, laboratory analyses have been completed on 30 soil profiles and are reported in the Appendix. Analyses of samples from 34 more profiles taken during 1978 are being completed with those taken during 1979 and results will be reported at a later date. Ten soil maps on 1:50,000 National Topographic Series or Forest Cover Series bases were produced and submitted to AOSERP management. The legend remains the same as that published in the 1979 interim report.

ACKNOWLEDGEMENTS

Grateful acknowledgement is made to Darrell K. Skinner for assistance with cartography and field work, to Daniel P. McCarthy for cartographic assistance, and to Graeme A Spiers for assistance in the field. Thanks are also extended to Mr. C. Tarnocai, Land Resource Research Institute, Agriculture Canada, Ottawa, for accompanying us on a field trip and contributing to our understanding of organic soils in the area, and to Matt Fairbarns, Parks Planning, Alberta Recreation and Parks, for assistance in the field during his investigations of the area.

This research project LS 2.1 was funded by the Alberta Oil Sands Environmental Research Program (AOSERP), a joint Canada-Alberta research program established to fund, direct and coordinate research into the effects of oil sands development on the renewable resources of the Athabasca Oil Sands.

1. INTRODUCTION

Progress during 1979 on the soils inventory of the Alberta Oil Sands Environmental Research Program (AOSERP) study area (Figure 1) is summarized in this report. Background information on this project, including a resume of current state of knowledge and of the materials and methods used can be found in two previous reports (Turchenek and Lindsay 1978; 1979). The legend accompanying the 1979 interim report should be used with all preliminary soil maps.

Work on the soils inventory project during 1979 consisted of continuation and completion of field checking in the AOSERP study area, preparation of preliminary (1:50,000) soil maps, and analysis of soil samples. Further study of distribution and properties of organic soils with permafrost (Cryosols) was undertaken during the field season. A summary of developments in Alberta regarding classifying lands in the higher categories of the ecological land classification system is presented. Analytical results are presented in the Appendix.

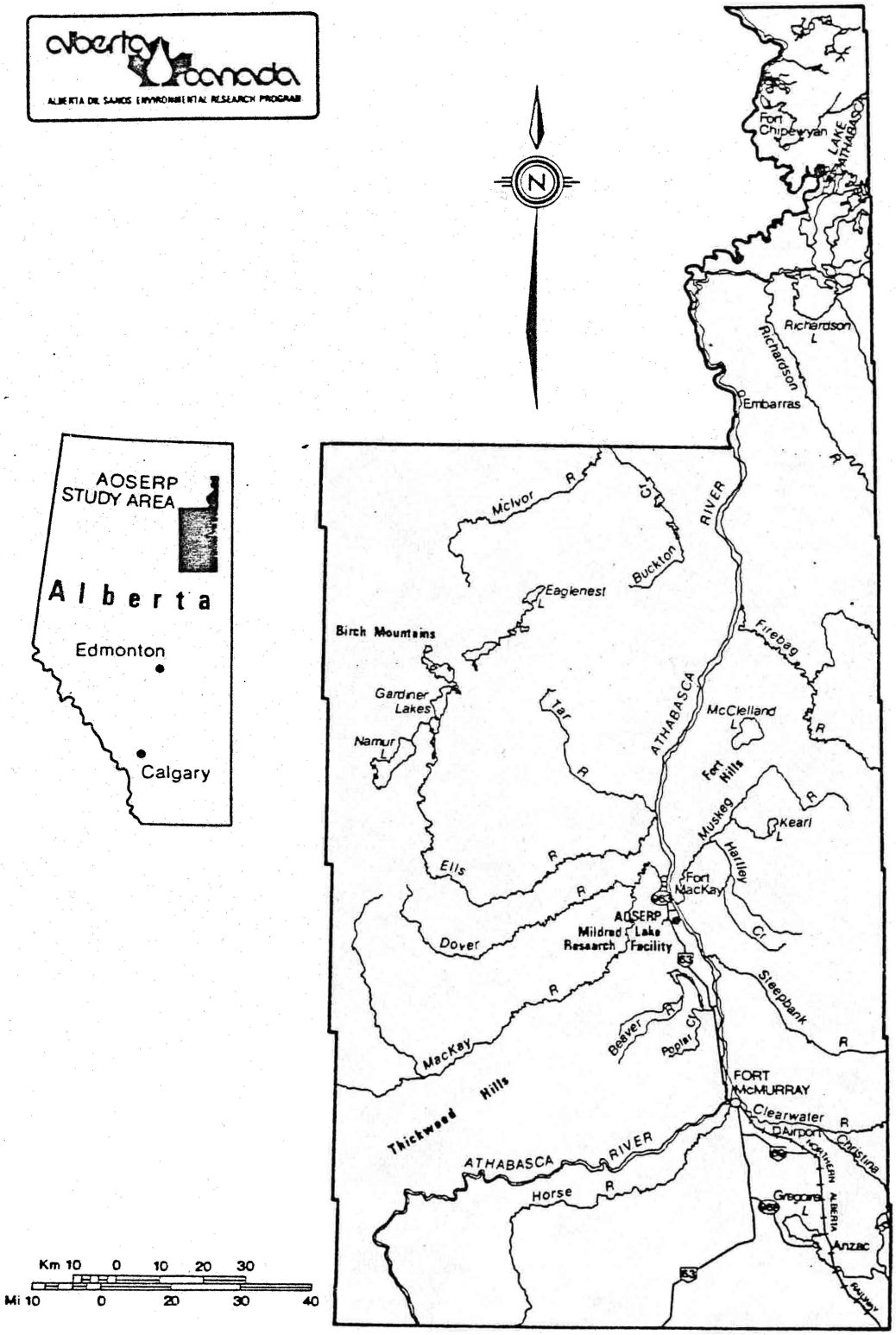

Figure 1. Location of the AOSERP study area.

2. RESULTS AND DISCUSSION

2.1 AREA MAPPED TO DATE

A large portion of the low priority area, about 30 townships in the northwest and northeast corners of the AOSERP study area, were field checked and sampled during the 1979 field season. About 40 hours of helicopter time were used during about 25 days in the field. Field checking in the low priority area was carried out during two week-long trips in June and July. General field checking with emphasis on examining problem areas was carried out during September. A trip to obtain more information on distribution of permafrost was made in early October.

Samples from eight mineral and eight organic soil profiles were taken during the field trip. In addition, samples of geologic parent material were taken at eight sites in the southwestern portion of the study area. These were taken to obtain more data by which three soil units developed on different morainal materials (Horse River, Kinosis and Legend units) could be differentiated. Analyses of the above samples and of 34 samples taken during the 1978 field season will be completed in January, 1980.

Preliminary soil maps of all the eastern half of the AOSERP study area south of Lake Athabasca (NTS sheets 74D, 74E and 74L) have been completed and presented to AOSERP management. An exception is 74D/5, which is presently in preparation along with several maps from NTS sheets 84A, 84H and 84I. All preliminary soil maps will be completed by the end of the 1979/80 contract year.

2.2 OCCURRENCE OF PERMAFROST IN THE AOSERP STUDY AREA

A discussion of permafrost occurrence was presented in the 1979 interim report (Turchenek and Lindsay 1979). It was indicated that observations made to that time were in agreement with those of Lindsay and Odynsky (1965). These observations were that in an area comprising the Birch Mountain Upland, the

Dunkirk Plain and the Kazan Upland, frozen conditions were found (during late summer) in the majority of organic soil sites inspected. In the remainder of the AOSERP study area, permafrost in organic soils occurs more sporadically, is mainly temporary but lasts more than a year, and in a few situations lasts over a very long time period as indicated by the occurrence of peat plateaus. Observations made during the October field trip provided additional evidence for division of the AOSERP study area into two main permafrost areas in regard to Organic soils.

Mr. Charles Tarnocai of the Land Resource Research Institute, Agriculture Canada, Ottawa, joined the September field trip and contributed to the examination and characterization of permafrost soils in the study area. Having had much experience in ecological surveys in the Northwest Territories, most recently in the Fort Smith area, Mr. Tarnocai's observations on permafrost in organic soils were of particular interest. Due to the spatial continuity of organic soils with permafrost (i.e., of Cryosols), the Birch Mountain Upland was, in his opinion, more similar to sub-Arctic regions than the Boreal region within which the AOSERP study area is considered to lie. The depth of permafrost in peat plateaus was about three to four meters on the Birch Mountain Upland as compared to one to two meters elsewhere, and the frozen layer extended into the mineral substratum in many cases. Over the rest of the AOSERP study area, Mr. Tarnocai suggested that permafrost may be more widespread than was previously found in this project. Investigating further, this indeed was found to be the case in bogs where peat plateaus had not developed, but the frozen layer was relatively thin (less than 1 m) in most cases and was probably temporary. In the Dunkirk Plain (in the central west portion of the AOSERP study area) widespread permafrost in peat plateaus was found much as in the Birch Mountain Upland. Collapse scars were much more abundant in the peat plateaus of the Dunkirk Plain, however. This indicates a higher proportion of melting in these peat plateaus as compared to those of the Birch

Mountain Upland, but whether or not this results from a slightly milder climate has not been clearly established.

Formation of permafrost is dependent on climate. Occurrence of permafrost, therefore, could be used as a climatic indicator and would be an important criterion for classifying land ecologically at the region and subregion level. It appears that areas such as the Birch Mountain Upland and the Dunkirk Plain could be classified as sub-Arctic or as relatively cool subtypes of the Boreal Region. Present work in ecological classification is discussed in the following section.

2.3 DESCRIPTION OF ECOLOGICAL UNITS

2.3.1 Land Regions

Principles of ecological land classification, and names and descriptions of ecological units in the AOSERP study area, were presented in the interim report (Turchenek and Lindsay 1978). The only land region recognized in northeastern Alberta was the Boreal Region. This was subdivided into land subregions by equating subregions with the forest sections of Rowe (1972). This approach is not entirely valid, however, since a land region is characterized by climate, as expressed by vegetation, while development of a forest section is dependent not only on climate but also on other factors such as parent material, and even fire history.

Further investigations and efforts at classifying Alberta lands at the land region level are being undertaken by the Ecological Regions Working Group for Alberta. This is a sub-committee of the National Ecological Land Classification Committee which is developing an ecoregion map of Canada at a scale of 1:5 million. The Alberta working group has praticipants from Canadian Forestry Service, the Alberta Institute of Pedology, the University of Alberta, and the Resources Evaluation and Planning Branch, Alberta Department of Energy and Natural Resources. In addition to this work a map of natural regions of Alberta was produced for the Parks Planning Branch, of the department of Alberta Recreation and Parks,

by Achuff and Wallace (1977), and an ecoregion map of Alberta is being prepared at a scale of 1:1.5 million by Strong and Leggat (1980; in prep.). Classification of the Boreal forest by these groups and individuals will be relevent to mapping the AOSERP study area. It is probable that the Boreal forest will be subdivided into high, mid and low Boreal areas at the region or subregion level. This classification will characterize the AOSERP study area in terms of ecosystems in relation to climate relatively accurately in comparison to the approach previously taken in this project.

2.3.2 Land Districts

Maps of land districts in the AOSERP study area were presented in previous reports (Turchenek and Lindsay 1978; 1979). A land district is defined as an area of land characterized by a distinctive pattern of relief, geology and geomorphology. Work in developing a physiographic map of Alberta at a scale of 1:1 million is currently being carried out by Pettapiece (1980, pers. comm.) of the Alberta Institute of Pedology. Although physiographic regions cannot be equated with land districts, they are similar in concept, and therefore, delineation and naming should be similar as well. The land district classification of this project has both contributed to and will derive information from the physiographic map project. Therefore, it is possible that some names and boundaries on the land district map as presented in previous reports will be changed for the final report.

2.4 SOIL DESCRIPTIONS AND ANALYSES

Analyses have been completed on samples from 30 of 74 profiles sampled in 1978. The results of these analyses and field descriptions of the profiles are presented in Section 6.1. In addition, engineering tests performed on 37 subsoil samples from the profiles sampled in 1978 are presented in the appendix section 6.2.

The particle size analyses show that profiles from the Muskeg Mountain Upland and from the Stony Mountain Upland have similar textures. Soil profiles from both land districts ae acidic throughout the control section (1 meter depth). Therefore, the Kinosis land system, mapped mainly on the Muskeg Mountain Upland, and the Surmount land system, mapped in the Stony Mountain Upland, are basically similar and the Kinosis name will be used for both units on the final map. The Surmount unit has been found to occur, however, on the western flanks of the Stony Mountain Upland in areas described as colluviated ground moraine by Bayrock and Reimchen (1977).

Analyses have also shown that the Horse River land system is higher in pH than the Kinosis unit and is often calcareous within the control section. The Legend unit is similar to Kinosis, as shown by laboratory analyses, but differences such as greater wetness and cooler soil temperatures persisting later in the summer season (as observed in the field) justify considering Legend a somewhat different land system from Kinosis or Horse River.

3. CONCLUSIONS AND RECOMMENDATIONS

Sampling and field checking in the AOSERP study area have now been completed. Examination of peatlands and permafrost distribution was continued from the previous year. More than half the preliminary 1:50,000 soil maps have been produced and the remainder will be completed by March, 1980. Preliminary soil maps which have been completed to date are for those parts of the AOSERP study area within National Topographic Sheets 74D, 74E and 74L south of Lake Athabasca. The legend to be used with these maps is that which appears in the 1979 interim report.

It is recommended that the soils inventory information be published at a scale of 1:126,720 rather than 1:250,000 as previously suggested. It is also recommended that the final report be produced in 1980 and that emphasis be placed on describing the land units in as much detail as possible by means of field descriptions, analytical data, diagrams and possibly photographs. These recommendations are discussed further in the next section.

4. FUTURE PLANS

The objectives of Project LS 2.1 as stated in the 1979-80 terms of reference are to provide program management with field working maps at a scale of 1:50,000 and to provide maps at a scale of 1:250,000 for final presentation. Much consideration has been given to alternatives to the 1:250,000 map, such as producing 1:50,000 maps only, or producing a 1:125,000 scale map. It is now proposed that the final map be produced at a scale of 1:126,720 in three colours: brown or gray for planimetry and access; blue for water bodies; black for soil lines and symbols. This is recommended for the following reasons:

1) According to general criteria for producing soils or biophysical maps in Canada, 1:126,720 is a suitable scale for presentation of the information gathered. This soils inventory is a level 4 to 5 (reconnaissance) survey. This means that since the information was mainly obtained by air-photo interpretations and helicopter field checking, almost all soil boundaries were inferred. Production of maps at 1:50,000 would imply that the information is more detailed than it really is. Publication at 1:250,000 would suggest less detail, would necessitate elimination of several delineations due to small size, and would be difficult to use in terms of pinpointing locations on the map. The scale of 1:126,720 sounds like a compromise, but it is, in fact, a proven useful scale. Several other soil maps have been produced at this scale in recent years.

2) 1:126,720 (1" = 2 mi) is the scale at which some types of forest cover maps are produced. Thus, base maps are available from the Department of Energy and Natural Resources.

3) A three colour map is recommended over full colour due to the time and expense that would be required in producing the latter. Use of different colours for planimetry, water bodies and soils information would avoid confusion in interpreting lines on the map.

4) The soils information for all of the AOSERP study area can be presented in five maps of manageable size at a scale of 1:126,720. This is an improvement over the 40 to 50 maps required

at the 1:50,000 scale. These maps can be easily used in the field and could be spliced to display larger portions, or all, of the AOSERP area on an office wall or desk.

5) A legend would accompany each map. A legend accompanying each 1:50,000 map would almost double the paper requirement.

6) The five maps can accompany the report in a folder.

A disadvantage of the 1:126,720 base scale is that due to the odd configuration of the AOSERP study area, boundaries do not coincide with many of the existing forest cover map boundaries. Thus, portions of base maps will have to be spliced. This was discussed with personnel from Cartographic Services, Resource Evaluation Branch, Department of Energy and Natural Resources and they have prepared a base for one of the five maps. This base is of good quality and considered suitable for production of final maps as discussed above.

In proceeding with production of 1:126,720 soil maps, it is also recommended that, to save time, all 1:50,000 field working maps still to be completed be done entirely in free hand. All previous maps were symbolized by stencil, which is relatively time-consuming. The major cartographic effort at this stage of the project should be directed to producing the final map.

The suggested work plan for future months is presented below:

Work Plan for the Remainder of the 1979-80 Fiscal Year:

- complete 1:50,000 preliminary soil maps in free hand.
- prepare a progress report - i.e. a short report on the past year's activities, and presentation of field and lab data.
- start work on the final report and map.

Work Plan for April-September, 1980:

Production of the Final Map

- obtain negatives of base maps from Cartographic Services, Resource Evaluation Branch, Department of Energy and Natural Resources.

- transfer information from 1:50,000 maps to 1:126,720 maps.
- change, add, or delete lines as necessary to eliminate areas too small to show at 1:126,720.
- symbolize the rough draft using a set of symbols modified from preliminary maps.
- scribe the soil maps.
- count, typeset, and produce strip film of map symbols.
- symbolize maps on overlay sheets.
- produce the legend (typeset) and arrange on maps.
- send to printer for proof copies.
- check proof copies.
- forward all map overlays to AOSERP management. This is the final product - printing of copies to be the responsibility of AOSERP management unless other arrangements are made.

Production of the Final Report

Outline

Abstract

1) Introduction
2) General Description of the Area
   Location and extent
   Bedrock Geology
   Surficial Geology
   Climate
   Vegetation
   Physiography and Topography
   Drainage
3) Resume of current state of knowledge
4) Methodology
   Ecological (biophysical) Classification - concepts, methods
   Soil genesis
   Soil classification and mapping
   Landform and topographic classification
   Plant community classification

5) Land Regions
6) Land Districts
7) Land Systems - soil series, vegetation, landforms
8) Discussion, Conclusions, Recommendations
   Land Use (some general comments on land capability for different uses)
   Permafrost
9) References cited
10) Appendix
   - definitions of descriptive terms
   - methods of chemical and physical analyses
11) Photographs of soil profiles and land systems
12) Fold-out maps (in back cover pocket)

5. LITERATURE CITED

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6. APPENDICES

6.1 DESCRIPTIONS AND ANALYSES OF SOILS SAMPLED IN 1978

Site features, soil morphological characteristics and analytical data of 30 soil profiles sampled in 1978 are presented in the following pages.

Site:	M78-1
Land System:	Heart
Location:	NW2-86-17-W4
Classification:	Eluviated Dystric Brunisol
Landform:	
Genetic Material:	Eolian; sandy
Surface Expression:	Undulating to hummocky; gentle slopes
Site Features:	Upper slope position; southeast aspect; rapidly drained; high perviousness; nonstony
Vegetation:	Jackpine-bearberry-lichens (2c)

Profile Description:

LF - 4 to 0 cm; very dark brown (10YR 2/2 m); slightly to moderately decomposed needles, leaves and lichens; very few, horizontal, coarse and few, fine to medium, horizontal roots; clear, smooth boundary.

Ae - 0 to 10 cm; grayish brown (10YR 5/2 m); fine sand; single grain, loose; very few, coarse, horizontal and few, very fine to medium, horizontal roots; gradual, smooth boundary.

AB - 10 to 19 cm; yellowish brown (10YR 5/4 m); fine sand; single grain; loose; very few, very fine to coarse, horizontal roots; diffuse, smooth boundary.

Bm1 - 19 to 34 cm; yellowish brown (10YR 5/4 m); fine sand; single grain; loose, very few, fine to coarse, oblique roots; diffuse, smooth boundary.

Bm2 - 34 to 78 cm; yellowish brown (10YR 5/4 m); fine sand; single grain; loose; very few roots; diffuse, smooth boundary.

BC - 78 to 100 cm; olive brown (2.5Y 4/4 m); fine sand; single grain; loose; very few roots; diffuse, smooth boundary.

C - 100+ cm; dark grayish brown (2.5Y 4/2 m); fine sand; single grain, loose.

Table 1. Analysis: Site M78-1.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		3.9	4.5	34.55	1.05	33
Ae	86	-	-	3	73	11	12	2		4.2	5.2	0.56	0.03	19
AB	88	-	-	3	72	14	10	2		5.0	6.0	0.26	0.02	13
Bm1	90	-	-	2	73	15	7	3		5.1	6.7	0.13	0.01	13
Bm2	89	-	-	2	73	13	6	5		5.1	6.0	0.16	0.01	16
BC	91	-	-	2	72	16	4	5		5.1	6.0	-	-	-
C	92	-	-	2	78	12	5	3		5.7	6.5	-	-	-

Horizon	$CaCO_3$ eq. (%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Ae	-	6.1	0.01	0.1	1.0	0.2	21						
AB	-	5.9	0.01	0.2	1.5	0.3	34						
Bm1	-	5.4	0.00	0.1	1.7	0.5	43						
Bm2	-	7.5	0.03	0.2	2.7	0.9	51						
BC	-	6.4	0.02	0.1	2.6	0.7	52						
C	-	6.4	0.02	0.1	3.5	0.5	66						

Site: M78-2
Land System: Horse River
Location: 11-83-13-W4
Classification: Orthic Gray Luvisol
Landform:
Genetic Material: Morainal; fine loamy
Surface Expression: Hummocky and ridges; gentle slopes
Site Features: Upper slope position; northeast aspect; moderately well drained; medium perviousness; moderately stony
Vegetation: Black spruce-Labrador tea-feathermosses (2b)
Profile Description:

LF - 8 to 0 cm; dark brown; slightly to moderately decomposed leaves and mosses; permeated by fungal hyphae; few, very coarse, horizontal and plentiful, very fine to medium, horizontal roots; abrupt, clear boundary.

Ae - 0 to 9 cm; light gray (10YR 7/2d); silty loam; strong, fine platy; very friable; few, fine to medium, horizontal roots; 10% coarse fragments; wavy, clear boundary.

AB - 9 to 22 cm; pale brown (10YR 6/3 m); fine sandy loam; weak, medium platy to weak, medium, subangular blocky; friable; few, fine and medium, oblique roots; 10% coarse fragments; gradual, smooth boundary.

Bt1 - 22 to 47 cm; brown (10YR 4/3 m); clay loam; moderate, medium and fine, subangular blocky; slightly sticky; few, fine to coarse, oblique roots; 10% coarse fragments; gradual, smooth boundary.

Bt2 - 47 to 59 cm; brown (10YR 4/3 m); clay loam; sticky; very few, fine and medium, oblique roots; 10% coarse fragments; gradual, smooth boundary.

BC - 59 to 75 cm; dark grayish brown (2.5Y 3.5/2 m); loam; sticky; very few roots; 10% coarse fragments; gradual smooth boundary.

C - 75 to 120 cm; dark grayish brown (2.5Y 4/2 m); loam; sticky; very few roots; 10% coarse fragments.

Table 2. Analysis: Site M78-2.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-	-	3.6	4.3	41.91	1.24	34
Ae	29	0.3	4	10	10	5	66	5		3.7	4.7	0.62	0.04	16
AB	51	2	7	17	19	8	42	7		4.2	5.1	0.40	0.03	13
Bt1	38	1	5	11	14	8	34	28		4.2	5.2	0.40	0.04	10
Bt2	39	1	5	12	14	7	32	29		4.2	4.5	0.34	0.03	11
BC	39	6	5	12	15	7	35	26		4.9	4.5	0.41	0.03	14
C	46	1	5	14	18	8	30	24		4.4	5.0	-	-	-

Horizon	$CaCO_3$ eq.(%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Ae	-	7.5	0.04	0.2	0.5	0.3	14						
AB	-	7.5	0.03	0.1	1.1	0.5	23						
Bt1	-	22.5	0.1	0.2	4.4	2.9	34						
Bt2	-	24.2	0.05	0.2	5.2	3.7	38						
BC	-	24.2	0.1	0.2	5.2	3.5	37						
C		20.4	0.10	0.2	5.2	3.4	44						

Site: M78-3

Land System: Dover

Location: SE33-86-12-W4

Classification: Orthic Gray Luvisol

Landform:

Genetic Material: Mixed glaciolacustrine veneer overlying till; fine silty over fine loamy

Surface Expression: Undulating; nearly level

Site Features: Midslope position; west aspect; moderately well drained; medium perviousness; moderately stony

Vegetation: Jackpine/white spruce/aspen-blueberry-feathermosses (2b)

Profile Description:

LF - 4 to 0 cm; dark brown; leaves and mosses, slightly decomposed in L layer and permeated by fungi in F layer; plentiful, fine and medium, horizontal roots; clear, wavy boundary.

Ae - 0 to 8 cm; light gray (10YR 7/2 d), dark grayish brown (10YR 4/2 m); silt loam; moderate fine platy, very friable; 10% coarse fragments; clear, wavy boundary;

AB - 8 to 13 cm; light gray (2.5Y 6/2 d), olive brown (2.5Y4/4 m); silt loam; moderate, medium platy breaking to moderate, fine subangular blocky; friable; 10% coarse fragments; gradual, wavy boundary.

Bt1 - 13 to 29 cm; light gray (10YR 7/2 d), dark yellowish brown (10YR 4/4 m); silty clay loam; strong, medium, subangular blocky; sticky; 10% coarse fragments; gradual, wavy boundary.

Bt2 - 29 to 55 cm; pale brown (10YR 6/3 d), brown (10YR 4/3 m); clay loam; moderate, medium, subangular blocky; sticky; 5% coarse fragments; gradual, smooth boundary.

IIBC - 55 to 100 cm; light yellowish brown (2.5Y 6/3d), dark grayish brown (2.5Y 4/2 m); loam; sticky; weak, fine, subangular blocky; 10% coarse fragments; gradual, smooth boundary.

IIC - 100 to 120+ cm; light yellowish brown (2.5Y 6/3 d), dark grayish brown (2.5Y 4/2 m); loam; sticky; massive; 10% coarse fragments.

Table 3: Analysis: Site M78-3.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		4.3	4.8	24.59	0.97	25
Ae	20	0.2	2	4	7	7	72	8		4.1	4.8	1.15	0.07	16
AB	12	-	0.8	2	4	5	71	17		4.3	5.2	0.42	0.03	14
Bt1	14	-	1	4	6	3	56	30		4.3	4.9	0.48	0.04	12
Bt2	23	-	1	5	10	7	45	32		4.4	5.0	0.50	0.03	17
IIBC	31	-	2	6	14	9	45	24		6.2	6.6	0.78	0.03	26
IIC	31	0.2	2	6	14	10	46	23		7.3	7.6	-	-	-

Horizon	$CaCO_3$ eq. (%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Ae	-	11.3	0.03	0.2	1.8	0.7	24						
AB	-	10.0	0.02	0.2	1.7	0.8	27						
Bt1	-	18.9	0.06	0.2	3.5	2.4	33						
Bt2	-	20.4	0.05	0.2	5.2	3.5	44						
IIBC	-	18.9	0.07	0.2	6.7	4.0	58						
IIC	4.5 WC	-	-	-	-	-	-						

Site:	M78-4
Land System:	Kinosis
Location:	NE8-85-11-4
Classification:	Brunisolic Gray Luvisol
Landform:	
Genetic Material:	Morainal; fine loamy
Surface Expression:	Undulating; very gentle slopes
Site Features:	Midslope position; west aspect; well drained; medium perviousness; moderately stony
Vegetation:	Jack pine/black spruce-Labrador tea/ blueberry-lichens (2c)

Profile Description:

L-F - 4 to 0 cm; dark brown; slightly and moderately decomposed needles and lichens; plentiful very fine and fine, horizontal roots; abrupt, wavy boundary.

Ae1 - 0 to 18 cm; light gray (10YR 7/1 m); loamy sand; single grain; loose; few, very fine and fine, oblique and very few, coarse oblique roots; 5% coarse fragments; clear, wavy boundary.

Bm - 18 to 27 cm; strong brown (7.5YR 5/6 m); fine sandy loam; single grain; loose; few, very fine to coarse, oblique roots; 5% coarse fragments; clear, wavy boundary.

Ae2 - 27 to 32 cm; very pale brown (10YR 7/3 m); sand; weak, medium platy; very friable; very few, fine to coarse, oblique roots; 5% coarse fragments; gradual, wavy boundary.

IIBt - 32 to 46 cm; brown (10YR 5.5/3 m); clay loam; weak, fine, subangular blocky; slightly sticky; very few, fine to coarse, oblique roots; 5% coarse fragments; gradual, smooth boundary.

IIBC - 46 to 85 cm; olive brown (2.5Y 4/3 m); clay loam; moderate, medium, subangular blocky; sticky; very few, fine to coarse, oblique and vertical roots; 5% coarse fragments.

IIC - 85 to 120 cm; dark grayish brown (2.5Y 3.5/2 m); clay loam; massive; sticky; very few roots; 5% coarse fragments.

Table 4. Analysis: Site M78-4.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		3.6 EA	4.1	37.01	1.09	34
Ae1	81	1	19	37	21	3	19	-		3.6 EA	4.1	0.42	0.02	21
Ae2	67	1	7	24	27	8	28	5		4.3 EA	5.3	0.14	0.01	14
Bm	90	2	15	40	31	2	3	7		4.6 VSA	5.5	0.23	0.02	12
IIBt	44	0.6	4	12	19	8	32	24		4.1 EA	4.8	0.21	0.03	9
IIBC	42	1	4	12	17	7	30	28		4.3 EA	4.9	0.28	0.03	9
IIC	44	0.2	4	14	18	7	29	27		4.9 VSA	5.2	-	-	-

Horizon	$CaCO_3$ eq.(%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Ae1	-	2.9	0.00	0.05	0.1	0.05	6.9						
Ae2	-	2.9	0.00	0.06	0.4	0.20	22						
Bm	-	4.3	0.00	0.1	0.2	0.10	9.3						
IIBt	-	15.4	0.03	0.2	2.9	1.8	32						
IIBC	-	23.0	0.04	0.2	4.6	2.9	34						
IIC	0	27.5	0.06	0.2	5.3	3.4	33						

Site:	M78-5
Land System:	Kinosis
Location:	NW12-87-7-4
Classification:	Orthic Gray Luvisol
Landform:	
Genetic Material:	Morainal; fine loamy
Surface Expression:	Undulating; very gentle slopes
Site Features:	Midslope position; north aspect; well drained; medium perviousness; slightly stony
Vegetation:	Jackpine/black spruce-Labrador tea/ cowberry-lichens (2c)

Profile Description:

L-F - 3 to 0 cm; dark brown; slightly to moderately decomposed needles and leaves.

Ae1 - 0 to 5 cm; light gray (10YR 7.5/1 m); silty loam; strong, medium platy; very friable; 15% coarse fragments; clear, wavy boundary.

Ae2 - 5 to 11 cm; light brownish gray (10YR 6/3 m); clay loam; moderate, medium platy; friable; 15% coarse fragments; clear, wavy boundary.

AB - 11 to 18 cm; light olive brown (10YR 5/4 m); clay loam; weak, medium, subangular blocky; firm; 15% coarse fragments; gradual, smooth boundary.

Bt - 18 to 46 cm; dark grayish brown (10YR 4/3 m); clay loam; moderate, coarse, subangular blocky; firm; 15% coarse fragments; gradual, smooth boundary.

BC - 46 to 60 cm; olive brown (10YR 3/3 m); clay loam; moderate, medium subangular blocky; firm; 15% coarse fragments; diffuse, smooth boundary.

Ck1 - 60 to 80 cm; olive brown (10YR 3/3 m); clay loam; massive; firm; weakly calcareous; gradual,smooth boundary.

Ck2 - 80 to 120 cm; dark grayish brown (2.5Y 4/2 m); moderately calcareous.

Table 5. Analysis: Site M78-5.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		3.6	4.2	25.28	0.61	41
Ae1	40	0.4	4	12	16	7	54	6		3.7	4.5	0.72	0.04	18
Ae2	41	-	3	13	21	10	31	28		4.3	5.0	0.49	0.03	16
AB	37	0.2	3	12	18	8	28	35		4.3	4.8	0.42	0.03	14
Bt	35	0.5	3	11	15	6	32	33		4.5	4.9	0.50	0.03	17
BC	37	0.5	3	10	15	7	32	31		4.9	5.2	0.49	0.03	16
Ck1	35	0.2	4	10	16	7	34	31		7.0	7.6	-	-	-
Ck2	-	-	-	-	-	-	-	-		7.5	7.8	-	-	-

Horizon	$CaCO_3$ eq.(%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Ae1	-	8.8	0.00	0.08	0.9	0.2	13						
Ae2	-	12.3	0.01	0.1	1.5	0.7	19						
AB	-	20.6	0.04	0.2	3.3	2.2	28						
Bt	-	28.9	0.08	0.2	5.5	3.7	33						
BC	-	25.1	0.06	0.2	6.2	3.8	41						
Ck1	2.1 WC	-	-	-	-	-	-						
Ck2	9.2 MC	-	-	-	-	-	-						

Site: M78-6

Land System: Kinosis

Location: SE35-84-9-W4

Classification: Orthic Gray Luvisol

Landform:

Genetic Material: Morainal; fine loamy

Surface Expression: Hummocky; gentle and moderate slopes

Site Features: Upper slope position; northeast aspect; moderately well drained; medium perviousness; moderately stony

Vegetation: Aspen/white spruce/black spruce-alder-feathermoss (2aM)

Profile Description:

LFH - 9 to 0 cm; dark brown, slightly to moderately decomposed leaves needles and mosses; permeated with fungal hyphae; abrupt, smooth boundary.

Ae1 - 0 to 8 cm; grayish brown (10YR 5/2 m); silt; moderate, fine platy; friable; 5% coarse gragments; plentiful, fine to coarse, horizontal roots; clear, wavy boundary.

Ae2 - 8 to 21 cm; yellowish brown (10YR 5/4 m); silt loam; strong, fine platy; friable; 5% coarse fragments; few, fine to coarse, oblique roots; gradual, wavy boundary.

AB - 21 to 26 cm; brown (10YR 5/3 m); silt loam; modearte, medium platy to moderate, fine subangular blocky; friable; 5% coarse fragments; very few, fine, oblique roots; clear, wavy boundary.

Bt - 26 to 41 cm; dark brown (10YR 4/3 m); clay loam; moderate, medium, subangular blocky; firm; 5% coarse fragments; very few roots; clear, wavy boundary.

BC - 41 to 70 cm; dark grayish brown (10YR 4/2 m); clay loam; moderate, medium, subangular blocky; firm; 5% coarse fragments; very few roots; gradual, smooth boundary.

C - 70 to 110+ cm; dark grayish brown (10YR 4/2); loam; massive; firm; very few roots; 5% coarse fragments.

Table 6. Analysis: Site M78-6.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		3.3	3.9	37.65	1.62	23
Ae1	6	-	-	-	-	-	83	11		3.7	4.6	1.09	0.08	14
Ae2	5	-	-	-	-	-	78	17		4.1	5.1	0.51	0.05	10
AB	23	0.4	2	7	9	4	56	21		4.2	4.8	0.41	0.03	14
Bt	44	0.5	4	10	19	10	27	29		4.2	4.5	0.33	0.03	11
BC	42	0.6	5	12	17	8	28	30		4.1	4.6	-	-	-
C	46	1	6	13	18	8	29	25		4.3	4.6	-	-	-

Horizon	$CaCO_3$ eq.(%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Ae1	-	14.5	0.1	0.2	0.4	0.2	6						
Ae2	-	7.8	0.02	0.2	1.2	0.6	26						
AB	-	10.2	0.02	0.2	2.3	1.1	35						
Bt	-	16.7	0.03	0.2	5.1	2.6	47						
BC	-	15.3	0.06	0.2	6.03	3.4	63						
C	-	14.8	0.09	0.2	6.8	3.6	72						

Site: M78-7

Land System: Kinosis

Location: 8-82-7-W4

Classification: Gleyed Gray Luvisol

Landform:

Genetic Material: Morainal; fine loamy

Surface Expression: Undulating; gentle slopes

Site Features: Upper slope position; northeast aspect; moderately well drained; medium perviousness; moderately stony

Vegetation: Aspen-sarsaparilla-club mosses (2aA)

Profile Description:

LF - 8 to 0 cm; dark brown; slightly to moderately decomposed leaves and mosses; plentiful, fine to coarse, horizontal roots.

Aegj - 0 to 6 cm; pale brown (10YR 6/3 m); fine sandy loam; moderate, coarse platy; friable; 5% coarse fragments; plentiful, fine to coarse, horizontal roots; wavy boundary.

ABgj - 6 to 17 cm; light yellowish brown (10YR 6/4 m); fine sandy loam; moderate, fine platy; friable; 5% coarse fragments; few, fine to medium, oblique roots; gradual, smooth boundary.

Bgj - 17 to 42 cm; light yellowish brown (10YR 6/4 m); fine sandy loam; weak, medium, subangular blocky; friable; 5% coarse fragments; few, fine, oblique roots; gradual, smooth boundary.

IIBC - 42 to 80 cm; dark grayish brown (10YR 4/2 m); loam; weak, medium subangular blocky; firm; 5% coarse fragments; very few roots; clear, smooth boundary.

IIC - 80 to 120 cm; dark grayish brown (10YR 4/2 m); loam; massive; firm; 5% coarse fragments; very few roots.

Table 7. Analysis: Site M78-7

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		4.2	4.6	35.09	1.79	20
Aegj	56	0.4	5	15	24	11	38	6		3.2	3.9	1.53	0.10	15
ABgj	59	1	4	15	27	13	31	10		3.8	4.5	0.82	0.06	14
Btgj	57	0.6	4	15	26	11	35	8		4.1	4.9	0.36	0.03	12
IIBC	42	0.4	4	11	18	9	38	20		4.2	4.5	0.24	0.24	8
IIC	41	1	4	11	17	8	35	24		4.2	4.6	-	-	-

Horizon	$CaCO_3$ eq. (%)	TEC me/100g	Exch. Cations me/100 g							Cations in saturation extract me/l			
			Na	K	Ca	Mg	%	mmho/cm	%	Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Aegj	-	7.8	0.02	0.2	1.2	0.7	26						
ABgj	-	9.3	0.02	0.09	1.2	0.7	22						
Btgj	-	5.8	0.04	0.06	1.4	0.6	36						
IIBC	-	14.3	0.08	0.2	5.9	2.3	59						
IIC	-	16.1	0.11	0.2	7.6	3.1	68						

Site: M78-8
Land System: Kinosis
Location: NE31-83-6-W4
Classification: Orthic Gray Luvisol
Landform:
Genetic Material: Morainal; fine loamy
Surface Expression: Hummocky; moderate and strong slopes
Site Features: Upper slope position; west aspect; well drained; medium perviousness; slightly stony
Vegetation; Aspen (2aA)
Profile Description:

LFH - 7 to 0 cm; black; slightly to well decomposed leaves; plentiful very fine to coarse, horizontal roots; abrupt, wavy boundary.

Ae1 - 0 to 10 cm; light gray (10YR 7/2 m); sandy loam; weak, medium platy; very friable; few, fine to coarse, horizontal roots; 5% coarse fragments; gradual, smooth boundary.

Ae2 - 10 to 22 cm; pale brown (10YR 6/3 m); fine sandy loam; moderate, medium platy; very friable; few, fine to coarse, oblique roots; 5% coarse fragments; clear, wavy boundary.

AB - 22 to 30 cm; brown (10YR 5/3 m); loam; moderate, medium platy to weak, fine subangular blocky; friable; very few, fine to coarse roots; 5% coarse fragments; wavy boundary.

Bt - 30 to 50 cm; dark yellowish brown (10YR 3/6 m); loam; strong, fine, subangular blocky; firm; very few roots; 5% coarse fragments; clear, wavy boundary.

BC - 50 to 70 cm; dark brown (10YR 3/3 m); sandy clay loam; moderate, medium, subangular blocky; firm; very few roots; 5% coarse fragments; gradual, smooth boundary.

C - 70+ cm; dark brown (10YR 3/3 m); loam; massive; firm; 5% coarse fragments.

Table 8. Analysis: Site M78-8.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		5.7	6.1	36.92	1.52	24
Ae1	68	1	8	24	28	7	31	1		4.6	5.3	0.27	0.13	2
Ae2	56	1	6	22	28	9	40	4		4.9	5.7	0.13	0.02	7
AB	49	1	4	13	21	10	31	20		5.2	5.7	0.23	0.03	8
Bt	46	1	3	10	22	10	30	24		5.2	5.6	0.00	0.03	8
BC	44	4	4	11	19	9	30	26		5.0	5.4	-	-	-
C	47	0.5	4	13	20	10	30	23		5.8	6.1	-	-	-

Horizon	$CaCO_3$ eq.(%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Ae1	-	2.8	0.01	0.09	1.7	0.2	71						
Ae2	-	3.1	0.01	0.08	2.4	0.5	96						
AB	-	10.5	0.02	0.20	7.6	2.2	95						
Bt	-	14.8	0.03	0.2	9.7	3.7	92						
BC	-	15.3	0.04	0.2	9.4	3.8	88						
C	-	13.1	0.06	0.2	9.5	3.6	102						

Site: M78-9

Land System: Algar

Location: NW7-91-10-W4

Classification: Gleyed Solonetzic Gray Luvisol

Landform:

Genetic Material: Glaciolacustrine veneer overlying till; fine clayey

Surface Expression: Undulating; nearly level slopes

Site Features: Level site; imperfectly drained; low perviousness; slightly stony

Vegetation: Black spruce/white spruce-Labrador tea/ blueberry (2b)

Profile Description:

LFH - 2 to 0 cm; black; moderately decomposed leaves.

Aeg - 0 to 9 cm; light gray (10YR 7/1 d); grayish brown (10YR 5/2 m); silt loam; strong, medium platy; friable; less than 5% coarse fragments.

ABg - less than 1 cm

Bnjtg1 - 9 to 17 cm; light gray (10YR 7/2 d), brown (10YR 5/3 m); clay loam; moderate, medium columnar breaking to strong, medium subangular blocky; very firm; less than 5% coarse fragments.

Bnjtg2 - 17 to 37 cm; light gray (10YR 7/2 d), brown (10YR 4/3 m); clay; moderate, medium columnar breaking to strong, fine subangular blocky; very firm; less than 5% coarse fragments.

BCgj - 37 to 46 cm; grayish brown (10YR 5/2 d), brown (10YR 4/3 m); clay; weak, medium columnar; very sticky; less than 5% coarse fragments.

Cgj - 46 to 67 cm; light brownish gray (10YR 6/2 d), brown (10YR 4/3 m); clay; massive; very sticky; less than 5% coarse fragments.

IICkgj - 67 to 95 cm; light brownish gray (2.5Y 6/2 d), brown and dark brown (10YR 5/3 and 3/3 w); clay loam; lenses of pink material; massive; very sticky; 5% coarse fragments.

Table 9. Analysis: Site M78-9.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		4.8	5.1	25.00	1.15	22
Aeg	42	1	5	19	14	4	52	6		4.3	5.1	0.65	0.05	13
Bntg1	35	0.3	3	11	16	5	32	33		4.5	5.1	0.43	0.04	11
Bntg2	31	0.3	2	9	14	5	28	41		4.6	5.0	0.43	0.03	14
BCgj	21	-	2	6	10	4	33	46		5.1	5.5	1.13	0.03	38
Cg	18	-	1	5	8	3	28	54		5.7	6.1	-	-	-
IICk	33	0.3	2	9	14	7	28	37		7.4	7.8	-	-	-

Horizon	$CaCO_3$ eq. (%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Aeg	-	4.3	0.02	0.07	1.4	0.7	51						
Bntg1	-	10.2	0.03	0.2	4.4	2.1	66						
Bntg2	-	14.3	0.06	0.2	6.8	3.1	71						
BCgj	-	19.6	0.09	0.2	13.0	4.7	92						
Cg	-	19.6	0.11	0.2	14.0	4.8	98						
IICk	5.2 WC	-	-	-	-	-	-						

Site: M78-10

Land System: Kinosis

Location: SW32-92-4-W4

Classification: Orthic Gray Luvisol

Landform:

Genetic Material: Morainal; fine-loamy

Surface Expression: Undulating, gentle slopes

Site Features: Midslope position; northeast aspect; moderately well drained; medium to high perviousness; moderately stony.

Vegetation: Black spruce-Labrador tea/cowberry-feathermoss/lichens (2b)

Profile Description:

LF - 6 to 0 cm; light and dark brown; mainly slightly decomposed needles, mosses and lichens; plentiful, fine to coarse, horizontal roots; clear, wavy boundary.

Ae - 0 to 16 cm; light gray (10YR 7/1 m); fine sandy loam; moderate, fine platy; very friable, plentiful, fine and medium, horizontal roots; 10% coarse fragments; clear, wavy boundary.

Bt1 - 16 to 34 cm; dark yellowish brown (10YR 4/4); loam; moderate, medium, subangular blocky; friable; few, fine and medium, oblique roots; 10% coarse fragments; gradual, wavy boundary.

Bt2 - 34 to 42 cm; brown (10YR 4/3 m); loam; weak, medium, subangular blocky; friable; few, fine, oblique roots; 10% coarse fragments; gradual, wavy boundary.

BC - 42 to 70 cm; dark brown (10YR 3/3 m); loam; weak, medium, subangular blocky; firm, very few, fine, roots; 10% coarse fragments; gradual, smooth boundary.

C - 70 to 110+ cm; very dark grayish brown (10YR 3/3 m); loam; very weak, medium, subangular blocky; firm; very few roots; 10% coarse fragments.

Table 10. Analysis: Site M78-10.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		3.1	3.7	33.23	0.82	40
Ae	48	0.7	6	16	17	9	48	4		3.7	4.6	0.32	0.03	11
Bt1	47	1	5	15	18	8	33	20		4.0	4.6	0.41	0.04	10
Bt2	47	1	6	15	17	7	32	21		4.1	4.6	0.20	0.02	10
BC	51	1	5	16	20	8	31	18		4.2	4.7	0.18	0.02	9
C	50	2	6	16	19	8	33	17		4.7	5.2	-	-	-

Horizon	$CaCO_3$ eq. (%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Ae	-	4.1	0.01	0.09	0.5	0.2	20						
Bt1	-	13.1	0.05	0.2	2.6	1.1	30						
Bt2	-	13.7	0.05	0.20	3.8	2.1	45						
BC	-	12.0	0.03	0.2	4.1	2.3	55						
C	-	11.7	0.04	0.2	6.03	3.3	82						

Site: M78-11

Land System: Not named*

Location: 16-95-4-W4

Classification: Eluviated Dystric Brunisol

Landform:

Genetic Material: Morainal; sandy

Surface Expression: Undulating; very gentle slopes

Site Features: Upper slope positions; southwest aspect; rapidly drained; high perviousness; moderately stony

Vegetation: Jack pine-Labrador tea/blueberry-lichens (2c)

Profile Description:

LF - 1 to 0 cm; brown; relatively undecomposed thin layer of needles, leaves and lichens; plentiful, fine to coarse, horizontal roots; abrupt, wavy boundary.

Ae - 0 to 20 cm; white (10YR 8/1 m); loamy (medium) sand; moderate, medium platy; very friable; plentiful, fine to medium, oblique roots; 5% coarse fragments; clear, irregular boundary - deeply tongued (up to 20 cm into Bfj horizon) in places.

Bfj - 20 to 40 cm; brown (7.5YR 4/4 m); sand (medium); weak, medium, subangular blocky; friable; few, fine to coarse, oblique roots; 5% coarse fragments; clear, wavy boundary.

Bm - 40 to 55 cm; yellowish brown (10YR 5/6 m); sand (medium); single grain; loose; very few fine and medium roots; 5% coarse fragments; clear, wavy boundary.

BC - 55 to 85 cm; yellowish brown (10YR 5/4 m); sand (medium); single grain; loose, very few roots; 5% coarse fragments.

* Soil is formed on coarse textured Gipsy till (Bayrock & Reimchen, 1974); included in Kinosis land system because of limited occurrence in the Study area.

Table 11. Analysis: Site M78-11.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		3.4	3.9	36.53	0.82	45
Ae	72	1	7	34	24	7	26	2		3.7	4.1	0.24	0.01	24
Bm	93	0.5	14	36	38	5	4	3		4.5	5.3	0.06	0.01	6
Btj	92	1	10	56	23	2	5	3		4.1	4.8	0.08	0.01	8
BC	80	1	8	27	34	11	16	4		4.6	5.3	0.04	0.01	4

Horizon	$CaCO_3$ eq.(%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Ae	-	1.4	0.10	0.02	0.2	0.05	26						
Bm	-	1.3	0.01	0.02	0.2	0.05	22						
Btj	-	2.5	0.01	0.03	0.2	0.05	12						
BC	-	1.2	0.02	0.03	0.2	0.10	29						

Site: M78-12

Land System: Legend

Location: SE11-97-15-W4

Classification: Orthic Gray Luvisol

Landform:

Genetic Material: Morainal; fine loamy

Surface Expression: Ridged (fluted); very gentle and gentle slopes

Site Features: Upper slope position; northeast aspect; moderately well drained; medium perviousness; moderately stony

Vegetation: Jack pine/black spruce-Labrador tea-lichens (2b)

Profile Description:

LF - 3 to 0 cm; dark brown; slightly to moderately decomposed; clear, smooth boundary.

Ae - 0 to 5 cm; light gray (10YR 6/1 m); fine sandy loam; moderate coarse platy; very friable; clear, wavy boundary.

AB - 5 to 10 cm; brown (10YR 5/3 m); loam; weak, medium platy to moderate, fine, subangular blocky; friable; gradual, wavy boundary.

Bt1 - 10 to 25 cm; yellowish brown (10YR 5/4 m); loam; moderate, fine and medium, subangular blocky; firm; gradual, wavy boundary.

Bt2 - 25 to 45 cm; light yellowish brown (10YR 6/4 m); loam; moderate, medium and coarse, subangular blocky; firm; gradual, smooth boundary.

Bt3 - 45 to 63 cm; dark yellowish brown (10YR 4/4 m); clay loam; moderate to strong, fine and medium, subangular blocky; firm; gradual, smooth boundary.

BC - 63 to 90 cm; brown (10YR 5/3 m); loam; weak to moderate, fine, subangular blocky; firm; gradual, smooth boundary.

C - 90 to 120+ cm; brown (10YR 5/3 m); loam; massive; firm.

Table 12. Analysis: Site M78-12.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		3.4	3.9	24.85	0.55	45
Ae	54	1	6	17	21	8	39	7		3.6	4.2	1.07	0.06	18
AB	49	0.5	6	17	19	7	35	16		3.8	4.6	0.66	0.05	13
Bt1	46	1	6	16	17	6	36	18		3.7	4.7	0.19	0.03	6
Bt2	45	1	6	15	17	7	32	23		3.8	4.6	0.09	0.03	3
Bt3	44	1	6	15	16	6	27	29		4.0	4.8	0.12	0.03	4
BC	44	1	7	14	16	6	29	27		4.0	4.5	-	-	-
C	46	1	6	16	17	6	28	26		4.4	4.9	-	-	-

Horizon	$CaCO_3$ eq.(%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Ae	-	8.1	0.02	0.1	1.3	0.2	20						
AB	-	11.1	0.04	0.2	1.4	0.5	19						
Bt1	-	8.6	0.04	0.1	1.6	0.7	28						
Bt2	-	11.1	0.07	0.2	2.8	1.3	39						
Bt3	-	15.3	0.09	0.2	5.9	2.7	58						
BC	-	16.1	0.1	0.2	7.1	3.0	65						
C	-	14.3	0.10	0.3	6.4	2.9	68						

Site: M78-13
Land System: Legend
Location: SW8-99-14-W4
Classification: Orthic Gray Luvisol
Landform:
Genetic Material: Morainal; fine loamy
Surface Expression: Hummocky; gentle slopes
Site Features: Upper slope position; north aspect; moderately well drained; medium perviousness; moderately and very stony
Vegetation: Jackpine/black spruce-Labrador tea/blueberry/dwarf birch (2b)

Profile Description:

LF - 3 to 0 cm; dark brown; slightly to moderately decomposed; clear, smooth boundary.

Ae - 0 to 5 cm; gray (10YR 6/1); silt loam; moderate, fine, platy; very friable; 10% coarse fragments; clear, wavy boundary.

Bm - 5 to 14 cm; grayish brown (10YR 5/2 m); loam*; moderate, medium, subangular blocky; friable; 15% coarse fragments; diffuse, smooth boundary.

Bt1 - 14 to 24 cm; yellowish brown (10YR 5/4 m); loam; moderate, medium, subangular blocky; firm; 15% coarse fragments; gradual, smooth boundary.

Bt2 - 24 to 42 cm; dark grayish brown (10YR 4/2 m); clay loam; strong, medium, subangular blocky; firm; 15% coarse fragments; gradual, smooth boundary.

BC - 42 to 77 cm; dark grayish brown (2.5Y 4/2 m); clay loam; moderate, medium, subangular blocky; firm to sticky; 15% coarse fragments; gradual, smooth boundary.

C - 77+ cm; dark grayish brown (2.5Y 4/2 m); loam; massive and layered; firm to sticky; 15% coarse fragments.

* hand texture

Table 13. Analysis: Site M78-13.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		3.5	4.1	25.77	0.86	30
Ae	36	1	5	11	12	5	53	11		3.7	4.4	1.07	0.07	15
Bm	-	-	-	-	-	-	-	-		-	-	-	-	-
Bt1	40	1	6	12	14	7	33	27		4.4	5.1	0.31	0.03	10
Bt2	35	1	5	11	13	5	31	34		4.6	5.5	0.36	0.03	12
BC	36	1	5	12	13	5	31	33		5.0	5.5	-	-	-
C	45	3	7	16	14	6	29	26		5.3	5.7	-	-	-

Horizon	$CaCO_3$ eq. (%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Ae	-	9.0	0.03	0.1	0.8	0.2	13						
Bm	-	-	-	-	-	-	-						
Bt1	-	14.3	0.04	0.2	6.4	2.8	66						
Bt2	-	18.1	0.06	0.3	9.6	4.2	78						
BC	-	19.0	0.08	0.3	9.0	4.8	75						
C	-	15.3	0.09	0.3	9.8	4.0	93						

Site: M78-14
Land System: Legend
Location: NE13-100-15-W4
Classification: Orthic Gray Luvisol
Landform:
Genetic Material: Morainal; fine loamy
Surface Expression: Ridged; gentle and moderate slopes
Site Features: Upper slope position; northwest aspect; well drained; medium perviousness; moderately stony
Vegetation: Jack pine/black spruce-Labrador tea/ green alder/bearberry/cowberry-feathermoss/ lichens (2b)

Profile Description:

LFH - 4 to 0 cm; dark brown to black; moderately decomposed leaves and needles.

Ae - 0 to 6 cm; light gray (10YR 7/2 m); sandy loam (medium); moderate, fine platy; very friable; 15% coarse fragments; clear, wavy boundary.

AB - 6 to 18 cm; brown (7.5YR 4/5/4 m); loam; weak, fine platy and moderate, fine, subangular blocky; friable; 15% coarse fragments; gradual, wavy boundary.

Bt1 - 18 to 36 cm; dark yellowish brown (10YR 4/4 m); clay loam; moderate, medium, subangular blocky firm; 15% coarse fragments; gradual, smooth boundary.

Bt2 - 36 to 62 cm; dark yellowish brown (10YR 4/4 m); clay loam; moderate, coarse, subangular blocky; firm; 15% coarse fragments; gradual, smooth boundary.

BC - 62 to 80 cm; very dark grayish brown (2.5Y 3/2 m); clay loam; strong, coarse, subangular blocky; firm; 15% coarse fragments; gradual, smooth boundary.

IIC - 80+ cm; light olive gray (5Y 6/2 d); olive gray (5Y 4/2 m); heavy clay; very firm.

Table 14. Analysis: Site M78-14.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		3.6	4.1	37.12	1.30	29
Ae	56	1	8	22	19	6	39	5		3.8	4.4	0.38	0.03	13
AB	48	1	5	16	19	6	28	24		4.2	4.8	0.60	0.05	12
Bt1	40	1	5	14	15	5	28	32		4.2	4.7	0.36	0.07	9
Bt2	40	0.5	7	15	14	4	28	32		4.2	4.8	0.31	0.03	10
BC	44	2	8	16	13	4	26	30		4.4	4.8	-	-	-
IIC	-	-	-	-	-	-	34	66		3.7	4.7	-	-	-

Horizon	$CaCO_3$ eq.(%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Ae	-	4.3	0.01	0.07	1.00	0.2	30						
AB	-	14.3	0.10	0.2	5.1	1.8	50						
Bt1	-	19.0	0.07	0.2	7.2	3.3	57						
Bt2	-	19.6	0.09	0.30	8.4	4.1	66						
BC	-	18.1	0.09	0.2	9.3	4.3	77						
IIC	-	39.2	0.5	1.0	6.09	3.4	28						

Site: M78-15

Land System: Legend

Location: SW8-100-15-W4

Classification: Gleyed Gray Luvisol

Landform:

Genetic Material: Morainal (local shaly till), fine-clayey

Surface Expression: Hummocky and rolling; gentle slopes

Site Features: Upper slope position; southeast aspect; moderately well drained; medium perviousness; slightly stony

Vegetation: Jack pine-green alder/black spruce/ Labrador tea-cowberry/bunchberry/ northern commandra (2b)

Profile Description:

LF - 4 to 0 cm; dark brown; slightly to moderately decomposed.

Ae - 0 to 3 cm; dark gray (10YR 4/1 m); silty clay; strong, fine granular; friable to sticky; very few coarse fragments; gradual, wavy boundary.

AB - 3 to 21 cm; brown (10YR 5/3 m) and dark gray (10YR 4/1 m); heavy clay; strong, fine and medium granular; friable to sticky; upper part is mixed with tongues of Ae; very weak cutan development; some charcoal-like particles present; gradual, smooth boundary.

Bmgj - 21 to 50 cm; grayish brown (2.5Y 5/2 m); loam; moderate, fine granular; very sticky; very few coarse fragments; gradual, smooth boundary.

BCgj - 50 to 68 cm; dark grayish brown (2.5Y 4/2 m); heavy clay; moderate, fine granular; very sticky, very few coarse fragments; gradual, wavy boundary.

Cgj - 68 to 80 cm; very dark gray (5Y 3/1 m); silty clay; moderate, fine granular; very sticky; very few coarse fragments.

Table 15. Analysis: Site M78-15.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		3.8	4.2	27.69	0.86	32
Ae	1	-	-	-	-	-	46	53		3.8	4.3	3.39	0.21	16
AB	1	-	-	-	-	-	37	60		4.0	4.6	0.77	0.11	7
Bmj	40	2	8	16	13	4	41	19		4.2	5.1	0.40	0.04	10
BC	-	-	-	-	-	-	37	63		3.7	4.8	-	-	-
C	-	-	-	-	-	-	43	57		3.8	4.3	-	-	-

Horizon	$CaCO_3$ eq.(%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Ae	-	45.1	0.10	1.5	5.4	2.5	21						
AB	-	36.3	0.07	1.09	5.2	3.02	26						
Bmj	-	9.8	0.03	0.1	2.5	1.1	38						
BC	-	39.2	0.5	0.9	6.3	3.6	29						
C	-	39.2	0.5	0.9	6.2	3.2	28						

Site: M78-16
Land System: Legend
Location: NE18-100-16-W4
Classification: Orthic Gray Luvisol
Landform:
Genetic Material: Morainal; fine loamy
Surface Expression: Ridged; gentle slopes
Site Features: Upper slope position; north aspect; moderately well drained; medium perviousness; moderately stony.
Vegetation: Jack pine/black spruce-Labrador tea/cowberry-lichens/feathermoss (2b)

Profile Description:

LF - 5 to 0 cm; dark brown; slightly to moderately decomposed.

Ae - 0 to 9 cm; dark gray (10YR 4/1 m); loam; strong, coarse platy; friable; 10% coarse fragments; gradual, wavy boundary.

AB - 9 to 17 cm; dark yellowish brown (10YR 4.5/4 m); clay loam; moderate, coarse platy and strong, fine subangular blocky; friable; 10% coarse fragments; gradual, smooth boundary.

Bt1 - 17 to 48 cm; dark yellowish brown (10YR 4/4 m); clay loam; strong, fine, subangular blocky; friable; 10% coarse fragments; gradual, smooth, boundary.

Bt2 - 48 to 64 cm; dark yellowish brown (10YR 4/4 m); clay loam; weak, medium, subangular blocky; friable; 10% coarse fragments; gradual, smooth boundary.

BC - 64 to 80 cm; dark brown (10YR 3/3 m); clay loam; weak, medium, subangular blocky; slightly sticky; 10% coarse fragments; diffuse, smooth boundary.

C - 80 to 120 cm; dark brown (10YR 3/3 m); clay loam; massive, breaking to weak, fine, subangular blocky; sticky; 10% coarse fragments.

Table 16. Analysis: Site M78-16.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		3.3	3.8	44.51	1.15	39
Ae	42	1	6	15	14	5	44	14		3.5	4.1	1.50	0.08	19
AB	31	1	5	10	11	5	41	28		4.1	4.8	0.68	0.07	10
Bt1	35	1	6	13	11	4	33	32		3.9	4.4	0.40	0.06	7
Bt2	37	1	5	14	13	5	32	31		3.9	4.4	0.34	0.05	7
BC	31	1	5	10	10	4	36	33		3.9	4.4	-	-	-
C	31	1	4	11	11	4	35	34		3.9	4.4	-	-	-

Horizon	$CaCO_3$ eq. (%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Ae	-	14.3	0.03	0.3	1.2	0.5	15						
AB	-	15.3	0.03	0.3	3.8	1.8	39						
Bt1	-	18.1	0.05	0.4	3.8	2.3	36						
Bt2	-	16.7	0.06	0.2	3.9	2.2	38						
BC	-	19.0	0.1	0.2	4.4	2.7	39						
C	-	19.0	0.10	0.3	4.8	2.9	43						

Site: M78-17

Land System: Namur

Location: NW22-103-11-W4

Classification: Gleyed Eluviated Dystric Brunisol

Landform:

Genetic Material: Fluvial; sandy

Surface Expression: Fan; almost level

Site Features: Upper slope position; southeast aspect; imperfectly to poorly drained; medium to high perviousness; nonstony

Vegetation: Aspen/white birch/willows (1a)

Profile Description:

LFH - 15 to 0 cm; dark brown and black; spongy, moderately to well decomposed leaf layer; plentiful, very fine to medium, and few, coarse, horizontal roots; abrupt, wavy boundary.

Aeg - 0 to 14 cm; dark brown (7.5YR 3/2 m) and yellowish red (5YR 4/6 m); many coarse, distinct mottles of yellowish hues; silt loam; moderate, medium platy; very friable; few, fine and medium, horizontal and oblique roots; clear, wavy boundary.

ABg - 14 to 32 cm; yellowish brown and dark yellowish brown (10YR 5/4 and 4.5/6 m); many, coarse, distinct mottles of yellowish hues; fine sandy loam; moderate, coarse platy; friable; few, fine and medium, oblique roots; diffuse, wavy boundary.

Bmg - 32 to 70 cm; brown (10YR 5/4 m); many, coarse distinct, yellowish brown (10YR 4/6 m) mottles; fine sandy loam; laminated; single grain; very friable; very few roots; diffuse, smooth boundary.

Cg - 70 to 90 cm; light brownish gray (10YR 6/2 m); many, coarse, faint to distinct, yellowish brown (10YR 5/4 m) mottles; fine sandy loam; laminated; single grain; very friable; very few roots.

Table 17. Analysis: Site M78-17.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		4.7	4.9	16.84	1.19	14
Aeg	32	-	-	5	16	11	58	10		5.1	5.5	0.51	0.05	10
ABg	73	-	-	14	45	13	18	9		5.2	5.8	0.34	0.03	11
Bmg	82	-	-	22	50	9	10	8		5.3	5.9	0.22	0.02	11
Cg	82	-	-	7	71	4	9	8		5.2	5.8	0.17	0.02	9

Horizon	$CaCO_3$ eq. (%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Aeg	-	10.5	0.1	0.2	3.7	1.1	49						
ABg	-	7.3	0.04	0.1	2.8	0.9	53						
Bmg	-	7.6	0.04	0.1	3.1	1.1	57						
Cg	-	7.0	0.05	0.1	3.0	1.0	59						

Site: M78-18
Land System: Legend
Location: NW20-102-13-W4
Classification: Orthic Gray Luvisol
Landform:
Genetic Material: Morainal; coarse loamy overlying sandy materials
Surface Expression: Hummocky; moderate slopes
Site Features: Midslope position; southwest aspect; well drained; high perviousness; very stony; slightly eroded by water, high point in land; possibly a kame complex
Vegetation: Jack pine/black spruce-green alder-lichens (2c)

Profile Description:

LF - 2 to 0 cm; dark brown, slightly to moderately decomposed needles and lichens.

Ae1 - 0 to 9 cm; dark grayish brown (10YR 4/2 m); sandy loam (medium); single grain to weak, coarse platy; very friable; 10% coarse fragments; gradual, wavy boundary.

Ae2 - 9 to 22 cm; dark grayish brown (10YR 4.5/2 m); fine sandy loam; weak, coarse platy; very friable; 10% coarse fragments; clear, wavy boundary.

Bt1 - 22 to 40 cm; dark yellowish brown (10YR 4.5/6 m); fine sandy loam; weak, fine, subangular blocky; very friable; 10% coarse fragments; clear, wavy boundary.

Bt2 - 40 to 65 cm; yellowish brown (10YR 5/5 m); fine sandy loam; weak, fine, subangular blocky; very friable; 10% coarse fragments; gradual, smooth boundary.

BC - 65 to 90 cm; strong brown (7.5YR 5.5/8 m); sand (medium); single grain; loose; 5% coarse fragments; gradual, smooth boundary.

C - 90 to 120 cm; strong brown (10YR 5/6 m); sand (medium); laminated; single grain; loose; 5% coarse fragments.

Table 18. Analysis: Site M78-18.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		3.3	4.1	37.17	0.90	41
Ae1	66	1	7	24	26	8	29	5		3.9	4.5	0.81	0.03	27
Ae2	51	1	7	20	18	6	47	2		4.2	5.0	0.46	0.03	15
Bt	56	1	6	19	22	8	30	14		4.5	5.2	0.23	0.01	23
Bm	55	2	3	13	23	14	34	11		4.3	5.1	0.13	0.01	13
BC	95	1	15	55	22	2	4	1		4.5	5.5	-	-	-
C	99	0.4	14	46	35	2	1	-		4.6	5.4	-	-	-

Horizon	$CaCO_3$ eq.(%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Ae1	-	7.3	0.01	0.08	0.2	0.05	5						
Ae2	-	5.1	0.00	0.09	0.2	0.1	7						
Bt	-	12.0	0.05	0.2	2.3	1.0	29						
Bm	-	7.6	0.5	0.1	1.9	1.1	47						
BC	-	1.8	0.02	0.03	0.4	0.3	42						
C	-	1.5	0.03	0.02	0.5	0.4	63						

Site	M78-19
Land System:	Legend
Location:	NW23-104-15-W4
Classification:	Gleyed Grey Luvisol
Landform:	
Genetic Material:	Morainal; fine-loamy
Surface Expression:	Ridged (fluted); gentle slopes
Site Features:	Upper slope position, northwest aspect; moderately well drained; medium perviousness; slightly stony
Vegetation:	Jack pine/black spruce-Labrador tea/ blueberry/dwarf birch/cowberry-lichens (2b)

Profile Description:

LF - 6 to 0 cm; dark brown; slightly to moderately decomposed leaves, needles and lichens; plentiful, very fine to coarse, horizontal roots; clear, wavy boundary.

Ae - 0 to 7 cm; gray (10YR 6/1 m); loam; moderate, medium platy; friable; plentiful, very fine to coarse, horizontal roots; 5% coarse fragments; clear, wavy boundary.

Bt1 - 7 to 24 cm; yellowish brown (10YR 5/4 m); clay loam; moderate, fine, subangular blocky; friable; few, fine to coarse, oblique roots; 5% coarse fragments; diffuse, wavy boundary.

Bt2 - 24 to 46 cm; yellowish brown (10YR 5/4 m); clay; strong, fine, subangular blocky; firm; few, fine to coarse, oblique roots; 5% coarse fragments; diffuse, wavy boundary.

Bt3 - 46 to 64 cm; brown (10YR 5/3 m); clay loam; moderate, medium, subangular blocky; sticky; 5% coarse fragments; clear, wavy boundary.

BC - 64 to 89 cm; grayish brown (10YR 5/3 m); clay loam; moderate, medium subangular blocky; sticky; very few roots; 5% coarse fragments; diffuse, smooth boundary.

Cgj - 89+ cm; gray (10YR 5/1 m); clay loam; very weak, fine and medium, subangular blocky; sticky; 5% coarse fragments.

Table 19. Analysis: Site M78-19.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		3.7	3.8	40.99	0.97	42
Ae	38	1	5	13	13	5	45	17		3.3	3.9	1.85	0.11	17
Bt1	26	0.4	4	8	9	4	41	33		3.9	4.7	0.77	0.07	11
Bt2	24	1	3	8	9	5	36	40		3.8	4.3	0.49	0.06	8
Bt3	25	1	4	8	9	3	37	38		3.8	4.2	0.51	0.06	9
BC	27	1	4	9	9	4	38	35		3.8	4.4	-	-	-
C	27	1	4	9	9	5	39	34		3.9	4.8	-	-	-

Horizon	$CaCO_3$ eq.(%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Ae	-	22.5	0.02	0.3	1.0	0.5	8						
Bt1	-	22.5	0.09	0.3	1.5	0.5	10						
Bt2	-	25.5	0.07	0.6	2.6	0.9	16						
Bt3	-	24.3	0.08	0.5	3.2	1.1	20						
BC	-	23.1	0.09	0.4	4.4	1.3	27						
C	-	22.5	0.08	0.4	5.1	1.2	30						

Site: M78-20
Land System: Legend
Location: NE23-103-18-W4
Classification: Orthic Gray Luvisol
Landform:
Genetic Material: Morainal; fine-clayey
Surface Expression: Undulating; very gentle slopes
Site Features: Midslope position; southwest aspect; imperfectly drained; medium perviousness; slightly stony
Vegetation: Black spruce/jack pine-Labrador tea/ blueberry/cowberry/crowberry-lichens/ feathermoss (2b)

Profile Description:

LF - 3 to 0 cm; brown; slightly to moderately decomposed needles and lichens; few fine to coarse horizontal roots; clear, wavy boundary.

Ae - 0 to 7 cm; dark gray (10YR 4/1.5 m); silt loam; strong, fine and medium platy; friable; few coarse fragments; few, fine and medium horizontal roots; clear, wavy to irregular boundary.

Bt1 - 7 to 23 cm; yellowish brown (10YR 5/4 m); clay loam; strong, fine, subangular blocky; sticky; few coarse fragments; few, fine and medium, oblique roots; clear, smooth boundary.

Bt2 - 23 to 35 cm; yellowish brown (10YR 5/4 m); silty clay; strong medium and fine, subangular blocky; sticky; few coarse fragments; very few, fine to coarse, oblique roots; gradual, smooth boundary.

Bt3 - 35 to 48 cm; dark grayish brown (2.5Y 4/2 m); silty clay; strong, medium, subangular blocky; sticky; few coarse fragments; very few, fine and medium, oblique roots; gradual, smooth boundary.

BC - 48 to 59 cm; dark gray (10YR 4/1.5 m); silty clay; moderate, medium, subangular blocky; sticky; few coarse fragments; very few roots; gradual, smooth boundary.

C - 59+ cm; dark grayish brown (10YR 4/2.5 m); silty clay; massive; firm; few coarse fragments.

Table 20. Analysis: Site M78-20.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		3.3	4.0	47.42	0.86	55
Ae	13	0.4	2	4	4	3	75	12		3.3	3.9	2.08	0.11	19
Bt1	21	0.3	3	8	7	2	41	38		3.9	4.6	0.77	0.08	10
Bt2	3	-	-	-	-	-	50	47		3.8	4.5	0.60	0.09	7
Bt3	9	-	-	-	-	-	41	50		3.8	4.3	0.60	0.09	7
BC	10	-	-	-	-	-	46	44		3.7	4.4	0.65	0.09	-
C	15	1	2	5	5	2	43	42		3.8	4.5	0.69	0.08	-

Horizon	$CaCO_3$ eq. (%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	116.7	0.02	2.4	1.8	1.8	5						
Ae	-	18.1	0.02	0.4	1.0	0.4	10						
Bt1	-	22.5	0.03	0.3	1.6	0.7	12						
Bt2	-	24.3	0.04	0.5	2.6	1.0	17						
Bt3	-	24.3	0.10	0.4	2.7	1.2	18						
BC	-	25.5	0.05	0.5	3.0	1.2	19						
C	-	25.5	0.1	0.5	4.6	1.7	27						

Site: M78-21

Land System: Legend

Location: NE29-97-18-W4 (Legend Lookout Tower)

Classification: Orthic Gray Luvisol

Landform:

Genetic Material: Morainal; fine-clayey

Surface Expression: Hummocky; moderate slopes

Site Features: Upper slope position; southeast aspect; moderately well drained; medium perviousness; moderately stony

Vegetation: White spruce-various shrubs-graminoids (2aC)

Profile Description:

LF - 12 to 0 cm; brown; slightly to moderately decomposed leaves; clear, wavy boundary.

Ae - 0 to 10 cm; gray (10YR 5/1 m); silt loam; strong, medium platy; friable; 10% coarse fragments; clear, wavy boundary.

AB - 10 to 15 cm; grayish brown (10YR 5/2 m); silt loam; moderate, fine, subangular blocky; firm; 10% coarse fragments; diffuse, smooth boundary.

Bt1 - 15 to 35 cm; yellowish brown (10YR 5/4 m); clay loam; strong, fine, subangular blocky; firm; 10% coarse fragments; diffuse, smooth boundary.

Bt2 - 35 to 60 cm; yellowish brown (10YR 5/4 m); clay; strong, medium subangular blocky; firm; 10% coarse fragments; diffuse, smooth boundary.

C - 60 to 100 cm; very dark grayish brown (10YR 3/2 m); silty clay; massive; firm; 10% coarse fragments.

Table 21. Analysis: Site M78-21.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		4.7	5.1	39.90	1.95	20
Ae	26	2	5	8	8	3	57	17		4.0	4.6	1.39	0.12	12
AB	32	1	6	11	10	4	50	18		4.1	4.7	1.24	0.07	18
Bt1	33	1	5	11	11	4	37	30		4.1	4.6	1.20	0.11	11
Bt2	23	1	3	8	8	3	35	42		3.8	4.3	0.63	0.07	9
C	6	-	-	-	-	-	45	49		3.7	4.3	-	-	-

Horizon	$CaCO_3$ eq.(%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Ae	-	17.6	0.02	0.3	3.2	0.6	23						
AB	-	17.6	0.02	0.2	3.8	1.0	29						
Bt1	-	22.5	0.04	0.2	3.7	1.1	22						
Bt2	-	27.8	0.09	0.5	3.7	1.6	21						
C	-	27.8	0.1	0.5	5.1	2.3	29						

Site: M78-22
Land System: Legend
Location: SW24-98-17-W4
Classification: Orthic Gray Luvisol
Landform:
Genetic Material: Morainal; fine-clayey
Surface Expression: Hummocky; gentle slopes
Site Features: Upper slope position; north aspect; moderately well drained; medium perviousness; moderately stony
Vegetation: Jack pine/black spruce/aspen-blueberry-lichens (2b)

Profile Descriptions:

LF - 2 to 0 cm; dark brown; slightly to moderately decomposed needles, leaves and lichens; plentiful, fine to coarse, horizontal roots; clear, wavy boundary.

Ae - 0 to 8 cm; grayish brown (10YR 5/2 m); silt loam; moderate, fine platy; friable; 10% coarse fragments; few, fine to coarse, horizontal roots; clear, wavy boundary.

Bt1 - 8 to 18 cm; brown (10YR 5/3 m); clay loam; moderate, fine and medium, subangular blocky; friable; 10% coarse fragments; very few, fine to coarse, oblique roots; diffuse, smooth boundary.

Bt2 - 18 to 35 cm; yellowish brown (10YR 5/4 m); clay loam; strong, fine and medium, subangular blocky; firm; 10% coarse fragments; few, fine to coarse, oblique roots; diffuse, smooth boundary.

BC - 35 to 60 cm; dark gray (10YR 4/1 m); clay; strong, medium, subangular blocky; slightly sticky; 10% coarse fragments; very few roots; diffuse, smooth boundary.

C - 60 to 100 cm; very dark gray (10YR 3/1 m); clay loam; moderate, fine, subangular blocky; firm; 10% coarse fragments; very few roots.

Table 22. Analysis: Site M78-22.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		4.4	4.9	24.06	0.86	28
Ae	22	1	4	8	7	2	67	11		3.9	4.7	0.81	0.08	16
Bt1	36	0.5	5	13	13	5	47	27		4.1	4.8	0.49	0.05	10
Bt2	44	1	6	17	16	5	28	28		4.1	4.7	0.29	0.04	7
BC	23	1	3	8	8	3	33	44		4.2	4.6	0.47	0.05	9
C	31	1	4	11	11	4	33	36		4.4	4.8	0.54	0.06	9

Horizon	$CaCO_3$ eq.(%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Ae	-	10.5	0.05	0.2	1.0	0.3	15						
Bt1	-	11.3	0.08	0.2	3.0	1.4	41						
Bt2	-	12.7	0.08	0.2	4.5	2.3	56						
BC	-	23.6	0.1	0.5	10.3	5.9	71						
C	-	19.2	0.1	0.5	10.7	5.6	88						

Site: M78-23
Land System: Legend
Location: SW18-100-17-W4
Classification: Orthic Gray Luvisol
Landform:
Genetic Material: Morainal; fine-loamy
Surface Expression: Hummocky and undulating; gentle slopes
Site Features: Upper slope position; southwest aspect; moderately well drained; medium perviousness; moderately stony
Vegetation: Jack pine/black spruce-cowberry/ Labrador tea-lichens (2b)

Profile Description:

LF - 3 to 0 cm; dark brown; slightly to moderately decomposed.

Ae - 0 to 10 cm; light gray (10YR 7/2.5 m); silt loam; strong, fine platy; very friable; 15% coarse fragments; gradual, wavy boundary.

AB - 10 to 16 cm; pale brown (10YR 6/3 m); clay loam; moderate, fine, subangular blocky; 15% coarse fragments; clear, wavy boundary.

Bt1 - 16 to 34 cm; dark brown (10YR 4/3 m); clay loam; strong, medium, subangular blocky; firm; 20% coarse fragments; gradual, smooth boundary.

Bt2 - 34 to 52 cm; dark grayish brown (10YR 4/2 m); sandy clay loam; strong, medium, subangular blocky; firm; 15% coarse fragments; gradual, smooth boundary.

BC - 52+ cm; very dark grayish brown (10YR 3/2 m); sandy clay loam; weak, medium, subangular blocky to massive; firm; 15% coarse fragments.

Table 23. Analysis: Site M78-23.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		4.0	4.5	33.47	1.09	31
Ae	19	0.3	3	7	6	2	66	15		4.1	4.9	0.97	0.04	24
AB	22	1	3	8	8	3	49	29		4.8	5.3	0.36	0.03	12
Bt1	37	1	5	13	13	3	28	35		4.6	5.1	0.29	0.03	10
Bt2	45	2	6	16	16	5	27	28		4.9	5.4	0.21	0.03	7
BC	46	0.5	5	15	18	6	27	27		5.3	5.8	0.31	0.03	10

Horizon	$CaCO_3$ eq.(%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Ae	-	11.7	0.07	0.2	2.9	0.9	36						
AB	-	13.9	0.1	0.4	7.6	3.8	86						
Bt1	-	18.6	0.1	0.4	11.2	4.6	88						
Bt2	-	15.1	0.1	0.2	10.7	4.4	102						
BC	-	15.1	0.1	0.2	11.1	4.7	107						

Site:	M78-24
Land System:	Legend
Location:	SW14-102-17-W4
Classification	Gleyed Gray Luvisol
Landform:	
Genetic Material:	Morainal; fine-clayey
Surface Expression:	Rolling; gentle slopes
Site Features:	Upper slope position; southeast aspect; imperfectly drained; medium perviousness; slightly stony
Vegetation:	Black spruce/jack pine-Labrador tea-lichens/feathermoss

Profile Description:

LF - 9 to 0 cm; dark brown; slightly to moderately decomposed; clear, wavy boundary.

Aegj - 0 to 5 cm; very dark grayish brown (10YR 3/2 m); silt loam; strong, fine platy; friable; few coarse fragments; clear, wavy boundary.

ABgj - 5 to 11 cm; dark grayish brown (10YR 4/2.5 m); silt loam; strong, fine, mixed platy and subangular blocky; friable; few, coarse fragments; diffuse, wavy boundary.

Btgj1 - 11 to 28 cm; yellowish brown (10YR 5/4 m); silty clay; strong, medium, subangular blocky; firm; few coarse fragments; diffuse, smooth boundary.

Btgj2 - 28 to 45 cm; dark grayish brown (2.5Y 4/2 m); silty clay loam; strong, fine and medium, subangular blocky; firm; few coarse fragments; diffuse, smooth boundary.

BCgj - 45 to 60 cm; grayish brown (2.5Y 4.5/2 m); silty clay; moderate, medium, subangular blocky; firm to sticky; few coarse fragments; diffuse, smooth boundary.

Cgj - 60 to 90 cm; very dark grayish brown (2.5Y 3/2 m); silty clay; massive to weak, coarse, subangular blocky; firm to sticky; few coarse fragments.

Table 24. Analysis: Site M78-24.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		3.5	4.1	32.51	0.78	42
Aegj	10	-	-	-	-	-	69	21		3.4	4.0	2.40	0.11	22
ABgj	9	-	-	-	-	-	67	24		3.8	4.6	0.78	0.07	11
Btgj1	9	-	-	-	-	-	48	43		4.0	4.5	0.29	0.07	4
Btgj2	17	0.2	1	6	7	10	44	39		4.1	4.5	0.41	0.07	6
BCgj	14	-	1	5	6	2	45	41		4.1	4.5	0.50	0.08	6
Cgj	9	-	-	-	-	-	43	48		4.3	4.6	0.65	0.08	8

Horizon	$CaCO_3$ eq.(%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Aegj	-	21.0	0.05	0.4	1.0	0.5	9						
ABgj	-	16.3	0.06	0.2	1.4	0.8	15						
Btgj1	-	20.1	0.07	0.5	4.5	2.5	37						
Btgj2	-	19.1	0.08	0.4	6.3	3.7	55						
BCgj	-	21.8	0.09	0.5	8.7	4.5	63						
Cgj	-	26.9	0.1	0.6	12.4	6.2	72						

Site: M78-25
Land System: Chipewyan
Location: NE8-109-9-W4
Classification: Gleyed Cumulic Regosol
Landform:
Genetic Material: Fluvial; fine silty
Surface Expression: Delta; level and nearly level
Site Features: Nearly level; imperfectly drained; medium perviousness; nonstony
Vegetation: Balsam poplar/white spruce-horsetail (1b)
Profile Description:

LF - 2 to 0 cm; dark brown; slightly to moderately decomposed needles and leaves; many fungal hyphae.

C - 0 to 30 cm; very dark gray (2.5Y 3/0 m); silty clay loam; weak, fine platy; laminated; friable; includes some thin LFb and Hb horizons; diffuse, smooth boundary.

Ckgj - 30 to 50 cm; pale olive (5Y 6/3 m); silty clay loam; weak, fine platy; laminated; friable; includes some thin LFb and Hb horizons.

Ckg - 50 to 100 cm; very dark grayish brown (2.5Y 3/2 m); silty clay loam; massive; laminated; friable; includes some thin Lfb and Hb horizons.

Table 25. Analysis: Site M78-25.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		6.8	7.3	35.41	1.36	26
Ck	-						64	36		6.9	7.5	9.56	0.52	18
Ckgj	-						62	38		7.4	7.8	3.97	0.24	16
Ckg	-						67	32		7.4	7.8	3.41	0.23	15

Horizon	$CaCO_3$ eq.(%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-												
Ck	-												
Ckgj	5.2 WC												
Ckg	5.4 WC												

Site: M78-26

Land System: Chipewyan

Location: NW24-108-8-W4

Classification: Gleyed Regosol

Landform:

Genetic Material: Fluvial; sandy

Surface Expression: Delta; nearly level or ridged (levees) with very gentle slopes

Site Features: Upper slope position; northwest aspect; well drained; high perviousness; nonstony

Vegetation: At site: Aspen-wild rose-horsetail; Downslope: Willow/aspen-graminoids

Profile Description:

LF - 10 to 0 cm; dark brown to black; slightly to moderately decomposed leaves; plentiful, fine to coarse, horizontal roots; coarse roots concentrated at LF-Cgj1 boundary; abrupt, smooth boundary.

Cgj1 - 0 to 20 cm; very pale brown (10YR 7/3 d), pale brown (10YR 5.5/3 m); few, medium, distinct, strong brown (7.5YR 5/8 m) mottles; fine sand; single grain; very friable; few, fine to coarse, oblique roots; diffuse, smooth boundary.

Cgj2 - 20 to 50 cm; very pale brown (10YR 7/3 d). pale brown (10YR 5.5/3 m); few, medium, faint to distinct, strong brown (7.5YR 5/8 m) mottles; fine sand; single grain; very friable; very few roots; diffuse smooth boundary.

Cgj3 - 50+ cm; very pale brown (10YR 7/3 d); pale brown (10YR 6/3 m); few, medium, faint mottles; fine sand; single grain; very friable, very few roots.

Table 26. Analysis: Site M78-26.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		5.3	5.7	22.80	1.30	18
Cgj1	97	-	-	5	77	15	3	-		4.4	5.2	0.11	0.01	11
Cgj2	98	-	-	2	91	5	2	-		4.6	5.6	0.07	0.00	-
Cgj3	99	-	-	13	84	2	1	-		4.7	5.4	0.04	0.00	-

Horizon	$CaCO_3$ eq.(%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Cgj1	-	0.9	0.02	0.01	0.3	0.08	46						
Cgj2	-	0.5	0.00	0.01	0.2	0.05	52						
Cgj3	-	0.5	0.01	0.01	0.2	0.08	60						

Site:	M78-27
Land System:	Chipewyan
Location:	NE16-109-8-W4
Classification:	Gleyed Humic Regosol
Landform:	
Genetic Material:	Fluvial; fine-clayey overlying sandy
Surface Expression:	Delta; level and nearly level
Site Features:	Nearly level site; imperfectly drained; medium to high perviousness; nonstony
Vegetation:	Balsam poplar/white spruce-wild rose/ dogwood-horsetail

Profile Description:

LF - 10 to 0 cm; very dark brown; slightly to moderately decomposed leaves and needles; abrupt, wavy boundary.

Ahj - 0 to 20 cm; very dark gray (10YR 3/1 m); silty clay; fine granular; friable; gradual, wavy boundary.

ACk - 20 to 42 cm; very dark grayish brown (10YR 3/2 m); silty clay; fine granular; friable; gradual, wavy boundary.

IICk - 42 to 60 cm; light olive brown (2.5Y 5/4 m); very fine sandy loam; laminated; amorphous; loose; diffuse, smooth boundary.

IICkg - 60 to 100 cm; light olive brown (2.5Y 5/4 m); fine sand; laminated; single grain; loose.

Table 27. Analysis: Site M78-27.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		6.6	7.1	24.63	1.21	20
Ahj	-	-	-	-	-	-	48	52		6.5	7.1	15.56	0.75	21
ACk	10	-	-	-	-	-	48	42		7.6	8.1	4.87	0.36	14
Ck	77	-	-	-	42	34	15	8		7.7	8.0	0.42	0.02	21
IICkg	-	-	-	-	-	-	-	-		7.6	8.1	0.43	0.03	14

Horizon	$CaCO_3$ eq.(%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-	-	-	-	-	-	-						
Ahj	-	74.9	1.1	0.7	59.0	17.4	100						
ACk	2.7	-	-	-	-	-	-						
Ck	3.4	-	-	-	-	-	-						
IICkg	3.4	-	-	-	-	-	-						

Site: M78-28

Land System: Mamawi

Location: NE24-109-8-W4

Classification: Orthic Gleysol

Landform:

Genetic Material: Fluvial; fine-clayey

Surface Expression: Depressional to level

Site Features: Level site; very poorly drained; medium perviousness; nonstony

Vegetation: Sedges/cattails (3a)

Profile Description:

Of - 0 to 30 cm; dark gray (10YR 4/1 d), black (10YR 2/1 m); slightly to moderately decomposed sedges mixed with mineral material; abundant, very fine and fine roots; clear, smooth boundary.

Cg - 30 to 100+ cm; grayish brown (2.5Y 5/2 d), very dark grayish brown (2.5Y 3/2 m); silty clay; massive; very sticky; abundant, very fine and fine roots.

Table 28. Analysis: Site M78-28.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
Of	-	-	-	-	-	-	-	-		6.7	7.0	12.30	0.73	17
Cg	-	-	-	-	-	-	51	49		7.2	7.7	5.16	0.30	15

Horizon	$CaCO_3$ eq.(%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
Of	-	64.0	1.1	3.2	48.6	16.6	108						
Cg	5.2	-	-	-	-	-	-						

Site: M78-29
Land System: Chipewyan
Location: NE15-109-7-W4
Classification: Gleyed Regosol
Landform:
Genetic Material: Fluvial; fine silty over coarse-silty
Surface Expression: Delta; level
Site Features: Nearly level site; imperfectly drained; medium perviousness; nonstony
Vegetation: Balsam poplar-river alder-horsetail/ graminoids (1a)

Profile Description:

L - 18 to 13 cm; dark brown to black; slightly to moderately decomposed leaves; abundant, very fine to medium, horizontal and oblique roots; gradual, smooth boundary.

FH - 13 to 0 cm; black; moderately to well decomposed; abundant, very fine to coarse, horizontal and oblique roots; abrupt, smooth boundary.

Aegj - 0 to 1 cm; very dark grayish brown (10YR 3/2 m); silty clay loam; fine granular; friable; abundant, very fine to coarse roots; clear, wavy boundary; discontinuous.

ACkgj - 1 to 9 cm; dark grayish brown (10YR 3.5/2 m); silt loam; fine granular; friable; abundant, very fine to coarse, oblique roots; common, faint, yellowish mottles; gradual, smooth boundary.

Ckgj - 9 to 39 cm; dark grayish brown (10YR 4/2 m); loam; amorphous; very friable; abundant, very fine to medium, oblique roots; common, faint, yellowish mottles; diffuse, smooth boundary.

Ckg - 39 to 100 cm; dark grayish brown (2.5Y 4/2 m); loam; laminated; amorphous; very friable; abundant, very fine and fine, oblique roots; few roots in lower part of horizon; very faintly mottled.

Table 29. Analysis: Site M78-29.

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
L	-	-	-	-	-	-	-	-		6.6	7.1	26.94	1.48	18
F-H	-	-	-	-	-	-	-	-		5.9	6.2	35.06	2.24	16
Aegj	7	-	-	-	-	-	62	31		6.6	6.9	5.24	0.39	13
ACkgj	15	-	-	-	2	12	62	23		7.2	7.4	2.81	0.20	11
Ckgj	39	-	-	-	8	31	46	15		7.6	7.9	1.73	0.07	16
Ckg	39	-	-	-	7	31	46	15		7.7	8.0	1.40	0.09	8

Horizon	$CaCO_3$ eq.(%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
L	-	-	-	-	-	-	-						
F-H	-	-	-	-	-	-	-						
Aegj	-	41.7	2.3	0.5	36.6	14.1	128						
ACkgj	4.9	24.5	1.4	0.2	34.7	9.9	188						
Ckgj	5.3												
Ckg	5.9												

Site: M78-30
Land System Chipewyan
Location: NW8-107-9-W4
Classification: Cumulic Regosol
Landform:
Genetic Material: Fluvial; fine loamy
Surface Expression: Delta; nearly level to level
Site Features: Nearly level site; moderately well drained; medium perviousness; nonstony
Vegetation: Balsam poplar/white spruce/river alder-dogwood

Profile Description:

LF - 4 to 0 cm; black; slightly to moderately decomposed leaves and needles; contains some loamy mineral materials; abundant very fine to medium, horizontal roots; gradual, wavy boundary.

ACk - 0 to 18 cm; dark grayish brown (2.5Y 4/2 m); silty clay loam; laminated; fine granular; friable; plentiful, very fine to coarse, horizontal and oblique roots; clear, wavy boundary; contains many thin LFb layers.

Ck1 - 18 to 28 cm; grayish brown (25Y 5/2 m); silty clay loam; laminated; fine granular and weak fine platy; friable; plentiful, fine to coarse, oblique roots; contains some thin LFb layers; clear, wavy boundary.

Ck2 - 28 to 62 cm; grayish brown (2.5Y 5/2 m); loam; laminated; amorphous; friable; few, fine to coarse, oblique roots; contains a few thin LFb layers; gradual, smooth boundary.

Ck3 - 62 to 100 cm; light brownish gray (2.5Y 6/2 m); loam; laminated; amorphous; friable; few, fine and medium, oblique roots; contains a few LFb layers; weakly calcareous.

Table 30. Analysis: Site M78-30

Horizon	Particle Size Distribution (%)									pH $CaCl_2$	pH H_2O	Org.C. %	Total N %	C/N
	Sand	VCS	CS	MS	FS	VFS	Silt	Clay	Fine C					
LFH	-	-	-	-	-	-	-	-		6.7	6.9	30.26	2.27	14
ACk	5	-	-	-	-	-	64	31		7.1	7.5	7.92	0.60	12
Ck1	15	-	-	0.4	6	9	58	27		7.1	7.5	4.64	0.32	13
Ck2	31	-	-	-	13	18	49	20		7.2	7.7	2.69	0.17	13
Ck3	29	-	-	-	11	17	49	22		7.3	7.8	3.09	0.21	12

Horizon	$CaCO_3$ eq.(%)	TEC me/100g	Exch. Cations me/100 g				Base Sat. %	E.C. mmho/cm	Sat.H_2O %	Cations in saturation extract me/l			
			Na	K	Ca	Mg				Na	K	Ca	Mg
LFH	-												
ACk	4.3												
Ck1	4.1												
Ck2	4.6												
Ck3	4.0												

6.2 ENGINEERING TEST DATA FOR SOILS SAMPLED IN 1978 AND 1979.

Laboratory data and the Unified and AASHO classifications of subsoils sampled in 1978 and 1979 are presented in the following table. For background information, see Turchenek and Oades (1978).

Table 31. Engineering test data for soils sampled in 1978 and 1979.

Site Sample	Location	System	Material	Horizon	Depth (cm)	Mechanical Analysis - % passing							Liquid Limit (%)	Plasticity Index	Classification	
						1 in.	3/4 in.	5/8 in.	#4	#10	#40	#200			Unified	AASHO
M78-2	11-83-13	HRR	morainal	C	75-120	100	100	100	99	98	86	51	28	12	CL	A-6(4)
M78-4	NE 8-85-11	HRR	morainal	IIC	85-120	100	100	100	99	99	90	57	31	17	CL	A-6(7)
M78-5	NW 12-87-74	KIN	morainal	Ck2	80-120	100	100	99	99	98	95	68	31	15	CL	A-6(9)
M78-6	SE 35-84-9	SMT	morainal	C	70-110	100	100	100	99	98	88	50	31	16	CL	A-6(5)
M78-7	8-82-7	SMT	morainal	C	80-120	100	100	100	100	99	91	55	32	15	CL	A-6(5)
M78-8	NW 12-84-6	KIN	morainal	C	70+	100	97	97	97	97	91	59	28	12	CL	A-6(6)
M78-9	NW 7-91-10	DOV	glacio-lacustrine	Cgj	46-67	100	100	100	100	100	98	79	44	25	CL	A-7-6(15)
M78-9	NW 7-91-10	DOV	morainal	IICk	67-95	100	100	100	100	100	93	65	34	14	CL	A-6(8)
M78-10	32 92-	KIN	morainal	C	70-110+	100	100	100	98	98	91	52	23	9	CL	A-4(3)
M78-12	SE 11-97-15	LGD	morainal	C	90-120+	100	100	100	100	99	90	54	30	14	CL	A-6(6)
M78-13	SW 8-99-14	LGD	morainal	C	77+	100	100	99	97	96	83	53	31	13	CL	A-6(5)
M78-14	NE 13-100-15	LGD	morainal	BC	62-80+	100	96	95	92	91	76	49	33	16	CL	A-6(8)
M78-15	SW 8-100-15	LGD	morainal	C	62-80	100	100	100	100	100	100	70	66	29	MH	A-7-5(15)
M78-16	NE 18-100-16	LGD	morainal	C	80-120	100	98	98	98	97	90	60	37	17	CL	A-6(8)
M78-19	NW 23-104-15	LGD	morainal	Cgj	89±	100	97	97	97	97	90	66	41	17	CL	A-7-6(11)
M78-20	NE 23-103-18	LGD	morainal	C	59-	100	100	100	100	100	97	77	46	22	CL	A-7-6(14)
M78-21	NE 29-97-18	LGD	morainal	C	60-100	100	100	100	100	100	99	81	44	20	CL	A-7-6(13)

(cont...)

Site Sample	Location	System	Material	Horizon	Depth (cm)	Mechanical Analysis - % passing							Liquid Limit (%)	Plasticity Index	Classification	
						1 in.	3/4 in.	5/8 in.	#4	#10	#40	#200			Unified	AASHO
M78-22	SW 24-98-17	LGD	morainal	C	60-100	100	100	100	99	98	91	67	37	17	CL	A-6(9)
M78-23	SW 8-100-15	LGD	morainal	BC	52-	100	100	100	100	98	85	51	29	13	CL	A-6(4)
M78-24	SW 14-102-17	LGD	morainal	Cgj	60-90	100	100	100	100	100	99	92	48	22	CL	A-7-6(15)
M78-25	NE 8-109-9	CPN	fluvial	Ckg	50-100	100	100	100	100	100	100	85	58	25	MH	A-7-5(18)
M78-29	NE 15-109-7	CPN	fluvial	Ckg	39-100	100	100	100	100	100	100	68	31	10	CL	A-4(7)
M78-32	NW 8-94-13	DOV	glacio-lacustrine	Ck	90-110+	100	100	100	100	100	97	81	44	21	CL	A-7-6(13)
M78-33-8	NE 14-95-16	HRR	morainal	C	72-	100	100	100	100	100	97	79	39	18	CL	A-6(11)
M78-34-7	NE 14-95-16	LGD	morainal	IIC	85-110	100	100	100	97	96	88	57	31	13	CL	A-6(5)
M78-35-6	SE 25-92-17	HRR	morainal	BC	55-80	100	100	100	100	99	91	60	31	12	CL	A-6(6)
M78-36-7	NW 6-91-18	HRR	morainal	Ck	54-110	100	100	100	100	100	96	66	27	13	CL	A-6(7)
M78-38-6	NW 2-90-14	DOV	morainal	IICk	70-100	100	100	100	100	99	90	55	26	12	CL	A-6(5)
M78-39-8	SW 88-16-	HRR	morainal	Ck	82-110	100	100	100	100	99	95	56	28	13	CL	A-6(5)
M78-40-6	NE 3-88-18	HRR	morainal	IICk	34-70	100	100	100	100	100	98	80	58	29	CH-MH	A-7-6(20)
M78-41-6	NE 20-85-15	LUK	glacio-lacustrine	IICg	55-110	100	100	100	100	99	96	71	31	13	CL	A-6(8)
M78-56-6	NE 2-87-9	DOV	glacio-lacustrine	BCk	48-66	100	100	100	100	99	97	68	31	15	CL	A-6(9)

(cont...)

Site Sample	Location	System	Material	Horizon	Depth (cm)	Mechanical Analysis - % passing							Liquid Limit (%)	Plasticity Index	Classification	
						1 in.	3/4 in.	5/8 in.	#4	#10	#40	#200			Unified	AASHO
M78-56-7	NE 2-87-9	DOV	glacio-lacustrine	IICk	66-85	100	100	100	100	100	97	68	31	15	CL	A-6(9)
M78-57-7	SW 15-85-10	HRR	morainal	IIC	75-120	100	100	100	99	99	97	74	39	15	CL	A-6(10)
MC-10	SW 26-88-9	DOV	glacio-lacustrine	C	80-120	100	100	100	100	100	97	90	44	23	CL	A-7-6(15)
M79-1-6	SW 19-82-12	ALG	glacio-lacustrine	Cg	100-135	100	100	100	100	100	98	94	38			
M79-3-6	SE 22-94-8	STP	mixed glacio-lacustrine	Cg	26-60	100	95	95	94	93	83	53	25			