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Clay mineralogical database of Canadian soils



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Clay mineralogical database of Canadian soils with a clay mineralogical map of surface soils

H. KODAMA, G.J. ROSS, C. WANG,
and K.B. MACDONALD
Centre for Land and Biological
Resources Research
Ottawa, Ontario

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Summary

Soil mineralogical information is of primary importance in the characterization and utilization of soils. Since the first report of clay mineralogical data for Canadian soils in 1937, mineralogical data for approximately 1500 samples from 500 pedons in Canada have been obtained and recorded. All these data were assembled along with data for related bedrock samples. Criteria for mineralogical classes were defined and the existing data were classified and compiled in digital files. A part of the data were the spatial coordinates allowing the site observations to be input and manipulated within a Geographical Information System (GIS). The mineralogical data were used in conjunction with the Soil Map of Canada (1:5 million) to produce a clay mineralogical map of surface soils (1:10 million) which is attached to this monograph. When many clay mineralogical data are available such as the case in southwestern Ontario, the data were used with regional Soil Landscape Maps (1:1 million) to produce a more detailed clay mineralogical map of the region. This map is now being used as a layer of information in the GIS and also in plotted form to study the relationship between clay mineralogy and pesticide use for areas of intensive crop production in this region. During the process of compiling the existing clay mineralogical data and manipulating them in a GIS, a number of gaps in the information were identified particularly for noncrystalline and smectitic soil components. New studies are currently in progress to fill in these information gaps.

INTRODUCTION

In Canada, more than 95% of the soils used for cultivation are mineral soils. Dominant components of mineral soils are inorganic substances of sand, silt and clay sizes along with some organic matter. The inorganic substances include primary minerals inherited from parent materials, and secondary minerals which were formed syngenetically or by the transformation of the primary minerals during pedogenic processes. These substances occur in crystalline or noncrystalline form.

The clay fraction of the soil is the most important of all the mineral components, because the clay-size components have the greatest influence on the physical, chemical and biological activities of soil. Clay particles have large specific surface area, are very reactive on and between the clay surfaces, and considered to be the most active part of soil. The amount and type of clay determine the character and productivity of the soil. For this reason, soil mineralogical studies in the past several decades have focused on the clay fraction of soils.

Since the first report of clay mineralogical data for Canadian soils (Clark et al. 1937), many papers have been published on subjects related directly or indirectly to clay mineralogy of Canadian soils. Kodama (1979) summarized mineralogical data of Canadian soils from 1937 to 1977, and characterized the distribution of clay minerals in terms of physiographic region and soil type. Although a considerable amount of clay mineralogical information on Canadian soils is available, much of it pertains only to crystalline mineral components in the clay fraction and to partial profiles of scattered pedons. As public concerns grow for soil conservation and environmental quality, there is a need (a) to organize and complete a mineralogical database of Canadian soils and (b) to assess the influence of mineralogical composition on soil behaviour in actual field conditions. The most effective way to extend this information is to organize the data including their interpretation in map form and in electronic file.

As mentioned before, mineralogical data for the clay fractions are relatively abundant. Therefore, we proceeded to make a clay mineralogical map of surface soils in Canada after we completed a supplemental review of the literature from 1978 to 1990 and produced additional data by ourselves.

The purpose of this monograph is to describe (1) how the clay mineralogical data were compiled, (2) how the data were organized and selected for the map, (3) how mineral criteria were defined for grouping, (4) how the clay mineralogical map was constructed, (5) how the electronic file for the data was established, and (6) how the map and electronic file are potentially utilized. Comprehensive tabulated clay mineralogical data and indices including geographical sites, soil type and mineral type are also presented.

METHODS OF DATA COMPILATIONS

Literature Survey

References cited for the mineral file are listed chronologically and alphabetically in each year as an Appendix to this monograph. In some cases, unpublished data were used and cited as such.

Compilation

All mineralogical data available for a pedon or a soil horizon were summarized in a format represented in Table 1. In the format, clay minerals are treated in a narrow sense as phyllosilicates. Besides the identification for the pedon examined (soil series name, location, type of deposition, etc.), the format also contains columns listing a brief description of the physical nature of each horizon and geological data of rocks or sediments underlying the pedon or of parent materials from which the pedon developed. The subgroup to which the soil series belongs is given just under the soil series name in the first column of the format. Since many soil series names and their subgroups were listed in Canadian Soil Names File by CanSIS (Canadian Soil Information System, 1973), the subgroup was indicated by symbols which followed the connotative code system adopted by CanSIS. If the soils studied were not listed in the CanSIS File, original descriptions were given. Qualitative or quantitative expressions for the mineralogical data were classified into one of nine categories given in Table 2, depending upon the type of presentation of the original data. Precision of data increases with numbers of the categories. When the original data did not fit correctly, a minimum modification was applied in order to accommodate them in one of the categories. The data compiled in such a manner were grouped by province or territory. When the exact location of a sample was known, it was marked on the 1:5M scale soil map of Canada (Clayton et al., 1977). The map showing the sample sites and the original data file in 12 volumes are available at the Soil Mineralogy Laboratory of the Centre for Land and Biological Resources Research in Ottawa.

Table 2. Various expressions for mineral quantities

	Symbol	Expression	
CLASS 1	O	Present	
	O,O...O	If the order of approx. amounts is known, 1 > 2 > ... > n	
	●	Main, without knowing the order	
	-	Absent	
CLASS 2	●	Dominantly, Largely, Mostly present	
	O	In a considerable amount	
	⊗	In a small amount - some amount	
	⊙	In a trace amount	
CLASS 3	+++	Strong	peak intensity of X-ray diffraction pattern.
	++	Medium	
	+	Weak	
	ident.	Identifiable	
CLASS 4	vs	Very strong	peak intensity of X-ray diffraction pattern
	s	Strong	
	ms	Medium strong	
	m	Medium	
	mw	Medium weak	
	w	Weak	
	vw	Very weak	
	faint	Faintly	
CLASS 5	tr	Trace	amount, based on X-ray peak intensity without considering intensity factors.
	D	Dominant	
	M	Major	
	M-m	Moderate	
	m	Minor	
CLASS 6	tr	Trace	amount, based on an intensity factor method.
	*	Minor	
	**	Moderate	
	***	Major	
	****	Dominant	
CLASS 7	05	100-80%	per total fraction studied.
	04	80-60%	
	03	60-40%	
	02	40-20%	
	01	20- 0%	
CLASS 8	05/P	100-80%	per total phyllosilicates.
	04/P	80-60%	
	03/P	60-40%	
	02/P	40-20%	
	01/P	20- 0%	
CLASS 9	0,1,2,...25...100 % as it indicates		

Selection and Preparation of Data for Mapping

In order to summarize clay mineralogical data in a map form, quantitative or at least semiquantitative data are required. There was no common standard for comparison of the data as given in the various quantitative expressions shown in Table 2, except classes 7, 8 and 9, where the amounts are given in weight percent. To facilitate the interpretation of the data on a common basis, it was necessary for a standardization process to set up for the quantification of soil minerals; this process is expressed by one of the schemes from class 2 to class 6 (Table 2). A semiquantitative scheme consisting of four divisions: major, moderate, minor and trace was set up as a common standard and all expressions were converted to the four-division scheme by including dominant in major and combining two or three divisions into one. Then the four divisions were tentatively scaled as >35%, 10-35%, 1-10% and <1% for major, moderate, minor and trace, respectively. Based on this scale, the mineralogical data given in each one of the schemes from class 2 to class 6 were numerated.

When there was more than one mineralogical expression available for one location, the one which considered to be most appropriate was chosen. If the data were more or less comparable, they were averaged for one representation.

Definition of Mineral Classes

A mineral class for the clay fraction of a soil is defined by the name of a single dominant mineral whose amount is >35% which was determined in the preceding section as the highest scaled one of the four divisions. For example, when a soil contains mica as such a dominant mineral constituent, the soil is grouped into a micaceous class. However, in the case where none of minerals are dominant (<35%), such a soil is grouped as a mixed mineral class. Of the Canadian soils more than half belong to either micaceous class (28%) or smectitic class (23%). Most of the remainder (44%) are grouped in a mixed mineral class. The last small portions of all soils selected (5%) belong to three mineral classes; vermiculitic, chloritic and carbonatic. Since these classes represent only 5% of

the whole soils, the classes are combined together in a major class called "others".

Canadian soils, thus, may be classified by four major groups: micaceous, smectitic, mixed and others, and these major classes are expressed by symbols of large capitals as shown in Table 3. This expression can also be extended by adding subordinate symbols of small capitals for constituent minerals of moderate amounts (10-35%) in order to add more information about the mineral composition of soil. Since only the mineralogy of the clay fraction is considered, it was important to include soil textural information along with clay mineralogical data. Three texture groups were set up: sandy (S), loamy (L) and clayey (C) and these were defined by their clay contents, that is: <10%, 10-35% and > 35%, respectively. The symbols for expressing texture group are placed at the end of the description after a slash sign (/), as shown by examples given in Table 3. In practice, however, to avoid crowded descriptions in the limited space of a map, coding numbers were set up for all 67 varieties of mineral composition which were observed in surface soils of Canada (see Appendix I). The coding numbers within the general classes were followed by textural expressions S, L and C to simplify the full description (Table 4).

Transformation of Point Data into Area Data

All clay mineral point data (461) were plotted on a 1:5 million (M) base map of soils of Canada (Canada Department of Agriculture, 1977), according to their sampling locations. The base map has a total of 756 soil polygons. When all mineral data were plotted, 150 of the total 756 soil polygons contained at least one data point. Most of the point data were located on agricultural land. As a consequence, a soil polygon in a prairie agricultural region and in southern Ontario usually contained several data points while there were few data available in northern regions of the provinces and in the territories. If there is only one data point within a soil polygon, the whole polygon is to be classified to a mineral class according to this mineral data point. If there are two or more data

points within a soil polygon, the mineral class of this polygon has to represent the majority of the data points contained within this polygon.

Table 3. Major mineral classes, mineral groups, defined soil texture and their abbreviated symbols, with an example of short description for clay mineral composition along with soil texture information.

<u>Mineral Class</u>		<u>Symbol</u>	<u>Mineral Group</u>	<u>Symbol</u>
Micaceous		M	Smectite	S
			Vermiculite	V
Smectitic		S	Chlorite	Ch
			Mica	M
Mixed		X	Kaolinite	K
			Quartz	Q
Others	Chloritic	Ch	Feldspar	F
			Amphibole	Am
	Vermiculitic	V	Carbonate	Ca
			Noncrystalline Phases	A
	Carbonatic	Ca		

<u>Texture Group</u>	<u>Symbol</u>	<u>Definition</u> (clay content)
Sandy	S	<10%
Loamy	L	10-35%
Clayey	C	>35%

Example

Subordinate mineral component

↓

 $M_S, v/S$

↑

Mineral Class

↑

Texture Group

In a sandy soil, its clay fraction has mica as the dominant mineral component (>35%) associated with a moderate amount (10~35%) of smectite and vermiculite. The mineralogy of this clay fraction is classified as micaceous.

Table 4. List of all sub-mineral classes combined with soil texture information for map codings.

<u>Micaceous Classes (>35% Mica)</u>			<u>Mixed Classes (All <35%)</u>		
<u>Map Coding</u>	<u>Other minerals (>15%)</u>	<u>Texture</u>	<u>Map Coding</u>	<u>Other minerals (>15%)</u>	<u>Texture</u>
01 S	Ch, Ca	Sandy	30 C	Ch, M, S	Clayey
02 L	Ch, K	Loamy	31 L	Ch, S, Am	Loamy
02 S	Ch, K	Sandy	32 L	Ch, V, K	Loamy
03 L	Ch, V	Loamy	33 S	F, M, Ch	Sandy
04 L	Ch	Loamy	34 L	M, Am, Ch	Loamy
04 S	Ch	Sandy	35 S	M, Am, V	Sandy
05 L	K, Ch	Loamy	36 L	M, Ch, K	Loamy
06 L	K, V	Loamy	36 S	M, Ch, K	Sandy
07 C	Q	Clayey	37 L	M, Ch, K	Loamy
08 L	S, K	Loamy	37 S	M, Ch, Q	Sandy
09 L	S, Q	Loamy	38 L	M, Ch, V	Loamy
09 S	S, Q	Sandy	39 L	M, Ch	Loamy
10 L	S, V	Loamy	39 S	M, Ch	Sandy
10 S	S, V	Sandy	40 L	M, K	Loamy
11 C	S	Clayey	41 L	M, Q, F	Loamy
11 L	S	Loamy	42 L	M, S, Ch	Loamy
11 S	S	Sandy	42 S	M, S, Ch	Sandy
12 L	V, Am	Loamy	43 S	M, S, Q	Sandy
13 L	V, K	Loamy	44 C	M, S, V	Clayey
14 L	V, Q	Loamy	45 C	M, S	Clayey
15 C	V, S	Clayey	46 C	M, V, K	Clayey
16 C	V	Clayey	46 L	M, V, K	Loamy
16 S	V	Sandy	47 L	M, V, S	Loamy
17 C	--	Clayey	48 L	Q, Ca	Loamy
17 L	--	Loamy	49 L	S, Ch, M	Loamy
17 S	--	Sandy	50 S	S, Ch, V	Sandy
<u>Smectitic Classes (>35% Smectite)</u>			51 S	S, Ch	Sandy
18 L	Ca, M	Loamy	52 L	S, M, Ch	Loamy
19 L	Ch, M	Loamy	53 L	Sm, M, K	Loamy
20 S	Ch	Sandy	54 C	S, M, Q	Clayey
21 L	M, Ch	Loamy	55 C	S, M, V	Clayey
22 L	M, K	Loamy	56 C	S, M	Clayey
23 L	M, Q	Loamy	56 L	S, M	Loamy
24 C	M, V	Clayey	56 S	S, M	Sandy
24 L	M, V	Loamy	57 L	S, V, M	Loamy
25 C	M	Clayey	58 C	V, K, M	Clayey
25 L	M	Loamy	59 L	V, M, Ch	Loamy
25 S	M	Sandy	60 L	V, M	Loamy
26 S	Q, M	Sandy	61 L	--	Loamy
27 L	Q, V	Loamy	<u>Others (Underlined >35%)</u>		
28 C	Q	Clayey	62 L	<u>Ca</u> , Q	Loamy
28 L	Q	Loamy	63 S	<u>Ch</u> , M	Sandy
29 C	--	Clayey	64 S	<u>Ch</u> , V, K	Sandy
29 L	--	Loamy	65 L	<u>Ch</u> , V, S	Loamy
29 S	--	Sandy	66 C	<u>V</u> , M, K	Clayey
			67 C	<u>V</u> , M	Clayey
			67 S	<u>V</u> , M	Sandy

Mineral Abbreviations

Am= Amphibole; Ca= Carbonate; Ch= Chlorite; F= Feldspar; K= Kaolinite; M= Mica; Q= Quartz; S= Smectite; V= Vermiculite.

The 1:5 M clay mineralogical map was further reduced to 1:10 M according to standard cartographic procedures. For reasons of map clarity, the area of the smallest polygon on the 1:10 M mineralogical map is approximately 0.2 cm^2 . The reduction processes from 1:5 M to 1:10 M did not result in significant reduction of mineralogical information. This is due mainly to the nature of clay mineral distribution in Canada. The mineral classes are highly geographically dependent. For example the smectitic mineral class is dominant in the prairies, the micaceous is most common in Quebec and in the Atlantic region, while the mixed mineral class is most frequently found in southern Ontario. As a result, most of the mineral class polygons in 1:5 M map are very large in size. The reduction to 1:10 M scale still leaves the area of most of these polygons well above the minimum of 0.2 cm^2 . In a few cases, the reduced polygon was less than 0.2 cm^2 in size and had to be integrated with other polygons. In such cases, the dominant mineral class in an integrated polygon is used to represent this new polygon.

Compilation of Digital Files

The computerized mineralogy database was developed on Arc/Info, a geographic information system (GIS) developed by Environment Systems Research Institute, Toronto, Canada¹, operating on a VAX 8650 computer. Records were compiled and associated with a known location (as given by some geographical co-ordinate system), a particular sample site and layer and was recorded in tabular form. This information was stored in its original format as a bibliographical file.

In order to provide a standard efficient format manipulation and analysis, the data have been reorganized into three files and a file of literature citations as shown below (Table 5). The mineral kind and content information was converted to a common, ordinal system of measurement.

¹ The mention of a trademark, proprietary product or vendor does not imply endorsement by Agriculture Canada to the exclusion of other products or vendors.

Table 5. Record structure for the mineralogy database

Datafile	Field	Description
XXSITE.DAT	PROVINCE	province code
	PEDON	pedon number
	STATUS	year of data publication (code)
	REF	reference link to PUBREF.DAT
	LATDD	latitude in dec. deg of pedon
	LONDD	longitude " " "
	LOCEST	flag if location is estimate
XXLAYER.DAT	PROVINCE	province code
	PEDON	pedon number
	LAYER	pedon soil layer (surface or sub)
	UDEPTH	upper depth of soil layer
	LDEPTH	lower depth os soil layer
	HZN-DESIG	horizon designation of layer
	TEXTURE	texture of layer
XXLAYMIN.DAT	PROVINCE	province code
	PEDON	pedon number
	LAYER	pedon soil layer
	CLAY-FRAC	clay fraction
	MIN	mineral code
	AMT	standardized value for mineral
PUBREF.DAT	REF	reference number
	YEAR	year of publication
	TITLE	title of publication
	AUTHOR	author(s) of publication
	JOURNAL	journal of publication
	PAGE_NO	page number

where 'XX' represents the provincial/territorial code and highlighted fields identify data file key

In order to achieve a common data format, some of the original information was significantly generalized and in some instances, information about a sample was ignored. If specific information for a particular record or group of records is required, the original data has been retained (MINAL.DAT) and can be linked to the more practical data model.

There are 967 clay mineral layer records linked to 461 reference records. Of these records, 59 were flagged during the data quality check due to the lack of accurate location information.

The 905 records with geographic location information were used to produce an Arc/Info point coverage which was overlaid by provincial boundaries [taken from the Soil Landscapes of Canada (Shields et al., 1991)]. The province of origin of the sample as recorded in the data was considered to be correct and compared to the plotted location; the location data has been rounded to the nearest 5 minutes. Only 2 sample sites that did not fall within the correct provincial boundaries (including the 5 minute margin of error). These should be rejected from further GIS analysis.

UTILIZATION OF THE MONOGRAPH

Use of Appendices

This monograph contains several Appendices and a clay mineralogical map of surface soils (1:10 million). Although all necessary data have been compiled in electronic files which are incorporated in a Geographical Information System (GIS), a book-form presentation is still convenient and useful for a quick overview of the mineralogical information available for Canadian soils. Thus, it was decided to prepare the following lists in order to facilitate such a search and make the available information as useful as possible.

1. Provincially listed sample locations with their longitudes and latitudes along with soil type and polygon number for soils of Canada.
2. Soil types and polygons grouped by type of clay mineral assemblage.
3. Sample locations grouped by major soil types.

These lists are given in Appendices II, III and IV, respectively, at the end of this monograph. List 1 (Appendix II) describes sample locations in an ascending order of their longitudes. Therefore, the list may also be used to find mineralogical data available for a soil sample from a location which is closest to the location in question. List 2 (Appendix III) can be used to correlate between clay mineral assemblage and soil type, and list 3 (Appendix IV) facilitates finding sample locations [where mineralogical data available] under a given major soil type. These are only a few examples for use of the lists.

Interpretations and Use of the Clay Mineralogical Map

As mentioned earlier, after criteria for mineralogical classes were defined, a part of the data denoted the spatial coordinates allowing the site observations to be input and manipulated within a Geographical Information System. The mineralogical data were combined with the Soil Map of Canada (1:5 million) to produce a clay mineralogical map of surface soils. Due to size limitation, the map attached to this monograph is given in 1:10 M scale. In some geographical regions, the data are sufficient to produce a more detailed clay mineralogical map in conjunction with regional Soil Landscape Maps (1:1 M). Recently, we prepared a detailed clay mineralogical map of Southwestern Ontario (Kodama et al. 1991). This map is now being used as a layer of information (texture, parent material precipitation etc.) in GIS and in plotted form to study the relationship between clay mineralogy and pesticide use and soil interaction for areas of intensive crop production in this region.

During the process of compiling the existing clay mineralogy and manipulating them in a GIS, a number of gaps in the information were identified particularly for noncrystalline and smectitic soil components. New studies are currently in progress to fill in these information gaps. (Kodama and Ross, 1991; Ross and Kodama, 1992; Ross et al. 1992).

The clay mineralogical map can be used to determine soil family mineralogy classes in Soil Taxonomy (Soil Survey Staff 1990) and in The Canadian System of Soil Classification, (Agriculture Canada Expert Committee on Soil Survey 1987).

It is particularly useful for clayey and fine loamy soils. For sandy and coarse loamy soils, the whole soil mineralogy should be more suitable to determine mineralogy classes (Lietzke 1985).

The clay mineralogical map can be used to locate areas in which potassium and ammonium fixation may occur by the presence of significant amounts of vermiculite in discrete or interstratified forms (Ross and Cline, 1984; Ross et al. 1985).

Strong retention of phosphorous can be expected in areas with soils containing appreciable amounts of iron and aluminum oxides, kaolinite and amorphous material (such as allophane) (Parfitt 1978; Kimble et al. 1990). Such soils would also have high pH-dependent cation exchange capacity (Ross, 1980). Soils containing smectite as a dominant component, as indicated in the prairie provinces, are characterized by considerable swelling and shrinking, high water retention, high liquid and plastic limits, high cation exchange capacities, and high specific surface areas (Yong and Warkentin, 1975; Ross et al. 1991).

The presence of carbonate minerals, particularly in the upper profile, indicates young soils, poor drainage conditions and/or low intensity weathering as well as abundant though sometimes excessive supply of plant-available calcium and magnesium with associated neutral or alkaline pH (Protz et al. 1984; Protz et al. 1988).

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APPENDIX I

List of References (marked with *) cited for the Mineral Data File

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ABBREVIATIONS

(For Appendices II, III and IV)

Long.	Longitude
Lat.	Latitude
Polygon No.*	Expressed in combination with symbol for soil classification. The first letter and number (e.g. A1, B1, C2, D3 etc.) correspond to respective soil classifications as described in Appendix IV.
Mineral Symbols M, S. X etc.	See Table 3
(M,V,Q) etc.	Subordinate minerals are in parenthesis
Symbols for Texture Group	See Table 3
AL	Alberta
BC	British Columbia
MN	Manitoba
NB	New Brunswick
NF	Newfoundland
NS	Nova Scotia
NW	Northwest Territories
ON	Ontario
PE	Prince Edward Island
QU	Quebec
SK	Saskatchewan
YU	Yukon

* Same as used in "Soils of Canada" by Clayton et al. (1977).

APPENDIX II

NEWFOUNDLAND

	Long.	Lat.	Soil Classification	Polygon No.
1.	52°20'	47°41'	Humo-Ferric Podzol	D3076
2.	52°33'	47°03'	Humo-Ferric Podzol	D3077

PRINCE EDWARD ISLAND

	Long.	Lat.	Soil Classification	Polygon No.
1.	62°07'	46°29'	Humo-Ferric Podzol	D3062
2.	62°56'	46°30'	Humo-Ferric Podzol	D3054
3.	63°31'	46°30'	Humo-Ferric Podzol	D3065
4.	64°19'	46°55'	Humo-Ferric Podzol	D3061

NOVA SCOTIA

	Long.	Lat.	Soil Classification	Polygon No.
1.	60°03'	46°22'	Humo-Ferric Podzol	D3083
2.	60°31'	45°30'	Gray Luvisol	C2111
3.	62°01'	45°29'	Humo-Ferric Podzol	D3075
4.	62°42'	45°30'	Humo-Ferric Podzol	D3047
5.	62°51'	45°30'	Gray Luvisol	C2117
6.	63°05'	45°21'	Gray Luvisol	C2114
7.	63°45'	45°29'	Humo-Ferric Podzol	D3067
8.	63°51'	44°23'	Humo-Ferric Podzol	D3053
9.	64°01'	45°30'	Cumulic Regosol	F2016
10.	64°28'	44°54'	Humo-Ferric Podzol	D3141
11.	64°33'	44°53'	Humo-Ferric Podzol	D3146

NEW BRUNSWICK

	Long.	Lat.	Soil Classification	Polygon No.
1.	65°10'	46°31'	Gray Luvisol	C2110
2.	65°13'	45°29'	Humo-Ferric Podzol	D3048
3.	66°08'	47°03'	Humo-Ferric Podzol	D3082
4.	66°38'	46°21'	Humo-Ferric Podzol	D3072
5.	67°00'	47°29'	Humo-Ferric Podzol	D3030
6.	67°22'	46°17'	Humo-Ferric Podzol	D3073
7.	67°37'	48°01'	Humo-Ferric Podzol	D3133
8.	68°06'	48°11'	Humo-Ferric Podzol	D3060

QUEBEC

	Long.	Lat.	Soil Classification	Polygon No.
1.	69°30'	49°50'	Humo-Ferric Podzol	D3126
2.	69°56'	56°39'	Rockland	R1014
3.	70°30'	46°20'	Humo-Ferric Podzol	D3066
4.	71°17'	46°29'	Humo-Ferric Podzol	D3058
5.	71°24'	48°29'	Orthic Gleysol	G2027
6.	71°33'	45°56'	Humo-Ferric Podzol	D3135
7.	72°45'	45°29'	Humic Gleysol	G1004
8.	73°44'	45°34'	Melanic Brunisol	E1012
9.	74°29'	45°09'	Humo-Ferric Podzol	D3007
10.	74°30'	46°15'	Dystic Brunisol	E3068
11.	78°23'	49°20'	Gray Luvisol	C2107

ONTARIO

	Long.	Lat.	Soil Classification	Polygon No.
1.	74°52'	45° 9'	Humic Gleysol	G1003
2.	75°30'	45°29'	Humic Gleysol	G1002
3.	75°42'	44°29'	Melanic Brunisol	E1013
4.	76°19'	44°29'	Melanic Brunisol	E1002
5.	76°21'	45°07'	Melanic Brunisol	E1005
6.	76°56'	44°30'	Melanic Brunisol	E1018
7.	78°20'	44°20'	Gray Brown Luvisol	C1001
8.	78°25'	42°41'	Humic Gleysol	G1005
9.	79°23'	43°30'	Gray Brown Luvisol	C1012
10.	79°29'	42°33'	Gray Brown Luvisol	C1013
11.	79°34'	43°29'	Gray Brown Luvisol	C1009
12.	80°14'	43°01'	Gray Brown Luvisol	C1002
13.	80°21'	44°30'	Gray Brown Luvisol	C1003
14.	80°31'	43°53'	Gray Brown Luvisol	C1008
15.	80°37'	42°45'	Gray Brown Luvisol	C1015
16.	81°02'	43°18'	Gray Brown Luvisol	C1014
17.	81°05'	48°58'	Orthic Gleysol	G2026
18.	81°56'	42°36'	Humic Gleysol	G1007
19.	82°13'	47°42'	Humo-Ferric Podzol	D3149
20.	85°37'	49°30'	Humo-Ferric Podzol	D3017
21.	87°16'	49°29'	Humo-Ferric Podzol	D3018
22.	94°48'	53°40'	Fibrisol	H1026

MANITOBA

	Long.	Lat.	Soil Classification	Polygon No.
1.	94°48'	53°40'	Fibrisol	H1031
2.	95°43'	50°30'	Fibrisol	H1027
3.	95°46'	51°58'	Fibrisol	H1032
4.	96°52'	49°30'	Humic Gleysol	G1014
5.	97°00'	49°51'	Black Chernozemic	A3107
6.	97°42'	51°07'	Dark Gray Chernozemic	A4135
7.	97°44'	51°55'	Gray Luvisol	C2075
8.	98°46'	56°10'	Fibrisol	H1030
9.	99°05'	49°33'	Black Chernozemic	A3072
10.	99°06'	50°57'	Black Chernozemic	A3106
11.	99°17'	49°29'	Black Chernozemic	A3090
12.	100°00'	50°19'	Black Chernozemic	A3087
13.	101°16'	49°46'	Black Chernozemic	A3108
14.	101°43'	49°29'	Black Chernozemic	A3089

SASKATCHEWAN

	Long.	Lat.	Soil Classification	Polygon No.
1.	101°31'	50°29'	Dark Gray Chernozemic	A4125
2.	102°38'	49°29'	Dark Brown Chernozemic	A2049
3.	103°28'	49°29'	Brown Solonetz	B1006
4.	103°40'	51°30'	Black Chernozemic	A3095
5.	104°16'	53°30'	Gray Luvisol	C2055
6.	104°21'	52°50'	Black Chernozemic	A3098
7.	104°39'	50°16'	Dark Brown Chernozemic	A2055
8.	105°15'	52°23'	Black Chernozemic	A3092
9.	105°45'	53°49'	Gray Luvisol	C2071
10.	105°50'	51°26'	Dark Brown Chernozemic	A2039
11.	107°23'	49°29'	Brown Chernozemic	A1018
12.	107°34'	51°30'	Dark Brown Chernozemic	A2044
13.	108°23'	51°03'	Brown Chernozemic	A1019
14.	108°24'	52°26'	Dark Brown Chernozemic	A2037
15.	108°28'	50°30'	Brown Chernozemic	A1014
16.	108°52'	51°30'	Brown Solonetz	B1002
17.	109°15'	53°22'	Black Chernozemic	A3113

ALBERTA

	Long.	Lat.	Soil Classification	Polygon No.
1.	110°10'	51°30'	Brown Chernozemic	A1021
2.	110°50'	52°29'	Dark Brown Chernozemic	A2030
3.	110°58'	53°15'	Black Chernozemic	A3083
4.	111°03'	50°59'	Brown Solonetz	B1001
5.	111°06'	56°59'	Fibrisol	H1008
6.	111°18'	49°45'	Brown Chernozemic	A1023
7.	111°22'	56°06'	Fibrisol	H1017
8.	111°32'	52°04'	Brown Solonetz	B1008
9.	112°02'	59°29'	Fibrisol	H1034
10.	112°20'	54°15'	Black Chernozemic	A3070
11.	112°28'	53°30'	Gray Luvisol	C2036
12.	112°42'	52°17'	Black Chernozemic	A3115
13.	112°42'	58°29'	Fibrisol	H1014
14.	112°46'	51°30'	Dark Brown Chernozemic	A2035
15.	112°48'	50°14'	Dark Brown Chernozemic	A2060
16.	113°04'	49°30'	Black Chernozemic	A3079
17.	113°32'	49°49'	Black Chernozemic	A3080
18.	114°23'	57°13'	Fibrisol	H1025
19.	114°36'	52°49'	Gray Luvisol	C2027
20.	116°40'	55°47'	Black Solod	B4022
21.	117°41'	53°42'	Gray Luvisol	C2061
22.	117°58'	56°46'	Orthic Regosol	F1008
23.	118°06'	56°33'	Black Solod	B4020
24.	118°09'	52°59'	Rockland	R1023
25.	118°44'	55°29'	Black Solonetz	B2011
26.	118°48'	55°44'	Black Solod	B4021
27.	118°56'	49°36'	Dark Brown Chernozemic	A2052
28.	119°10'	55°26'	Gray Luvisol	C2051

BRITISH COLUMBIA

	Long.	Lat.	Soil Classification	Polygon No.
1.	118°29'	51°14'	Humo-Ferric Podzol	D3106
2.	118°38'	50°01'	Gray Luvisol	C2100
3.	118°40'	49°30'	Eutric Brunisol	E2033
4.	119°28'	52°36'	Rockland	R1033
5.	120°31'	49°36'	Dystric Brunisol	E3079
6.	120°41'	49°46'	Gray Luvisol	C2102
7.	121°43'	57°16'	Gray Luvisol	C2058
8.	122°02'	49°53'	Rockland	R1036
9.	122°02'	50°14'	Humo-Ferric Podzol	D3114
10.	122°05'	53°43'	Gray Luvisol	C2054
11.	122°35'	49°29'	Humic Gleysol	G1017
12.	122°41'	49°34'	Humo-Ferric Podzol	D3117
13.	123°54'	54°29'	Gray Luvisol	C2053
14.	123°55'	48°50'	Dystric Brunisol	E3066
15.	123°58'	54°19'	Gray Luvisol	C2099
16.	124°13'	54°25'	Gray Luvisol	C2103
17.	124°25'	49°14'	Humo-Ferric Podzol	D3009
18.	125°15'	54°13'	Gray Luvisol	C2060
19.	125°31'	49°30'	Humo-Ferric Podzol	D3006
20.	125°31'	49°30'	Humo-Ferric Podzol	D3014
21.	128°19'	54°30'	Dystric Brunisol	E3070

YUKON TERRITORY

	Long.	Lat.	Soil Classification	Polygon No.
1.	136°39'	60°54'	Eutric Brunisol	E2045

NORTHWEST TERRITORIES

	Long.	Lat.	Soil Classification	Polygon No.
1.	71°44'	67°31'	Cryic Orthic Regosol	F3075
2.	87°53'	75°18'	Cryic Orthic Regosol	F3063
3.	99°48'	65°45'	Cryic Orthic Regosol	F3079
4.	101°40'	77°30'	Cryic Orthic Regosol	F3033
5.	116°17'	61°18'	Eutric Brunisol	E2050
6.	121°22'	61°30'	Eutric Brunisol	E2036
7.	122°12'	73°12'	Cryic Orthic Regosol	F3064
8.	123°42'	68°07'	Cryic Orthic Regosol	F3069
9.	129°07'	69°29'	Cryic Orthic Regosol	G3043
10.	130°17'	69°53'	Cryic Orthic Regosol	G3042
11.	134°38'	68°16'	Cryic Orthic Regosol	F3070

APPENDIX III

Clay Mineral Assemblage	Polygon number including coding for soil classification
M,	C1008, C1013, C1014, D3133, D3135, H1008
M, (Ch)	C2117, D3030, D3061, D3066
M, (Ch, K)	D3067, D3072, D3073, D3126, D3141
M, (Ch, V)	C2114
M, (K, Ch)	D3047
M, (K, V)	D3075
M, (Q)	G1005, G2027
M, (S)	C1003, G1002, G2026, H1014, H1025, H1034, R1033
M, (S, K)	D3146
M, (S, Q)	A2044, A3108, E2050
M, (S, V)	G3042, G3043
M, (V)	C1012, F3063, F3075, F3079
M, (V, Am)	A2052
M, (V, K)	D3083
M, (V, Q)	C1009
M, (V, S)	G1007
S,	B2011, C2055, C2071
S, (Ca,M)	C2061
S, (Ch)	D3114
S, (Ch, M)	E3079
S, (M)	A2030, A2049, A3070, A3079, A3080, A3089, A3090, A3092, A3098, A3115, A4125, B1001, B1002, B4021, C2051, F1008
S, (M, Ca)	A2060
S, (M, K)	A3106, B1008
S, (M, Q)	A1018, C2027, C2036

S, (M, V)	B1006, G1014
S, (Q)	A1021, A1023, A2035
S, (Q, M)	H1017
S, (Q, V)	A3083
X, (Ch, M, S)	E2045
X, (Ch, S, Am)	G1017
X, (Ch, V, K)	D3014
X, (F, M, Ch)	C2107
X, (M, Am, Ch)	E2033
X, (M, Am, V)	E2036
X, (M, Ch)	D3018, D3058, D3082
X, (M, Ch, Ca)	R1023
X, (M, Ch, K)	C2110, D3048, D3054, D3062, D3065, R1014
X, (M, Ch, Q)	D3017, D3076, D3149
X, (M, Ch, V)	C2111
X, (M, K)	F3033
X, (M, Q, F)	D3060, E1013
X, (M, S, Ch)	C1002, C2058, E1018, E3068
X, (M, S)	E3070
X, (M, S, Q)	F3064
X, (M, S, V)	G1003, G1004
X, (M, V, K)	D3053, F2016
X, (M, V, S)	E1012
X, (Q, Ca)	A1019
X, (S, Ch)	R1036
X, (S, Ch, M)	C2102
X, (S, Ch, V)	D3009
X, (S, M)	A2037, A2039, A3072, A3087, A3107, A4135, B4020, B4022, F3069, F3070, H1026, H1027, H1030, H1031, H1032

X, (S, M, Ch)	C2100
X, (S, M, K)	C2060
X, (S, M, Q)	A1014, A2055
X, (S, M, V)	C2054
X, (S, V, M)	A3095, C2103, D3106
X, (V, K, M)	C2099
X, (V, M)	C1001, C1015
X, (V, M, Ch)	E1002, E1005

OTHERS

Ch, (M)	D3117
Ch, (V, K)	D3006
Ch, (V, S)	E3066

V, (M)	D3007
V, (M, K)	C2053
Ca, (Q)	A3113

APPENDIX IV

A1 Orthic Brown Chernozemic Subgroup

	Long.	Lat.	Prov.	Short Mineral Description	Texture	Polygon No.
1.	107°23'	49°29'	SK	S, (M, Q)	/L	A1018
2.	108°23'	51°03'	SK	X, (Q, Ca)	/L	A1019
3.	108°28'	50°30'	SK	X, (S. M. Q)	/C	A1014
4.	110°10'	51°30'	AL	S, (Q)	/L	A1021
5.	111°18'	49°45'	AL	S, (Q)	/L	A1023

A2 Orthic Dark Brown Chernozemic Subgroup

	Long.	Lat.	Prov.	Short Mineral Description	Texture	Polygon No.
1.	102°38'	49°29'	SK	S, (M)	/L	A2049
2.	104°39'	50°16'	SK	X, (S, M, Q)	/C	A2055
3.	105°50'	51°26'	SK	X, (S, M)	/L	A2039
4.	107°34'	51°30'	SK	M, (S, Q)	/L	A2044
5.	108°24'	52°26'	SK	X, (S. M)	/L	A2037
6.	110°50'	52°29'	AL	S, (M)	/L	A2030
7.	112°46'	51°30'	AL	S, (Q)	/C	A2035
8.	112°48'	50°14'	AL	S, (M, Ca)	/L	A2060
9.	118°56'	49°36'	AL	M, (V, Am)	/L	A2052

A3 Black Chernozemic Great Group

	Long.	Lat.	Prov.	Soil Subgroup	Short Mineral Description	Texture	Polygon No.
1.	97°00'	49°51'	MN	R. BL [*]	X, (S, M)	/C	A3107
2.	99°05'	49°33'	MN	O. BL ^{**}	X, (S, M)	/S	A3072
3.	99°06'	50°57'	MN	R. BL	S, (M, K)	/L	A3106
4.	99°17'	49°29'	MN	O. BL	S, (M)	/L	A3090
5.	100°00'	50°19'	MN	O. BL	X, (S, M)	/L	A3087
6.	101°16'	49°46'	MN	R. BL	M, (S, Q)	/L	A3108
7.	101°43'	49°29'	MN	O. BL	S, (M)	/L	A3089
8.	103°40'	51°30'	SK	O. BL	X, (S, V, M)	/L	A3095
9.	104°21'	52°50'	SK	O. BL	S, (M)	/C	A3098
10.	105°15'	52°23'	SK	O. BL	S, (M)	/L	A3092
11.	109°15'	53°22'	SK	O. BL	Ca, (Q)	/L	A3113
12.	110°58'	53°15'	AL	O. BL	S, (Q, V)	/L	A3083
13.	112°20'	54°15'	AL	O. BL	S, (M)	/S	A3070
14.	112°42'	52°17'	AL	O. BL	S, (M)	/L	A3115
15.	113°04'	49°30'	AL	O. BL	S, (M)	/L	A3079
16.	113°32'	49°49'	AL	O. BL	S, (M)	/L	A3080

* R. BL: Rego Black Chernozemic

** O. BL: Orthic Black Chernozemic

A4 Orthic Dark Gray Chernozemic Subgroup

	Long.	Lat.	Prov.	Short Mineral Description	Texture	Polygon No.
1.	97°42'	51°07'	MN	X, (S, M)	/L	A4135
2.	101°31'	50°29'	SK	S, (M)	/L	A4125

B1 Brown Solonetz Subgroup

	Long.	Lat.	Prov.	Short Mineral Description	Texture	Polygon No.
1.	103°28'	49°29'	SK	S, (M, V)	/L	B1006
2.	108°52'	51°30'	SK	S, (M)	/L	B1002
3.	111°03'	50°59'	AL	S, (M)	/L	B1001
4.	111°32'	52°04'	AL	S, (M, K)	/L	B1008

B2 Black Solonetz Subgroup

	Long.	Lat.	Prov.	Short Mineral Description	Texture	Polygon No.
1.	118°44'	55°29'	AL	S	/C	B2011

B4 Black Solod Subgroup

	Long.	Lat.	Prov.	Short Mineral Description	Texture	Polygon No.
1.	116°40'	55°47'	AL	X, (S, M)	/C	B4022
2.	118°06'	56°33'	AL	X, (S, M)	/C	B4020
3.	118°48'	55°44'	AL	S, (M)	/C	B4021

C1 Gray Brown Luvisol Great Group

	Long.	Lat.	Prov.	Soil Subgroup	Short Mineral Description	Texture	Polygon No.
1.	78°20'	44°20'	ON	BR. GBL [*]	X, (V, M)	/L	C1001
2.	79°23'	43°30'	ON	O. GBL ^{**}	M, (V)	/C	C1012
3.	79°29'	42°33'	ON	O. GBL	M,	/C	C1013
4.	79°34'	43°29'	ON	BR. GBL	M, (V, Q)	/L	C1009
5.	80°14'	43°01'	ON	BR. GBL	X, (M, S, Ch)	/S	C1002
6.	80°21'	44°30'	ON	O. GBL	M, (S)	/L	C1003
7.	80°31'	43°53'	ON	BR. GBL	M	/L	C1008
8.	80°37'	42°45'	ON	O. GBL	X, (V, M)	/C	C1015
9.	81°02'	43°18'	ON	O. GBL	M	/C	C1014

* BR. GBL: Orthic Gray Brown Luvisol
 ** O. GBL: Brunisolic Gray Brown Luvisol

C2 Orthic Gray Luvisol Subgroup

	Long.	Lat.	Prov.	Short Mineral Description	Texture	Polygon No.
1.	60°31'	45°30'	NS	X, (M, Ch, V)	/L	C2111
2.	62°51'	45°30'	NS	M, (Ch)	/L	C2117
3.	63°05'	45°21'	NS	M, (Ch, V)	/L	C2114
4.	65°10'	46°31'	NB	X, (M, Ch, K)	/L	C2110
5.	78°23'	49°20'	QU	X, (F, M, Ch)	/S	C2107
6.	97°44'	51°55'	MN	X	/L	C2075
7.	104°16'	53°30'	SK	S	/S	C2055
8.	105°45'	53°49'	SK	S	/L	C2071
9.	112°28'	53°30'	AL	S, (M, Q)	/L	C2036
10.	114°36'	52°49'	AL	S, (M, Q)	/L	C2027
11.	117°41'	53°42'	AL	S, (Ca, M)	/L	C2061
12.	118°38'	50°01'	BC	X, (S, M, Ch)	/L	C2100
13.	119°10'	55°26'	AL	S, (M)	/L	C2051
14.	120°41'	49°46'	BC	X, (S, Ch, M)	/L	C2102
15.	121°43'	57°16'	BC	X, (M, S, Ch)	/L	C2058
16.	122°05'	53°43'	BC	X, (S, M, V)	/C	C2054
17.	123°54'	54°29'	BC	V, (M, K)	/C	C2053
18.	123°58'	54°19'	BC	X, (V, K, M)	/C	C2099
19.	124°13'	54°25'	BC	X, (S, V, M)	/L	C2103
20.	125°15'	54°13'	BC	X, (S, M, K)	/L	C2060

D3 Orthic Humo-Ferric Podzol Subgroup

	Long.	Lat.	Prov.	Short Mineral Description	Texture	Polygon No.
1.	52°20'	47°41'	NF	X, (M, Ch, Q)	/L	D3076
2.	52°33'	47°03'	NF	X	/L	D3077
3.	60°03'	46°22'	NS	M, (V, K)	/L	D3083
4.	62°01'	45°29'	NS	M, (K, V)	/L	D3075
5.	62°07'	46°29'	PE	X, (M, Ch, K)	/S	D3062
6.	62°42'	45°30'	NS	M, (K, Ch)	/L	D3047
7.	62°56'	46°30'	PE	X, (M, Ch, K)	/S	D3054
8.	63°31'	46°30'	PE	X, (M, Ch, K)	/L	D3065
9.	63°45'	45°29'	NS	M, (Ch, K)	/L	D3067
10.	63°51'	44°23'	NS	X, (M, V, K)	/L	D3053
11.	64°19'	46°55'	PE	M, (Ch)	/S	D3061
12.	64°28'	44°54'	NS	M, (Ch, K)	/S	D3141
13.	64°33'	44°53'	NS	M, (S, K)	/L	D3146
14.	65°13'	45°29'	NB	X, (M, Ch, K)	/L	D3048
15.	66°08'	47°03'	NB	X, (M, Ch)	/L	D3082
16.	66°38'	46°21'	NB	M, (Ch, K)	/L	D3072
17.	67°00'	47°29'	NB	M, (Ch)	/L	D3030
18.	67°22'	46°17'	NB	M, (Ch, K)	/L	D3073
19.	67°37'	48°01'	NB	M	/S	D3133
20.	68°06'	48°11'	NB	X, (M, Q, F)	/L	D3060
21.	69°30'	49°50'	QU	M, (Ch, K)	/S	D3126
22.	70°30'	46°20'	QU	M, (Ch)	/L	D3066
23.	71°17'	46°29'	QU	X, (M, Ch)	/S	D3058
24.	71°33'	45°56'	QU	M	/L	D3135
25.	74°29'	45°09'	QU	V, (M)	/S	D3007
26.	82°13'	47°42'	QU	X, (M, Ch, Q)	/S	D3149
27.	85°37'	49°30'	QU	X, (M, Ch, Q)	/S	D3017
28.	87°16'	49°29'	QU	X, (M, Ch)	/S	D3018

D3 Orthic Humo-Ferric Podzol (Continued)

	Long.	Lat.	Prov.	Short Mineral Description	Texture	Polygon No.
29.	118°29'	51°14'	BC	X, (S, V, M)	/L	D3106
30.	122°02'	50°17'	BC	S, (Ch)	/S	D3114
31.	122°41'	49°34'	BC	Ch, (M)	/S	D3117
32.	124°25'	49°14'	BC	X, (S, Ch, V)	/S	D3009
33	125°31'	49°30'	BC	Ch, (V, K)	/S	D3006
34.	125°31'	49°30'	BC	X, (Ch, V, K)	/L	D3014

E1 Melanic Brunisol Great Group

	Long.	Lat.	Prov.	Short Mineral Description	Texture	Polygon No.
1.	73°44'	45°34'	QU	X, (M, V, S)	/L	E1012
2.	75°42'	44°29'	ON	X, (M, Q, F)	/L	E1013
3.	76°19'	44°29'	ON	X, (V, M, Ch)	/L	E1002
4.	76°21'	45°07'	ON	X, (V, M, Ch)	/L	E1005
5.	76°56'	44°30'	ON	X, (M, S, Ch)	/L	E1018

E2 Eutric Brunisol Great Group

	Long.	Lat.	Prov.	Short Mineral Description	Texture	Polygon No.
1.	116°17'	61°18'	NW	M, (S, Q)	/S	E2050
2.	118°40'	49°30'	BC	X, (M, Am, Ch)	/L	E2033
3.	121°22'	61°30'	NW	X, (M, Am, V)	/S	E2036
4.	136°39'	60°54'	YU	X, (Ch, M, S)	/C	E2045

E3 Dystric Brunisol Great Group

	Long.	Lat.	Prov.	Short Mineral Description	Texture	Polygon No.
1.	74°30'	46°15'	QU	X, (M, S, Ch)	/S	E3068
2.	120°31'	49°36'	BC	S, (Ch, M)	/L	E3079
3.	123°55'	48°50'	BC	Ch, (V, S)	/L	E3066
4.	128°19'	54°30'	BC	X, (M, S)	/C	E3070

F1 Orthic Regosol Subgroup

	Long.	Lat.	Prov.	Short Mineral Description	Texture	Polygon No.
1.	117°58'	56°46'	AL	S, (M)	/L	F1008

F2 Cumulic Regosol Subgroup

	Long.	Lat.	Prov.	Short Mineral Description	Texture	Polygon No.
1.	64°01'	45°30'	NS	X, (M, V, K)	/C	F2016

F3 Regosolic Static Cryosol Subgroup

	Long.	Lat.	Prov.	Short Mineral Description	Texture	Polygon No.
1.	71°44'	67°31'	NW	M, (V)	/S	F3075
2.	87°53'	75°18'	NW	M, (V)	/C	F3063
3.	99°48'	65°45'	NW	M, (V)	/S	F3079
4.	101°40'	77°30'	NW	X, (M, K)	/L	F3033
5.	122°12'	73°12'	NW	X, (M, S, Q)	/S	F3064
6.	123°42'	68°07'	NW	X, (S, M)	/L	F3069
7.	134°38'	68°16'	NW	X, (S, M)	/C	F3070

G1 Humic Gleysol Great Group

	Long.	Lat.	Prov.	Short Mineral Description	Texture	Polygon No.
1.	72°45'	45°29'	QU	X, (M, S, V)	/C	G1004
2.	74°52'	45°09'	ON	X, (M, S, V)	/C	G1003
3.	75°30'	45°29'	ON	M, (S)	/C	G1002
4.	78°25'	42°41'	ON	M, (Q)	/C	G1005
5.	81°56'	42°36'	ON	M, (V, S)	/C	G1007
6.	96°52'	49°30'	MN	S, (M, V)	/C	G1014
7.	122°35'	49°29'	BC	X, (Ch, S, Am)	/L	G1017

G2 Orthic Gleysol Subgroup

	Long.	Lat.	Prov.	Short Mineral Description	Texture	Polygon No.
1.	71°24'	48°29'	QU	M, (Q)	/C	G2027
2.	81°05'	48°58'	ON	M, (S)	/C	G2026

G3 Gleysol Turbic Cryosol Subgroup

	Long.	Lat.	Prov.	Short Mineral Description	Texture	Polygon No.
1.	129°07'	69°29'	NW	M, (S, V)	/L	G3043
2.	130°17'	69°53'	NW	M, (S, V)	/S	G3042

H1 Fibrisol (Mineral Subsoil)

	Long.	Lat.	Prov.	Short Mineral Description	Texture	Polygon No.
1.	94°48'	53°40'	MN	X, (S, M)	/C	H1031
2.	94°52'	49°38'	ON	X, (S, M)	/S	H1026
3.	95°43'	50°30'	MN	X, (S, M)	/C	H1027
4.	95°46'	51°58'	MN	X, (S, M)	/C	H1032
5.	98°46'	56°10'	MN	X, (S, M)	/C	H1030
6.	111°06'	56°59'	AL	M	/S	H1008
7.	111°22'	56°06'	AL	S, (Q, M)	/S	H1017
8.	112°02'	59°29'	AL	M, (S)	/S	H1034
9.	112°42'	58°29'	AL	M, (S)	/S	H1014
10.	114°23'	57°13'	AL	M, (S)	/S	H1025

R Rockland

	Long.	Lat.	Prov.	Short Mineral Description	Texture	Polygon No.
1.	69°56'	56°39'	QU	X, (M, Ch, K)	/S	R1014
2.	118°09'	52°59'	AL	X, (M, Ch, Ca)	/S	R1023
3.	119°28'	52°36'	BC	M, (S)	/S	R1033
4.	122°02'	49°53'	BC	X, (S, Ch)	/S	R1036

