Soils of the Lac La Hache - Clinton Area, British Columbia

Report No. 25 British Columbia Soil Survey 1980

Agriculture Canada

Research Branch Direction de la recherche

SOILS OF THE

LAC LA HACHE - CLINTON AREA

BRITISH COLUMBIA

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Agriculture Canada, Vancouver, British Columbia

Report No. 25
British Columbia Soil Survey

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ERRATA (soil map)

1. Tu3-Tr1/4 map symbol on western edge of map at approximate latitude 51°32' North should be Tu2-Tr1/4.
2. Tu1-Tr1/3-4 uncolored linked area at approximately 51°54'N, 121°42'W northwest of Cariboo Nature Park.
3. The symbol Tu3 in Glacial Till cross section (Cariboo Midlands: southern section) at the foot of the map is superfluous. There is no such group of soils mapped.

Alphabetical List of Soils

PREFACE

The design of the Lac la Hache-Clinton soil map and report is different from most others that have been published in British Columbia. Formal printed soil reports, typeset and bound, take a long time to publish. Maps can be produced more quickly. There are many parts of British Columbia where the soils have been mapped, but the information still awaits compilation and publication. Therefore a number of maps and reports, of which the Lac la Hache-Clinton is the first, have been planned in order to make the information available more quickly. Much more information has been put into the map than before. Indeed for some purposes the map could be used by itself. The report has been reduced in size considerably by referring to other published material wherever possible, and using alternative forms of presentation such as computor print outs of soil descriptions. Inevitably such a shortened publication will not contain all the information that a land manager may need. In such cases users are encouraged to approach the authors for additional information. Other similar maps and reports are planned, principally in the Cariboo, Chilcotin and Peace River regions. The authors would welcome comments on the usefulness of this publication.

Many people helped in the preparation of the soil map and the report. The authors wish to thank Mr. T.M. Lord, Dr. J.A. Shields, Mr. J.H. Day, Mr. J.L. Nowland and Mr. B.E. Edwards all of the Land Resource Research Institute, Agriculture Canada for help with the content and design. The soil map was prepared by the Cartography Section, Land Resource Research Institute, Ottawa.

The following people assisted with field and mapping work: D. Hodgson, B. Thomson, S. Miller and J. Stobbe. Soil analyses were done by K.S. Chan. G.A. Young and N. Gough gave advice and supplied descriptions for soils on the southern and eastern borders respectively.

Mr. G.E. Cheesman, Ministry of the Environment and Mr. D.G. Schaefer, Environment Canada, provided climate information.

Mr. R. Coupé and Dr. R.M. Annas of the Ministry of Forests helped with the vegetation section.

The computor printouts of the soil descriptions were prepared by Mr. M. Brown and reproduction was arranged by Mr. R. Reid, Ministry of the Environment.

Mr. W. Watt, Ministry of Forests and Mr. R.C. Kowall, Ministry of the Environment gave helpful advice in the preparation of the forestry interpretations.

Ms. J. Melzer did the final typing for direct reproduction.

The cover photograph is courtesy of the British Columbia Government (Photo No. 8343).

PART 1

GENERAL DESCRIPTION

OF THE AREA

1.1 LOCATION

This report describes the soils of about 7700 km^2 in south-central British Columbia. The actual location is shown on the Key Map in the lower left hand corner of the soil map. The National Topographic map sheet covered is the west half of 92 P.

The principal settlements are Clinton, Lac la Hache and 100 Mile House. Forestry forms the basis of the economy. Agriculture is limited to ranching. Natural grasslands, wetland meadows and forest range provide grazing for cattle. The attractive scenery of the Cariboo with its forests, meadows and lakes is encouraging an expanding tourist industry based on camping, fishing, hunting and riding.

1.2 CLIMATE

A concise description of the climate of the interior Plateau of British Columbia is given by Schaefer (1978), and a more detailed account of the climate of the Cariboo Forest Region is given by Chilton (1979). As these authors point out the climate of the area is influenced regionally by the Coast Mountains and locally by elevation and aspect. The Coast Mountains limit the effects of the moist Pacific air. The plateau and especially some southern valleys are relatively dry (see the data for Ashcroft in Table 1), although the precipitation is well distributed throughout the year. Precipitation increases towards the north and towards higher elevations. The protection of the Coast Mountains also contributes to a continental temperature regime. The January-July mean temperature range for both 150 Mile House and Ashcroft is over 25°C. At Ashcroft this is caused by hot summers (mean daily temperature for July is 21.4°C), while cold winters are more the cause at 150 Mile House (mean daily temperature for January is -11.2°C). Apart from some very favoured aspects in the southern valleys the frost free period is quite short.

Summer heat and relatively little precipitation leads to soil moisture deficits over all the map area apart from possibly some north-facing slopes of the Quesnel Highlands. Moisture deficits increase towards the south and towards lower elevations and the season of deficit becomes longer. Therefore, over most of the area plant growth has to contend with significant soil moisture stress in the summer. Low winter temperatures that can freeze the soil down to 50 cm are another aspect of the climate that are significant to the soil system. Under these conditions physical and chemical reactions in the soil, such as swelling and shrinking, leaching and weathering, are most prevalent in the spring and fall.

TABLE 1 SELECTED CLIMATIC DATA

Station	Elev. (m)	Mean Annual Temp (°C)	Mean Jan. Temp (°C)	Mean July Temp (°C)	GDD[1] (5.0°C)	FFP[2] 0°C
Long Term Atmospheric Environment Service Stations						
150 Mile House	737	4.1	-11.2	15.8	1354	76
Ashcroft	304	8.7	-6.5	21.4	2417	160
Short term Atmospheric Environment Service Stations						
Jesmond	1158	3.2	-9.3	14.3	1097	54
100 Mile House	914	4.4	-9.4	15.9	1379	77
70 Mile House	1106	2.0	-11.6	13.5	949	11
Loon Lake	838	4.7	-9.9	16.8	1485	66

	Mean Annual pptn(mm)	May-Sept pptn (mm)	Snowfall (cm)	P.E.T.[3] (mm)	Moisture[4] Deficit (mm)	Moisture Deficit Season
Long term Atmospheric Environment Service Stations						
150 Mile House	425	222	142	536	314	Apr.-Sept.
Ashcroft	213	105	50	551	446	March-Oct.
Short term Atmospheric Environment Service Stations						
Jesmond	411	220	163E	490	270	May-Sept.
100 Mile House	401	212	146E	515	303	Apr.-Sept.
70 Mile House	355	197	146E	525	328	Apr.-Sept.
Loon Lake	329	178	128E	583	405	Apr.-Sept.

1. GDD: Growing Degree Days - degree days accumulated above 5.0°C base
2. FFP: Freeze Free Period (days)
3. Potential Evapotranspiration based on latent evapotranspiration after Baier and Robertson (1965) with a conversion after Holmes and Robertson (1958)
4. Moisture Deficit = Precipitation - P.E.T.

E. Estimate based on Nov. - March precipitation

1.3 GEOLOGY AND PHYSIOGRAPHY

The map area covers part of the Fraser and Thompson plateaus (Holland 1964). The hardrock geology has been discussed by Campbell and Tipper (1971) and Tipper (1971) has also described the glacial landforms and Pleistocene history.

For the purposes of the survey the map sheet was divided into three physiographic areas as shown in the upper right hand corner of the soil map. In the northeast there is a mountainous area of mainly igneous rocks: THE QUESNEL HIGHLANDS. Most of the area is a level or gently undulating lava plateau: THE CARIBOO MIDLANDS. In the southwest there are a number of mountain ranges underlain by a variety of rock types: THE SOUTHERN UPLANDS. The corresponding areas of Holland (1964) are as follows: The Quesnel Highlands - an unmapped outlier of the Quesnel Highlands; The Cariboo Midlands - the Fraser Plateau, small parts of the Thompson Plateau and the Fraser Basin; The Southern Uplands - The Marble and Camelsfoot Ranges.

Each area contains a distinct group of soils, largely as a result of the contrasting geology and physiography. For this reason the descriptions of the soils in the map legend and in the report are arranged by physiographic area.

THE QUESNEL HIGHLANDS range in elevation from about 1,000 m above sea level just north of 100 Mile House to 1,660 m on the summit of Timothy Mountain. The bedrock geology is a complex of intrusive diorite, granodiorite and gabbro, plus augite andesite lavas and sedimentary rocks of the Nicola group. The whole area was covered by ice up to 8,500 years ago (Prest 1969), so the mountain slopes are mantled with glacial till or colluvium whose composition is closely related to the bedrock. The soil parent materials are therefore moderately acid to neutral gravelly loams or sandy loams. On many summits bedrock reaches or approaches the surface. Between Bradley Creek and the northeast corner of the area the intrusive rocks are exposed at the surface. These rocks have a strong pattern of cross jointing. Small organic meadows occupy the hollows at the junction of two joints. The valleys between the mountains are often narrow. Their bottomlands usually contain fluvial sediments near the streams, flanked on either side by very coarse textured fluvioglacial deposits.

THE CARIBOO MIDLANDS is a large level or gently undulating plateau extending across the whole map sheet from the northwest to the southeast corner. Most of it is underlain by Miocene and Pliocene olivine basalt and basalt andesite lavas. It ranges in elevation from 1,000 m to 1,300 m asl, although isolated plugs of dolerite rise sharply above this level at Lone Butte and Mount Begbie. South of the Bonaparte River the plateau rises to over 1,600 m and is underlain by dacite, andesite and basalt of the Eocene Skull Hill formation.

Ice receded from the whole plateau towards the northeast between 10,000 and 9,500 years ago leaving three main types of glacial deposits. Over most of the plateau ice deposited loamy glacial till, which often has a very complex hummocky surface with numerous enclosed hollows that are now occupied by lakes or organic meadows. Where large volumes of meltwater flowed from the melting ice a veneer of very coarse sands and gravels was deposited in a variety of topographic forms ranging from flat plains, to the ridges and humps of eskers, kames and deltas. The distribution of these materials is very patchy but the two largest occurrences are on the northeast side of the Marble Range and around Rail Lake. Surface drainage is usually absent. The third type of deposit is the stratified lacustrine silt that is found in many of the enclosed or ice dammed depressions of the plateau. The principal exposures are in the Bridge Creek valley around 100 Mile House and near Beaverdam Lake. These sediments are thinly plastered on the valley sides or form benches bordering the creeks.

A number of large rivers have cut down through the plateau lavas to form deep valleys. Basalt lavas are often exposed on the steep upper slopes and colluvium occurs on the lower slopes. The San José and Bonaparte Rivers, and Bridge and Loon Creeks are the major examples.

THE SOUTHERN UPLANDS in the southwest are composed of the Marble Range, the Edge Hills, the Camelsfoot Range and the valley of the Fraser River. The topography is rugged with steep slopes, deep river valleys and bedrock often at or near the surface. The elevation ranges from 300 m asl in the bottom of the Fraser canyon to nearly 2,000 m asl in the Edge Hills and over 2,200 m asl on the summit of Mount Bowman in the Marble Range.

The mountains of the Marble Range are formed from the massive limestone of the Permiam Marble Canyon formation. They are well dissected by numerous streams which occasionally disappear underground especially towards the northeast. The slopes are mantled by highly calcareous sandy loam glacial till and colluvium. These unconsolidated slope deposits decrease in thickness with altitude, and bedrock exposures are common on the mountain summits.

The Edge Hills are composed of chert, argillite, siltstone and limestone of the Permian Pavilion Group. Their topography is similar to the Marble Range but the slope deposits are not so calcareous.

Below the slopes of the Edge Hills the Fraser River and small tributary streams have cut down through very complicated unconsolidated sediments, and are now eroding the underlying bedrock. Thus below about 900 m there are numerous isolated sloping benches separated by steep sided ravines. The benches usually have a core of glacial till or lacustrine deposits overlain by fluvial fan gravels.

The top few centimetres of all mineral soils in the area is a thin veneer of eolian fine sand and silt. It is thickest on the benches of the Fraser River, and thinnest in the Quesnel Highlands. In many places, especially in the southwest, it contains considerable amounts of volcanic ash. This layer is rarely more than 25 centimeters thick so it has an insignificant effect on topography, but has a very important effect on surface soil characteristics.

1.4 VEGETATION

Krajina (1969) described four Biogeoclimatic zones within the map area. The names of these zones appear in the legend on the soil map. More recently a study of the vegetation of the Cariboo Forest Region by Annas and Coupé (1979) has redefined the original zones, and in fact now describes five within the map area. Table 2 shows the names of the zones that each soil association is most commonly found within according to the two studies. The more recently defined zones correspond quite closely with the physiographic areas that have been described in section 1.3. The following description of the vegetation of the area will use the newer zone names. The common names of plants are also taken from the publication by Annas and Coupé (1979).

In the Quesnel Highlands of the northeast a wet subzone of the Engelmann Spruce - Subalpine Fir zone occurs at higher elvations and the Sub-Boreal zone (with Douglas fir) at the lower elevations. Subalpine fir and Engelmann spruce (with lodgepole pine on drier sites) are the main trees in the higher zone where abundant soil moisture and frozen soils in winter are controlling conditions. White rhododendron, tall blue huckleberry, Sitka valerian, and bunchberry are common plants in the well developed shrub and herb layers. Mosses form the ground cover under closed canopies. In the Sub-Boreal Spruce zone temperatures are higher, soil moisture is less abundant and the soils are frozen for a shorter period. Douglas fir, white spruce, lodgepole pine and trembling aspen are the main tree species. Thimbleberry, false box, wild sasparilla and bunchberry are among the more common shrubs and herbs.

The Interior Douglas Fir zone corresponds almost exactly with the Cariboo Midlands physiographic area. However, the dividing line between its two subzones (drier - south, and wetter - north) is further south than the division between the northern and southern sections of the Cariboo Midlands. The most common tree in the northern subzone where there is some moisture deficit in summer is the Douglas fir. Other trees include lodgepole pine, trembling aspen, Rocky Mountain juniper and white spruce. Pinegrass dominates the herb layer with kinnikinnick. The shrub layer is less dense but includes soapberry and rose. This vegetation assemblage is typical of about three quarters of the map sheet. It covers the major portion of the undulating plateau surface stretching from just north of Clinton to the northern border of the map. The drier subzone, where more severe summer soil moisture deficits occur is to be found in the valleys around Clinton. The forest of Douglas fir and Ponderosa pine is open. Pinegrass and bluebunch wheatgrass are the main grasses. There are few shrubs.

The four biogeoclimatic zones that occur in the Southern Uplands reflect the greater range of elevation, which (with aspect) influences temperatures, precipitation effectiveness and soil moisture deficit. At the lowest elevations on the terraces of the Fraser River high summer temperatures, high potential evapotranspiration rates and severe soil moisture deficits

Table 2: Soil Associations and Biogeoclimatic Zones according to Krajina, and Annas and Coupé

Soil Association	Biogeoclimatic Zones (and subzones)	
	after Krajina (1969)	after Annas and Coupé (1979)[1]
The Quesnel Highlands		
Archie	ESSF[2]	ESSF (b-wet)
Bobtail	IDF	SBS (b)
Larghetto	ESSF	ESSF (b-wet)
Lolo	ESSF	ESSF (b-wet)
Spout	IDF (wet)	SBS (b)
The Cariboo Midlands: northern section		
Buffalo	CALP	IDF (b-wet)
Canim	CALP	IDF (b-wet)
Eugene	IDF	IDF (b-wet)
Elliot	CALP	IDF (b-wet)
Exeter	CALP	IDF (b-wet)
Helena	CALP	IDF (b-wet)
Neilson	CALP	IDF (b-wet)
Rail	CALP	IDF (b-wet)
Stolle	IDF	IDF (b-wet)
Tatton	CALP	IDF (b-wet)
Tyee	CALP	IDF (b-wet)
Trurans	CALP	IDF (b-wet
Williams Lake	CALP	IDF (b-wet)
The Cariboo Midlands: southern section		
Big Bar	CALP	IDF (b-wet)
Beaverdam	CALP	IDF (b-wet)
Chasm	IDF (dry)	IDF (a-dry)
Holden	CALP (dry)	IDF (b-wet)
Soues	IDF (dry)	IDF (a-dry)
Timber	CALP (dry)	IDF (b-wet)
Tubbs	CALP	IDF (b-wet)
Tunkwa	CALP	IDF (b-wet)
The Southern Uplands		
Bowman	IDF	IDF (b-wet)
Cavanaugh	IDF (dry)	ESSF (a-dry)
Carson	ESSF	ESSF (a-dry)
Courtney	PPBG	PPBG (c)
Community	IDF (dry)	ESSF (a-dry)
Dog Creek	IDF	PPBG (c)
Frances	PPBG	IDF (a-dry)
Gang	PPBG	PPBG (c)
Kerr	ESSF (Krumholz)	AT

(1) plus further modifications, personal communications R. Annas and R. Coupé, Research Division, British Columbia Ministry of Forests

(2) Biogeoclimatic Zone names from both sources:

AT	Alpine Tundra
ESSF	Engelmann Spruce - Subalpine Fir
SBS	Sub-Boreal Spruce
IDF	Interior Douglas Fir
CALP	Cariboo Aspen-Lodgepole Pine - Douglas Fir
PPBG	Ponderosa Pine - Bunchgrass

lead to sagebrush and bluebunch wheatgrass, with almost no trees. At higher elevations within the zone Ponderosa pine and Douglas fir occur. Next in the elevation succession is the Interior Douglas Fir zone. Both subzones probably occur, but in narrow bands on the steeply sloping topography. The same plants are found as on the plateau to the north and east. Above this in the Marble Range, Edge hills and Camelsfoot Range is the drier subzone of the Engelmann Spruce - Subalpine Fir zone. The climate is cold and dry, as it is situated in the rainshadow of the Coast Mountains. The predominance of lodgepole pine and a sparser shrub and herb layer are the most obvious reflections of the greater summer moisture deficit compared to the wetter subzone in the Quesnel Highlands. Whitebark pine, subalpine fir and Engelmann spruce are the other principal trees. Common juniper, soapberry, grouseberry and lupins are common in the shrub and herb layers. Finally on a few windswept peaks of the Marble Range there are expanses of the Alpine Tundra zone, especially on dry south-facing slopes. The few trees such as subalpine fir and whitebark pine are stunted. There are some shrubs such as willow and common juniper, and many herbs, grasses, sedges and mosses.

PART 2

THE SOILS

2.1 INTRODUCTION

2.1.1 Survey and Mapping Procedures

Before the soils were mapped in the field areas which were assumed to contain similar soils had been marked on aerial photographs. Field work involved checking these areas to determine the types of soils within them. Boundaries between contrasting soils were mapped using changes in visible landscape features such as vegetation, slope or white alkaline efflorescence that could be associated with the difference between the adjacent soils. Wherever possible features were chosen that were visible on aerial photographs. No soil boundaries were ever located by digging holes systematically on either side of them. There was not enough time.

Soil properties of a given area were recorded by noting external features such as slope, aspect, vegetation, stoniness and erosion. Then such properties as texture, drainage, root penetration and the sequence of horizons would be recorded from soil pits or road cuts. Gradually a list of soils was developed to cover the whole area by grouping similar soils together. The soils were classified according to the Revised System of Soil Classification for Canada (Canada Soil Survey Committee 1973). It should be noted that this system has been superseded by the Canadian System of Soil Classification (Canada Soil Survey Committee 1978), but the earlier classification has been retained in this report. Eventually the soils were given names from the areas where they were first found, plus symbols to denote the names. The final list became the legend on the soil map. At the end of each field season typical sections of the major soils were described and sampled in detail. Boundaries between soils were plotted on aerial photographs (1:63,360 scale) in the field. They were then transferred to base maps (1:50,000) in the office. The soil map is published at a scale of 1:125,000.

This type of survey procedure is appropriate to a survey intensity of level 4. Nearly all traveses were by surface vehicle or helicopter. Almost all boundaries were inferred and most delineations (areas on the map) were checked.

Further information about soils and soil classification in British Columbia may be found in the Soil Landscapes of British Columbia (Valentine *et al*, 1978).

2.1.2 Reliability

Field work involved travelling all the available roads and tracks by motor vehicle. Areas inaccessible to motor vehicles were checked by helicopter. As was pointed out in the previous section much of the mapping was done by inferring soil boundaries from aerial photographs. Moreover on a reconnaissance survey of this intensity, although some soil areas will be checked more than once, other inaccessible ones will not be checked at all. It is obvious therefore that the symbols within any area on the map will not describe accurately 100% of

what is in that area. What percentage then can they be expected to describe? Various tests in other parts of British Columbia have shown that mapping accuracy can range from about 65% to 85% (according to the accessibility and complexity of the landscape) when air photo interpretation and ground observations are combined. The same range of accuracy probably applies to this map area. At the foot of the soil map there is a small inset map entitled "Access and Relative Mapping Accuracy". It shows three classes of accessibility. The corresponding mapping accuracy or reliability would be probably as follows:

Dense road network	85% map reliability
Sparse road network	75% " "
Helicopter access, very few roads	65% " "

These figures were confirmed for one map unit by checking the soils along transects in five areas chosen at random. A total of 48 sites were inspected. The results were as follows:

Map Unit Tyee .1 (Te 1)

	Total	%
Soil Sites that met criteria for principal soil of map unit	23	48
Soil Sites that were closely similar to principal soil of map unit (could be put to same use)	18	37
Soil Sites that were significantly different from any described for the map unit	7	15

The number of different soil sites is within the stated limits (15%) but the number of closely similar soils is rather high (37%).

The soil map shows different areas that have certain ranges of soils and soil properties. The reliability or accuracy of these ranges varies from one part of the map to another. It is never 100%. Therefore, to determine the qualities of a soil at a particular location a site inspection must be made.

2.1.3. Soil Associations and Map Units

At the scale used in the Lac la Hache-Clinton survey individual soils could not be shown on the map. Therefore groups of soils that consistently occur together are shown. Such a group of soils is called a SOIL ASSOCIATION.

A SOIL ASSOCIATION is a group of related soils developed on similar parent materials, which differ due to different soil water regimes, or other characteristics such as depth to bedrock. The soils will occur under

similar climatic conditions and usually within one physiographic area or vegetation zone. A SOIL ASSOCIATION is named after its most common soil.

A soil association will contain several soils, but the full range may not occur everywhere in the landscape. In this case each group of soils that is mapped from within the association is given a number. For instance the Spout Association includes a deep well drained soil, a wet soil and a shallow soil. Often only the deep soil and the wet soil occur together. These two soils are designated Spout 1. All three soils together are Spout 2. Wherever possible groups of soils from only one association are shown on the map as a SINGLE MAP UNIT. The convention is illustrated below:

Single Map Unit	Symbol	Soils Included	% of single map unit
Spout 1	St 1	Deep well drained soil	60
		wet soil	25
Spout 2	St 2	Deep well drained soil	60
		wet soil shallow soil	25

In many parts of the Lac la Hache - Clinton map different soil associations were too intimately mixed to be shown separately on the map. Elsewhere it was sometimes impossible to map the precise boundaries between soil associations in the time allotted for the survey. Both of these situations forced the soil mappers to group soils from different associations within one area on the map. This produced a COMPOUND MAP UNIT. For instance the Spout 1 soils are often shown with the Bobtail 2 soils. The Bobtail 2 soils, like Spout 2, include a deep well drained soil, a wet soil and a shallow soil. But, the Bobtail soils differ from the Spout soils due to the alkalinity of their parent materials, their classification and their associated vegetation and topography. The convention for a COMPOUND MAP UNIT is illustrated below:

Compound Map Unit	Symbol	Soils Included	% of compound map unit
Spout 1 plus Bobtail 2	St 1 - Bt 2	Deep well drained Spout Wet Spout	60
		Deep well drained Bobtail Wet Bobtail Shallow Bobtail	25

The soil associations have been described in the legend and colored on the map according to the physiographic area in which they most commonly occur. All the soils of the Quesnel Highlands are colored shades of pink or mauve. The soils of the Cariboo Midlands (northern section) are colored green, those of the Cariboo Midlands (southern section) are colored blue or grey, and the Southern Uplands are yellow and orange. The major soils of each association are described in the legend blocks on the right. Each block representing a physiographic area is color coded. Cross sections illustrate the landscape relationships of the associations. The landscape positions of the individual soils within each association are illustrated by the four cross sections at the foot of the map. The associations are again arranged by physiographic area in color coded strips.

2.2 DESCRIPTION OF THE SOILS

2.2.1 Presentation and Methods of Analysis

The following sections contain information about the soil associations. They have been arranged by physiographic area in the same way as they are shown in the map legend. A description of the profile, the immediate site and the analytical results (when available) of the most common soil in each association is reproduced from information stored in the British Columbia Soil Data File. Brief descriptions of the map units of each association are given on the page opposite the description of the major soil. There are no descriptions of the rock land types. They occur only as small inclusions within some soil map units, which is where they are described. After each map unit symbol there is the number of areas on the map that have that symbol and the total area in hectares that they cover.

The methods of soil analysis that were used to obtain the results given in the reproductions of the Soil Data File are as follows:

Colour 1 and 2: Colors refer to the Munsell Soil Color designations. Colors 1 and 2 are colors of the soil in different states.

pH 1: pH in $CaCl_2$ solution after the method of Schofield and Taylor (1955).

pH 2: pH in water with a 1:1 soil:water paste.

Organic Carbon: Method of Peech given in Atkinson (1958). For organic horizons the samples were ashed at 400°C in a muffle furnace and the organic matter content calculated as percent loss of weight.

Nitrogen: The total N Kjeldahl method given in Atkinson (1958).

Ash: The mineral fraction in organic soil horizons was calculated from the loss of weight after ignition to 400°C.

Ca Carb. Equiv.: Calcium Carbonate Equivalent was measured by the method of Schollenberger (1958).

Exchangeable Cations and Cation Exchange Capacity (C.E.C.): methods of Peech given in Atkinson (1958).

Elect. Cond.: Electrical Conductivity measured by the saturated paste method in Richards (1954).

Extractable Fe and Al: Oxalate method of McKeague and Day (1966). Where two results are given the second one is the pyrophosphate method of Bascomb (1968).

P : Easily soluble phosphorous; Bray method in Atkinson (1958).

S : Easily soluble sulphur; method of Johnson and Nishita (1952).

Mn : Extractable manganese by pyrophosphate method of Bascomb (1968).

Particle Size: Sand, silt and clay by the pipette method of Kilmer and Alexander (1949).

Coarse Fragments: The volume of particles larger than 2 mm in diameter was estimated in the field.

Further conventions for describing soils in the field, or the class limits for characteristics such as slope, can be found in the Canadian System of Soil Classification (Canada Soil Survey Committee 1978). Definitions of soil terms not explained in this report may be found in the Glossary of Terms in Soil Science (Canada Soil Survey Committee 1976).

2.2.2. Soils of the Quesnel Highlands

The mountain soils of the Quesnel Highlands have developed from gravelly loam or sandy loam glacial till and colluvium. The properties of the soil parent materials are closely related to the underlying bedrock. The moderately high rainfall and cool temperatures give only slight soil moisture deficits in the summer. Leaching rates are the highest in the map sheet. The forest of Engelmann spruce, Douglas fir and subalpine fir with a dense understory of shrubs and herbs supplies considerable litter to the soils. However, this litter layer is often poorly decomposed. All these factors combine to produce the most acid soils in the map sheet, with any accumulation of carbonates well below 100 cm. Clay has been washed out of the surface horizons and deposited in the subsurface horizons of the glacial till soils (Bobtail, Sprout and Archie). This produces a denser layer that may hold up water for a long time in the spring giving cold wet soils. The colluvial soils on the steeper slopes appear to be subject to too much down slope movement for such a clay layer to develop (Lolo and Larghetto).

On the map all the soils of the Quesnel Highlands have been colored shades of pink or mauve. They are described in the right hand legend in the block colored pink. A cross section shows the landscape relationships of the various associations. The landscape positions of the individual soils in each association are shown in the four cross sections at the foot of the map in the strip colored pink.

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: ARCHIE NTS: 93A15 SUMMARY DATE: APR 25,1978 PAGE: 01

ARCHIE ASSOCIATION

DATE OF SURVEY: 74 SURVEYOR: NG KELOWNA, B.C.M.A. & R.A.B.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION

LATITUDE (N) 52 59 00
LONGITUDE (W) 120 43 00
PRECISION (SEC) 30
ELEVATION (M) 1219

CLASSIFICATION

PODZOLIC GRAY LUVISOL(1973)
STATUS: MODAL SOIL (NO DEVIATION)

SLOPE

ASPECT (DEG) 90

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL MORAINAL

ROOTING DEPTH 46 CM. DRAINAGE MODERATELY WELL DRAINED

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
LH	8- 0					ABUNDANT
A E1	0- 3	10.0YR6.0/2.0 MOIST 10.0YR7.0/1.0 DRY	SANDY LOAM	GRANULAR	FRIABLE	ABUNDANT
B F1	3-13	10.0YR5.0/4.0 MOIST 10.0YR6.0/3.0 DRY	SANDY LOAM	GRANULAR	FRIABLE	ABUNDANT
B F2	13-28	2.5Y5.0/4.0 MOIST 2.5Y6.0/4.0 DRY	SANDY LOAM	GRANULAR	FRIABLE	ABUNDANT
A E2	28-46	5.0Y5.0/3.0 MOIST 5.0Y6.0/3.0 DRY	LOAM	GRANULAR	FRIABLE	FEW
B T1	46-66	5.0Y5.0/2.0 MOIST 5.0Y6.0/2.0 DRY	LOAM	PLATY	FIRM	
BC	66-112	5.0Y4.0/2.0 MOIST 5.0Y5.0/2.0 DRY	SILT LOAM	PLATY	FIRM	
C	112-	5.0Y4.0/2.0 MOIST	LOAM	PLATY	FIRM	

PHYSICAL & CHEMICAL DATA

HORIZON	PH 1 VALUE	PH 2 VALUE	ORGANIC CARBON %	NITROGEN %	EXCHANGEABLE CATIONS(ME/100G) CA	MG	NA	K	C.E.C. DETERMINED	EXTRACTABLE FE(%) RESULT	EXTRACTABLE AL(%) RESULT
LH	4.8	4.9	42.92	1.81	89.18	9.09	.12	2.80	91.6		
A E1	4.1	3.6	.73	.06	1.28	.38	.16	.06	5.1		
B F1	5.2	4.9	2.22	.13	1.50	.47	.08	.09	15.7	0.7	0.4
B F2	5.0	4.5	1.18	.09	1.95	.64	.06	.11	10.8	0.6	0.5
A E2	5.6	5.0	.44	.03	1.72	.58	.05	.12	5.2		
B T1	6.0	5.5	.29	.02	3.33	1.54	.10	.21	8.8		
BC	5.8	6.1									
C											

PARTICLE SIZE

HORIZON	P1 PPM.	S PPM.	% SAND	% SILT	TOTAL CLAY %
LH					
A E1	8.6	3.6			
B F1	66.1	2.2			
B F2	83.3	0.0			
A E2	28.4	0.6	45	45	10
B T1	9.9	0.0	37	45	18
BC			39	57	4
C					

Map Units of the Archie Association

Ac 1 (2 areas: 545 ha): The deep, moderately well drained soil occurs with small areas of shallow soils over bedrock, and coarse textured soils with accumulations of Fe and Al in the B horizon (Orthic Humo-Ferric Podzols). The topography ranges from strongly to very steeply sloping.

Ac 1 - St 2 (1 area: 504 ha): The group of soils described above in the Ac 1 map unit is associated with small areas of the three Spout soils (well drained, imperfectly drained and shallow to bedrock) on the boundary between the Engelmann Spruce - Subalpine Fir and the Sub-Boreal Spruce zones.

Ac 1 - Lg 1 (1 area: 922 ha): A single area of strongly to very steeply sloping topography contains the soils of the Ac 1 map unit, plus on the steeper slopes moderately coarse textured and slightly acid to neutral colluvial soils, some of which are shallow to bedrock (Larghetto soils).

Ac 1 - Rk 1 (2 areas: 227 ha): Small granitic rock outcrops and talus slopes occur with the soils of the Ac 1 map unit on strongly to very steeply sloping topography.

Ac 2 (1 area: 676 ha): The deep moderately well drained soil occurs with small areas of wet imperfectly drained soils and shallow soils over bedrock on gently to steeply sloping topography.

Ac 2 - Rk 1 - St 2 (1 area: 464 ha): This is a large very complex map unit which contains a number of soils that could not be mapped separately. The soils of the Ac 2 map unit are associated with smaller areas of granitic rock outcrops on the ridge crests and the less acid, well drained Spout soils on the lower slopes. The topography ranges from very gently sloping on the rounded ridges to very steeply sloping on the valley sides.

SOIL: BOBTAIL 1 NTS: 92P13 RESOURCE ANALYSIS BRANCH MINISTRY OF ENVIRONMENT VICTORIA, B.C. SUMMARY DATE: APR 25,1978 PAGE: 01

BOBTAIL ASSOCIATION

DATE OF SURVEY: 67 SURVEYOR: KV VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISSANCE SURVEY

LOCATION		CLASSIFICATION		SLOPE	
LATITUDE (N)	51 58 16	ORTHIC GRAY LUVISOL(1973)		%	16.0
LONGITUDE (W)	121 52 37			TYPE	SIMPLE
PRECISION (SEC)	00	STATUS:	MODAL SOIL (NO DEVIATION)	CLASS	STEEPLY SLOPING
				ASPECT (DEG)	45
				PROFILE SITE	LOWER SLOPE
				LENGTH (M)	200

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL	MORAINAL
LANDFORM	BLANKET

STONINESS	SLIGHTLY STONY	SEEPAGE	ABSENT	DRAINAGE	MODERATELY WELL DRAINED
ROOTING DEPTH	76 CM.			RUNOFF	SLOW

ADDITIONAL NOTES

MATURE DOUGLAS FIR-PINEGRASS. DEPTH TO BEDROCK=3M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
LFH	6- 0	ABRUPT SMOOTH					
A E1	0-10	ABRUPT SMOOTH	10.0YR6.0/2.0 DRY EXPED	SANDY LOAM	WEAK VERY FINE TO FINE SUBANGULAR BLOCKY	SLIGHTLY HARD	ABUNDANT FINE
A E2	10-20	ABRUPT SMOOTH	10.0YR6.0/2.0 DRY EXPED	SANDY LOAM	WEAK VERY FINE TO FINE SUBANGULAR BLOCKY	SLIGHTLY HARD	PLENTIFUL FINE
B T	20-48	CLEAR SMOOTH	10.0YR3.0/3.0 MOIST EXPED	LOAM	WEAK TO MODERATE VERY FINE TO FINE SUBANGULAR BLOCKY	VERY FIRM	PLENTIFUL FINE
BC	48-76	ABRUPT SMOOTH	10.0YR4.0/3.0 MOIST EXPED	LOAM	WEAK TO MODERATE VERY FINE TO FINE SUBANGULAR BLOCKY	FIRM	FEW FINE
II C K	76-112		10.0YR3.0/2.0 MOIST EXPED	LOAM GRAVELLY	WEAK TO MODERATE VERY FINE TO FINE SUBANGULAR BLOCKY	VERY FIRM	

HORIZON	ROOTS 2	CLAY FILMS 1	CLAY FILMS 2	CARBONATE DESCRIPTION	EFFERVESCENCE	MATERIAL COMP.		DECOMPOSITION
LFH						% LEAVES % NEEDLES	20 80	SLIGHT
A E1	ABUNDANT MEDIUM							
A E2	PLENTIFUL MEDIUM							
B T	PLENTIFUL MEDIUM	MANY MOD. THICK IN ROOT CHANNELS AND OR PORES ONLY	MANY MOD. THICK ON HORIZONTAL & VERTICAL PED FACES					
BC					VERY WEAK			
II C K				STREAKED BANDED COMMON (2-20%) MEDIUM (5-15MM) HORIZONTAL SOFT VERY FRIABLE	MODERATE			

PHYSICAL & CHEMICAL DATA

HORIZON	PH 1 VALUE	ORGANIC CARBON %	NITROGEN %	EXCHANGEABLE CATIONS(ME/100G) CA	MG	NA	K	C.E.C. DETERMINED	BULK DENSITY	PARTICLE SIZE % SAND	% SILT	TOTAL CLAY %	% FINE CLAY
LFH													
A E1	5.4	0.94	.09	5.20	1.60	.10	.70	11.0	1.27	53	41	6	1
A E2	5.4	0.53	.05	4.70	2.80	.10	.50	10.3	1.16	64	30	6	2
B T	6.4	0.59	.04	13.10	10.70	.20	.60	28.3	1.63	39	36	25	11
BC	7.2	0.07		9.70	7.80	.20	.30	20.0	1.97	41	41	18	2
II C K	7.6	0.15							2.22	43	42	15	2

PHYSICAL & CHEMICAL DATA

HORIZON	COARSE FRAGMENTS GRAVEL %	COBBLE %
LFH		
A E1		
A E2	10	
B T	15	5
BC	10	5
II C K	30	15

Map Units of the Bobtail Association

Bt 1 (7 areas: 5475 ha): This map unit occurs on the gently to strongly sloping lower mountain slopes towards the western edge of the Quesnel Highlands. The deep, moderately well drained soils are associated with small areas of wet imperfectly drained soils.

Bt 1 - St 2 (3 areas: 2543 ha): On some moderately to steeply sloping mid sections of mountain slopes the soils of the Bt 1 map unit are associated with the three Spout soils (well and imperfectly drained and shallow to bedrock) on medium textured less acid till.

Bt 1 - Tr 2 (2 areas: 1838 ha): Some meltwater channels containing the very coarse textured Trurans soils and some lava bedrock occur in wide valley bottoms with the soils of the Bt 1 map unit.

Bt 2: (5 areas: 5088 ha): The deep moderately well drained soils occur with small areas of shallow soils over bedrock and wet imperfectly drained soils. The topography is moderately to steeply sloping.

Bt 2 - St 2 (9 areas: 10,600 ha): This is a common map unit on the moderately to steeply sloping upper mountain slopes. The soils of the Bt 2 map unit are associated with small areas of the three Spout soils (well and imperfectly drained and shallow to bedrock) on medium textured, slightly acid till.

Bt 2 - St 2 - Rk 1 (1 area: 3846 ha): A large map unit on the southern edge of the Quesnel Highlands contains the soils of the Bt 2 - St 2 map unit plus granitic rock outcrops on strongly to very steeply sloping topography. The soils and rock outcrops are so mixed up that it was impossible to map them separately.

Bt 2 - St 2 - Rk 2 (2 areas: 1737 ha): These two map units are very similar to the one designated Bt 2 - St 2 - Rk 1 but the rock outcrops are composed of andesite and greywacke.

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: LARGHETTO NTS: 92P15 SUMMARY DATE: APR 25,1978 PAGE: 01

LARGHETTO ASSOCIATION

DATE OF SURVEY: 74 SURVEYOR: NG KELOWNA, B.C.M.A. & R.A.B.
SAMPLING PURPUSE: RECONNAISANCE SURVEY

LOCATION

LATITUDE (N) 51 51
LONGITUDE (W) 120 59
PRECISION (SEC) 30
ELEVATION (M) 792
AIR PHOTOGRAPH A13320 7

CLASSIFICATION

DEGRADED EUTRIC BRUNISOL(1973)
STATUS: MODAL SOIL (NO DEVIATION)

SLOPE

% 15.0
ASPECT (DEG) 180
PROFILE SITE TOE
LENGTH (M) 549

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL COLLUVIAL

BEDROCK

DPTH TO BEDROCK 30 CM.
ORIGIN INTRUSIVE (PLUTONIC)

STONINESS EXCESSIVELY STONY
FLOOD HAZARD NO HAZARD
SEEPAGE ABSENT

DRAINAGE WELL DRAINED
RUNOFF MEDIUM
PERMEABILITY RAPID
INFILTRATION VERY RAPID

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	TEXTURE	STRUCTURE I	CONSISTENCE
LF	3- 0				
A E	0- 3	NONE SMOOTH	SANDY LOAM	STRUCTURELESS VERY COARSE GRANULAR	NON STICKY VERY FRIABLE LOOSE NONPLASTIC
B M1	3-15	NONE SMOOTH	SANDY LOAM GRAVELLY	STRUCTURELESS VERY COARSE GRANULAR	NON STICKY VERY FRIABLE LOOSE NONPLASTIC
B M2	15-43	NONE SMOOTH	SANDY LOAM GRAVELLY	STRUCTURELESS VERY COARSE GRANULAR	NON STICKY VERY FRIABLE LOOSE NONPLASTIC
C	43-	NONE SMOOTH	SANDY LOAM GRAVELLY	STRUCTURELESS VERY COARSE GRANULAR	NON STICKY VERY FRIABLE LOOSE NONPLASTIC

Map Units of the Larghetto Association

Lg 1 (1 area: 43 ha): A small area on the eastern edge of the map sheet contains mainly deep, well drained, moderately coarse textured, colluvial soils on strongly to steeply sloping topography. There are small areas of shallow soils over bedrock.

Lg 1 - Ac 1 (3 areas: 759 ha): On the strongly to very steeply sloping topography east and west of Lang Lake the two soils of the Lg 1 map unit occur with small areas of Archie soils. The Archie soils include deep, moderately well drained, medium acid soils with some shallow soils over bedrock and some coarse textured, acid soils with Fe and Al accumulation in the B horizon.

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: LOLO NTS: 92P15 SUMMARY DATE: APR 25,1978 PAGE: 01

LOLO ASSOCIATION

DATE OF SURVEY: 74 SURVEYOR: NG KELOWNA, B.C.M.A. & R.A.B.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION

LATITUDE (N) 51 49
LONGITUDE (W) 120 58
PRECISION (SEC) 30
ELEVATION (M) 1097
AIR PHOTOGRAPH A13320 7

CLASSIFICATION

DEGRADED DYSTRIC BRUNISOL(1973)
STATUS: MODAL SOIL (NO DEVIATION)

SLOPE

% 30.0
ASPECT (DEG) 270
LENGTH (M) 2743

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL COLLUVIAL

BEDROCK

DPTH TO BEDROCK 25 CM.
ORIGIN INTRUSIVE (PLUTONIC)

STONINESS MODERATELY STONY
FLOOD HAZARD NO HAZARD

DRAINAGE WELL DRAINED
RUNOFF MEDIUM
PERMEABILITY RAPID
INFILTRATION VERY RAPID

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	TEXTURE	STRUCTURE 1	CONSISTENCE
LF	3- 0				
A E	0- 3	NONE SMOOTH	SANDY LOAM	STRUCTURELESS VERY COARSE GRANULAR	NON STICKY VERY FRIABLE LOOSE NONPLASTIC
B M1	3-15	NONE SMOOTH	SANDY LOAM GRAVELLY	STRUCTURELESS VERY COARSE GRANULAR	NON STICKY VERY FRIABLE LOOSE NONPLASTIC
B M2	15-36	NONE SMOOTH	SANDY LOAM GRAVELLY	STRUCTURELESS VERY COARSE GRANULAR	NON STICKY VERY FRIABLE LOOSE NONPLASTIC
C	36-	NONE SMOOTH	SANDY LOAM GRAVELLY	STRUCTURELESS VERY COARSE GRANULAR	NON STICKY VERY FRIABLE LOOSE NONPLASTIC

Map Units of the Lolo Association

Lo 1 (3 areas: 1931 ha): Deep, well drained soils developed on moderately coarse textured, acid colluvium occur on strongly to very steeply topography on the far eastern edge of the map. Small areas of shallow soils over granitic bedrock occur with them.

Lo 1 - Ac 1 (1 area: 129 ha): A small map unit on steeply to very steeply sloping topography contains the two soils of the Lo 1 map unit and the three soils of the Archie association. The latter soils are deep, moderately well drained, medium acid, on glacial till, with some shallow soils over bedrock and some coarse textured acid soils with Fe and Al accumulations in the B horizon.

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: SPOUT 1 NTS: 92P14 SUMMARY DATE: APR 25,1978 PAGE: 01

SPOUT ASSOCIATION

DATE OF SURVEY: 67 SURVEYOR: KV VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION

LATITUDE (N) 51 57 16
LONGITUDE (W) 121 26 34
PRECISION (SEC) 00

CLASSIFICATION

PODZOLIC GRAY LUVISOL(1973)
STATUS: MODAL SOIL (NO DEVIATION)

SLOPE

% 14.0
TYPE SIMPLE
CLASS STRONGLY SLOPING
ASPECT (DEG) 180
PROFILE SITE MIDDLE
LENGTH (M) 150
MICROTOPOGRAPHY SLIGHTLY MOUNDED

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL MORAINAL
LANDFORM BLANKET

STONINESS SLIGHTLY STONY SEEPAGE ABSENT DRAINAGE WELL DRAINED
RUNOFF SLOW

ADDITIONAL NOTES

LODGEPOLE PINE-PINEGRASS-SERAL COMMUNITY AFTER BURN IN DOUGLAS FIR-PINEGRASS ZONE. DEPTH TO BEDROCK=2.5M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
LFH	8- 0						
A E1	0- 9	CLEAR SMOOTH	10.0YR/.0/1.0 DRY EXPED	SANDY LOAM	WEAK VERY FINE PLATY	LOOSE	PLENTIFUL FINE HORIZONTAL EX PED
B F	9-28	GRADUAL WAVY	10.0YR6.0/6.0 MOIST EXPED	SANDY LOAM	WEAK VERY FINE SUBANGULAR BLOCKY	FIRM	PLENTIFUL FINE HORIZONTAL EX PED
A E2	28-38	CLEAR WAVY	10.0YR6.0/2.0 MOIST EXPED	SANDY LOAM	WEAK VERY FINE SUBANGULAR BLOCKY	VERY FIRM	FEW FINE RANDOM EX PED
B T	38-60	GRADUAL WAVY	10.0YR6.0/3.0 MOIST EXPED 10.0YR4.0/1.0 DRY EXPED		WEAK VERY FINE ANGULAR BLOCKY	VERY FIRM	FEW FINE RANDOM EX PED
II C	60-112		10.0YR6.0/2.0 MOIST EXPED	LOAM GRAVELLY	WEAK VERY FINE ANGULAR BLOCKY	VERY FIRM	

HORIZON	ROOTS 2	CLAY FILMS 1	CLAY FILMS 2	MATERIAL COMP.		DECOMPOSITION
LFH				% LEAVES % NEEDLES	20 80	SLIGHT
A E1	PLENTIFUL MEDIUM					
B F	PLENTIFUL MEDIUM					
A E2	FEW MEDIUM					
B T		COMMON MOD. THICK IN ROOT CHANNELS AND OR PORES ONLY	COMMON MOD. THICK ON HORIZONTAL & VERTICAL PED FACES			
II C						

PHYSICAL & CHEMICAL DATA

HORIZON	PH 1 VALUE	ORGANIC CARBON %	NITROGEN %	EXCHANGEABLE CATIONS(ME/100G) CA	MG	NA	K	C.E.C. DETERMINED	EXTRACTABLE FE(%) RESULT	EXTRACTABLE AL(%) RESULT	BULK DENSITY
LFH											
A E1	4.7	1.22	.08	2.80	.70	.10	.20	10.7	.5	.1	
B F	5.7	0.87	.06	5.60	1.90	.10	.40	16.8	1.0	.5	1.34
A E2	5.7	0.32		3.40	1.20	.10	.20	7.3	.7	.7	1.91
B T	5.8	0.25		7.00	3.20	.10	.40	14.2	.6	.6	2.07
II C	6.2	0.08		7.30	3.90	.10	.40	14.4	.3	.3	2.00

HORIZON	PARTICLE SIZE % SAND	% SILT	TOTAL CLAY %	% FINE CLAY	COARSE FRAGMENTS GRAVEL %	COBBLE %
LFH						
A E1	54	41	5	1		
B F	53	35	12	4	10	
A E2	63	32	5	0	10	
B T	49	36	15	2	15	
II C	51	35	14	3	20	15

Map Units of the Spout Association

St 1 (2 areas: 166 ha): Two small map units bordering Spout Lake contain the deep, well drained Spout soils on slightly acid, gravelly loam glacial till, with small areas of wet imperfectly drained soils in low spots. The topography is gently to moderately sloping.

St 1 - Hl 1 (1 area: 788 ha): On the northern edge of the map there is a map unit where the two soils of the St 1 map unit are combined with small areas of Helena soils that normally are found in the Cariboo Midlands. The Helena soils are predominantely deep, well drained and moderately alkaline on gravelly sandy loam glacial till. There are also some wet imperfectly drained soils.

St 2 (4 areas: 1440 ha): Deep well drained soils developed on slightly acid gravelly loam glacial till occur with small areas of shallow soils over bedrock and wet imperfectly drained soils. The topography is moderately to steeply sloping. The four areas mapped are often on north-facing slopes.

St 2 - Rl 1 (1 area: 553 ha): In a small upland area the three soils of the St 2 map unit are associated with the moderately well decomposed organic Rail soils that have developed in depressions.

St 2 - Rk 1 (1 area: 743 ha): Just north of Lang Lake the three soils of the St 2 map unit over with small outcrops of granitic bedrock on moderately to steeply sloping topography.

St 2 - Bt 2 (2 areas: 825 ha): The three soils of the St 2 map unit occur with small areas of Bobtail soils (deep, moderately well drained, shallow over bedrock and wet imperfectly drained) on strongly to steeply sloping topography.

St 2 - Bt 1 (4 areas: 4828 ha): The highlands north of Timothy Mountain contain an assemblage of soils that are the same as the St 2 - Bt 2 map unit apart from the absence of the Bobtail soils that are shallow to bedrock. The topography is moderately to steeply sloping.

St 2 - Ac 2 (1 area: 1418 ha): On Timothy Mountain the three soils of the St 2 map unit are associated with small areas of the soils of the Ac 2 map unit (deep, moderately well drained, wet imperfectly drained and shallow soils over bedrock). The Archie soils occur at the higher elevations.

St 2 - Ac 2 - Rk 1 (1 area: 557 ha): South of Lang Lake there is an area that is very similar to the St 2 - Ac 2 map unit described above except that it contains small outcrops of granitic bedrock. The topography is very irregular changing from very gently sloping on the ridge tops to very steeply sloping on the upper mountain sides.

2.2.3 Soils of the Cariboo Midlands: Northern Section

The soils of the northern section of the Cariboo Midlands have developed from a variety of glacial and postglacial surficial materials under a cool, relatively dry climate. The topography is an undulating plateau surface with many enclosed depressions. In places small rivers have cut shallow valleys into the plateau surface. Most of the vegetation is an open forest of Douglas fir, lodgepole pine and pine grass. In the valleys and some plateau depressions there are limited expanses of grassland. The northern section of the Cariboo Midlands is slightly wetter and cooler than the southern section. This difference in climate is the principal cause of the difference between the soils of the two sections.

The textures of the glacial till soils ranges from gravelly loam or clay loam (Tyee and Williams Lake) to gravelly sandy loam (Canim, Eugene and Helena). Clay has been washed out of the surface horizons and deposited in the subsurface horizons. This produces a denser layer that holds up water, especially in the spring, and may restrict root growth. Towards the east, carbonates have been leached to below 90 cm in the soil profile (Tyee, Helena and Eugene). However, in the west evapotranspiration rates are higher, leaching less effective and carbonate accumulations occur above this level (Williams Lake). All glacial till soils (except Canim) have an open forest cover which provides only a thin poorly decomposed organic surface.

The very coarse textured fluvioglacial soils (Trurans and Stolle) have a much lower water storage capacity than the till soils. They are rapidly drained, with neither carbonate accumulations nor fine textured impeding layers in the subsoil.

Both forested and grassland soils have developed from the lacustrine silts in and adjacent to the Bridge Creek Valley. The forested soils (Exeter) are found in the upper, moister areas of the former lacustrine basins. In the lower and warmer parts, and an exposed southern slopes higher evapotranspiration rates produce grassland soils (Buffalo). Under conditions of extreme evapotranspiration and the lateral transfer of soil water, soluble salts accumulate to form saline soils.

Organic soils (Rail) occur in the very poorly drained enclosed depressions on the plateau.

Narrow strips of fluvial soils (Elliot and Neilson) along stream courses have a grass, sedge and willow vegetation cover and are mildly alkaline. They have a wide range of textures and drainage conditions.

On the map all the soils of the Cariboo Midlands, northern section, are colored shades of green. They are described in the right hand legend in the block colored green. A cross section shows the landscape relationship of the various associations. The landscape positions of the individual soils in each association are shown in the four cross sections at the foot of the map in the strip colored green.

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: BUFFALO 1 NTS: 92P11 SUMMARY DATE: APR 25,1978 PAGE: 01

BUFFALO ASSOCIATION

DATE OF SURVEY: 67 SURVEYOR: KV VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION		CLASSIFICATION		SLOPE	
LATITUDE (N)	51 39 22	ORTHIC DARK GRAY(1973)		%	6.0
LONGITUDE (W)	121 17 03			CLASS	MODERATELY SLOPING
PRECISION (SEC)	00	STATUS:	MODAL SOIL (NO DEVIATION)	ASPECT (DEG)	180
				PROFILE SITE	MIDDLE
				LENGTH (M)	10
				MICROTOPOGRAPHY	LEVEL

PARENT MATERIAL & LANDFORM

GENETIC MODIFIER	GLACIO
GENETIC MATERIAL	LACUSTRINE
LANDFORM	TERRACED

ROOTING DEPTH:	80 CM.	SEEPAGE	ABSENT	DRAINAGE	WELL DRAINED
				RUNOFF	SLOW

ADDITIONAL NOTES

KENTUCKY BLUEGRASS COMMUNITY. DEPTH TO BEDROCK=9.9M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
A H	0- 4	ABRUPT SMOOTH	10.0YR3.0/1.5 DRY EXPED	SILT LOAM	WEAK VERY FINE SUBANGULAR BLOCKY	LOOSE	ABUNDANT MEDIUM EX PED
A HE	4-10	CLEAR SMOOTH	10.0YR4.5/2.0 DRY EXPED	SILT LOAM	WEAK VERY FINE SUBANGULAR BLOCKY	SLIGHTLY HARD	PLENTIFUL FINE EX PED
B M1	10-30	GRADUAL SMOOTH	10.0YR5.0/3.0 DRY EXPED	SILT LOAM	WEAK VERY FINE SUBANGULAR BLOCKY	HARD	VERY FEW FINE EX PED
B M2	30-50	ABRUPT SMOOTH	10.0YR6.0/3.0 DRY EXPED	SILT LOAM	WEAK VERY FINE SUBANGULAR BLOCKY	SLIGHTLY HARD	VERY FEW FINE EX PED
C K	50-76	CLEAR SMOOTH	10.0YR7.0/2.0 DRY EXPED	SILT	WEAK VERY FINE SUBANGULAR BLOCKY	SLIGHTLY HARD	VERY FEW FINE EX PED
II C K	76-120		10.0YR5.0/2.0 MOIST EXPED	SILTY CLAY LOAM	MODERATE MEDIUM PLATY	FRIABLE	VERY FEW FINE EX PED

HORIZON	EFFERVESCENCE
A H	
A HE	
B M1	
B M2	
C K	STRONG
II C K	MODERATE

PHYSICAL & CHEMICAL DATA

HORIZON	PH 1 VALUE	ORGANIC CARBON %	NITROGEN %	EXCHANGEABLE CATIONS(ME/100G) CA	MG	NA	K	C.E.C. DETERMINED	BULK DENSITY	PARTICLE SIZE % SAND	% SILT	TOTAL CLAY %	% FINE CLAY
A H	5.7	6.61	.56	16.40	2.90	.10	1.70	23.1	.99	16	69	15	2
A HE	6.4	2.84	.26	16.40	3.80	.10	.70	23.2	1.24	17	71	12	2
B M1	6.7	1.16	.14	15.90	5.70	.10	.50	31.5	1.32	3	78	19	6
B M2	7.1	.41	.06	12.40	4.70	.10	.30	17.4	1.29	1	85	14	3
C K	7.9	.52							1.39	5	90	6	4
II C K	8.2	.29								10	63	27	5

Map Units of the Buffalo Association

Bf 1 (7 areas: 2131 ha): In some depressional basins of the plateau a deep, well drained, medium textured soil is associated with small areas of saline soils. The topography ranges from very gently to moderately sloping. The vegetation is a cover of Kentucky blue grass, saltgrass and sedges.

Bf 1 - Hl 1 (3 areas: 988 ha): In some areas the boundary between the grassland lacustrine soils and the forested glacial till soils is very irregular. In this case the two soils of the grassland Bf 1 map unit have had to be mapped with two of the Helena soils (the deep, well drained soil, and the wet imperfectly drained soil). The topography is gently to moderately sloping.

Bf 2 (3 areas: 278 ha). Three small areas at the south end of Lac la Hache contain the two soils of the Bf 1 map unit plus small lower terrace flats with deep, moist, highly carbonated Black grassland soils. The topography is very gently to moderately sloping. The moist Black soils have a mixture of sedges and Kentucky blue grass.

Bf 2 - Ex 1 (2 areas: 645 ha): In some areas the boundary between the grassland and forest soils on the lacustrine silts is very irregular. In two such areas the three soils of the Bf 2 map unit (grassland) have been mapped with the deep, well drained forested Exeter soils. The topography varies from gently to moderately sloping.

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: CANIM 1 NTS: 92P14 SUMMARY DATE: APR 25,1978 PAGE: 01

CANIM ASSOCIATION

DATE OF SURVEY: 67 SURVEYOR: KV VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISSANCE SURVEY

LOCATION		CLASSIFICATION		SLOPE	
LATITUDE (N)	51 48 54	ORTHIC DARK BROWN(1973)		%	12.0
LONGITUDE (W)	121 24 17			TYPE	COMPLEX
PRECISION (SEC)	00	STATUS: MODAL SOIL (NO DEVIATION)		CLASS	MODERATELY ROLLING
				ASPECT (DEG)	225
				PROFILE SITE	MIDDLE
				LENGTH (M)	50

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL	MORAINAL				
LANDFORM	BLANKET				
ROOTING DEPTH	80 CM.	SEEPAGE	ABSENT	DRAINAGE	WELL DRAINED
				RUNOFF	MEDIUM

ADDITIONAL NOTES

KENTUCKY BLUEGRASS-RICHARDSON'S NEEDLEGRASS COMMUNITY.OVERGRAZED.
DEPTH TO BEDROCK=2M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
L	3- 0						
A H1	0- 4	ABRUPT SMOOTH	10.0YR2.5/2.0 DRY EXPED	LOAM	WEAK VERY FINE SUBANGULAR BLOCKY	SLIGHTLY HARD	ABUNDANT FINE
A H2	4-10	CLEAR SMOOTH	10.0YR3.0/2.0 DRY EXPED	SANDY LOAM	WEAK VERY FINE SUBANGULAR BLOCKY	SLIGHTLY HARD	ABUNDANT FINE
B M	10-25	ABRUPT SMOOTH	10.0YR4.0/2.5 DRY EXPED	SANDY LOAM	MODERATE VERY FINE SUBANGULAR BLOCKY	SLIGHTLY HARD	ABUNDANT FINE
II B M	25-46	ABRUPT SMOOTH	10.0YR4.0/3.0 DRY EXPED	SANDY LOAM VERY GRAVELLY	WEAK VERY FINE SUBANGULAR BLOCKY	SOFT	ABUNDANT FINE
III C K1	46-60	ABRUPT SMOOTH	10.0YR5.0/3.5 DRY EXPED	LOAMY SAND GRAVELLY	WEAK VERY FINE SUBANGULAR BLOCKY	SLIGHTLY HARD	VERY FEW FINE
III C K2	60-120		10.0YR7.0/2.5 DRY EXPED	SANDY LOAM GRAVELLY	WEAK VERY FINE SUBANGULAR BLOCKY	SLIGHTLY HARD	VERY FEW FINE

HORIZON	ROOTS 2	CLAY FILMS 1	CARBONATE DESCRIPTION	EFFERVESCENCE	MATERIAL COMP.	DECOMPOSITION
L					% LEAVES 90 % NEEDLES 10	SLIGHT
A H1	ABUNDANT MEDIUM					
A H2	ABUNDANT MEDIUM					
B M		FEW VERY THIN ON PED FACES-UNSPECIFIED				
II B M				WEAK		
III C K1			NODULAR COMMON (2-20%) MEDIUM (5-15MM) OBLONG SOFT	STRONG		
III C K2			NODULAR COMMON (2-20%) MEDIUM (5-15MM) OBLONG SOFT	STRONG		

PHYSICAL & CHEMICAL DATA

HORIZON	PH 1 VALUE	ORGANIC CARBON %	NITROGEN %	EXCHANGEABLE CATIONS(ME/100G) CA	MG	NA	K	C.E.C. DETERMINED	BULK DENSITY	PARTICLE SIZE % SAND	% SILT	TOTAL CLAY %	% FINE CLAY
L													
A H1	6.0	5.92	.57	27.60	3.30	.10	2.40	40.2	.90	43	42	15	3
A H2	6.3	3.25	.36	23.20	2.90	.10	2.20	32.2	1.18	55	32	13	4
B M	6.5	.75	.21	18.10	2.50	.10	1.90	26.2	1.38	58	31	11	3
II B M	6.9	1.97		19.10	2.30	.10	2.10	25.7	1.97	59	31	10	3
III C K1	7.4	.46							1.64	80	17	3	0
III C K2	8.1	.46							1.56	47	46	7	1

COARSE FRAGMENTS

HORIZON	GRAVEL %	COBBLE %
L		
A H1		
A H2		
B M	10	
II B M	65	
III C K1		30
III C K2		45

Map Units of the Canim Association

Cx 1 (7 areas: 1607 ha): The grassland Canim soils are found principally on the southwest-facing slopes bordering the San José River around Lac la Hache. This map unit contains the deep, well drained moderately alkaline soils plus small areas of soils with bedrock less than 50 cm below the ground surface. These shallow soils occur mainly on the crests of the gently to strongly sloping topography.

Cx 1 - Rl 1 (1 area: 534 ha): At the eastern end of Chimney Lake in the northwest corner of the map sheet there is an open flat bottomed valley. The topography is hummocky, with numerous small depressions that could not be mapped separately. The two soils of the Cx 1 map unit occur on the moderately to strongly sloping terrain. Many small exposures of the very poorly drained organic Rail soils occur in the depressions.

Cx 1 - Hl 1 (1 area: 359 ha): This is a small map unit on the boundary between the grassland (Canim) and the forested (Helena) gravelly sandy loam glacial till soils. The boundary is so irregular that the two soils of the Cx 1 map unit could not be mapped separately from the deep, well drained and wet imperfectly drained soils of the Hl 1 map unit.

Cx 1 - Hl 2 (7 areas: 3598 ha): This is the more common map unit on the forest-grassland boundary between the Canim and Helena soils. It contains the same four soils as the Cx 1 - Hl 1 map unit plus some small areas of saline grassland soils.

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: ELLIOT 1 NTS: 92P13 SUMMARY DATE: APR 25,1978 PAGE: 01

ELLIOT ASSOCIATION

DATE OF SURVEY: 66 SURVEYOR: KV VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION

LATITUDE (N) 51 57 39
LONGITUDE (W) 121 47 53
PRECISION (SEC) 00

CLASSIFICATION

CARBONATED REGO HUMIC GLEYSOL(1973)
STATUS: MODAL SOIL (NO DEVIATION)

SLOPE

% 0.0
CLASS DEPRESSIONAL TO LEVEL
MICROTOPOGRAPHY LEVEL

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL FLUVIAL
LANDFORM PLAIN

DRAINAGE IMPERFECTLY DRAINED
RUNOFF SLOW

ADDITIONAL NOTES

UNDISTURBED SEDGES-ARROW GRASS-SMOOTH BROME WATER HEMLOCK. SMALL AMOUNTS OF MARL IN H. & SNAILS IN AHK2. ALL OF CKG HORIZON IS GLEYED.
DEPTH TO BEDROCK=9.9M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
LFH	5- 0		2.5Y2.0/0.0 MOIST MATRIX		STRUCTURELESS		
A HK1	0- 8	ABRUPT SMOOTH	2.5Y2.0/0.5 MOIST MATRIX	SILT LOAM	STRUCTURELESS	SLIGHTLY STICKY SLIGHTLY PLASTIC	ABUNDANT FINE IN PED
H	8-13	ABRUPT SMOOTH	2.5Y2.0/0.0 MOIST MATRIX		STRUCTURELESS	VERY STICKY PLASTIC	ABUNDANT FINE IN PED
A HK2	13-33	ABRUPT SMOOTH	2.5Y3.0/0.0 MOIST MATRIX	SILTY CLAY LOAM	STRUCTURELESS	VERY STICKY PLASTIC	FEW FINE IN PED
C KG	33-75		5.0Y4.0/1.0 MOIST EXPED	SILTY CLAY LOAM	STRUCTURELESS	VERY STICKY PLASTIC	FEW FINE IN PED

HORIZON	MOTTLES 1	EFFERVESCENCE	MATERIAL COMP.		DECOMPOSITION
LFH			% LEAVES	20	SLIGHT
			% SEDGE	40	
			% REED	40	
A HK1		WEAK			
H		MODERATE			
A HK2		STRONG			
C KG	5.0Y4.0/1.0	STRONG			

PHYSICAL & CHEMICAL DATA

HORIZON	PH 1 VALUE	PH 2 VALUE	ORGANIC CARBON %	NITROGEN %	EXCHANGEABLE CATIONS(ME/100G) CA	MG	NA	K	C.E.C. DETERMINED	ELECT. COND. (MMHOS/CM)	BULK DENSITY
LFH	6.9	7.4	35.60	2.92	119.15	50.92	4.68	1.98	118.1	.67	0.27
A HK1	7.2	7.7	7.90	.53	150.34	32.51	3.88	1.30	34.3	.84	1.04
H	7.0	7.3	26.90	2.10	208.26	47.88	5.17	1.38	117.8	1.17	0.42
A HK2	7.6	8.2	4.60	.33	157.93	23.95	3.89	1.30	31.4	.63	
C KG	7.5	7.9	1.50	.12	33.51	16.87	2.61	1.31	30.1	.65	

Map Units of the Elliot Association

El 1 (12 areas: 2015 ha): The soils of this map unit have developed in the moderately fine textured fluvial sediments deposited by the small streams that occupy the bottomlands of the valleys running across the plateau. The topography is usually a series of narrow low terraces, which are often flooded in the spring. The vegetation is a mixture of sedges, sea-side arrow grass and willows. The map unit contains a number of different soils. Most are wet for much of the time that they are not frozen. They contain large amounts of calcium carbonate, and have large quantites of organic matter in the surface horizons.

El 1 - Tr 1 (1 area: 305 ha): Just east of Watch Lake is a broad shallow valley where areas of fluvial sediments (Elliot soils) are mixed with smaller areas of fluvioglacial sediments (Trurans soils). Most of this map unit contains the same soils as in the Ee 1 map unit, but there are also small areas of deep, rapidly drained, very coarse textured soils which contain no carbonates (Tr 1).

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: EUGENE NTS: 92P10 SUMMARY DATE: APR 25,1978 PAGE: 01

EUGENE ASSOCIATION

DATE OF SURVEY: 71 SURVEYOR: NG KELOWNA, B.C.M.A. & R.A.B.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION		CLASSIFICATION	SLOPE
LATITUDE (N)	51 43 00	ORTHIC GRAY LUVISOL(1973)	% .5
LONGITUDE (W)	120 46 00		ASPECT (DEG) 270
PRECISION (SEC)	30		
ELEVATION (FT)	3700		

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL MORAINAL

DRAINAGE WELL DRAINED
PERMEABILITY MODERATELY RAPID
INFILTRATION MEDIUM

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(IN)	COLOUR 1	COLOUR 2	TEXTURE	STRUCTURE 1	CONSISTENCE
LF	1- 0					
A E1	0- 5	10.0YR4.0/4.0 MOIST IN PED	10.0YR7.0/2.0 MOIST CRUSHED	SANDY LOAM	GRANULAR	FRIABLE
AB	5-17	10.0YR3.0/4.0 MOIST IN PED	10.0YR6.0/2.0 MOIST CRUSHED	SANDY LOAM	GRANULAR	FRIABLE
B T	17-28	10.0YR4.0/3.0 MOIST IN PED	10.0YR5.0/2.0 MOIST CRUSHED	LOAM	SUBANGULAR BLOCKY	FRIABLE
C	28-	10.0YR3.0/4.0 MOIST IN PED	10.0YR5.0/3.0 MOIST CRUSHED	SANDY LOAM	PLATY	FRIABLE

HORIZON	ROOTS 1
LF	ABUNDANT
A E1	ABUNDANT
AB	ABUNDANT
B T	PLENTIFUL
C	FEW

PHYSICAL & CHEMICAL DATA

HORIZON	PH 1 VALUE	PH 2 VALUE	ORGANIC CARBON %	NITROGEN %	EXCHANGEABLE CATIONS(ME/100G) CA	MG	NA	K	C.E.C. DETERMINED	P1 PPM.	P2 PPM.	S PPM.	MN PPM.
LF	5.9	5.5	15.33	0.89						156.9	596.7	51.2	4.7
A E1	5.7	6.2	1.33	0.07	6.90	1.88	0.07	0.81	13.1	228.0	437.3	9.2	2.6
AB	5.9	6.5	.57	0.04	8.74	3.40	0.11	0.60	14.3	31.3	69.9	11.1	1.5
B T	6.0	6.6	.42	0.03	20.89	8.92	0.18	0.87	31.1	17.1	672.3	8.6	0.5
C	6.4	6.9			19.53	2.45	0.17	0.57	26.2	3.2	549.9		0.5

Map Units of the Eugene Association

Ee 1 (12 areas: 4146 ha): On the eastern border of the map sheet the deep, well drained Eugene soils occur with small areas of wet imperfectly drained soils on neutral gravelly sandy loam glacial till. The topography of the plateau varies from gently to steeply sloping.

Ee 1 - Tu 1 (3 areas: 1112 ha): In this map unit the two soils of the Ee 1 map unit are combined with small areas where the surface of the glacial till has been washed with large volumes of post glacial meltwater. This has left a thin, crudely stratified layer of sands and gravels on the surface in some shallow depressions on the eastern border of the map area. The Tubbs soils have developed in these materials and include a deep, well drained, moderately alkaline soil with small portions of a wet, imperfectly drained soil.

Ee 2 (4 areas: 1681 ha): The Ee 2 map unit occurs on the higher portions of the plateau where small areas of soil on ridge crests have bedrock within 50 cm of the surface. The predominant soils are the same as in the Ee1 map unit. The topography is irregular varying from gently sloping on the crests to steeply sloping bordering some valleys.

SOIL: EXETER 1 NTS: 92P11

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SUMMARY DATE: APR 25,1978 PAGE: 01

EXETER ASSOCIATION

DATE OF SURVEY: 77 SURVEYOR: KV VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISSANCE SURVEY

LOCATION		CLASSIFICATION		SLOPE	
LATITUDE (N)	51 39 46	ORTHIC GRAY LUVISOL(1973)		%	5.0
LONGITUDE (W)	121 13 47			TYPE	COMPLEX
PRECISION (SEC)	00	STATUS: MODAL SOIL (NO DEVIATION)		CLASS	UNDULATING
				ASPECT (DEG)	225
				PROFILE SITE	MIDDLE
				LENGTH (M)	10
				MICROTOPOGRAPHY	SLIGHTLY MOUNDED

PARENT MATERIAL & LANDFORM

GENETIC MODIFIER	GLACIO
GENETIC MATERIAL	LACUSTRINE
LANDFORM	TERRACED

ROOTING DEPTH	112 CM.	SEEPAGE	ABSENT	DRAINAGE	WELL DRAINED
				RUNOFF	SLOW

ADDITIONAL NOTES

MATURE ENGELMANN SPRUCE-MOSS COMMUNITY. DEPTH TO BEDROCK=9.9M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
LFH	8- 0						
A E	0-13	ABRUPT SMOOTH	10.0YR5.0/4.0 MOIST EXPED 10.0YR6.0/3.0 DRY EXPED	SILT LOAM	WEAK FINE SUBANGULAR BLOCKY	VERY FRIABLE	PLENTIFUL FINE EX PED
B T	13-30	ABRUPT SMOOTH	10.0YR3.0/3.0 MOIST EXPED	SILTY CLAY LOAM	MODERATE FINE SUBANGULAR BLOCKY	FIRM	PLENTIFUL FINE EX PED
BC	30-56	ABRUPT SMOOTH	2.5Y5.0/2.0 DRY EXPED	SILT LOAM	WEAK VERY FINE SUBANGULAR BLOCKY	FRIABLE	PLENTIFUL FINE EX PED
C K1	56-74	ABRUPT SMOOTH	2.5Y5.0/4.0 MOIST EXPED	SILT LOAM	MODERATE VERY FINE ANGULAR BLOCKY	FIRM	FEW FINE EX PED
C K2	74-80	ABRUPT SMOOTH	10.0YR4.0/2.0 MOIST EXPED	LOAM	WEAK VERY FINE SUBANGULAR BLOCKY	FRIABLE	VERY FEW FINE EX PED
C K3	80-122		2.5Y5.0/3.0 MOIST EXPED	SILT	STRONG MEDIUM PLATY	FRIABLE	VERY FEW FINE EX PED

HORIZON	ROOTS 2	MOTTLES 1	CLAY FILMS 1	CLAY FILMS 2	CARBONATE DESCRIPTION	EFFERVESCENCE	MATERIAL COMP.
LFH							% LEAVES 30 % NEEDLES 70
A E	PLENTIFUL COARSE						
B T	PLENTIFUL COARSE		COMMON THIN IN ROOT CHANNELS AND ON PORES ONLY	COMMON THIN ON HORIZONTAL & VERTICAL PED FACES			
BC	PLENTIFUL COARSE	COMMON FINE DISTINCT 10.0YR5.0/4.0					
C K1						WEAK	
C K2						WEAK	
C K3					STREAKED BANDED COMMON (2-20%) FINE (<5MM) HORIZONTAL LOOSE	STRONG	

PHYSICAL & CHEMICAL DATA

HORIZON	PH 1 VALUE	ORGANIC CARBON %	NITROGEN %	EXCHANGEABLE CATIONS(ME/100G) CA	MG	NA	K	C.E.C. DETERMINED	BULK DENSITY	PARTICLE SIZE % SAND	% SILT	TOTAL CLAY %	% FINE CLAY
LFH													
A E	6.2	.93	.07	7.60	1.90	.10	1.70	14.0	1.12	20	65	15	4
B T	6.6	.70	.05	16.10	6.60	.10	1.90	27.3	1.26	3	67	30	14
BC	7.4	.35		11.30	5.00	.10	.70	16.5	1.24	0	88	12	4
C K1	7.8	.46		14.30	7.30	.20	.60	20.7	1.34	7	70	23	3
C K2	7.8	.29		24.30	8.20	.20	.50	20.1		37	45	18	1
C K3	7.9	.06		9.80	5.00	.20	.30	12.0	1.27	3	88	9	0

Map Units of the Exeter Association

Ex 1 (9 areas: 8744 ha): The Ex 1 map unit is composed of forested soils on moderately alkaline lacustrine silts. Deep, well drained, stone-free soils (most of which have an accumulation of clay in the subsoil) occur on gently to moderately sloping topography in the upper parts of the small lacustrine basins on the plateau.

Ex 1 - Bf 1 (5 areas: 4919 ha): In some areas the boundary between the forest soils (Exeter) and the grassland soils (Buffalo) on the lacustrine silts is very irregular. The two groups of soils could not be mapped separately. In this map unit the most common soils are the two included in the Ex 1 map unit. They occur with small areas of deep, well drained soils (some of which are saline) that have a vegetation cover of Kentucky blue grass, saltgrass and sedges. The topography is gently to moderately sloping.

Ex 1 - Bf 2 (7 areas: 6939 ha): This map unit is very similar to the Ex 1 - Bf 1 map unit except that the expanses of Buffalo soils extend down into the bottoms of the grassland depressions on the plateau surface. Therefore, at these lowest positions they include small areas of deep, moist, highly carbonated Black soils, which have a cover of sedges and Kentucky blue grass. The topography ranges from very gently to strongly sloping.

SOIL: HELENA 1 NTS: 92P13

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SUMMARY DATE: APR 25,1978 PAGE: 01

HELENA ASSOCIATION

DATE OF SURVEY: 67 SURVEYOR: KV VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION

LATITUDE (N) 51 46 27
LONGITUDE (W) 121 40 16
PRECISION (SEC) 00

CLASSIFICATION

ORTHIC GRAY LUVISOL(1973)
STATUS: MODAL SOIL (NO DEVIATION)

SLOPE

% 5.0
TYPE COMPLEX
CLASS UNDULATING
ASPECT (DEG) 90
PROFILE SITE MIDDLE
LENGTH (M) 10
MICROTOPOGRAPHY SLIGHTLY MOUNDED

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL MORAINAL
LANDFORM BLANKET

STONINESS SLIGHTLY STONY
ROOTING DEPTH 90 CM.
SEEPAGE ABSENT
DRAINAGE WELL DRAINED
RUNOFF SLOW

ADDITIONAL NOTES

MATURE DOUGLAS FIR-PINEGRASS WITH DOUGLAS FIR-LODGEPOLE PINE REGENERATING. DEPTH TO BEDROCK=5M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	COLOUR 2	TEXTURE	STRUCTURE 1
L	5- 0					
A E1	0- 5	ABRUPT SMOOTH	10.0YR6.0/2.0 DRY EXPED		SILT LOAM	WEAK VERY FINE PLATY
A E2	5-18	ABRUPT SMOOTH	10.0YR5.0/2.5 DRY EXPED		SILT LOAM	WEAK VERY FINE SUBANGULAR BLOCKY
II B T	18-36	ABRUPT SMOOTH	10.0YR3.0/4.0 MOIST EXPED	10.0YR4.0/3.0 MOIST IN PED	CLAY LOAM GRAVELLY	MODERATE TO STRONG VERY FINE ANGULAR BLOCKY
II BC	36-76	ABRUPT SMOOTH	10.0YR4.0/3.0 MOIST EXPED		LOAM GRAVELLY	WEAK TO MODERATE VERY FINE SUBANGULAR BLOCKY
II C	76-100		10.0YR4.0/2.5 MOIST EXPED		SANDY LOAM GRAVELLY	WEAK VERY FINE SUBANGULAR BLOCKY

HORIZON	CONSISTENCE	ROOTS 1	ROOTS 2	CLAY FILMS 1	CLAY FILMS 2	EFFERVESCENCE	MATERIAL COMP.
L							% LEAVES 20 % NEEDLES 80
A E1	LOOSE	PLENTIFUL FINE EX PED	PLENTIFUL MEDIUM				
A E2	SLIGHTLY HARD	PLENTIFUL FINE EX PED	PLENTIFUL MEDIUM				
II B T	VERY FIRM	FEW FINE EX PED	FEW MEDIUM	MANY THICK IN ROOT CHANNELS AND ON PORES ONLY	MANY 3HICK ON HORIZONTAL & VERTICAL PED FACES		
II BC	VERY FIRM	FEW FINE EX PED	FEW MEDIUM	FEW VERY THIN ON PED FACES-UNSPECIFIED			
II C	FIRM	VERY FEW FINE EX PED				VERY WEAK	

PHYSICAL & CHEMICAL DATA

HORIZON	PH 1 VALUE	ORGANIC CARBON %	NITROGEN %	EXCHANGEABLE CATIONS(ME/100G) CA	MG	NA	K	C.E.C. DETERMINED	BULK DENSITY	PARTICLE SIZE % SAND	% SILT	TOTAL CLAY %	% FINE CLAY
L													
A E1	5.4	1.16	.07	6.60	2.80	.10	.50	16.0	1.18	38	54	8	2
A E2	5.1	.75	.05	8.30	4.80	.10	.40	18.9	1.43	37	52	11	3
II B T	6.5	.75	.06	17.20	11.80	.10	1.00	37.5	1.63	33	36	30	12
II BC	6.5	.12		13.80	8.50	.10	.90	25.7	1.86	44	47	9	1
II C	7.4	.02		10.90	4.90	.10	.50	16.1	2.08	49	47	4	0

PHYSICAL & CHEMICAL DATA

HORIZON	COARSE FRAGMENTS GRAVEL %	COBBLE %
L		
A E1	10	
A E2	10	
II B T	25	5
II BC	25	10
II C	25	10

Map Units of the Helena Association

The Helena soils are very common and have many map units. The five single map units are described below, followed by a list of their compound map units, with brief notes on the minor soils only.

Hl 1 (37 areas: 37,629 ha): This is a very common map unit on the gently to moderately sloping surface of the plateau. Deep, well drained soils with an accumulation of clay in the subsoil have developed on moderately alkaline, gravelly sandy loam glacial till. There is an open forest of Douglas fir, with pinegrass and kinnikinnick. There are small areas of wet, imperfectly drained soils.

Hl 1 - Bf 1 (4 areas: 2057 ha): Grassland lacustrine soils at lower elevations, some saline.
Hl 1 - Bt 1 (1 area: 2356 ha): Forested mildly alkaline glacial till at higher elevations.
Hl 1 - Cx 1 - Rl 1 (1 area: 15 ha): Grassland till, very poorly drained organics in depressions.
Hl 1 - Ex 1 (1 area: 298 ha): Forested lacustrine soils at lower elevations.
Hl 1 - St 1 (1 area: 2048 ha): Forested acid glacial till at higher elevations.
Hl 1 - Tr 2 (1 area: 349 ha): Meltwater channels with coarse textured acid soils.
Hl 1 - Tu 1 (3 areas: 1556 ha): Forested coarse textured alkaline glacial till.

Hl 2 (3 areas: 891 ha): This map unit contains the deep well drained soil of the Hl map unit plus small areas of grassland some of which are saline.

Hl 2 - Cx 1 - Rl 1 (4 areas: 8883 ha): Grassland till and wet organic, hummocky topography.
Hl 2 - Cx 1 (2 areas: 1461 ha): Grassland glacial till at lower elevations.
Hl 2 - Rl 1 (5 areas: 5302 ha): Very poorly drained organic soils in depressions.

Hl 3 (12 areas: 12621 ha): Small areas of soils that have bedrock within 50 cm of the surface occur with the two soils of the Hl 1 map unit on higher parts of the plateau having gently to steeply sloping topography.

Hl 3 - Rk 4 (1 area: 44 ha): Exposed bedrock lava cliffs at upper elevations.
Hl 3 - Tu 2 (9 areas: 2359 ha): Forested coarse textured alkaline glacial till.

Hl 4 (14 areas: 28594 ha): In this map unit the ground is covered with many very large boulders of basalt lava. More boulders are buried in the soil. There are very large areas of this map unit between Lac la Hache and the Dog Creek valley. The other soils are similar to those in the Hl 1 map unit.

Hl 4 - Rk 3 (2 areas: 177 ha): Exposed lava cliffs at edge of plateau.
Hl 4 - Rl 1 (4 areas: 21,146 ha): Organics in depressions between boulder fields.
Hl 4 - Tr 1 (1 area: 851 ha): Forested coarse textured acid soils.

Hl 5 (8 areas: 9131 ha): In this map unit deep, well drained and wet imperfectly drained soils similar to those in the Hl 1 map unit have developed on pinkish materials.

Hl 5 - Bd 1 (3 areas: 571 ha): Grassland lacustrine soils at lower elevations.
Hl 5 - Hd 1 (1 area: 657 ha): Forested coarse textured alkaline soils.
Hl 5 - Tr 1 (1 area: 1264 ha): Forested coarse textured acid soils.

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: NEILSON 1 NTS: 92P12 SUMMARY DATE: APR 25,1978 PAGE: 01

NEILSON ASSOCIATION

DATE OF SURVEY: 68 SURVEYOR: KV VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISSANCE SURVEY

LOCATION		CLASSIFICATION		SLOPE	
LATITUDE (N)	51 37 09	DEGRADED EUTRIC BRUNISOL(1973)		%	4.5
LONGITUDE (W)	121 50 44			TYPE	SIMPLE
PRECISION (SEC)	00	STATUS: MODAL SOIL (NO DEVIATION)		CLASS	GENTLY SLOPING
				ASPECT (DEG)	225
				PROFILE SITE	MIDDLE
				LENGTH (M)	10
				MICROTOPOGRAPHY	LEVEL

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL	FLUVIAL				
LANDFORM	TERRACED				
ROOTING DEPTH	90 CM.	SEEPAGE	ABSENT	DRAINAGE	RAPIDLY DRAINED
				RUNOFF	MEDIUM

ADDITIONAL NOTES

LODGEPOLE PINE (MATURE AND REGENERATING) PINEGRASS AND KINNIKINNICK.
LFH CONTAINS PINE NEEDLES AND GRASSROOTS WITH SOME CHARCOAL.
SILT CONCRETIONS IN CK1. DEPTH TO BEDRUCK=3M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	COLOUR 2	TEXTURE	STRUCTURE 1
LFH	3- 0					
A EJ	0-10	CLEAR SMOOTH	10.0YR5.0/4.0 MOIST EXPED 10.0YR6.0/4.0 DRY EXPED		LOAM	WEAK VERY FINE TO FINE PLATY
B TJ	10-28	CLEAR SMOOTH	10.0YR3.0/3.0 MOIST EXPED	10.0YR3.5/3.0 MOIST CRUSHED	SILTY CLAY LOAM	MODERATE FINE SUBANGULAR BLOCKY
C K1	28-43	CLEAR SMOOTH	10.0YR4.0/1.5 MOIST EXPED		SILT LOAM	MODERATE FINE SUBANGULAR BLOCKY
C K2	43-74	ABRUPT SMOOTH	10.0YR4.0/1.5 MOIST EXPED		VERY FINE SANDY LOAM	WEAK FINE SUBANGULAR BLOCKY
C	74-91		10.0YR4.0/1.5 MOIST EXPED		VERY FINE SANDY LOAM	MODERATE FINE PLATY

HORIZON	CONSISTENCE	ROOTS 1	ROOTS 2	CLAY FILMS 1	CONCRETION & NODULE DESCRIPTION 1	EFFERVESCENCE	MATERIAL COMP.
LFH							% NEEDLES 90
A EJ	FRIABLE	PLENTIFUL FINE EX PED	PLENTIFUL MEDIUM				
B TJ	FRIABLE	PLENTIFUL FINE EX PED		FEW VERY THIN ON PED FACES- UNSPECIFIED			
C K1	VERY FRIABLE	PLENTIFUL FINE EX PED			UNSPECIFIED COMMON FINE THROUGHOUT MATRIX SPHERICAL	STRONG	
C K2	VERY FRIABLE	FEW VERY FINE EX PED				STRONG	
C	VERY FRIABLE	VERY FEW VERY FINE EX PED					

HORIZON	DECOMPOSITION
LFH	SLIGHT
A EJ	
B TJ	
C K1	
C K2	
C	

Map Units of the Neilson Association

Nl 1 (1 area: 700 ha): There are moderately coarse textured, mildly alkaline, fluvial sediments in the bottomlands of parts of the Dog Creek valley. The soils that have developed on them are predominantly deep and rapidly drained with an open forest cover of lodgepole pine. There are some small depressions with wet soils that contain large amounts of calcium carbonate and organic matter in the surface horizons. The low, terraced, topography is very gently to gently sloping.

SOIL: RAIL 1 NTS: 92P14

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SUMMARY DATE: APR 25,1978 PAGE: 01

RAIL ASSOCIATION

DATE OF SURVEY: 67 SURVEYOR: KV VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION

LATITUDE (N) 51 58 22
LONGITUDE (W) 121 27 06
PRECISION (SEC) 00

CLASSIFICATION

TYPIC MESISOL(1973)
STATUS: MODAL SOIL (NO DEVIATION)

SLOPE

% 0.0
CLASS DEPRESSIONAL TO LEVEL
MICROTOPOGRAPHY LEVEL

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL ORGANIC
LANDFORM BLANKET

SEEPAGE PRESENT
DRAINAGE VERY POORLY DRAINED
RUNOFF PONDED

ADDITIONAL NOTES

UNDISTURBED SEDGES-SCRUB BIRCH-WILLOS-MOSSES. SEDGE AND REEDS VALUES FOR HORIZONS 01,02,04, & 05, ARE 100%, 100%, 80%, & 100%, RESPECTIVELY. WOOD VALUE FOR HORIZON 04 IS 20% 8M HORIZON IS VOLCANIC ASH. DEPTH TO BEDROCK=6M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE
O M1	0-36	CLEAR SMOOTH	10.0YR3.0/2.0 WET NATURAL 10.0YR3.0/2.0 WET PRESSED			
O M2	36-61	ABRUPT SMOOTH	10.0YR2.5/4.0 WET NATURAL 10.0YR3.0/4.0 WET PRESSED			
B M	61-64	ABRUPT SMOOTH	10.0YR6.0/3.0 WET NATURAL	COARSE SANDY LOAM	STRUCTURELESS	NON STICKY
O M3	64-114	CLEAR WAVY	10.0YR4.0/3.0 WET NATURAL 10.0YR4.0/3.0 WET PRESSED			
O H	114-145	CLEAR WAVY	10.0YR3.0/1.5 WET NATURAL 10.0YR3.0/1.5 WET PRESSED			
C G	145-180		5.0BG5.0/1.0 WET NATURAL	SILTY CLAY LOAM	STRUCTURELESS	SLIGHTLY STICKY

HORIZON	CEMENTATION AGENT/DESCRIP.	DECOMPOSITION	WOOD MATERIAL	% FIBRE	
O M1		SLIGHT		RUBBED	40
O M2		SLIGHT		RUBBED	40
B M	HUMUS ALUMINUM				
O M3		SLIGHT	SIZE(CM) 02 %VOLUME 20 MODERATELY HARD	RUBBED	40
O H		MODERATE		RUBBED	20
C G	IRON				

PHYSICAL & CHEMICAL DATA

HORIZON	PH 1 VALUE	ORGANIC CARBON %	NITROGEN %	% ASH	EXCHANGEABLE CATIONS(ME/100G) CA	MG	NA	K	C.E.C. DETERMINED	BULK DENSITY	PARTICLE SIZE % SAND	% SILT	TOTAL CLAY %	% FINE CLAY
O M1	6.3	43.04	3.05	26	63.10	22.20	2.50	1.10	133.9	.15				
O M2	5.8	44.37	3.13	24	73.60	22.50	1.10	.10	141.3	.15				
B M	5.9	7.54	.49	87	12.50	3.50	.30	.10	21.8		56	41	3	1
O M3	5.7	41.47	2.66	29	80.70	24.10	1.10	.20	153.2	.14				
O H	5.5	41.18	1.83	29	127.40	35.70	1.10	.30	206.2	.17				
C G	6.6	.52	.05		8.90	4.20	.20	.80	14.7		44	37	19	6

Map Units of the Rail Association

Rl 1 (37 areas: 4057 ha): The Rail soils are mapped in the small enclosed depressions on the plateau surface or in the flat bottomlands of the shallow valleys. The predominant type of soil in this map unit is very poorly drained and is formed of moderately decomposed, medium acid organic materials that are over 1 m thick. Around the borders of the depressions or near the sloping valley sides the organic materials are much thinner and the lower part of the soil is mineral. The vegetation is usually a mixture of sedges, grasses, willows, and grandular birch. The topography is level to very gently undulating.

As the Rail soils occur in small isolated depressions they often had to be mapped with the intervening soil. In the following compound map units only the intervening soils are described.

Rl 1 - Bf 2 (2 areas: 505 ha): Grassland soils (some of which are saline or calcareous) that have developed from lacustrine silts that encircle the depressions.

Rl 1 - Bt 1 (2 areas: 228 ha): Forested soils on glacial till at upper elevations.

Rl 1 - Cx 1 (1 area: 645 ha): South of Lac la Hache many depressions contain Rail soils surrounded by smaller areas of grassland soils developed on glacial till (Cx 1).

Rl 1 - Hd 1 (3 areas: 795 ha): Very coarse textured mildly alkaline soils.

Rl 1 - Hd 4 (1 area: 984 ha): Very coarse textured, rapidly drained, mildly alkaline soils on sinuous fluvioglacial ridges (eskers).

Rl 1 - Tu 1 (1 area: 85 ha): Coarse textured soils on alkaline glacial till.

Rl 1 - Hd 1 - Tu 1 (4 areas: 878 ha): A combination of the Rl 1 - Hd 1 and Rl 1 - Tu 1 map units.

Rl 1 - Hl 1 (1 area: 94 ha): Forested soils on mildly alkaline glacial till.

Rl 1 - Hl 2 (6 areas: 860 ha): Complex pattern, grassland and forest soils on glacial till.

Rl 1 - Se 1 (1 area: 488 ha) and Rl 1 - Tr 1 (4 areas: 607 ha): Very coarse textured soils on slightly acid fluvioglacial materials. The Stolle soils (Se) have a higher base status, than the Trurans soils (Tr).

Rl 1 - Tr 2 (2 areas: 140 ha): Meltwater channels with coarse textured acid soils.

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: STOLLE NTS: 92P 2 SUMMARY DATE: APR 25,1978 PAGE: 01

STOLLE ASSOCIATION

DATE OF SURVEY: 71 SURVEYOR: NG KELOWNA, B.C.M.A. & R.A.B.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION

LATITUDE (N) 51 08 00
LONGITUDE (W) 120 52 00
PRECISION (SEC) 30
ELEVATION (FT) 3400

CLASSIFICATION

ORTHIC EUTRIC BRUNISOL(1973)

SLOPE

ASPECT (DEG) 360

PARENT MATERIAL & LANDFORM

GENETIC MODIFIER GLACIO
GENETIC MATERIAL FLUVIAL

DRAINAGE RAPIDLY DRAINED
PERMEABILITY MODERATELY RAPID
INFILTRATION MEDIUM

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(IN)	COLOUR 1	COLOUR 2	TEXTURE	STRUCTURE 1	CONSISTENCE
LF	2- 0					
B M	0-15	7.5YR4.0/4.0 MOIST IN PED	10.0YR4.0/4.0 MOIST CRUSHED	SANDY LOAN	SINGLE GRAIN	LOOSE
C	15-34	7.5YR6.0/4.0 MOIST IN PED	10.0YR6.0/4.0 MOIST CRUSHED	SAND	SINGLE GRAIN	LOOSE
R	34-					

HORIZON	ROOTS 1
LF	
B M	ABUNDANT
C	PLENTIFUL
R	

PHYSICAL & CHEMICAL DATA

HORIZON	PH 1 VALUE	PH 2 VALUE	ORGANIC CARBON %	NITROGEN %	EXCHANGEABLE CATIONS(ME/100G) CA	MG	NA	K	C.E.C. DETERMINED	EXTRACTABLE FE(%) RESULT	RESULT	EXTRACTABLE AL(%) RESULT	RESULT
LF	5.8	5.2	26.62	.88									
B M	6.3	5.5	0.80	.07	9.57	2.96	.06	.41	15.6	.8	.1	.6	.1
C	6.2	5.6			2.82	1.07	.05	.09	4.8				
R													

HORIZON	P1 PPM.	P2 PPM.	S PPM.	MN PPM.
LF	29.5	102.2	65.7	43.1
B M	35.4	62.6	8.8	2.6
C	13.3	23.8	10.4	1.0
R				

Map Units of the Stolle Association

Se 1 (1 area: 140 ha): Very coarse textured, rapidly drained soils, developed on slightly acid fluvioglacial materials occur on the lower slopes of valleys in the northeast border of the map area. Some soils have a slightly impeded drainage due to an accumulation of clay in the subsoil. The topography is moderately to steeply sloping.

Se 1 - Ac 1 (1 area: 389 ha): Two small valleys in the northeast border of the map area contain, on their lower slopes, the two soils of the Se 1 map unit, plus small areas of moderately well drained, medium textured soils (some of which are shallow over bedrock), developed from moderately acid glacial till. The topography is gently to moderately sloping.

Se 1 - Ex 1 (2 areas: 595 ha): In the Bridge Creek valley near Forest Grove the soils of the Se 1 map unit occur with small areas of well drained, forested soils developed on moderately alkaline, lacustrine silts. The topography is gently to moderately sloping.

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: TATTON 1 NTS: 92P13 SUMMARY DATE: APR 25,1978 PAGE: 01

TATTON ASSOCIATION

DATE OF SURVEY: 67 SURVEYOR: KV VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION		CLASSIFICATION		SLOPE	
LATITUDE (N)	51 59 15	ORTHIC GRAY LUVISOL(1973)		%	20.0
LONGITUDE (W)	121 53 55			CLASS	STEEPLY SLOPING
PRECISION (SEC)	06	STATUS:	MODAL SOIL (NO DEVIATION)	ASPECT (DEG)	45
				PROFILE SITE	LOWER SLOPE
				LENGTH (M)	100

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL	COLLUVIAL
LANDFORM	VENEER

STONINESS	SLIGHTLY STONY	SEEPAGE	ABSENT	DRAINAGE	MODERATELY WELL DRAINED
ROOTING DEPTH	76 CM.			RUNOFF	MEDIUM

ADDITIONAL NOTES

DOWNSLOPE MOVEMENT OF SOIL SHOWN BY FLAT LYING GRAVEL.
OCCASIONAL HORIZONS DISTURBED BY TREE THROW.
MATURE DOUGLAS FIR-PINEGRASS. DEPTH TO BEDROCK=2M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
LFH	6- 0	ABRUPT SMOOTH					
A E	0-10	ABRUPT SMOOTH	10.0YR6.0/2.0 DRY EXPED	SANDY LOAM	WEAK VERY FINE TO FINE SUBANGULAR BLOCKY	SLIGHTLY HARD	ABUNDANT FINE
AB	10-18	ABRUPT	10.0YR5.5/2.0	SANDY LOAM	WEAK	SLIGHTLY HARD	PLENTIFUL
		SMOOTH	DRY EXPED		VERY FINE TO FINE SUBANGULAR BLOCKY		FINE
II B T	18-40	CLEAR SMOOTH	10.0YR3.0/3.0 MOIST EXPED	LOAM GRAVELLY	WEAK TO MODERATE VERY FINE TO FINE SUBANGULAR BLOCKY	FIRM	PLENTIFUL FINE
II BC	40-70	ABRUPT	10.0YR4.0/3.0 MOIST EXPED	LOAM GRAVELLY	WEAK TO MODERATE VERY FINE TO FINE SUBANGULAR BLOCKY	FIRM	FEW FINE
II C	70-110		10.0YR3.0/2.0 MOIST EXPED	LOAM GRAVELLY	WEAK TO MODERATE VERY FINE TO FINE SUBANGULAR BLOCKY	FIRM	

HORIZON	ROOTS 2	CLAY FILMS 1	CLAY FILMS 2
LFH			
A E	ABUNDANT MEDIUM		
AB	PLENTIFUL MEDIUM		
II B T	PLENTIFUL MEDIUM	MANY MOD. THICK IN ROOT CHANNELS AND OR PORES ONLY	MANY MOD. THICK ON HORIZONTAL & VERTICAL PED FACES
II BC			
II C			

PHYSICAL & CHEMICAL DATA

	COARSE FRAGMENTS	
HORIZON	GRAVEL %	COBBLE %
LFH		
A E	5	5
AB	5	5
II B T	15	10
II BC	15	10
II C	15	15

Map Units of the Tatton Association

Ta 1 (19 areas: 2544 ha): This map unit occurs on the upper slopes of the valleys which are cut into the plateau. Moderately well drained, deep soils developed on mildly alkaline colluvium are associated with some small areas of soil which have lava bedrock within 50 cm of the surface. The topography varies from moderately to extremely sloping, and there is often a quite dense forest cover of Douglas fir.

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: TRURANS 1 NTS: 92P14 SUMMARY DATE: APR 25,1978 PAGE: 01

TRURANS ASSOCIATION

DATE OF SURVEY: 67 SURVEYOR: KV VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION

LATITUDE (N) 51 57 02
LONGITUDE (W) 121 27 50
PRECISION (SEC) 00

CLASSIFICATION

DEGRADED DYSTRIC BRUNISOL(1973)
STATUS: MODAL SOIL (NO DEVIATION)

SLOPE

% 3.0
TYPE SIMPLE
CLASS GENTLY SLOPING
ASPECT (DEG) 180
PROFILE SITE MIDDLE
LENGTH (M) 50
MICROTOPOGRAPHY LEVEL

PARENT MATERIAL & LANDFORM

GENETIC MODIFIER GLACIO
GENETIC MATERIAL FLUVIAL
LANDFORM BLANKET

SEEPAGE ABSENT DRAINAGE RAPIDLY DRAINED
RUNOFF MEDIUM

ADDITIONAL NOTES

LODGEPOLE PINE,ENGELMANN SPRUCE,AND PINEGRASS REGENERATING SERAL COMMUNITY. DEPTH TO BEDROCK=5M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
LFH	2- 0	ABRUPT SMOOTH					
A E	0- 2	ABRUPT SMOOTH	10.0YR6.5/2.0 DRY EXPED	SANDY LOAM	WEAK FINE SUBANGULAR BLOCKY	SOFT	PLENTIFUL MEDIUM EX PED
II B M	2-15	CLEAR SMOOTH	10.0YR5.0/3.5 DRY EXPED	LOAMY COARSE SAND GRAVELLY	WEAK FINE SUBANGULAR BLOCKY	LOOSE	PLENTIFUL FINE EX PED
II BC	15-38	GRADUAL SMOOTH	10.0YR5.0/3.5 MOIST EXPED	LOAMY COARSE SAND VERY GRAVELLY	STRUCTURELESS	LOOSE	PLENTIFUL FINE
II C	38-102		10.0YR4.0/4.0 MOIST EXPED	COARSE SAND VERY GRAVELLY	STRUCTURELESS	LOOSE	VERY FEW FINE

HORIZON	ROOTS 2	MATERIAL COMP.		DECOMPOSITION
LFH		% LEAVES	20	SLIGHT
		% NEEDLES	80	
A E	PLENTIFUL COARSE			
II B M	PLENTIFUL MEDIUM			
II BC	PLENTIFUL MEDIUM			
II C	VERY FEW MEDIUM			

PHYSICAL & CHEMICAL DATA

HORIZON	COARSE FRAGMENTS GRAVEL %	COBBLE %
LFH		
A E	10	
II B M	30	15
II BC	40	35
II C	40	35

Map Units of the Trurans Association

Tr 1 (6 areas: 7274 ha): The Trurans soils have developed from very gravelly coarse textured fluvioglacial materials. A rapidly drained, slightly acid soil occurs with small areas of soils having a clay accumulation in the subsoil. They are found on the undulating plateau surface with an open forest of lodgepole pine and a ground cover of pine grass and kinnikinnick.

Tr 1 - Ex 1 (2 areas: 453 ha): North of Green Lake there is a complex intermixture of fluvioglacial and lacustrine deposits. Small areas of the deep well drained forested Exeter soils (Ex 1) occur with the two soils of the Tr 1 map unit on gently to moderately sloping topography.

Tr 1 - Hl 1 (2 areas: 1396 ha): Two valleys north of Lac la Hache contain a layer of fluvioglacial gravels over glacial till. The predominant soils are those contained in the Tr 1 map unit, but in some areas the till is exposed at the surface, and deep, well drained and wet imperfectly drained Helena (Hl 1) soils occur.

Tr 1 - Rl 1 (2 areas: 433 ha): The two soils of the Tr 1 map unit are associated with the Rail soils (Rl 1) in enclosed depressions of the undulating plateau.

Tr 1 - Hl 1 - Rl 1 (1 area: 4223 ha): The soils are a combination of the Tr 1 - Hl 1 and Tr 1 - Rl 1 map units. The topography is gently to moderately sloping.

Tr 2 (5 areas: 4816 ha): Deep, sinuous meltwater channels contain the soils of the Tr 1 map unit. Small outcrops of lava bedrock are sometimes exposed at the upper edges of the channels.

Tr 2 - Rk 3 (4 areas: 948 ha): Similar to the Tr 2 map unit except that the outcrops of lava bedrock on the upper slopes of the meltwater channels are much more extensive.

Tr 3 (5 areas: 562 ha): This map unit represents old deltas. The best examples are near Watson Lake, west of Forest Grove and on the north side of Lac la Hache. The Trurans soils (Tr 1) occur on these deep, stratified, loose, very coarse textured deposits.

Tr 3 - Tu 1 (1 area: 67 ha): A delta with the Tr 1 soils is encircled by areas of coarse textured glacial till with deep, well drained (with some imperfectly drained) soils (Tu 1).

Tr 4 (3 areas: 1225 ha): The soils of the Tr 1 map unit occur on steep sided, sinuous ridges (eskers).

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: TYEE 1 NTS: 93B 1 SUMMARY DATE: APR 25,1978 PAGE: 01

TYEE ASSOCIATION

DATE OF SURVEY: 66 SURVEYOR: WS VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION

LATITUDE (N) 52 13 20
LONGITUDE (W) 122 03 24
PRECISION (SEC) 00

CLASSIFICATION

ORTHIC GRAY LUVISOL(1973)

STATUS: MODAL SOIL (NO DEVIATION)

SLOPE

% 5.0
TYPE COMPLEX
CLASS UNDULATING
ASPECT (DEG) 135
PROFILE SITE MIDDLE
LENGTH (M) 200
MICROTOPOGRAPHY SLIGHTLY MOUNDED

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL MORAINAL
LANDFORM BLANKET

STONINESS SLIGHTLY STONY SEEPAGE ABSENT DRAINAGE MODERATELY WELL DRAINED
RUNOFF SLOW

ADDITIONAL NOTES

MATURE DOUGLAS FIR-PINEGRASS WITH LODGEPOLE PINE, WHITE SPRUCE, AND TREMBLING ASPEN. PROFILE FROM BILL SCOTTS SURVEY OF 93B IN 1966. DEPTH TO BEDROCK=5M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
LFH	5- 0	ABRUPT SMOOTH					ABUNDANT EX PED
A E	0-18	ABRUPT SMOOTH	10.0YR7.0/2.0 DRY EXPED	SANDY LOAM	WEAK FINE GRANULAR	VERY FRIABLE	PLENTIFUL EX PED
AB	18-28	CLEAR SMOOTH	10.0YR6.0/2.0 DRY EXPED	LOAM	MODERATE FINE SUBANGULAR BLOCKY	FIRM	PLENTIFUL EX PED
B T	28-50	CLEAR SMOOTH	10.0YR5.0/4.0 DRY EXPED	LOAM	MODERATE TO STRONG FINE SUBANGULAR BLOCKY	FIRM	PLENTIFUL HORIZONTAL EX PED
II BC	50-76	CLEAR SMOOTH	10.0YR6.0/3.0 DRY EXPED	LOAM GRAVELLY	MODERATE MEDIUM SUBANGULAR BLOCKY	FIRM	FEW EX PED
II C	76-100	GRADUAL WAVY	10.0YR6.0/3.0 DRY EXPED	LOAM GRAVELLY	MODERATE MEDIUM SUBANGULAR BLOCKY	FRIABLE	VERY FEW EX PED
II C K	100-130		2.5Y5.0/2.0 DRY EXPED	LOAM GRAVELLY	MODERATE MEDIUM SUBANGULAR BLOCKY	FRIABLE	

HORIZON	CLAY FILMS 1	CLAY FILMS 2	EFFERVESCENCE	MATERIAL COMP.	DECOMPOSITION
LFH				% LEAVES 20 % NEEDLES 80	SLIGHT
A E					
AB					
B T	MANY MOD. THICK IN ROOT CHANNELS AND OR PORES ONLY	MANY MOD. THICK ON HORIZONTAL & VERTICAL PED FACES			
II BC					
II C					
II C K			MODERATE		

PHYSICAL & CHEMICAL DATA

HORIZON	PH 1 VALUE	ORGANIC CARBON %	NITROGEN %	EXCHANGEABLE CATIONS(ME/100G) CA	MG	NA	K	C.E.C. DETERMINED	PARTICLE SIZE % SAND	% SILT	TOTAL CLAY %	% FINE CLAY	COARSE FRAGMENTS GRAVEL %
LFH	4.7		.43	23.90	5.00	.20	1.40	48.0					
A E	4.4	.52	.04	3.00	1.00	.10	.20	8.2	49	45	6	2	5
AB	4.9	.58	.04	8.10	3.60	.10	.40	15.0	43	39	18	8	10
B T	5.6	.41	.03	14.20	7.80	.10	.60	24.0	38	46	16	13	15
II BC	6.2	.17	.03	12.20	6.50	.10	.50	19.4	43	33	24	6	30
II C	6.4	.12	.02	11.10	5.20	.10	.40	16.9	45	33	22	6	55
II C K	7.3	.12	.02	22.90	4.30	.10	.30	15.4	45	33	22	6	40

Map Units of the Tyee Association

Te 1 (29 areas: 33,211 ha): This is a very common map unit in the north central portion of the area. Deep, moderately well drained soils developed on moderately alkaline gravelly loam to clay loam glacial till occur with small areas of wet, imperfectly drained soils, on gently to strongly sloping portions of the plateau. The vegetation is an open forest of Douglas fir with a ground cover of pine grass and kinnikinnick.

Te 1 - Tu 1 (4 areas: 3908 ha): The two soils of the Te 1 map unit are associated in broad shallow depressions on the plateau with small areas of the deep well drained and wet imperfectly drained Tubbs soils, which are very coarse textured. The topography is gently to moderately sloping.

Te 2 (1 area: 1048): The two soils of the Te 1 map unit occur with small areas of grassland soils, some of which are saline. The topography is gently to moderately sloping.

Te 2 - Bf 1 (1 area: 2996 ha): Small pockets of deep well drained grassland soils developed on Lacustrine silts are intermixed with the three soils of the Te 2 map unit developed on glacial till. The topography is gently to moderately sloping.

Te 2 - Rl 1 (5 areas: 5381 ha): On some parts of the plateau there are small expanses of the Rail soils (Rl 1) in the depressions of the gently rolling topography mixed with the predominant soils of the Te 2 map unit.

Te 3 (33 areas: 19,366 ha): On the higher parts of the plateau, especially on the eastern margins of the map, some of the Tyee soils have lava bedrock within 50 cm of the surface. They form a minor but important part of this map unit whose predominant soils are the same as those of the Te 1 map unit. The topography varies from gently to steeply sloping.

Te 3 - Rk 4 (3 areas: 865 ha): In some places such as Lone Butte and Mount Begbie olivine gabbro plugs (Rk 4) stand up above the plateau. They are included as small portions of this map unit with the three soils of the Te 3 map unit. The topography varies from moderately to steeply sloping.

Te 4 (7 areas: 7309 ha): This map unit is dominated by many large boulders of lava bedrock on the surface and buried in the soil, and occurs mainly southwest of Lac la Hache and 100 Mile House. The other soils are similar to those in the Te 1 map unit.

Te 4 - Rl 1 (4 areas: 9466 ha): Over extensive hummocky portions of the plateau southwest of Lac la Hache and 100 Mile House boulders and mineral soils occur with pockets of the organic Rail soils (Rl 1) in the enclosed depressions.

SOIL: WILLIAMS LAKE1 NTS: 92P 4

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WILLIAMS LAKE ASSOCIATION

DATE OF SURVEY: 72 SURVEYOR: TML VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISSANCE SURVEY

LOCATION

LATITUDE (N) 51 12 10
LONGITUDE (W) 121 52 14
PRECISION (SEC) 60

CLASSIFICATION

ORTHIC GRAY LUVISOL(1973)
STATUS: MODAL SOIL (NO DEVIATION)

SLOPE

% 10.0
TYPE COMPLEX
CLASS MODERATELY ROLLING
ASPECT (DEG) 180
PROFILE SITE UPPER SLOPE
LENGTH (M) 50

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL MORAINAL
LANDFORM BLANKET

STONINESS MODERATELY STONY SEEPAGE ABSENT DRAINAGE MODERATELY WELL DRAINED
RUNOFF MEDIUM

ADDITIONAL NOTES

MATURE DOUGLAS FIR-PINEGRASS. BEDROCK DEPTH=5M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
LFH	3- 0						PLENTIFUL FINE
A E	0- 5	ABRUPT SMOOTH	10.0YR5.0/2.0 MOIST EXPED	FINE SANDY LOAM	MODERATE FINE GRANULAR	LOOSE	PLENTIFUL FINE EX PED
AB	5- 9	CLEAR SMOOTH	10.0YR3.0/2.5 MOIST EXPED	LOAM	MODERATE MEDIUM SUBANGULAR BLOCKY	FIRM	FEW MEDIUM EX PED
B T1	9-28	CLEAR SMOOTH	10.0YR3.0/2.0 MOIST EXPED	CLAY LOAM	STRONG COARSE SUBANGULAR BLOCKY	FIRM	FEW COARSE EX PED
B T2	28-46	CLEAR WAVY	10.0YR3.0/2.5 MOIST EXPED	CLAY LOAM	STRONG COARSE SUBANGULAR BLOCKY	FIRM	VERY FEW FINE EX PED
BC	46-76	DIFFUSE IRREGULAR	10.0YR3.0/2.5 MOIST EXPED	CLAY LOAM	MODERATE MEDIUM SUBANGULAR BLOCKY	FIRM	
II C K	76-102	DIFFUSE IRREGULAR		CLAY LOAM GRAVELLY	MODERATE MEDIUM ANGULAR BLOCKY	FIRM	
II C	102-183			CLAY LOAM GRAVELLY			

HORIZON	ROOTS 2	CLAY FILMS 1	CLAY FILMS 2	EFFERVESCENCE	MATERIAL COMP.		DECOMPOSITION
LFH					% LEAVES % NEEDLES	20 80	SLIGHT
A E	PLENTIFUL MEDIUM						
AB							
B T1		MANY MOD. THICK IN ROOT CHANNELS AND OR PORES ONLY	MANY MOD. THICK ON HORIZONTAL & VERTICAL PED FACES				
B T2	VERY FEW MEDIUM	MANY MOD. THICK IN ROOT CHANNELS AND OR PORES ONLY	MANY MOD. THICK ON HORIZONTAL & VERTICAL PED FACES				
BC							
II C K				MODERATE			
II C							

PHYSICAL & CHEMICAL DATA

HORIZON	COARSE FRAGMENTS GRAVEL %	COBBLE %
LFH		
A E		
AB	10	
B T1	15	
B T2	15	
BC	15	
II C K	25	10
II C	25	15

Map Units of the Williams Lake Association

Wl 1 (6 areas: 16,006 ha): This map unit occurs on the undulating plateau north and south of Chimney Lake in the northwest corner of the map. A deep, moderately well drained soil is associated with small areas of a wet, imperfectly drained soil on moderately alkaline gravelly clay loam glacial till. There is an open forest of Douglas Fir.

Wl 1 - Rl 1 (1 area: 1037 ha): Small areas of the very poorly drained organic Rail soils occur with the two soils from the Wl 1 map unit on the gently to moderately sloping plateau surface.

Wl 2 - Rl 1 (1 area: 4354 ha): South of Chimney Lake there is a very hummocky portion of the plateau, where small expanses of grassland soils developed on glacial till, occur between the principal two forested Williams Lake soils on the higher land (Wl 2) and the very poorly drained organic Rail soils (Rl 1) in the depressions.

Wl 3 (2 areas: 4957 ha): This map unit is dominated by many large boulders of lava bedrock that lie on the surface or are buried in the soil. It occurs south and east of Chimney Lake on the gently to moderately sloping plateau. The other soils are similar to those in the Wl 1 map unit.

Wl 3 - Rl 1 (1 area: 163 ha): In a small map unit southeast of Chimney Lake the boulder fields and their intervening soils occur with isolated pockets of the organic Rail soils (Rl 1) in the enclosed depressions.

2.2.4. Soils of the Cariboo Midlands: Southern Section

The soils of the southern section of the Cariboo Midlands have developed from a variety of glacial and postglacial surficial materials, under a climate that is warmer and drier than the northern section. Evapotranspiration rates are therefore higher, effective leaching is less, and soil moisture deficits during the growing season are greater. As a result there are a number of differences from the northern section in the types of soils that occur in equivalent landscape positions. The forest cover is more open with more lodgepole pine, less Douglas fir, and Ponderosa pine appears in places. Grassland soils with significant growing season soil moisture deficits are much more common, and more of them are saline. Organic soils are less common. Instead wet, or moist mineral soils are found in the equivalent landscape positions. Soil carbonates have been leached to only shallow depths in many soils, and the leaching of clay from the surface into the subsoil is also less marked.

The forested soils on glacial till are all mildly or moderately alkaline, and only one has a medium base status with a marked accumulation of clay in the subsoil (Tunkwa). The other two have a high base status, which is dominated by calcium (Timber and Tubbs). The grassland soils on glacial till (Big Bar) are more extensive than in the north, but are often scattered in small pockets through the forest.

There are very large areas of soils on fluvioglacial sands and gravels (Holden) in association with the soils derived from water worked glacial till (Tubbs), especially towards the west, between Gustafsen Lake in the north and the flanks of the Marble Range in the south. As the ice melted it deposited extensive but quite thin layers of sand and gravel in these areas. It was often impossible to map the Holden and Tubbs soils separately as the thickness and type of deposit was difficult to predict from aerial photographs. The Holden soils have a high base status and a low water holding capacity.

No significant area of soils developed on lacustrine silts occurs under forest. Virtually all the Beaverdam soils have a grass cover (heavily overgrazed), and many of them in the lower spots are either saline (sodium and magnesium salts) or carbonated (calcium salts).

On the steep slopes of the Bonaparte River and Loon Creek valleys aspect is extremely important in determining the type of soils that occur. Forested soils on colluvium under an open forest canopy (Chasm) occur on the cooler north and east facing slopes, and grassland soils (Soues) occur on the warmer and drier south and west facing slopes.

On the map all the soils of the Cariboo Midlands, southern section, are colored shades of blue or grey. They are described in the right hand legend in the block colored blue. A cross section shows the landscape relationships of the various associations. The landscape positions of the individual soils in each association are shown in the four cross sections at the foot of the map in the strip colored blue.

SOIL: BEAVERDAM 1 NTS: 92P 5

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BEAVERDAM ASSOCIATION

DATE OF SURVEY: 68 SURVEYOR: AS VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION

LATITUDE (N) 51 17 47
LONGITUDE (W) 121 40 31
PRECISION (SEC) 00

CLASSIFICATION

ORTHIC DARK BROWN(1973)
STATUS: MODAL SOIL (NO DEVIATION)

SLOPE

%	6.0
TYPE	COMPLEX
CLASS	GENTLY ROLLING
ASPECT (DEG)	180
PROFILE SITE	MIDDLE
LENGTH (M)	50

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL	LACUSTRINE
LANDFORM	ROLLING PLAIN

ROOTING DEPTH	100 CM.	SEEPAGE	ABSENT	DRAINAGE RUNOFF	MODERATELY WELL DRAINED SLOW

ADDITIONAL NOTES

SANBERGS BLUEGRASS SMALL WESTERN NEEDLEGRASS. DEPTH TO BEDROCK=5M.
GRASSES,FORBES,AND HEATH OVERGRAZED.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
A H	0- 5	ABRUPT SMOOTH	10.0YR2.0/2.0 MOIST EXPED 10.0YR3.5/2.0 DRY EXPED	SILT LOAM	MODERATE VERY FINE GRANULAR	SOFT	PLENTIFUL MEDIUM VERTICAL EX PED
B M1	5-13	CLEAR SMOOTH	10.0YR4.0/3.0 DRY EXPED	SILT LOAM	WEAK VERY FINE GRANULAR	HARD	PLENTIFUL MEDIUM VERTICAL EX PED
B M2	13-33	ABRUPT SMOOTH	10.0YR4.0/3.0 DRY EXPED	SILT LOAM	MODERATE MEDIUM SUBANGULAR BLOCKY	HARD	PLENTIFUL MEDIUM VERTICAL EX PED
BC CA	33-61	GRADUAL WAVY	10.0YR6.5/2.0 DRY EXPED	SILT LOAM	WEAK MEDIUM SUBANGULAR BLOCKY	SLIGHTLY HARD	PLENTIFUL MEDIUM VERTICAL EX PED
C K	61-127		10.0YR7.0/2.0 DRY EXPED	SILT LOAM		FRIABLE	VERY FEW FINE VERTICAL EX PED

HORIZON	ROOTS 2	MOTTLES 1	CARBONATE DESCRIPTION	EFFERVESCENCE
A H	PLENTIFUL FINE OBLIQUE EX PED			
B M1	PLENTIFUL FINE OBLIQUE EX PED			
B M2	PLENTIFUL FINE VERTICAL EX PED			
BC CA	PLENTIFUL FINE VERTICAL EX PED		STREAKED BANDED COMMON (2-20%) MEDIUM (5-15MM) HORIZONTAL SOFT 10.0YR7.0/1.0	STRONG
C K		FEW FINE DISTINCT 10.0YR6.0/4.0		MODERATE

PHYSICAL & CHEMICAL DATA

HORIZON	Ph 1 VALUE	ORGANIC CARBON %	NITROGEN %	CA CARB. EQUIV.	EXCHANGEABLE CATIONS(ME/100G) CA	MG	NA	K	C.E.C. DETERMINED	ELECT. COND. (MMHOS/CM)	BULK DENSITY	PARTICLE SIZE % SAND	% SILT
A H	5.4	6.70	.57		17.20	7.20	.20	1.30	32.2		.69	37	52
B M1	5.3	1.60	.18		9.50	6.50	.30	.80	19.3	.62	.89	42	54
B M2	6.4	0.90	.06		7.20	6.90	.90	1.00	21.9	.30	1.45	36	59
BC CA	8.5	0.60									1.37	31	61
C K	8.2	0.10		4.1							1.65	35	64

HORIZON	PARTICLE SIZE TOTAL CLAY %	% FINE CLAY
A H	11	3
B M1	4	2
B M2	5	1
BC CA	8	1
C K	3	1

Map Units of the Beaverdam Association

Bd 1 (6 areas: 1113 ha): The soils of this map unit have been developed from strongly alkaline, silt loam lacustrine materials. They are deep, moderately well drained and some of them have a large carbonate content. The vegetation is a heavily over-grazed grassland, and the topography is usually very gently to moderately sloping.

Bd 1 - Bb 1 (1 area: 376 ha): In this map unit there are small areas of grassland soils on strongly alkaline glacial till (Bb 1). Most of them are deep and well drained, but a few are saline or have bedrock at shallow depths. The topography is gently to moderately sloping.

Bd 1 - Hd 1 (4 areas: 2351 ha): The soils of the Bd 1 map unit are mixed with small areas of soils developed on very coarse textured mildly alkaline fluvioglacial materials (Hd 1). The latter soils are deep, and rapidly drained. The topography is hummocky, ranging from very gently to moderately sloping. Lakes occupy some small depressions.

Bd 2 (4 areas: 2105 ha): Small areas of wet, poorly drained soils which have a large carbonate content occur with the soils of the Bd 1 map unit. They are in the hollows of the very gently to moderately sloping topography.

Bd 2 - Hd 1 (1 area: 291 ha): This small area is very similar to the Bd 1 - Hd 1 map unit except it includes the wet poorly drained highly carbonated soils of the Bd 2 map unit.

Bd 2 - Rl 1 (1 area: 3221 ha): South of Beaverdam Lake the soils of the Bd 2 map unit occur with small areas of the organic Rail soils. The terrain is hummocky with the topography ranging from very gently to moderately sloping.

Bd 3 (8 areas: 1619 ha): This map unit contains small areas of saline soils in addition to the soils of the Bd 2 unit. The surface of many of these saline and carbonated soils is either bare, or has a sparse cover of saltgrass.

Bd 4 (5 areas: 1812 ha): This map unit contains small areas of forested soils on lacustrine materials in addition to the soils of the Bd 1 map unit. The topography is gently to moderately sloping.

Bd 4 - Hd 1 (2 areas: 1473 ha): Two large, shallow, hummocky depressions contain the soils of the Bd 4 map unit plus the rapidly drained soils on fluvioglacial materials of the Hd 1 map unit. The topography is very gently to moderately sloping. Many small lakes occur in the enclosed hollows.

SOIL: BIG BAR 1 NTS: 92P 5

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MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

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BIG BAR ASSOCIATION

DATE OF SURVEY: 68 SURVEYOR: AS VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION

LATITUDE (N) 51 17 29
LONGITUDE (W) 121 55 51
PRECISION (SEC) 00

CLASSIFICATION

ORTHIC DARK BROWN(1973)
STATUS: MODAL SOIL (NO DEVIATION)

SLOPE

% 18.0
CLASS STEEPLY SLOPING
ASPECT (DEG) 90
PROFILE SITE MIDDLE
LENGTH (M) 50

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL MORAINAL
LANDFORM BLANKET

ROOTING DEPTH 95 CM. SEEPAGE ABSENT DRAINAGE WELL DRAINED
RUNOFF MEDIUM

ADDITIONAL NOTES

SANDBERGS BLUEGRASS BLUEBUNCH WHEATGRASS & KENTUCKY BLUEGRASS OVERGRAZED.
SOME VOLCANIC ASH IN A & B HORIZONS. DEPTH TO BEDROCK=6M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
A H1	0- 4	ABRUPT SMOOTH	10.0YR2.0/2.0 MOIST EXPED 10.0YR4.0/2.0 DRY EXPED	LOAM	WEAK MEDIUM PLATY	VERY FRIABLE	PLENTIFUL FINE EX PED
A H2	4-15	CLEAR WAVY	10.0YR2.0/2.0 MOIST EXPED 10.0YR4.0/2.0 DRY EXPED	SANDY LOAM	WEAK MEDIUM SUBANGULAR BLOCKY	VERY FRIABLE	PLENTIFUL FINE EX PED
II B M	15-33	ABRUPT SMOOTH	10.0YR4.0/3.0 DRY EXPED	LOAM GRAVELLY	MODERATE MEDIUM SUBANGULAR BLOCKY	SLIGHTLY HARD	PLENTIFUL FINE EX PED
II C CA	33-53	GRADUAL SMOOTH	10.0YR6.0/2.0 DRY EXPED	LOAM GRAVELLY	WEAK MEDIUM PLATY	SOFT	FEW FINE EX PED
II C K	53-110		10.0YR5.0/2.0 DRY EXPED	SANDY LOAM GRAVELLY		FIRM	

HORIZON	ROOTS 2	MOTTLES 1	EFFERVESCENCE
A H1	PLENTIFUL MEDIUM		
A H2	PLENTIFUL MEDIUM		
II B M	PLENTIFUL MEDIUM		
II C CA			STRONG
II C K		FEW FINE DISTINCT 10.0YR6.0/4.0	MODERATE

PHYSICAL & CHEMICAL DATA

HORIZON	PH 1 VALUE	ORGANIC CARBON %	NITROGEN %	EXCHANGEABLE CATIONS(ME/100G) CA	MG	NA	K	C.E.C. DETERMINED	PARTICLE SIZE % SAND	% SILT	TOTAL CLAY %	% FINE CLAY	COARSE FRAGMENTS GRAVEL %	COBBLE %
A H1	5.8	2.08	.24	10.07	4.77	0.56	1.44	19.7	50	42	08	01	10	
A H2	6.4	2.01	.23	11.65	5.05	0.95	0.99	20.6	52	41	07	01	10	
II B M	7.0	1.08	.15	12.56	8.21	0.38	1.11	22.9	47	44	09	01	15	10
II C CA	8.6	0.89							41	45	14	01	15	10
II C K	8.4	0.36							55	40	05	00	15	15

Map Units of the Big Bar Association

Bb 1 (1 area: 1244 ha): Just north of the Marble Range there are some expanses of grassland soils on strongly alkaline, gravelly sandy loam glacial till. Most of the soils are deep and well drained, but there are a few areas of saline soils, and soils with lava bedrock within 50 cm of the surface. The topography is moderately to strongly sloping.

Bb 1 - Hd 1 (1 area: 631 ha): In the valley of Big Bar Creek near the northern end of the Marble range there is one area where the three soils of the Bb 1 map unit are associated with deep raidly drained soils developed on very coarse textured mildly alkaline fluvioglacial materials (Hd 1).

Bb 1 - Tw 1 (2 areas: 477 ha): Northwest of Meadow Lake the three grassland soils on glacial till of the Bb 1 map unit are associated with small patches of forest soils that are mainly deep and well drained, but a few of them are wet and imperfectly drained. The topography is gently to moderately sloping.

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SOIL: CHASM 1 NTS: 92P 3 SUMMARY DATE: APR 25,1978 PAGE: 01

CHASM ASSOCIATION

DATE OF SURVEY: 68 SURVEYOR: AS VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISSANCE SURVEY

LOCATION		CLASSIFICATION		SLOPE	
LATITUDE (N)	51 09 21	DEGRADED EUTRIC BRUNISOL(1973)		%	35.0
LONGITUDE (W)	121 23 57			CLASS	VERY STEEPLY SLOPING
PRECISION (SEC)	00	STATUS: MODAL SOIL (NO DEVIATION)		ASPECT (DEG)	135
				PROFILE SITE	UPPER SLOPE
				LENGTH (M)	400

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL	COLLUVIAL
LANDFORM	VENEER
EROSIONAL MODIFIER	GULLIED

STONINESS	MODERATELY STONY	SEEPAGE	ABSENT	DRAINAGE	MODERATELY WELL DRAINED
ROOTING DEPTH	100 CM.			RUNOFF	MEDIUM

ADDITIONAL NOTES

DOUGLAS FIR PONDEROSA PINE BLUEBUNCH WHEATGRASS REGENERATING SERAL COMMUNITY. SOME VOLCANIC ASH IN A & B HORIZONS. BEDROCK DEPTH=1M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
LFH	2- 0	ABRUPT SMOOTH					
A E	0- 5	CLEAR SMOOTH	10.0YR5.5/2.0 DRY EXPED	LOAM	WEAK FINE PLATY	SOFT	PLENTIFUL FINE EX PED
B TJ	5-30	CLEAR	10.0YR4.5/3.0	LOAM	MODERATE	SLIGHTLY HARD	PLENTIFUL
		SMOOTH	DRY EXPED		MEDIUM SUBANGULAR BLOCKY		FINE EX PED
B M	30-43	ABRUPT SMOOTH	10.0YR5.0/2.5 DRY EXPED	LOAM	WEAK FINE SUBANGULAR BLOCKY	SLIGHTLY HARD	PLENTIFUL FINE EX PED
II C K	43-114		10.0YR6.0/2.5 DRY EXPED	LOAM GRAVELLY	WEAK FINE SUBANGULAR BLOCKY	FRIABLE	VERY FEW VERY FINE EX PED

HORIZON	ROOTS 2	MOTTLES 1	MOTTLES 2	CLAY FILMS 1	EFFERVESCENCE	MATERIAL COMP.	DECOMPOSITION
LFH						% LEAVES 20 % NEEDLES 80	SLIGHT
A E	PLENTIFUL MEDIUM EX PED						
B TJ	PLENTIFUL MEDIUM EX PED			FEW VERY THIN IN ROOT CHANNELS AND OR PORES ONLY			
B M	PLENTIFUL MEDIUM EX PED	FEW FINE FAINT 10.0YR5.0/4.0					
II C K			COMMON MEDIUM DISTINCT 10.0YR6.0/4.0		MODERATE		

PHYSICAL & CHEMICAL DATA

	COARSE FRAGMENTS	
HORIZON	GRAVEL %	COBBLE %
LFH		
A E	10	5
B TJ	10	5
B M	10	5
II C K	20	10

Map Units of the Chasm Association

Cm 1 (7 areas: 3921 ha): This map unit contains deep, moderately well drained soils developed on mildly alkaline, gravelly loam colluvium, plus small areas of soils where basalt bedrock is within 50 cm of the surface. It is found on the strongly to extremely sloping sides of the deep valleys that have been cut into the plateau. The aspect of most of these slopes with the Chasm soils is north or east facing. Map units of the Soues soils occur on the drier south and west facing slopes. There is an open forest cover of Douglas fir and Ponderosa pine with a surface of bluebunch wheat grass.

Many of the valleys cut into the plateau are quite narrow, so that the contrasting soils on opposite slopes, or in the bottomlands had to be mapped as the following compound map units:

Cm 1 - So 1 (11 areas: 12,371 ha): Here the soils of the Cm 1 map unit are mapped with the deep, moderately well drained soils that have developed on similar colluvium on the drier south and west facing slopes. Their vegetation is a sparse cover of Ponderosa pine with bluebunch wheat grass. The valley sides are strongly to extremely sloping.

Cm 1 - Rk 3 (8 areas: 7000 ha): This map unit occurs on some of the steeper valley sides where exposures of olivine basalt bedrock occur at the lip of the plateau. Steep talus slopes are often found below these basalt cliffs and then below that are the soils of the Cm 1 map unit. The topography is steeply to extremely sloping.

Cm 1 - So 1 - Rk 3 (2 areas: 1647 ha): Two especially deep narrow valleys (one of which forms Chasm Park) contain a combination of the soils of the Cm 1 - So 1 and Cm 1 - Rk 3 map units.

Cm 1 - Fs 1 (1 area: 1714 ha): The valley southwest of Clinton contains the soils of the Cm 1 map unit, plus small stretches of deep, but imperfectly drained soils on the medium textured, mildly alkaline fluvial deposits adjacent to the stream.

Cm 1 - Fs 1 - Rl 1 (1 area: 565 ha): Northwest of Clinton there are small flats in the bottom of the valley which contain the very poorly drained, organic Rail soils (Rl 1). The other soils are the same as in the Cm 1 - Fs 1 map unit. The topography varies from very gently to strongly sloping.

Cm 1 - Hd 1 (1 area: 34 ha): A very small map unit east of Upper Loon Lake contains the soils of the Cm 1 map unit plus small areas of deep, rapidly drained soils developed on very coarse textured, mildly alkaline fluvioglacial materials.

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MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: HOLDEN 1 NTS: 92P 3 SUMMARY DATE: APR 25,1976 PAGE: 01

HOLDEN ASSOCIATION

DATE OF SURVEY: 68 SURVEYOR: AS VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION

LATITUDE (N) 51 02 35
LONGITUDE (W) 121 13 55
PRECISION (SEC) 00

CLASSIFICATION

DEGRADED EUTRIC BRUNISOL(1973)
STATUS: MODAL SOIL (NO DEVIATION)

SLOPE

% 7.0
TYPE COMPLEX
CLASS GENTLY ROLLING
ASPECT (DEG) 225
PROFILE SITE MIDDLE
LENGTH (M) 75

PARENT MATERIAL & LANDFORM

GENETIC MODIFIER GLACIO
GENETIC MATERIAL FLUVIAL
LANDFORM BLANKET

SEEPAGE ABSENT DRAINAGE RAPIDLY DRAINED
RUNOFF MEDIUM

ADDITIONAL NOTES

REGENERATED LODGE POLE PINE-DOUGLAS FIR-PINEGRASS. BEDROCK DEPTH=5M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
LFH	3- 0	ABRUPT SMOOTH					
A E	0- 5	ABRUPT SMOOTH	10.0YR6.5/3.0 DRY EXPED	COARSE SANDY LOAM	WEAK FINE PLATY	SLIGHTLY HARD	ABUNDANT FINE EX PED
II B M1	5-15	ABRUPT SMOOTH	10.0YR4.0/4.0 MOIST EXPED	LOAM GRAVELLY	WEAK FINE SUBANGULAR BLOCKY	VERY FRIABLE	ABUNDANT FINE EX PED
II B M2	15-30	CLEAR SMOOTH	10.0YR5.5/3.0 MOIST EXPED	LOAM GRAVELLY	WEAK FINE SUBANGULAR BLOCKY	VERY FRIABLE	PLENTIFUL FINE EX PED
II BC	30-46	CLEAR SMOOTH	10.0YR6.0/3.0 MOIST EXPED	SANDY LOAM VERY GRAVELLY	WEAK FINE SUBANGULAR BLOCKY	VERY FRIABLE	PLENTIFUL FINE EX PED
II C K1	46-70	ABRUPT SMOOTH	5.0Y5.0/2.5 DRY EXPED	SANDY LOAM VERY GRAVELLY	STRUCTURELESS	VERY FRIABLE	PLENTIFUL FINE EX PED
III C K	70-96	CLEAR SMOOTH	5.0Y5.0/2.0 MOIST EXPED	COARSE SAND	STRUCTURELESS	LOOSE	FEW FINE EX PED
II C K2	96-127		5.0Y5.0/2.0 MOIST EXPED	LOAMY SAND VERY GRAVELLY	STRUCTURELESS	LOOSE	

HORIZON	ROOTS 2	EFFERVESCENCE	MATERIAL COMP.		DECOMPOSITION
LFH			% LEAVES	20	MODERATE
			% NEEDLES	80	
A E	ABUNDANT MEDIUM				
II B M1	ABUNDANT MEDIUM				
II B M2	PLENTIFUL MEDIUM				
II BC	PLENTIFUL MEDIUM				
II C K1	PLENTIFUL MEDIUM	MODERATE			
III C K		MODERATE			
II C K2		MODERATE			

PHYSICAL & CHEMICAL DATA

HORIZON	COARSE FRAGMENTS GRAVEL %
LFH	
A E	10
II B M1	35
II B M2	35
II BC	55
II C K1	55
III C K	10
II C K2	60

Map Units of the Holden Association

The Holden soils are very common and have a number of map units. The single map units are described below, followed by a list of their compound units,with brief notes on the minor soils only.

Hd 1 (4 areas: 1525 ha): The Holden soils have developed from gravelly, very coarse, textured mildly alkaline fluvioglacial deposits. This map unit includes a deep, rapidly drained soil with small areas of soils having a slight clay accumulation in the subsoil. It is found on the undulating plateau surface, with an open forest of lodgepole pine and a groundcover of pine grass and kinnikinnick.

Hd 1 - Tw 1 (4 areas: 2018 ha): Small areas of deep, well and imperfectly drained soils developed on gravelly silt loam, mildly alkaline glacial till (Tw 1). The topography is gently to strongly sloping.

Hd 1 - Tu 1 (3 areas: 2780 ha): Large complex shallow depressions contain a mixture of glaciofluvial gravels and water sorted glacial till which are mildly alkaline and very coarse textured. The topography is very gently to moderately sloping.

Hd 1 - Hl 5 (7 areas: 7323 ha): Small areas of deep, well and imperfectly drained soils developed on reddish colored gravelly sandy loam glacial till.

Hd 1 - Bw 1 (1 area: 2281 ha): Small areas of deep well drained soils developed on strongly alkaline glacial till which is derived from limestone. The topography is gently to strongly sloping.

Hd 1 - Bd 1 (2 areas: 2031 ha): Some deep, moderately well drained soils (some of which are highly calcareous) occur on lacustrine silts.

Hd 2 (3 areas: 3526 ha): On the east side of the Marble Range there are deep sinuous meltwater channels cut into the surface of the plateau. The two soils of the Hd 1 map unit occur in the bottoms of the channels and on the plateau surface adjacent to the edges. Small outcrops of lava bedrock are sometimes exposed at the upper edges of the channel.

Hd 2 - Tw 1 (1 area: 14,058 ha): In between the meltwater channels are deep, well and imperfectly drained Tunkwa soils on gravelly silt loam glacial till.

Hd 2 - Tu 1 (2 areas: 824 ha): There are small areas of deep, well and imperfectly drained soils on stratified glacial till.

Hd 4 (2 areas: 828 ha): Here the two soils of the Hd 1 map unit occur on the steep sided, sinuous ridges (eskers) that are found in some of the broad shallow meltwater channels on the plateau.

Hd 4 - Bw 1 (1 area: 158 ha): There are small areas of deep, well drained soils on strongly alkaline glacial till.

Hd 4 - Rl 1 (4 areas: 3713 ha): There are small areas of very poorly drained organic Rail soils in very gently sloping meadows.

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: SOUES 1 NTS: 92P 4 SUMMARY DATE: APR 25,1978 PAGE: 01

SOUES ASSOCIATION

DATE OF SURVEY: 68 SURVEYOR: AS VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISSANCE SURVEY

LOCATION

LATITUDE (N) 51 05 42
LONGITUDE (W) 121 38 21
PRECISION (SEC) 00

CLASSIFICATION

ORTHIC DARK BROWN(1973)
STATUS: MODAL SOIL (NO DEVIATION)

SLOPE

%	20.0
TYPE	SIMPLE
CLASS	STEEPLY SLOPING
ASPECT (DEG)	180
PROFILE SITE	MIDDLE
LENGTH (M)	400

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL	COLLUVIAL
LANDFORM	VENEER

STONINESS	SLIGHTLY STONY	SEEPAGE	ABSENT	DRAINAGE	MODERATELY WELL DRAINED
ROOTING DEPTH	80 CM.			RUNOFF	MEDIUM

ADDITIONAL NOTES

PONDEROSA PINE,BLUEBUNCH WHEATGRASS,REGENERATING SERAL COMMUNITY.
SOME VOLCANIC ASH IN A & B HORIZONS. DEPTH TO BEDROCK=1M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
LFH	3- 0						
A H	0-10	CLEAR SMOOTH	10.0YR2.0/1.0 MOIST EXPED 10.0YR3.5/2.0 DRY EXPED	SANDY LOAM	WEAK FINE PLATY	VERY FRIABLE	PLENTIFUL FINE EX PED
B M	10-18	ABRUPT	10.0YR3.0/2.0	SANDY LOAM	WEAK	LOOSE	PLENTIFUL
		SMOOTH	MOIST EXPED 10.0YR4.0/2.0 DRY EXPED		MEDIUM SUBANGULAR BLOCKY		FINE EX PED
II B MK	18-25	GRADUAL WAVY	10.0YR5.0/2.0 DRY EXPED	SANDY LOAM GRAVELLY	WEAK MEDIUM SUBANGULAR BLOCKY	LOOSE	PLENTIFUL FINE EX PED
II C K	25-100		10.0YR5.0/2.0 DRY EXPED	SANDY LOAM VERY GRAVELLY	STRUCTURELESS	LOOSE	FEW FINE EX PED

HORIZON	ROOTS 2	EFFERVESCENCE
LFH		
A H	PLENTIFUL MEDIUM EX PED	
B M	PLENTIFUL MEDIUM EX PED	
II B MK	PLENTIFUL MEDIUM EX PED	STRONG
II C K		STRONG

PHYSICAL & CHEMICAL DATA

HORIZON	PH 1 VALUE	ORGANIC CARBON %	NITROGEN %	EXCHANGEABLE CATIONS(ME/100G) CA	MG	NA	K	C.E.C. DETERMINED	PARTICLE SIZE % SAND	% SILT	TOTAL CLAY %	% FINE CLAY	COARSE FRAGMENTS GRAVEL %	COBBLE %
LFH														
A H	7.1	2.08	.17	19.88	5.06	0.42	0.76	28.4	62	29	09	02	10	5
B M	6.5	.96	.07	18.15	5.36	0.75	0.22	24.9	63	30	07	01	15	
II B MK	7.7	1.11							66	30	04	00	10	30
II C K	7.8	.56							72	24	04	00	25	30

Map Units of the Soues Association

So 1 (2 areas: 456 ha): This map unit contains deep, moderately well drained soils developed on moderately alkaline, very gravelly sandy loam colluvium, plus small areas of soils where the basalt bedrock is within 50 cm of the surface. It is found on the strongly to extremely sloping sides of the deep valleys that have been cut into the plateau. The aspect of most of the slopes where the Soues soils predominate is south or southwest. Elsewhere they are associated with the Chasm soils. The vegetation cover is Ponderosa pine and bluebunch wheat grass. Towards the north Douglas fir gradually becomes more common than Ponderosa pine.

So 1 - Cm 1 (7 areas: 4165 ha): Here the soils of the So 1 map unit occur with the deep moderately well drained soils that have developed from similar colluvium on the cooler and moister north and east facing slopes. There is a considerable amount of Douglas fir in the forest cover.

So 1 - Rk 3 (1 area: 307 ha): This map unit occurs in a steep sided valley near Clinton where exposures of olivine basalt bedrock occur at the lip of the plateau. Steep talus slopes are found below the basalt cliffs and then below that are the soils of the So 1 map unit. The topography is steeply to extremely sloping.

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: TIMBER TM-1 NTS: 92P 4 SUMMARY DATE: APR 25,1978 PAGE: 01

TIMBER ASSOCIATION

DATE OF SURVEY: 68 SURVEYOR: AS KELOWNA, B.C.M.A. & R.A.B.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION

LATITUDE (N) 51 09 50
LONGITUDE (W) 121 32 35

CLASSIFICATION

DEGRADED EUTRIC BRUNISOL(1973)

STATUS: MODAL SOIL (NO DEVIATION)

SLOPE

%	6.0
TYPE	SIMPLE
CLASS	MODERATELY SLOPING
ASPECT (DEG)	270
LENGTH (M)	50

PARENT MATERIAL & LANDFORM

TEXTURAL MODIFIER 1	SILTY
GENETIC MATERIAL	MORAINAL
LANDFORM	BLANKET
LANDFORM	HUMMOCKY

STONINESS	MODERATELY STONY	SEEPAGE	ABSENT	DRAINAGE	WELL DRAINED
				RUNOFF	MEDIUM

ADDITIONAL NOTES

IN CARIBOO ASPEN LODGEPOLE PINE BIO-GEOCLIMATIC ZONE.
REGENERATING FOREST SOFTWOOD, CONIFEROUS, UNPRODUCTIVE WOODLAND.
DOUGLAS FIR, PONDEROSA PINE, AND BLUEBUNCH WHEATGRASS SERAL COMMUNITY.
SOIL MOISTURE - SUBHUMID, MODERATELY PERVIOUS.
TERRESTIAL HUMUS-FORMS = CONIFERO HUMI-FIBRIMOR.
COARSE FRAGMENTS IN CCA AND CK HORIZONS ARE GRAVELLY.
CCA AND CK HORIZONS - EFFFERVESCENCE REAGENT: HCL 10%
DEPTH TO BEDROCK = 2M.
PARENT MATERIAL AND LANDFORM: UNCONSOLIDATED UNDULATING MORAINAL BLANKET
LITHOLOGICALLY MIXED, FINE LOAMY AND FINE FINE SILTY-CLAY; ALKALINE.
WEAKLY CALCAREOUS, CHEMICALLY AND PHYSICALLY WEATHERED.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
L	2- 0	ABRUPT SMOOTH					
A E	0-13	GRADUAL SMOOTH	10.0YR5.5/1.5 DRY EXPED	SANDY LOAM	MODERATE FINE TO MEDIUM PLATY	FRIABLE	PLENTIFUL FINE
B M1	13-28	GRADUAL SMOOTH	10.0YR5.0/3.0 DRY EXPED	LOAM	MODERATE MEDIUM SUBANGULAR BLOCKY	SLIGHTLY HARD	PLENTIFUL FINE
B M2	28-46	ABRUPT SMOOTH	10.0YR5.0/3.0 DRY EXPED	LOAM	MODERATE MEDIUM SUBANGULAR BLOCKY	SLIGHTLY HARD	PLENTIFUL FINE
II C CA	46-86	GRADUAL SMOOTH	10.0YR6.0/2.5 DRY EXPED	CLAY LOAM GRAVELLY	MODERATE TO STRONG MEDIUM SUBANGULAR BLOCKY	SLIGHTLY HARD	FEW FINE
II C K	86-122		10.0YR6.0/2.0 DRY EXPED	CLAY LOAM GRAVELLY		VERY HARD	VERY FEW FINE

HORIZON	CARBONATE DESCRIPTION	EFFERVESCENCE	MATERIAL	COMP.	DECOMPOSITION
L			% LEAVES	40	SLIGHT
			% NEEDLES	60	
A E					
B M1					
B M2					
II C CA	STREAKED BANDED COMMON (2-20%) MEDIUM (5-15MM) HORIZONTAL SOFT VERY FRIABLE 10.0YR7.0/2.0	STRONG			
II C K		MODERATE			

PHYSICAL & CHEMICAL DATA

COARSE FRAGMENTS

HORIZON	GRAVEL %
L	
A E	5
B M1	10
B M2	15
II C CA	35
II C K	40

Map Units of the Timber Association

Tm 1 (7 areas: 5424 ha): This map unit occurs on some lower and drier portions of the plateau edge near Clinton. The soils are predominantly deep and well drained, though some are imperfectly drained and some have an accumulation of clay in the subsoil. They have developed from mildly alkaline gravelly clay loam glacial till. The open forest cover is mixed Douglas fir and Ponderosa pine, with a ground cover of bluebunch wheat grass. The topography is gently to moderately sloping.

SOIL: TUBBS 1 NTS: 92P14

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SUMMARY DATE: APR 25,1978 PAGE: 01

TUBBS ASSOCIATION

DATE OF SURVEY: 67 SURVEYOR: KV VAN RES SIN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISSANCE SURVEY

LOCATION		CLASSIFICATION		SLOPE	
LATITUDE (N)	51 45 21	DEGRADED EUTRIC BRUNISOL(1973)		%	12.0
LONGITUDE (W)	121 20 03			TYPE	COMPLEX
PRECISION (SEC)	00	STATUS: MODAL SOIL (NO DEVIATION)		CLASS	MODERATELY ROLLING
				ASPECT (DEG)	270
				PROFILE SITE	MIDDLE
				LENGTH (M)	100

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL	MORAINAL
LANDFORM	BLANKET

STONINESS	SLIGHTLY STONY	SEEPAGE	ABSENT	DRAINAGE	WELL DRAINED
ROOTING DEPTH	100 CM.			RUNOFF	SLOW

ADDITIONAL NOTES

MATURE DOUGLAS FIR-PINEGRASS COMMUNITY. ORIGINAL MORAINAL PARENT MATERIAL HAS BEEN MODIFIED BY WATER PRODUCING CRUDE BEDDING. DEPTH TO BEDROCK=4M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
LFH	6- 0	ABRUPT SMOOTH					
A E	0-15	CLEAR WAVY	10.0YR5.5/2.0 DRY EXPED	LOAM	WEAK VERY FINE SUBANGULAR BLOCKY	SLIGHTLY HARD	PLENTIFUL FINE EX PED
II B TJ	15-33	CLEAR WAVY	10.0YR4.0/3.0 MOIST EXPED	SANDY LOAM VERY GRAVELLY	WEAK VERY FINE SUBANGULAR BLOCKY	VERY FRIABLE	PLENTIFUL FINE EX PED
II BC	33-53	ABRUPT SMOOTH	5.0Y5.0/2.0 MOIST EXPED	SANDY LOAM VERY GRAVELLY	STRUCTURELESS	LOOSE	FEW FINE EX PED
II C CA	53-94	ABRUPT SMOOTH	5.0Y4.0/1.5 MOIST EXPED	LOAMY SAND VERY GRAVELLY	WEAK VERY FINE SUBANGULAR BLOCKY	VERY FRIABLE	PLENTIFUL FINE EX PED
II C K	94-127		5.0Y3.5/2.0 MOIST EXPED 10.0YR4.0/1.5 DRY EXPED	LOAMY SAND GRAVELLY	WEAK FINE PLATY	VERY FRIABLE	FEW FINE EX PED

HORIZON	ROOTS 2	CLAY FILMS 1	CARBONATE DESCRIPTION	EFFERVESCENCE	MATERIAL COMP.		DECOMPOSITION
LFH					% LEAVES	20	SLIGHT
					% NEEDLES	80	
A E	PLENTIFUL MEDIUM EX PED						
II B TJ	PLENTIFUL MEDIUM EX PED	FEW VERY THIN IN ROOT CHANNELS AND OR PORES ONLY					
II BC	FEW MEDIUM EX PED						
II C CA	PLENTIFUL MEDIUM EX PED		HOMOGENOUS BANDED MANY (>20%) COARSE (>15MM) HORIZONTAL SOFT 10.0YR7.0/1.0	STRONG			
II C K	FEW MEDIUM EX PED			MODERATE			

PHYSICAL & CHEMICAL DATA

HORIZON	PH 1 VALUE	ORGANIC CARBON %	NITROGEN %	CA CARB. EQUIV.	EXCHANGEABLE CATIONS(ME/100G) CA	MG	NA	K	C.E.C. DETERMINED	BULK DENSITY	PARTICLE SIZE % SAND	% SILT	TOTAL CLAY %	% FINE CLAY
LFH														
A E	6.1	1.10	.07		16.20	2.30	.20	1.00	25.6	1.49	51	39	10	2
II B TJ	6.2	0.60	.07		20.00	3.30	.20	.40	29.4	1.35	67	25	8	3
II BC	7.2	0.30			16.60	2.00	.70	.10	17.4		71	26	3	0
II C CA	6.7	0.80		10.8							80	18	2	0
II C K	7.6	0.10		4.6							82	17	1	0

COARSE FRAGMENTS

HORIZON	GRAVEL %
LFH	
A E	10
II B TJ	60
II BC	60
II C CA	55
II C K	35

Map Units of the Tubbs Association

Tu 1 (2 areas: 259 ha): This map unit contains predominantly deep, well drained soils developed on moderately alkaline very coarse textured glacial till that is crudely stratified. There are also small areas of imperfectly drained soils, and soils that have an accumulation of clay in the subsoil. The plateau surface is gently to strongly sloping. There is an open forest of Douglas fir, with a ground cover of pine grass and kinnikinnick.

The soils of the Tubbs association could rarely be separated from the surrounding soils, as the boundaries of the stratified glacial till could not be mapped very accurately from aerial photographs. Consequently, large expanses of the Tubbs soils are mapped with other soils in the following compound map units. Only the minor soils are given in the following descriptions.

Tu 1 - Bd 1 (5 areas: 937 ha): There are small areas of the grassland Beaverdam soils developed from strongly alkaline lacustrine silt loam, on gently to moderately sloping topography.

Tu 1 - Hd 1 (11 areas: 63,538 ha): There are small areas of very coarse textured, mildly alkaline soils on gently to moderately sloping topography.

Tu 1 - Rl 1 (4 areas: 1232 ha): A number of small depressions contain the organic Rail soils.

Tu 1 - Hd 1 - Rl 1 (1 area: 1061 ha): This map unit contains a combination of the soils from the Tu 1 - Hd 1 and Tu 1 - Rl 1 map units.

Tu 1 - Hl 1 (4 areas: 1729 ha), and Tu 1 - Hl 3 (1 area: 871 ha) and Tu 1 - Hl 5 (3 areas 6338 ha): Small areas with combinations of the Helena soils: (Hl 1) well and imperfectly drained, (Hl 3) as Hl 1 plus areas with shallow bedrock, (Hl 5) as Hl 1 but reddish parent material.

Tu 1 - Te 1 (2 areas: 745 ha) and Tu 1 - Te 3 (1 area: 595 ha): Two combinations of the Tyee soils: either deep well and imperfectly drained (Te 1) or deep, well and imperfectly drained, plus some shallow soils over bedrock (Te 3).

Tu 1 - Tr 1 (21 areas: 25,974 ha) and Tu 1 - Tr 2 (2 areas: 2638 ha): Two combinations of the Trurans soils; either the deep, rapidly drained soils (Tr 1) or soils near meltwater channels (Tr 2).

Tu 1 - Tr 1 - Rl 1 (2 areas: 10,907 ha): This map unit contains the same soils as the Tu 1 - Tr 1 map unit, plus the organic Rail soils.

Tu 2 - Tr 1 (4 areas: 3167 ha) and Tu 2 - Hd 1 (3 areas: 6565 ha): Well drained Tubbs soils some of which are shallow over bedrock (Tu 2) are associated with deep rapidly drained soils developed on either slightly acid (Tr 1), or mildly alkaline (Hd 1) very coarse textured glaciofluvial deposits.

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: TUNKWA 1 NTS: 92P 3 SUMMARY DATE: APR 25,1978 PAGE: 01

TUNKWA ASSOCIATION

DATE OF SURVEY: 68 SURVEYOR: AS VAN RES SIN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION		CLASSIFICATION		SLOPE	
LATITUDE (N)	51 05 24	ORTHIC GRAY LUVISOL(1973)		%	14.0
LONGITUDE (W)	121 22 09			CLASS	STRONGLY SLOPING
PRECISION (SEC)	00	STATUS: MODAL SOIL (NO DEVIATION)		ASPECT (DEG)	90
				PROFILE SITE	MIDDLE
				LENGTH (M)	100

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL	MORAINAL
LANDFORM	BLANKET
EROSIONAL MODIFIER	GULLIED

STONINESS	MODERATELY STONY	SEEPAGE	ABSENT	DRAINAGE	WELL DRAINED
ROOTING DEPTH	100 CM.			RUNOFF	MEDIUM

ADDITIONAL NOTES

SOME VOLCANIC ASH IN A & B HORIZONS. DEPTH TO BEDROCK=4M.
DOUGLAS-FIR LODGEPOLE PINE-PINEGRASS REGENERATING SERAL COMMUNITY.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
LFH	3- 0	ABRUPT SMOOTH					PLENTIFUL FINE EX PED
A E	0-15	ABRUPT SMOOTH	10.0YR3.5/2.0 MOIST EXPED 10.0YR6.0/2.0 DRY EXPED	SILT LOAM	WEAK FINE PLATY	SOFT	PLENTIFUL FINE EX PED
B T	15-41	GRADUAL WAVY	10.0YR4.0/2.0 DRY EXPED	CLAY LOAM	STRONG MEDIUM SUBANGULAR BLOCKY	HARD	FEW FINE EX PED
II CB K	41-61	GRADUAL WAVY	10.0YR5.0/2.5 DRY EXPED	SILT LOAM GRAVELLY	WEAK FINE SUBANGULAR BLOCKY	HARD	FEW FINE EX PED
II C K	61-110		10.0YR5.0/2.5 DRY EXPED	SILT LOAM GRAVELLY	WEAK VERY FINE TO FINE SUBANGULAR BLOCKY	FRIABLE	FEW FINE EX PED

HORIZON	ROOTS 2	MOTTLES 1	CLAY FILMS 1	CLAY FILMS 2	EFFERVESCENCE	MATERIAL COMP.		DECOMPOSITION
LFH	PLENTIFUL MEDIUM EX PED					% LEAVES % NEEDLES	30 70	SLIGHT
A E	PLENTIFUL MEDIUM EX PED	FEW FINE DISTINCT 10.0YR5.0/4.0						
B T	PLENTIFUL MEDIUM EX PED		COMMON MOD. THICK IN ROOT CHANNELS AND OR PORES ONLY	COMMON MOD. THICK ON HORIZONTAL & VERTICAL PED FACES				
II CB K			FEW VERY THIN IN ROOT CHANNELS AND OR PORES ONLY		MODERATE			
II C K					MODERATE			

PHYSICAL & CHEMICAL DATA

HORIZON	PH 1 VALUE	ORGANIC CARBON %	NITROGEN %	EXCHANGEABLE CATIONS(ME/100G) CA	MG	NA	K	C.E.C. DETERMINED	PARTICLE SIZE BULK DENSITY	% SAND	% SILT	TOTAL CLAY %	% FINE CLAY
LFH													
A E	5.7	1.30	.10	6.20	2.60	.10	.80	14.1	1.01	37	55	8	3
B T	5.9	0.70	.10	14.10	12.90	.20	.90	36.2	1.58	31	38	31	18
II CB K	6.8	.10							1.76	36	55	9	2
II C K	7.1	.10							1.78	43	50	7	1

COARSE FRAGMENTS

HORIZON	GRAVEL %	COBBLE %
LFH		
A E	10	5
B T	10	5
II CB K	10	15
II C K	10	15

Map Units of the Tunkwe Association

Tw 1 (35 areas: 21,748 ha): This map unit occurs on the rolling plateau north and south of Loon Lake. The soils are mainly deep and well drained (with some imperfectly drained) and have developed on mildly alkaline gravelly silt loam glacial till. The open forest is a mixture of Douglas fir, lodgepole pine with some Ponderosa pine in the south. The topography varies from gently to strongly sloping.

Tw 1 - Bd 4 (5 areas: 681 ha): In some hummocky broad shallow depressions the soils of the Tw 1 map unit occur with both grassland and forested Beaverdam soils developed on strongly alkaline lacustrine silts at the lower elevations.

Tw 1 - Hd 1 (7 areas: 14,411 ha) and Tw 1 - Hd 2 (3 areas: 3369 ha): In these map units the Tw 1 soils occur with two map units of the Holden soils, either the deep, rapidly drained soils on the gently sloping plateau (Hd 1), or the deep rapidly drained soils, plus some that are shallow to bedrock associated with meltwater channels (Hd 2).

Tw 1 - Rl 1 (1 area: 144 ha): Small areas of the organic Rail soils occur in the wet depressions of the hummocky topography.

Tw 1 - Hd 1 - Rl 2 (2 areas: 7566 ha): This map unit contains a combination of the soils in the Tw 1 - Hd 1 and Tw 1 - Rl 1 map units.

Tw 1 - Cm 1 (1 area: 70 ha): The soils of the Tw 1 map unit are associated at the edge of the plateau with the Chasm soils developed on mildly alkaline colluvium.

Tw 1 - Hl 5 (4 areas: 28,135 ha): On large areas of the gently to moderately sloping plateau north and south of the Bonaparte River the soils of the Tw 1 map unit are associated with smaller areas of the deep, well drained and imperfectly drained Helena soils developed on reddish moderately alkaline gravelly sandy loam glacial till.

Tw 1 - Tr 1 (1 area: 1847 ha) and Tw 1 - Tr 2 (1 area: 331 ha): Just south of Loon Lake the soils of the Tw 1 map unit occur with deep, rapidly drained, coarse textured soils, either on the plateau surface (Tr 1) or adjacent to meltwater channels (Tr 2).

Tw 1 - Tu 1 (1 area: 932 ha): Just north of the Marble Range a gently to moderately sloping portion of the plateau contains the soils of the Tw 1 map unit plus smaller areas of soils developed on coarse textured, stratified glacial till.

Tw 2 (12 areas: 7048 ha): On the higher points of the rolling plateau north and south of Loon Lake there are areas where some of the Tunkwa soils are shallow with bedrock within 50 cm of the surface.

2.2.5. Soils of the Southern Uplands

The variation in climate, topography and bedrock types is greater in the Southern Uplands than in either of the other two physiographic areas. The climate during the growing season ranges from hot and dry on the lower benches of the Fraser River to cool and moist on the summits of the Marble Range. The elevation difference between these two areas is about 1900 m: from 300 m at the Fraser River to over 2200 m on the Summit of Mount Bowman. The topography is rugged with many steep, and sometimes precipitous slopes. Soil materials are therefore often disrupted by downslope movement, and in extreme cases the soil surface is being stripped by erosion. The bedrock of the Marble Range is limestone, producing highly calcareous soils. The bedrock of the Edge Hills is chert, siltstone, argillite and some limestone, giving soils that are considerably less calcareous. The parent materials of the soils on the highly dissected benches above the Fraser River are very complex. The bulk of the deposits are a mixture of glacial till and fluvioglacial deposits, but the upper metre or two is usually formed of gravelly fluvial fans overlain by eolian silt. The vegetation on the lower benches is a sparse cover of sagebrush and bluebunch wheat grass. On the higher benches Ponderosa pine appears. The slopes of the mountains have an open Douglas fir forest, and the summits have stunted whitebark pine and juniper.

The soils of the Marble Range are calcareous, thin and droughty, because limestone weathers by solution leaving only a small volume of residual weathering products, and water moves rapidly out of the soil profile into the permeable rock. Numerous angular fragments of limestone occur throughout the soil profile to the surface. The soils formed on the gravelly sandy loam glacial till of the lower slopes (Bowman) have an accumulation of clay in the subsoil. The colluvial soils on the upper slopes (Carsou and Community) do not. On the cool, moist summits the soils (Kerr) contain large amounts of organic matter and volcanic ash in the upper horizons.

The colluvial soils of the Edge Hills (Cavanaugh) are very coarse textured, do not have an accumulation of clay in the subsoil, and are far less calcareous than the soils of the Marble Range.

The very dry conditions on the Fraser River benches have produced grassland soils on moderately alkaline parent materials (Courtney and Dog Creek). All the benches are highly dissected by large gullies, with steeply sloping sides. The upper horizons of the weakly developed gulley soils are constantly being eroded (Gang). Weakly developed soils, some of which are saline, also occur on the alluvial floodplains of the Bonaparte River and Loon Creek valleys (Frances).

On the map all the soils of the Southern Uplands are colored shades of yellow or orange. They are described in the right hand legend in the block colored yellow. A cross section shows the landscape relationships of the various associations. The landscape positions of the individual soils in each association are shown in the four cross sections at the foot of the map in the strip colored yellow.

SOIL: BOWMAN 1 NTS: 92P 5

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SUMMARY DATE: APR 25,1978 PAGE: 01

BOWMAN ASSOCIATION

DATE OF SURVEY: 68 SURVEYOR: AS VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION		CLASSIFICATION		SLOPE	
LATITUDE (N)	51 19 39	ORTHIC GRAY LUVISOL(1973)		%	20.0
LONGITUDE (W)	121 56 48			CLASS	STEEPLY SLOPING
PRECISION (SEC)	00	STATUS:	MODAL SOIL (NO DEVIATION)	ASPECT (DEG)	225
				PROFILE SITE	LOWER SLOPE
				LENGTH (M)	500

PARENT MATERIAL & LANDFORM		BEDROCK	
GENETIC MATERIAL	MORAINAL	ORIGIN	SEDIMENTARY
LANDFORM	BLANKET	PHYSICAL PROP.	FINE GRAINED
EROSIONAL MODIFIER	GULLIED	NAME	LIMESTONE

STONINESS	MODERATELY STONY	SEEPAGE	ABSENT	DRAINAGE	WELL DRAINED
ROOTING DEPTH	80 CM.			RUNOFF	RAPID

ADDITIONAL NOTES

MATURE DOUGLAS FIR-PINEGRASS-KINNIKINNICK COMMUNITY. BEDROCK DEPTH=2M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
LFH	3- 0	ABRUPT WAVY					
A E	0-13	CLEAR WAVY	10.0YR6.0/2.0 DRY EXPED	SANDY LOAM GRAVELLY	WEAK MEDIUM PLATY	SOFT	PLENTIFUL FINE EX PED
B T	13-30	GRADUAL WAVY	10.0YR4.0/3.0 DRY EXPED	LOAM VERY GRAVELLY	MODERATE FINE SUBANGULAR BLOCKY	FRIABLE	PLENTIFUL FINE EX PED
BC	30-46	GRADUAL WAVY	10.0YR5.0/3.5 DRY EXPED	SANDY LOAM VERY GRAVELLY	WEAK FINE SUBANGULAR BLOCKY	VERY FRIABLE	FEW FINE EX PED
C K1	46-64	CLEAR WAVY	10.0YR4.5/3.0 DRY EXPED	SANDY LOAM VERY GRAVELLY	WEAK FINE SUBANGULAR BLOCKY	VERY FRIABLE	FEW FINE EX PED
C K2	64-115		10.0YR5.5/2.0 DRY EXPED	SANDY LOAM VERY GRAVELLY	WEAK FINE SUBANGULAR BLOCKY	FRIABLE	VERY FEW FINE EX PED

HORIZON	ROOTS 2	CLAY FILMS 1	CLAY FILMS 2	EFFERVESCENCE	MATERIAL COMP.	DECOMPOSITION
LFH					% LEAVES 20 % NEEDLES 80	MODERATE
A E	PLENTIFUL COARSE					
B T	PLENTIFUL COARSE EX PED	MANY MOD. THICK IN ROOT CHANNELS AND OR PORES ONLY	MANY MOD. THICK ON HORIZONTAL & VERTICAL PED FACES	MODERATE		
BC	FEW COARSE EX PED	FEW VERY THIN IN ROOT CHANNELS AND OR PORES ONLY		STRONG		
C K1	FEW COARSE EX PED			STRONG		
C K2				STRONG		

PHYSICAL & CHEMICAL DATA

HORIZON	PH 1 VALUE	ORGANIC CARBON %	NITROGEN %	CA CARB. EQUIV.	EXCHANGEABLE CATIONS(ME/100G) CA	MG	NA	K	C.E.C. DETERMINED	PARTICLE SIZE BULK DENSITY	% SAND	% SILT	TOTAL CLAY %	% FINE CLAY
LFH														
A E	6.6	0.90	.04		4.70	1.20	.10	1.90	8.9	.74	63	33	4	0
B T	7.2	2.30	.12		30.00	3.20	.10	1.10	32.6	1.43	34	40	26	15
BC	7.5	1.00									53	32	15	6
C K1	7.8	1.00		42.5						1.92	71	22	7	1
C K2	8.0	0.30								1.65	62	30	8	0

HORIZON	COARSE FRAGMENTS GRAVEL %	COBBLE %
LFH		
A E	45	
B T	40	20
BC	40	20
C K1	40	20
C K2	35	20

Map Units of the Bowman Association

Bw 1 (9 areas: 9272 ha): This map unit occurs on the lower slopes of the Marble Range. Deep, well drained soils (most of which have an accumulation of clay in the subsoil) occur on strongly alkaline, very gravelly sandy loam glacial till. The topography is very varied, ranging from gently to very steeply sloping.

Bw 1 - Cw 1 (1 area: 33 ha): In a very small area in the extreme south the soils of the Bw 1 map unit occur with small exposures of deep, rapidly drained soils on moderately alkaline, very coarse textured colluvium. The topography varies from strongly to very steeply sloping.

Bw 1 - Hd 1 (3 areas: 1954 ha) and Bw 1 - Hd 2 (2 areas: 678 ha): On some of the lowest slopes of the Marble Range (mainly on the eastern side) the soils of the Bw 1 map unit occur with two map units of the Holden soils. The Holden map units include either the deep, rapidly drained soils on mildly alkaline fluvioglacial materials on the gently to steeply sloping plateau (Hd 1), or the deep rapidly drained soils plus some that are shallow to bedrock associated with meltwater channels (Hd 2).

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: CARSON 1 NTS: 92P 4 SUMMARY DATE: APR 25,1978 PAGE: 01

CARSON ASSOCIATION

DATE OF SURVEY: 68 SURVEYOR: AS VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION

LATITUDE (N) 51 02 16
LONGITUDE (W) 121 47 23
PRECISION (SEC) 00

CLASSIFICATION

DEGRADED EUTRIC BRUNISOL(1973)
STATUS: MODAL SOIL (NO DEVIATION)

SLOPE

% 32.0
CLASS VERY STEEPLY SLOPING
ASPECT (DEG) 270
PROFILE SITE LOWER SLOPE
LENGTH (M) 200

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL COLLUVIAL
LANDFORM VENEER

BEDROCK

ORIGIN SEDIMENTARY
PHYSICAL PROP. FINE GRAINED
NAME LIMESTONE

STONINESS MODERATELY STONY
SEEPAGE ABSENT
DRAINAGE WELL DRAINED
RUNOFF MEDIUM

ADDITIONAL NOTES

MATURE DOUGLAS FIR-PINEGRASS. DEPTH TO BEDROCK=1M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
LFH	1- 0	GRADUAL WAVY					
A EJ	0-13	GRADUAL WAVY	10.0YR5.5/2.0 DRY EXPED	SANDY LOAM GRAVELLY	WEAK FINE SUBANGULAR BLOCKY	SOFT	PLENTIFUL FINE EX PED
B TJ	13-41	ABRUPT WAVY	10.0YR5.0/2.5 DRY EXPED	LOAM GRAVELLY	WEAK FINE SUBANGULAR BLOCKY	SOFT	PLENTIFUL FINE EX PED
C K	41-102		10.0YR5.5/3.0 DRY EXPED	LOAM GRAVELLY	WEAK FINE SUBANGULAR BLOCKY	SOFT	FEW FINE EX PED

HORIZON	ROOTS 2	CLAY FILMS 1	EFFERVESCENCE	MATERIAL COMP.		DECOMPOSITION
LFH				% LEAVES % NEEDLES	20 80	MODERATE
A EJ	PLENTIFUL MEDIUM EX PED					
B TJ	PLENTIFUL MEDIUM EX PED	COMMON VERY THIN IN ROOT CHANNELS AND OR PORES ONLY				
C K	FEW MEDIUM EX PED		STRONG			

PHYSICAL & CHEMICAL DATA

HORIZON	COARSE FRAGMENTS GRAVEL %	COBBLE %
LFH		
A EJ	20	5
B TJ	20	5
C K	25	15

Map Units of the Carson Association

Cs 1 (4 areas: 583 ha): This map unit occurs predominantly on the south facing upper slopes and ridge crests of the Marble Range. Deep, well drained soils developed on moderately alkaline, gravelly loam colluvium are associated with small areas where the soils are shallow, and limestone bedrock is within 50 cm of the surface. The topography varies from steeply to very steeply sloping. The vegetation on these drier south facing slopes is mainly Douglas fir and pinegrass.

Cs 1 - Kr 1 (27 areas: 11,556 ha): In these areas the soils of the Cs 1 map unit are associated at the highest elevations with small areas of well drained soils (some of which are shallow over limestone bedrock), which have a surface capping of volcanic ash, and a vegetation community of whitebark pine and juniper. The topography varies from strongly to very steeply sloping.

Cs 2 (26 areas: 12,925 ha): This map unit occurs predominantly on the upper north facing slopes of the Marble Range. It contains deep well drained soils (some of which have an accumulation of clay in the subsoil), that have developed on moderately alkaline, gravelly loam colluvium. The topography varies from steeply to extremely sloping. On these cooler and moister north facing slopes the Douglas fir forest has a more closed canopy than in the Cs 1 map unit.

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: CAVANAUGH NTS: 92I 3 SUMMARY DATE: APR 25,1978 PAGE: 01

CAVANAUGH ASSOCIATION

DATE OF SURVEY: 28 7 74 SURVEYOR: GY KELOWNA, B.C.M.A. & R.A.B.
SAMPLING PURPOSE: RECONNAISSANCE SURVEY

LOCATION

LATITUDE (N) 50 13
LONGITUDE (W) 121 05
PRECISION (SEC) 30
ELEVATION (M) 540

CLASSIFICATION

DEGRADED EUTRIC BRUNISOL(1973)
STATUS: MODAL SOIL (NO DEVIATION)

SLOPE

% 15.0
TYPE SIMPLE
CLASS STEEPLY SLOPING
ASPECT (DEG) 210
PROFILE SITE UPPER SLOPE
MICROTOPOGRAPHY LEVEL

PARENT MATERIAL & LANDFORM

TEXTURAL MODIFIER 1 GRAVELLY
GENETIC MATERIAL COLLUVIAL
LANDFORM FAN

STONINESS MODERATELY STONY
ROOTING DEPTH 80 CM.
FLOOD HAZARD NO HAZARD
SEEPAGE ABSENT
DRAINAGE RAPIDLY DRAINED
RUNOFF VERY SLOW
PERMEABILITY RAPID
INFILTRATION MEDIUM

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1	EFFERVESCENCE
LF	2- 0	ABRUPT SMOOTH					
A E	0-17	CLEAR SMOOTH	LOAMY SAND	STRUCTURELESS MEDIUM TO COARSE SINGLE GRAIN	LOOSE	ABUNDANT FINE RANDOM EX PED	
B M	17-42	CLEAR SMOOTH	LOAMY SAND GRAVELLY	STRUCTURELESS MEDIUM TO COARSE SINGLE GRAIN	SLIGHTLY HARD	ABUNDANT FINE RANDOM EX PED	
BC K	42-62	GRADUAL SMOOTH	SAND GRAVELLY	STRUCTURELESS MEDIUM TO COARSE SINGLE GRAIN	LOOSE	ABUNDANT FINE RANDOM EX PED	VERY WEAK
C K1	62-80	DIFFUSE SMOOTH	SAND GRAVELLY	STRUCTURELESS MEDIUM TO COARSE SINGLE GRAIN	LOOSE	ABUNDANT FINE RANDOM EX PED	MODERATE
C K2	80-		SAND GRAVELLY	STRUCTURELESS MEDIUM TO COARSE SINGLE GRAIN	LOOSE		MODERATE

PHYSICAL & CHEMICAL DATA

HORIZON	PH 1 VALUE	PH 2 VALUE	ORGANIC CARBON %	NITROGEN %	EXCHANGEABLE CATIONS(ME/100G) CA	MG	NA	K	C.E.C. DETERMINED	EXTRACTABLE FE(%) RESULT	EXTRACTABLE AL(%) RESULT
LF	6.1	5.5	22.87	.35							
A E	6.5	5.9	1.46	.06	14.44	4.57	.05	.68	19.0		
B M	6.6	6.0	.48	.02	18.44	6.81	.23	.22	21.7	0.1	0.1
BC K	7.1	6.8	.31	.04	10.41	2.33	.32	.17	13.5		
C K1	7.8	7.1									
C K2	7.9	7.4									

COARSE FRAGMENTS

HORIZON	P1 PPM.	S PPM.	% VOL	GRAVEL %
LF				
A E	24.6	0.9	10	10
B M	17.4	2.3	30	30
BC K	27.0	0.6	30	30
C K1	30.5		30	30
C K2	12.4			

Map Units of the Cavanaugh Association

Cg 1 (16 areas: 5610 ha): This map unit occurs on north facing slopes and ridge crests in the Edge Hills. It contains deep, rapidly drained soils (some of which have an accumulation of clay in the subsoil) developed on mildly alkaline very coarse textured colluvium. The topography varies from gently sloping on the ridge crests to very steeply sloping on the mountain sides.

Cg 1 - Rk 6 (12 areas: 3312 ha): On some of the summits and more precipitous slopes argillite, silt stone and chert outcrops are associated with the soils of the Cg 1 map unit. The topography varies from moderately sloping on the summits to extremely sloping on the mountain sides. Talus slopes occur below some of the rock outcrops.

Cg 2 (9 areas: 7481 ha): This map unit occurs on the warmer and drier south facing slopes in the upper elevations of the Edge Hills. The soils are deep and rapidly drained and have formed on the same colluvium as those of the Cg 1 map unit. However, the soils are drier than those in the Cg 1 map unit, and the Douglas fir forest is more open. The topography varies from moderately to very steeply sloping.

Cg 2 - Rk 6 (1 area: 644 ha): In an area east of the Fraser River there are exposures of argillite, siltstone and chert bedrock, with the soils of the Cg 1 map unit below them, on the steeply to very steeply sloping topography.

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: COMMUNITY NTS: 92I13 SUMMARY DATE: APR 25,1978 PAGE: 01

COMMUNITY ASSOCIATION

DATE OF SURVEY: 22 7 74 SURVEYOR: GY KELOWNA, B.C.M.A. & R.A.B.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION		CLASSIFICATION		SLOPE	
LATITUDE (N)	50 59	ORTHIC DYSTRIC BRUNISOL(1973)		%	40.0
LONGITUDE (W)	121 42			TYPE	SIMPLE
PRECISION (SEC)	30	STATUS:	MODAL SOIL (NO DEVIATION)	CLASS	VERY STEEPLY SLOPING
ELEVATION (M)	1835			ASPECT (DEG)	270
				PROFILE SITE	MIDDLE
				MICROTOPOGRAPHY	LEVEL

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL	COLLUVIAL
LANDFORM	BLANKET

STONINESS	MODERATELY STONY	FLOOD HAZARD	NO HAZARD	DRAINAGE	WELL DRAINED
		SEEPAGE	PRESENT	RUNOFF	MEDIUM
				PERMEABILITY	MODERATE
				INFILTRATION	MEDIUM

ADDITIONAL NOTES

ROOTING DEPTH IS BELOW 25CM. BEDROCK IS BELOW 150CM.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
LF	15- 9	CLEAR SMOOTH				ABUNDANT MEDIUM RANDOM EX PED
H	9- 0	CLEAR SMOOTH		STRUCTURELESS FINE SINGLE GRAIN	VERY FRIABLE	ABUNDANT MEDIUM RANDOM EX PED
ASH	0- 3	CLEAR WAVY	SAND	STRUCTURELESS MEDIUM TO COARSE SINGLE GRAIN	LOOSE	ABUNDANT MEDIUM RANDOM EX PED
B M1	3-13	CLEAR WAVY	LOAMY SAND	STRUCTURELESS MEDIUM SINGLE GRAIN	LOOSE	ABUNDANT MEDIUM RANDOM EX PED
B M2	13-25	CLEAR WAVY	SAND	STRUCTURELESS MEDIUM TO COARSE SINGLE GRAIN	LOOSE	PLENTIFUL MEDIUM RANDOM EX PED
C	25-		COARSE SAND	STRUCTURELESS VERY COARSE SINGLE GRAIN	LOOSE	

PHYSICAL & CHEMICAL DATA

HORIZON	PH 1 VALUE	PH 2 VALUE	ORGANIC CARBON %	NITROGEN %	EXCHANGEABLE CATIONS(ME/100G) CA	MG	NA	K	C.E.C. DETERMINED	EXTRACTABLE FE(%) RESULT	EXTRACTABLE AL(%) RESULT
LF	5.8	5.3	45.26	.88							
H	5.3	4.6	6.07	.17							
ASH	5.0	4.3	1.96	.12	4.24	.99	.08	.43	13.5		
B M1	5.2	4.6	1.82	.13	4.53	1.60	.09	.52	17.2	0.5	0.4
B M2	5.1	4.3	.62	.07	2.54	.89	.09	.30	9.7	0.1	0.2
C	5.5	4.7	.31	.05	3.85	.76	.06	.43	7.6		

COARSE FRAGMENTS

HORIZON	P1 PPM.	S PPM.	% VOL	GRAVEL %	
LF					
H					
ASH	236.9	0.8			
B M1	61.5	0.2			
B M2	19.7	0.3			
C	4.1	0.4	20	20	

Map Units of the Community Association

Cw 1 (2 areas: 777 ha): This map unit occurs in the extension of the Marble Range towards Pavilion Mountain, in the extreme south of the map area. Deep, rapidly drained soils developed on moderately alkaline, very coarse textured colluvium are the predominant soils. There are small areas of soils that have an accumulation of clay in the subsoil. There is a considerable amount of volcanic ash in the surface horizons of both types of soils. The topography varies from strongly to very steeply sloping.

Cw 1 - Kr 1 (1 area: 91 ha): This small map unit occurs on the ridge where the soils of the Cw 1 map unit are associated with deep well drained soils (and some soils that have shallow bedrock) developed on very gravelly sandy loam colluvium (Kerr soils). The Kerr soils have considerable accumulations of organic matter and volcanic ash in the surface horizons. The topography varies from steeply to very steeply sloping.

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: COURTNEY NTS: 92I14 SUMMARY DATE: APR 25,1978 PAGE: 01

COURTNEY ASSOCIATION

DATE OF SURVEY: 23 6 73 SURVEYOR: GY KELOWNA, B.C.M.A. & R.A.B.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION		CLASSIFICATION	SLOPE	
LATITUDE (N)	50 47	ORTHIC BROWN(1973)	%	5.0
LONGITUDE (W)	121 05		ASPECT (DEG)	180
PRECISION (SEC)	30			
ELEVATION (M)	365			

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL	COLLUVIAL
LANDFORM	FAN

STONINESS VERY STONY DRAINAGE WELL DRAINED

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
A H	0-10	ABRUPT	10.0YR5.0/2.0 DRY	SANDY LOAM GRAVELLY	COARSE PLATY	SOFT	ABUNDANT
B M	10-30	ABRUPT	7.5YR4.0/2.0 DRY	SANDY LOAM GRAVELLY	WEAK MEDIUM TO COARSE SUBANGULAR BLOCKY	SOFT	PLENTIFUL
C CA	30-66	ABRUPT	10.0YR5.0/5.0 DRY	LOAMY SAND GRAVELLY	GRANULAR	LOOSE	FEW
C K	66-		10.0YR5.0/4.0 DRY	LOAMY SAND GRAVELLY	GRANULAR	LOOSE	FEW

PHYSICAL & CHEMICAL DATA

HORIZON	PH 1 VALUE	PH 2 VALUE	ORGANIC CARBON %	NITROGEN %	EXCHANGEABLE CATIONS(ME/100G) CA	MG	NA	K	C.E.C. DETERMINED	P1 PPM.	S PPM.	MN PPM.
A H	7.3	6.7	1.17	.11	11.84	6.69	.04	1.31	15.4	22.6	11.0	0.9
B M	7.3	6.5	.94	.17	13.61	6.50	.07	1.16	17.6	11.0	9.8	0.8
C CA	8.1	7.5	.71	.08	18.85	8.43	.24	1.28	15.1	12.4	24.3	1.0
C K	8.4	7.6								4.3	21.4	1.7

Map Units of the Courtney Association

Ct 1 (1 area: 133 ha): A large sloping bench on the east side of the Fraser River contains predominantly deep, well drained soils developed on moderately alkaline, very coarse textured mixed deposits. There are also small areas of soils that are highly calcareous, and some that are very weakly developed. The vegetation is a heavily overgrazed cover of sagebrush and bluebunch wheat grass. The topography is moderately to strongly sloping.

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: DOG CREEK 1 NTS: 92O15 SUMMARY DATE: APR 25,1978 PAGE: 01

DOG CREEK ASSOCIATION

DATE OF SURVEY: 71 SURVEYOR: AB VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION		CLASSIFICATION		SLOPE	
LATITUDE (N)	51 50 31	ORTHIC DARK BROWN(1973)		%	6.0
LONGITUDE (W)	122 32 50			CLASS	MODERATELY SLOPING
PRECISION (SEC)	00	STATUS:	MODAL SOIL (NO DEVIATION)	ASPECT (DEG)	180
				PROFILE SITE	UPPER SLOPE
				LENGTH (M)	200

PARENT MATERIAL & LANDFORM

GENETIC MODIFIER	GLACIO
GENETIC MATERIAL	FLUVIAL
LANDFORM	FAN
EROSIONAL MODIFIER	GULLIED

STONINESS	SLIGHTLY STONY	SEEPAGE	ABSENT	DRAINAGE	RAPIDLY DRAINED
				RUNOFF	RAPID

ADDITIONAL NOTES

BIG SAGEBRUSH AND BLUEBUNCH WHEATGRASS OVERGRAZED. BEDROCK DEPTH=9.9M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	EFFERVESCENCE
A H	0-13	CLEAR SMOOTH	10.0YR3.0/3.5 MOIST EXPED 10.0YR4.0/3.5 DRY EXPED	FINE SANDY LOAM	MODERATE MEDIUM SUBANGULAR BLOCKY	LOOSE	
II B M	13-25	CLEAR SMOOTH	10.0YR4.0/2.5 MOIST EXPED 10.0YR5.0/3.0 DRY EXPED	SANDY LOAM GRAVELLY	WEAK MEDIUM SUBANGULAR BLOCKY	SLIGHTLY HARD	
II C K	25-70		10.0YR5.5/2.0 MOIST EXPED 10.0YR6.0/2.5 DRY EXPED	SANDY LOAM GRAVELLY	WEAK MEDIUM SUBANGULAR BLOCKY	SLIGHTLY HARD	STRONG

PHYSICAL & CHEMICAL DATA

	COARSE FRAGMENTS	
	GRAVEL	COBBLE
HORIZON	%	%
A H		
II B M	25	
II C K	25	15

Map Units of the Dog Creek Association

The Dog Creek soils never form the major portion of a map unit. They are included with two map units of the Gang association in some highly dissected topography on either side of the Fraser River.

Dc 1 (included with Gg 1): These soils are deep and rapidly drained. They have been formed on moderately alkaline mixed materials under a heavily overgrazed vegetation cover of sagebrush and bluebunch wheat grass. They are very similar to the Courtney soils, but have more organic matter in the upper horizons, because they occur in a slightly cooler and moister environment.

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: FRANCES F5-1 NTS: 92P 4 SUMMARY DATE: APR 25,1978 PAGE: 01

FRANCES ASSOCIATION

DATE OF SURVEY: 72 SURVEYOR: KV VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISSANCE SURVEY

LOCATION

LATITUDE (N) 51 03 25
LONGITUDE (W) 121 33 45

CLASSIFICATION

ORTHIC REGOSOL(1973)
STATUS: MODAL SOIL (NO DEVIATION)

SLOPE

% 4.0
TYPE SIMPLE
CLASS GENTLY SLOPING
ASPECT (DEG) 135
MICROTOPOGRAPHY SLIGHTLY MOUNDED

PARENT MATERIAL & LANDFORM

TEXTURAL MODIFIER 1 SILTY
LANDFORM TERRACED

SEEPAGE ABSENT DRAINAGE IMPERFECTLY DRAINED
RUNOFF MEDIUM

ADDITIONAL NOTES

NATURAL GRAZING, UNDISTURBED GRASSES AND FORBES.
GRASSLAND SEDGE COMMUNITY.
NON STONY AND NON ROCKY.
SOIL MOISTURE - HUMID, MODERATELY PREVIOUS.
TERRESTIAL HUMIFORMS - MULL-LIKE MODER.
C HORIZON - EFFERVESCENCE REAGENT: HCL 10%, WEAKLY CALCAREOUS.
DEPTH TO BEDROCK = 9.9M.
PARENT MATERIAL AND LANDFORM: UNCONSOLIDATED FLUVIAL TERRACE.
LITHOLOGICALLY MIXED, FINE LOAMY AND FINE SILTY; WEAKLY CALCAREOUS.
CHEMICALLY AND PHYSICALLY WEATHERED.
FINE SILTY, ALKALINE MINERAL SOIL.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
L	2- 0	GRADUAL SMOOTH					
A H	0- 5	GRADUAL SMOOTH	10.0YR3.0/2.0 DRY EXPED	SILT LOAM	WEAK FINE GRANULAR	FRIABLE	PLENTIFUL FINE RANDOM
C	5-75		5.0Y8.0/1.0 DRY EXPED	SILT LOAM	WEAK FINE PLATY	LOOSE	PLENTIFUL FINE RANDOM

HORIZON	EFFERVESCENCE	MATERIAL COMP.		DECOMPOSITION
L		% LEAVES	90	SLIGHT
		% NEEDLES	10	
A H				
C	WEAK			

Map Units of the Frances Association

Fs 1 (2 areas: 449 ha): This map unit occurs on the narrow fluvial bottomlands of the Loon Creek and Bonaparte River valleys. The predominant soils are very weakly developed and imperfectly drained. They have formed on deep, mildly alkaline, silt loam fluvial materials. The vegetation is a grassland-sedge community. In some areas over which the streams flood regularly there are layered soils produced by repeated additions of sediments to the surface. The topography varies from very gently to moderately sloping.

Fs 1 - Rl 1 (2 areas: 409 ha): In these areas the soils of the Fs 1 map unit are associated with very poorly drained organic Rail soils (Rl 1) in the lowest portions of the floodplains. The topography varies from very gently to moderately sloping.

Fs 1 - Tm 1 (1 area: 467 ha): At the head of Loon Lake the soils of the Fs 1 map unit occur with small areas of deep and well drained soils developed on mildly alkaline gravelly clay loam glacial till. The vegetation on these glacial till soils is a mixture of Douglas fir and Ponderosa pine. The topography varies from very gently to moderately sloping.

Fs 2 (1 area: 442 ha): This map unit occurs in the valley south of Clinton. The soils of the Fs 1 map unit are associated with small areas, on the lower terraces, of saline soils, that have also developed from the silt loam fluvial materials. The topography varies from very gently to moderately undulating.

SOIL: GANG 1 NTS: 92P 4

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SUMMARY DATE: APR 25,1978 PAGE: 01

GANG ASSOCIATION

DATE OF SURVEY: 68 SURVEYOR: AS VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION

LATITUDE (N) 51 04 19
LONGITUDE (W) 121 57 28
PRECISION (SEC) 00

CLASSIFICATION

ORTHIC REGOSOL(1973)
STATUS: MODAL SOIL (NO DEVIATION)

SLOPE

% 45.0
CLASS VERY STEEPLY SLOPING
ASPECT (DEG) 135
PROFILE SITE UPPER SLOPE
LENGTH (M) 100

PARENT MATERIAL & LANDFORM

GENETIC MODIFIER	GLACIO
GENETIC MATERIAL	FLUVIAL
LANDFORM	FAN
EROSIONAL MODIFIER	GULLIED

SEEPAGE ABSENT DRAINAGE RAPIDLY DRAINED
RUNOFF VERY RAPID

ADDITIONAL NOTES

BIG SAGE-BUNCHGRASS COMMUNITY. DEPTH TO BEDROCK=9.9M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
A H	0-11	CLEAR WAVY	10.0YR3.5/2.0 MOIST EXPED 10.0YR6.5/2.0 DRY EXPED	LOAM GRAVELLY	WEAK FINE PLATY	SOFT	FEW FINE EX PED
C K	11-90		10.0YR4.0/2.0 DRY EXPED	LOAMY COARSE SAND GRAVELLY		LOOSE	VERY FEW FINE EX PED

HORIZON	ROOTS 2	EFFERVESCENCE
A H	FEW MEDIUM	VERY WEAK
C K		STRONG

PHYSICAL & CHEMICAL DATA

HORIZON	COARSE FRAGMENTS GRAVEL %	COBBLE %
A H	25	
C K	25	15

Map Units of the Gang Association

Ggl (2 areas: 1312 ha): This map unit occurs on the rugged, gullied topography adjacent to the Fraser River. Very weakly developed, rapidly drained soils have formed on moderately alkaline, mixed materials. Their upper horizons are subject to extreme erosion in many places. The ground is either bare, or covered with sparse sagebrush and bluebunch wheat grass. The gullies have moderately to very steeply sloping sides.

Cg 1 - Ct 1 (1 area: 152 ha and Gg 1 - Dc 1 (2 areas: 571 ha): The soils of the gullied Gg 1 map unit occur with small areas of deep, well drained soils developed on moderately alkaline mixed materials, on the flatter bench surfaces between the gullies. The topography ranges from moderately to very steeply sloping.

RESOURCE ANALYSIS BRANCH
MINISTRY OF ENVIRONMENT
VICTORIA, B.C.

SOIL: KERR 1 NTS: 92P 5 SUMMARY DATE: APR 25,1978 PAGE: 01

KERR ASSOCIATION

DATE OF SURVEY: 68 SURVEYOR: AS VAN RES STN PED UNIT AG CAN.
SAMPLING PURPOSE: RECONNAISANCE SURVEY

LOCATION

LATITUDE (N) 51 18 19
LONGITUDE (W) 121 55 28

CLASSIFICATION

ORTHIC MELANIC BRUNISOL(1973)
STATUS: MODAL SOIL (NO DEVIATION)

SLOPE

% 4.0
CLASS GENTLY SLOPING
ASPECT (DEG) 270
PROFILE SITE CREST
LENGTH (M) 20
MICROTOPOGRAPHY MODERATELY MOUNDED

PARENT MATERIAL & LANDFORM

GENETIC MATERIAL COLLUVIAL
LANDFORM BLANKET
GENETIC MATERIAL EOLIAN
LANDFORM BLANKET

BEDROCK

ORIGIN SEDIMENTARY
PHYSICAL PROP. FINE GRAINED
NAME LIMESTONE

STONINESS MODERATELY STONY SEEPAGE ABSENT DRAINAGE WELL DRAINED
ROOTING DEPTH 70 CM. RUNOFF RAPID

ADDITIONAL NOTES

LARGE AMOUNT OF VOLCANIC ASH IN A & B HORIZONS. DEPTH TO BEDROCK=2M.

PROFILE DESCRIPTION

HORIZON	THICKNESS DEPTH(CM)	HORIZON BOUNDARY	COLOUR 1	TEXTURE	STRUCTURE 1	CONSISTENCE	ROOTS 1
A H	0-15	CLEAR WAVY	10.0YR2.0/1.0 DRY EXPED	SANDY LOAM GRAVELLY	WEAK FINE GRANULAR	LOOSE	PLENTIFUL FINE EX PED
B MK	15-30	DIFFUSE WAVY	10.0YR6.0/3.0 DRY EXPED	LOAMY SAND VERY GRAVELLY		LOOSE	PLENTIFUL FINE EX PED
C K	30-102		10.0YR6.5/2.0 DRY EXPED	SANDY LOAM VERY GRAVELLY		LOOSE	VERY FEW VERY FINE EX PED

HORIZON	ROOTS 2	EFFERVESCENCE
A H	PLENTIFUL MEDIUM	
B MK	PLENTIFUL MEDIUM	STRONG
C K		STRONG

PHYSICAL & CHEMICAL DATA

HORIZON	COARSE FRAGMENTS GRAVEL %	COBBLE %
A H	25	20
B MK	40	25
C K	40	25

Map Units of the Kerr Association

Kr 1 - Cs 1 (2 areas: 225 ha): Two ridge crests in the Marble Range contain predominantly deep, well drained soils developed on moderately alkaline, very gravelly sandy loam colluvium. The soils have considerable amounts of volcanic ash and organic matter in their upper horizons, and some of them are shallow over bedrock. The vegetation includes sparse stunted whitebark pine and juniper with numerous herbs and grasses. These are the soils of the Kr 1 map unit. There are also small areas, on lower slopes of deep, well drained soils developed on similar colluvium, that do not have the large amounts of volcanic ash and organic matter in the upper horizons. The vegetation here is Douglas fir, pine grass and kinnikinnick. These are the soils of the Cs 1 map unit. The topography varies from strongly to very steeply sloping.

Kr 1 - Cs 1 - Rk 5 (20 areas: 6706 ha): This is the map unit that occurs over most of the summits and ridge crests in the Marble Range. There is a mixture of contrasting soils in this landscape. In addition to the soils included in the Kr 1 - Cs 1 map unit there are exposures of limestone bedrock, and below them talus slopes, on the highest portions of the summits and ridges. The topography varies from strongly to very steeply sloping.

PART 3

SOIL INTERPRETATIONS

3.1 INTRODUCTION: CANADA LAND INVENTORY MAPS

Information about soil can be used to estimate the capability of a piece of land to sustain various types of land use. As part of the Canada Land Inventory the soils were classed for forestry, agriculture, recreation and wildlife. Maps and short reports were prepared. They provide an estimate of the capability of the land considering its physical characteristics. Economics and location are not taken into account. Some of these surveys have already been published:

Land Capability for Forestry: Lac la Hache 92 P/NW
Land Capability for Forestry: Clinton 92 P/SW
Soil Capability for Agriculture: Clinton 92 P/SW
Land Capability for Wildlife - Waterfowl: Bonaparte River 92 P
Land Capability for Wildlife - Ungulates: Bonaparte River 92 P
Land Capability for Recreation: Bonaparte River 92 P

A land capability map is also available for much of the Cariboo and Chilcotin area (92 P, 92 O, 93 A/SE and SW 93 B/SE and SW). It was made by comparing the capability maps for the individual types of land use.

Land Capability Analysis: Cariboo Area

These published maps and some of the yet unpublished ones may be obtained from:

The Map Librarian
Resource Analysis Branch
Ministry of the Environment
Parliament Bldgs
Victoria, British Columbia
V8V IX4

or

Canada Map Office
Surveys and Mapping Branch
Department of Energy, Mines and Resources
Ottawa, Ontario
K1A OE9

All the above land capability maps are published at a scale of 1:125,000 (apart from the Cariboo Area which is 1:250,000). As such they are suitable for broad scale planning, but not for site specific interpretations.

3.2 SOIL INTERPRETATIONS: FORESTRY AND AGRICULTURE

The Canada Land Inventory maps show the soil or land capability of particular areas. They are suitable for regional planning. They are less suitable for the evaluation of a specific site, because areas on the map usually contain a range of capability classes. This is because they usually contain a range of soils.

In the following sections there are interpretations for forestry and agriculture relating to the individual soils. Areas delineated on the map will have one or more soil associations within them. They will therefore contain a number of different though related soils. The soil legend was designed to help a person locate each of these soils in the field. The main association legend down the right hand side, helps him to identify the association with its dominant and minor soils. Then the four cross sections below the map show him the location of each of those dominant and minor soils. He should therefore be able to identify the particular soil he is standing on or looking at. The tables of interpretations in the following sections are arranged in the same way. The first table gives various interpretations or limitations of the dominant soil in each association. The second table gives the same information for the minor soils. In this second table many of the soils have been grouped, as for instance all the poorly drained soils in the Tyee, Helena, Eugene, Williams Lake, Timber, Tunkwa and Tubbs associations will have similar if not the same limitations.

3.2.1. Forestry

Forested land accounts for over 90 percent of the total surveyed areas, with about 20 percent in mature forests, 60 percent in immature forests and 10 percent as non-productive forest land. The capability of the soils to support all aspects of a forest harvesting operation is therefore of great importance to the local economy.

Detailed interpretations of the soils for various forest management considerations are given in Tables 3 and 4. The first table deals with the dominant soils in each association and the second with the minor soils. These interpretations are for specific soils but some generalizations can be made regarding timber harvesting on the main types of surficial materials in the area.

The land covered by glacial till is usually gently to strongly sloping and will present few problems for main line road construction. There will be few areas where erosion or stream sedimentation are liable. The texture of the glacial till varies from gravelly sandy loam to gravelly clay loam. Therefore it contains enough fine materials to form a satisfactory binding agent for a road bed and to allow road cuts to maintain their angle without slumping. Some trafficability problems will occur in the spring when the combination of snow melt, flat topography

and the fine textured subsoils will combine to produce very wet surface conditions. There are also certain areas with large boulders on the surface that will present traffic problems. They are in the areas mapped as Hl 4, Te 4 and Wl 3.

The areas with surficial colluvium will present more problems to timber harvesting, although they have higher capability for tree growth especially in the Quesnel Highlands. Erosion, stream sedimentation and slumping of road cuts is likely on this steeper terrain where downslope movement of the surface materials is active. Bedrock at a shallow depth may need blasting or if smoothed by glacial action, it may provide a lubricated surface over which the colluvium will move downslope.

Only in the northeast of the map sheet are there any significant areas of forested lacustrine and fluvial materials. They are fine textured silts forming sloping or hummocky terraces with steep outer scarps. The nature of the materials rather than the topography will cause the most problems to timber harvesting. During wet periods they retain surface moisture for a long time either due to the accumulation of clay in the subsoils of the forested Gray Luvisols or due to the accumulation of sodium and magnesium plus clay in some of the grassland soils. During dry periods the surface becomes pulverized by wheeled vehicles and the individual particles are easily blown away by wind. Trafficability is therefore a problem. Slumps and flows are also liable in these uniform sediments which do not have a range of particle sizes to increase their cohesion. Erosion due to drainage diversion in road building is highly likely.

The fluvioglacial deposits tend to be coarse textured gravels and sands, which have accumulated along or adjacent to linear meltwater depressions. They are therefore suitable for road locations as they are usually on subdued topography. They will provide good road bed material and will drain quickly after wet periods. However, they may need the addition of some finer binding materials to form a good road surface and in many areas they form only a thin veneer over the glacial till. Old deltas and eskers should therefore by located for deep gravel sources. They are mapped as Tr 3, Tr 4, Hd 3 or Hd 4. Although they will cause few engineering problems these coarse textured materials support only moderate to poor tree growth due to soil moisture deficiencies.

One proviso is necessary. The interpretations in Tables 3 and 4 cannot be regarded as "site specific". Not all the problems mentioned in the text or in the tables may be encountered in any particular place. This section must be used as a guide to the types of problems that may be encountered. Whether they will or not, and how difficult they will be to overcome in a particular place, must be determined by on site inspection.

TABLE 3 FORESTRY INTERPRETATIONS FOR THE DOMINANT SOIL IN EACH ASSOCIATION OF THE LAC LA HACHE-CLINTON MAP SHEET

Dominant Soil	Symbol	Capability Class	Physical Limitations to Forest Management	Limitations to Regeneration	Species to Regenerate
Archie (Podzolic Gray Luvisol)	Ac	4M 3S	Some loss of organic litter and soil compaction from skidding. Good road building material but steep slopes. Possible stream sedimentation, some windthrow hazard	Minor apart from moderate brush competition. 8cm Humi-Fibrimor-discretionary slashburn	wS 1P
Beaverdam (Orthic Dark Brown)	Bd	7 A N	Not applicable	Climatic limitation-aridity. Excessive soluble salts	--- (grassland)
Big Bar (Orthic Dark Brown)	Bd	7 U A	Not applicable	Climatic limitation-aridity. Excessive soluble salts	--- (grassland)
Bobtail (Orthic Gray Luvisol)	Bt	4M 3S	Some loss of organic litter and soil compaction from skidding. Good road building material but steep slopes. Possible stream sedimentation, and windthrow hazard	Few limitations apart from moderate brush competition. 6cm Humi-Fibrimor-discretionary slash burn	1P wS
Bowman (Orthic Gray Luvisol)	Bw	5M 4S	Some loss of organic litter from dry soil site. Possible erosion and stream sedimentation from moderately steep slopes. Moderate windthrow hazard. Fair road building material	Soil moisture deficiency and high carbonate content of the A and B soil horizons. 3cm Fibrimor-no slash burn	1P, D
Buffalo (Orthic Dark Gray)	Bf	7 A	Not applicable	Climatic limitation-aridity	--- (grassland)
Canim (Orthic Dark Brown)	Cx	7 A	Not applicable	Climatic limitation-aridity. Exposure	--- (grassland)
Carson (Degraded Eutric Brunisol)	Cs	5M 6H R	Some loss of soil resource from skidding. Fair road building material but steep slopes. Possible erosion and stream sedimentation. Some windthrow hazard	Soil moisture deficiency. Climatic limitation-short growing season. Shallow and rocky rooting medium 1cm Fibrimor-no slash burn	1P, D, wS
Cavanaugh (Degraded Eutric Brunisol)	Cg	6M 7A A	Some loss of soil resource from skidding. Steep slopes. Possible erosion and stream sedimentation. Some windthrow hazard	Climatic limitation-aridity. Soil moisture deficiency. 2cm partly decomposed litter-no slash burn	1P, D, pP

TABLE 3 (cont.) FORESTRY INTERPRETATIONS FOR THE DOMINANT SOIL IN EACH ASSOCIATION OF THE LAC LA HACHE-CLINTON MAP SHEET

Dominant Soil	Symbol	Capability Class	Physical Limitations to Forest Management	Limitations to Regeneration	Species to Regenerate
Chasm (Degraded Eutric Brunisol)	Cm	6A 7A	Some loss of soil resource and soil compaction from skidding. Fair road building material but steep slopes. Possible erosion and stream sedimentation. Some windthrow hazard	Climatic limitation-aridity, exposure. 2cm Fibrimor - no slash burn	1P, D, pP
Community (Orthic Eutric Brunisol)	Cw	5M 6M A	Some loss of organic litter from skidding. Fair road building material but steep slopes. Possible erosion and stream sedimentation, some windthrow hazard	Climatic limitation-aridity. Soil moisture deficiency. 15cm Fibrimor-no slash burn	1P D
Courtney (Orthic Brown)	Ct	7A	Not applicable	Climatic limitation-aridity	--- (grassland)
Dog Creek (Orthic Dark Brown)	Dc	7A	Not applicable	Climatic limitation-aridity	--- (grassland)
Elliot (Carbonated Rego Humic Gleysol)	El	7W N	Not applicable	Periodic flooding and high carbonate content of soil	--- (sedge meadow)
Eugene (Orthic Gray Luvisol)	Ee	5A 4M 6A	Minor apart from some liability to destroy the organic litter with skidding, and trafficability problems due to wetness in the spring. Good road building material.	Climatic limitation-aridity. Fibrimor-no slash burn.	1P, D
Exeter (Orthic Gray Luvisol)	Ex	4S 5A	Compaction of soil from skidding. Trafficability problems due to water retention of fine silt. Possible erosion and stream sedimentation from silts. Poor road building material.	Minor apart from same brush competition, frost heaving and a climatic limitation of aridity. 8cm Humi-Fibrimor-discretionary slash burn	D, wS
Frances (Orthic Regosol)	Fs	7W N	Not applicable	Periodic flooding and excessive soluble salts	--- (sedge meadow)
Gang (Orthic Regosol)	Gg	7A U	Not applicable	Climatic limitation-aridity. Exposure	--- (grassland)

TABLE 3 (cont.) FORESTRY INTERPRETATIONS FOR THE DOMINANT SOIL IN EACH ASSOCIATION OF THE LAC LA HACHE-CLINTON MAP SHEET

Dominant Soil	Symbol	Capability Class	Physical Limitations to Forest Management	Limitations to Regeneration	Species to Regenerate
Helena (Orthic Gray Luvisol)	Hl	5A 4M 6A	Minor apart from some liability to destroy the organic litter with skidding, and trafficability problems due to wetness in the spring. Good road building material	Climatic limitation-aridity. 5cm Fibrimor-no slash burn	1P, D
Holden (Degraded Eutric Brunisol)	Hd	6M 5A A	Liability to destroy organic litter in such a dry soil environment. Fair road building material.	Climatic limitation-aridity. Soil moisture deficiency. 3cm Fibrimor-no slash burn	1P, D
Kerr (Orthic Melanic Brunisol)	Kr	7H R	Not applicable	Climatic limitation-cold temperatures-short growing season	--- ("Krumholz" community)
Larghetto (Degraded Eutric Brunisol)	Lg	4M 3S R	Fair road building material but steep slopes. Possible erosion and stream sedimentation from road construction. Some windthrow hazard.	Minor apart from moderate brush competition. 3cm Fibrimor-no slash burn	wS, 1P
Lolo (Degraded Dystric Brunisol)	Lo	4M 3S R	Fair road building material but steep slopes. Possible erosion and stream sedimentation from road construction. Some windthrow hazard.	Minor apart from moderate brush competition. 3cm Fibrimor-no slash burn	wS, 1P
Nielson (Degraded Eutric Brunisol)	Nl	6A 5A	Liability to destroy the organic litter in such a dry soil environment. Poor road building material	Climatic limitation-aridity. Soil moisture deficiency. 3cm Fibrimor-no slash burn	1P, D
Rail (Typic Mesisol)	Rl	7W	Not applicable	Excess soil moisture	--- (Sedge community)

TABLE 3 (cont.) FORESTRY INTERPRETATIONS FOR THE DOMINANT SOIL IN EACH ASSOCIATION OF THE LAC LA HACHE-CLINTON MAP SHEET

Dominant Soil	Symbol	Capability Class	Physical Limitations to Forest Management	Limitations to Regeneration	Species to Regenerate
Rockland 1 & 2 (Quesnel Highlands)	Rk	6^{M}_{R} 7^{M}_{R}	Exposed and shallow bedrock. Possible loss of limited soil resource from skidding and erosion. Road building problems from bedrock.	Very shallow and rocky rooting medium. Soil moisture deficiency 2-3 cm Fibrimor - no slashburn	wS, 1P
Rockland 3, 4, 5 and 6	Rk	7R	Not applicable.	Exposed bedrock. little or no rooting medium. 1-2 cm Fibrimor - no slashburn	
Soues (Orthic Dark Brown)	So	7A 6A	Loss of organic litter in dry soil environment. Fair road building material but steep slopes. Possible erosion and stream sedimentation.	Climatic limitation - aridity. Exposure 3 cm Fibrimor - no slashburn	D, 1P, pP
Spout (Podzolic Gray Luvisol)	St	4M 3S	Some loss of organic litter and soil compaction from skidding. Good road building material but steep slopes. Possible erosion and stream sedimentation some windthrow hazard.	Minor apart from some brush competition. 8 cm Humi-Fibrimor - discretionary slashburn	wS, 1P
Stolle (Orthic Eutric Brunisol)	Se	6^{M}_{A} 5A	Liability to destroy organic litter in such a dry soil environment. Fair road building material.	Climatic limitation - aridity. Soil moisture deficiency. 2 cm Fibrimor - no slashburn	1P, D
Tatton (Orthic Gray Luvisol)	Ta	5A 4M	Some loss of soil resource from skidding. Good road building material but steep slopes. Possible erosion and some windthrow hazard.	Climatic limitation - aridity. 6 cm Humi-Fibrimor - discretionary slashburn	1P, D
Timber (Degraded Eutric Brunisol)	Tm	6A	Minor apart from some liability to destroy the organic litter with skidding, and trafficability problems due to wetness in the spring. Good road building material.	Climatic limitation - aridity. 4 cm Fibrimor - no slashburn	D, 1P, pP
Trurans (Degraded Dystric Brunisol)	Tr	6^{M}_{A} 5A	Liability to destroy organic litter in such a dry soil environment. Fair road building material.	Climatic limitation - aridity. Soil moisture deficiency. 2 cm Fibrimor - no slashburn	1P, D

TABLE 3 (cont.) FORESTRY INTERPRETATIONS FOR THE DOMINANT SOIL IN EACH ASSOCIATION OF THE LAC LA HACHE-CLINTON MAP SHEET

Dominant Soil	Symbol	Capability Class	Physical Limitations to Forest Management	Limitations to Regeneration	Species to Regenerate
Tubbs (Degraded Eutric Brunisol)	Tu	6^{A}_{M} 5^{A}_{M}	Liability to destroy organic litter in such a dry soil environment. Good to fair road building material	Climatic limitation - aridity. Soil moisture deficiency. 6 cm Fibrimor - no slashburn	lP, D
Tunkwa (Orthic Gray Luvisol)	Tw	5A 6A	Minor apart from some liability to destroy organic litter with skidding, and trafficability problems due to wetness in the spring. Good road building material	Climatic limitation - aridity. 3 cm Fibrimor - no slashburn	lP, D
Tyee (Orthic Gray Luvisol)	Te	5A 6A 4M	Minor apart from some liability to destroy organic litter with skidding, and trafficability problems due to wetness in the spring. Good road building material	Climatic limitation - aridity. Possibly some frost heaving. 3 cm Fibrimor - no slashburn	lP, D
Williams Lake (Orthic Gray Luvisol)	Wl	5A 6A 4M	Minor apart from some liability to destroy organic litter with skidding, and trafficability problems due to wetness in the spring. Good road building material	Climatic limitation - aridity. Possibility some frost heaving. 3 cm Fibrimor - no slashburn	lP, D

KEY TO SPECIES TO REGENERATE:

wS	white spruce
lP	lodgepole pine
D	Douglas-fir
pP	Ponderosa Pine

TABLE 4 FORESTRY INTERPRETATIONS FOR THE MINOR SOILS OF THE LAC LA HACHE-CLINTON MAP SHEET

Minor Soils	Map Units in which the minor soils are to be found.	Soil Moisture regime and drainage class.	Capability Class	Physical Limitations to Forest Management	Limitations to Regeneration	Species to Regenerate
Gleyed soils associated with forested soils on glacial till in the Quesnel Highlands	Bt1 Bt2 St1 St2 Ac2	Humid imperfectly drained	3S 4W	Trafficability problems, loss of organic topsoil on skid roads, soil compaction due to high moisture content. Road building problems due to high water content.	Few limitations apart from moderate brush competition. 8-10 cm. Humi-fibrimor - slash-burn.	wS, 1P
Gleyed soils associated with forested soils on glacial till in the Cariboo Midlands	Te1 Te3 H11 H13 H15 Ee1 Ee2 W11 Tw1 Tw2 Tm1 Tu1	Subhumid, imperfectly drained	3S 4W	Trafficability problems, loss of organic topsoil on skid roads, soil compaction and road building problems due to high water content.	Few limitations apart from moderate brush competition. 6-8 Humi-Fibrimor - discretionary slash burn.	1P, D, wS
Lithic soils (shallow to bedrock) associated with forested soils on glacial till in the Quesnel Highlands	Bt2 St2 Ac1 Ac2	Humid, well drained	5^{M}_{R}	Loss of shallow soil resource from skidding. Moderate liability to windthrow. Possible stream sedimentation. Fair road building materials but steep slopes.	Shallow and rocky rooting medium. little brush competition. 4-6 cm Fibrimor - no slash-burn.	wS, 1P, D
Lithic soils (shallow to bedrock) associated with forested soils on glacial till in the Cariboo Midlands	Te3 H13 Ee2 Tu2 Tw1	Subhumid well drained	5^{M}_{R}	Loss of shallow soil resource from skidding. Moderate liability to windthrow. Fair road building materials, apart from bedrock problems.	Shallow and rocky rooting medium. Soil moisture deficiency. Some brush competition. 2-4 cm Fibrimor - no slash-burn	1P, D.
Lithic soils (shallow to bedrock) associated with forested soils on colluvium in the Quesnel Highlands	Lg1 Lo1	Humid, well drained	5^{M}_{R} 7^{U}_{R}	Loss of shallow soil resource from skidding and erosion. High liability to windthrow. Possible stream sedimentation. Fair road building material but steep slopes	Shallow and rocky rooting medium. Slight soil moisture deficiency. Some brush competition 3-4 cm Fibrimor - no slashburn	wS, 1P

TABLE 4 (cont.) FORESTRY INTERPRETATIONS FOR THE MINOR SOILS OF THE LAC LA HACHE-CLINTON MAP SHEET

Minor Soils	Map Units in which the minor soils are to be found.	Soil Moisture regime and drainage class.	Capability Class	Physical Limitations to Forest Management	Limitations to Regeneration	Species to Regenerate
Lithic soils (shallow to bedrock) associated with forested soils on colluvium in the Cariboo Midlands and Southern Uplands	Ta1 Cm1 Cs1 Kr1	Subhumid to semiarid well drained	5^{M}_{R} 7^{U}_{R}	Loss of shallow soil resource from skidding and erosion. High liability to windthrow. Possible stream sedimentation. Steep slopes. Fair road building materials apart from bedrock problems	Shallow and rocky rooting medium. Soil moisture deficiency. Some brush competition. 2-4 cm Fibrimor - no slashburn	1P, D.
Lithic soils (shallow to bedrock) associated with soils of dry environments	Cx1 Tr2 Bb1 Hd2 So1	Semiarid well to rapidly drained	7^{A}_{R}	not applicable	Climatic limitation-aridity. shallow and rocky rooting medium.	--- (grassland)
Soils with large basalt boulders on and under the surface	Te4 H14 W13	Subhumid, well drained	5^{S}_{R} 6^{S}_{R}	Serious access problems for harvesting equipment. Very poor road building materials	Climatic limitation - aridity. Rocky rooting medium 2-4 Fibrimor - no slashburn	1P, D
Saline and/or highly calcareous soils usually in depressions	Te2 H12 W12 Bf1 Bf2 Bb1 Bd1 Bd3 Bd4 Fs2 Ct1	Semiarid to Subarid moderately well drained	7^{N}_{A}	Not applicable	Excessive soluble salts. Climatic limitation - aridity	--- (grassland)
Grassland soils associated with forested Gray Luvisols	Te2 H12 W12	Semiarid moderately well drained	7A	Not applicable	Climatic limitation - aridity. Exposure	--- (grassland)
Forested Gray Luvisols and Dystic Brunisols associated with Eutric Brunisols on colluvium in the Southern Uplands	Cs2 Cw1 Cg1 Cg2	Subhumid, well drained	5M 6^{M}_{A}	Loss of soil resource from skidding and erosion. Some liability to windthrow and stream sedimentation. Fair road building material but steep slopes	Climatic limitation - aridity. Soil moisture deficiency. 2-3 cm Fibrimor - no slashburn	1P, D.

TABLE 4 (cont.) FORESTRY INTERPRETATIONS FOR THE MINOR SOILS OF THE LAC LA HACHE-CLINTON MAP SHEET

Minor Soils	Map Units in which the minor soils are to be found.	Soil Moisture regime and drainage class.	Capability Class	Physical Limitations to Forest Management	Limitations to Regeneration	Species to Regenerate
Forested Gray Luvisols associated with Brunisols on coarse textured deposits or in dry soil environments.	Nl1 Trl Tr_2 Tr3 Tr4 Sel Tu2 Tml Bd4 Hdl Hd2 Hd3 Hd4	Semiarid, well drained	4M $_5$M A	Loss of thin organic litter from skidding. Fair to good road building materials	Climatic limitation - aridity. Soil moisture deficiency. 2-3 cm Fibrimor - no slashburn	1P, D.
Podzolic soils in the Quesnel Highlands	Acl	Humid, well drained	3s 4s	Loss of soil resource from skidding. Moderate liability to windthrow. Fair road building material but steep slopes	Few limitations apart from moderate brush competition. 8cm Fibrimor - discretionary slashburn	

KEY TO SPECIES TO REGENERATE:

wS	white spruce
1P	lodgepole pine
D	Douglas-fir

3.2.2. Agriculture

Before the soil capability for agriculture could be determined the climatic capability of the area had to be estimated. This was done by setting up a series of short term weather stations and relating the data collected to the nearby long term Atmospheric Environment Service stations. The results are published in two maps (Climate Capability for Agriculture 92 P/NW and 92 P/SW) and are available from:

The Map Librarian
Resource Analysis Branch
Ministry of the Environment
Parliament Buildings
Victoria, British Columbia
V8V 1X4

The climate classes vary from 3 in some valleys such as near Lac la Hache to 7 on the summits of the Marble Range. The principal climatic limitations in the valleys and on the plateau of the Cariboo Midlands are aridity, lack of heat units or occasional low temperatures during the growing season. Generally low temperatures in the growing season reduce the climate class to 6 or 7 in the Quesnel Highlands and Southern Uplands.

The Agricultural Capability classes and the soil limitations are given in Tables 5 and 6. The first table deals with the dominant soils in each association and the second with the minor soils. A number of soils span two or three classes of climate capability. Their agriculture capability is listed for each climate class. The classes reflect the capability of the soils to produce a range of field crops. Some soils may have a high capability for a single speciality crops. This is not considered. Location and economic market factors are not considered either. Further information about the soil capability classification for agriculture may be obtained from the publication of the Canada Land Inventory (1965).

TABLE 5 SOIL CAPABILITY FOR AGRICULTURE OF THE DOMINANT SOIL IN EACH ASSOCIATION OF THE LAC LA HACHE-CLINTON MAP SHEET

Dominant Soil (Symbol)	Climate Capability Class 3	4	5	6	7	Principal soil limitations (apart from soil climate)
Archie (Ac)		5-7	6-7	7		steep topography and limited natural fertility
Beaverdam (Bd)	3-5	5-6	5-6			limited natural fertility and sloping topography
Big Bar (Bb)		5-6				stoniness and sloping topography
Bobtail (Bt)	4	5-6				stoniness and sloping topography
Bowman (Bw)			5-6	6-7		limited natural fertility, stoniness and steep topography
Buffalo (Bf)	4	5				sloping topography
Canim (Cx)	4-5	5-6				stoniness and sloping topography
Carson (Cs)				6-7	7	steep topography
Cavanaugh (Cg)			6-7	7		steep topography
Chasm (Cm)	4	6-7	6-7			steep topography and low moisture holding capacity
Community (Cw)				7		steep topography
Courtney (Ct)			5-6			sloping topography and low moisture holding capacity
Dog Creek (Dc)			5-6			sloping topography and low moisture holding capacity
Elliot (El)		5				excess water in soil
Eugene (Ee)		5-6	6			sloping topography and stoniness
Exeter (Ex)	4-5	5				limited natural fertility and sloping topography
Frances (Fs)		5-6	6			excess water in soil
Gang (Gg)			7			steep topography and active erosion
Helena (Hl)	4-6	5-6	6			stoniness and sloping topography
Holden (Hd)	4-5	5-6	6-7			low moisture holding capacity, very coarse textures and sloping topography
Kerr (Kr)				7		steep topography and shallow soils over bedrock
Larghetto (Lg)		5-7	6-7	7		steep topography and limited natural fertility

TABLE 5 (CONTD). SOIL CAPABILITY FOR AGRICULTURE OF THE DOMINANT SOIL IN EACH ASSOCIATION OF THE LAC LA HACHE-CLINTON MAP SHEET

Dominant Soil (Symbol)	Climate Capability Class 3	4	5	6	7	Principal soil limitations (apart from soil climate)
Lolo (Lo)		5-7	6-7	7		steep topography and limited natural fertility
Neilson (Nl)		5-6				low moisture holding capacity and sloping topography
Rail (Rl)	6-7	6-7	6-7	6-7		excess water in soil
Rockland (Rk)		7	7	7	7	bedrock at or very near surface
Soues (So)		6-7	6-7			steep topography and low moisture holding capacity
Spout (St)		5-6	6-7			steep topography and stoniness
Stolle (Se)		5-6	6			low moisture holding capacity, stoniness and sloping topography
Tatton (Ta)		5-6				steep topography and stoniness
Timber (Tm)		5	6			stoniness and sloping topography
Trurans (Tr)	4-5	5-6	6			low moisture holding capacity, stoniness and sloping topography
Tubbs (Tu)	5-6	5-6	6			low moisture holding capacity, stoniness and sloping topography
Tunkwa (Tw)		5-6	6			stoniness and sloping topography
Tyee (Te)	4-5	5-6	6			stoniness and sloping topography
Williams Lake (Wl)		5-6	6			stoniness and sloping topography

TABLE 6 SOIL CAPABILITY FOR AGRICULTURE OF THE MINOR SOILS OF THE LAC LA HACHE-CLINTON MAP SHEET

Minor Soils	Map Units in which the minor soils are to be found.	Climate Capability Class 3	4	5	6	7	Principal soil limitations (apart from soil climate)
Gleyed soils associated with forested soils on glacial till in the Quesnel Highlands	Bt1 Bt2 St1 St2 Ac2		6	6			excess water in soil and stoniness
Gleyed soils associated with forested soils on glacial till in the Cariboo Midlands	Te1 Te3 H11 H13 H15 Ee1 Ee2 W11 Tw1 Tw2 Tm1 Tu1	5	6	6			excess water in soil and stoniness
Lithic soils (shallow to bedrock) associated with forested soils on glacial till in the Quesnel Highlands	Bt2 St2 Ac1 Ac2		6-7	6-7			shallow soils over bedrock and steep topography
Lithic soils (shallow to bedrock) associated with forested soils on glacial till in the Cariboo Midlands	Te3 H13 Ee2 Tw2 Tu2	6	6-7	6-7			shallow soils over bedrock stoniness and sloping topography
Lithic soils (shallow to bedrock) associated with forested soils on colluvium in the Quesnel Highlands	Lg1 Lo1		6-7	6-7	7		shallow soils over bedrock and steep topography
Lithic soils (shallow to bedrock) associated with forested soils on colluvium in the Cariboo Midlands and Southern Uplands	Ta1 Cm1 Cs1 Kr1		6-7	6-7	6-7	7	shallow soils over bedrock and steep topography
Lithic soils (shallow to bedrock) associated with soils of dry environments	Cx1 Tr2 Bb1 Hd2 So1	6	6	6-7			shallow soils over bedrock stoniness and sloping topography
Soils with large basalt boulders on and under the surface	Te4 H14 W13		6	6	6		many large boulders on the surface
Saline and/or highly calcareous soils usually in depressions	Te2 H12 W12 Bf1 Bf2 Bb1 Bd1 Bd3 Bd4 Fs2 Ct1	5	5-6	6			salinity and excess water in soil
Grassland soils associated with forested Gray Luvisols	Te2 H12 W12	5	5				sloping topography and stoniness

TABLE 6 (CONTD). SOIL CAPABILITY FOR AGRICULTURE OF THE MINOR SOILS OF THE LAC LA HACHE-CLINTON MAP SHEET

Minor Soils	Map Units in which the minor soils are to be found.	Climate Capability Class 3	4	5	6	7	Principal soil limitations (apart from soil climate)
Forested Gray Luvisols and Dystric Brunisols associated with Eutric Brunisols on colluvium in the Southern Uplands	Cs2 Cw1 Cg1 Cg2		6	6	6-7	7	steep topography and stoniness
Forested Gray Luvisols associated with Brunisols on coarse textured deposits or in dry soil environments	Nl1 Tr1 Tr2 Tr3 Tr4 Se1 Tu2 Tm1 Bd4 Hd1 Hd2 Hd3 Hd4	5	5	6			low moisture holding capacity and stoniness
Podzolic soils in the Quesnel Highlands	Ac1		6-7	6-7	7		limited natural fertility and steep topography

PART 4

DERIVED AND INTERPRETIVE MAPS

4.1 DERIVED AND INTERPRETIVE MAPS FROM THE CANSIS CARTOGRAPHIC FILE

A reference was made in Part 3 to a number of capability maps that have been published based on soil information for the Lac la Hache-Clinton area. Agriculture Canada is able to produce other maps based on the soil information. These may be either further interpretive maps like the soil capability for agriculture, or they may be derived from the original soil information, such as maps of texture, slope or drainage. They can be made because the original boundaries and map unit symbols are stored in a computer as part of the Canadian Soil Information System (CanSIS).

Soil maps are drafted by the Cartography Section in the Land Resource Research Institute of Agriculture Canada, Ottawa. As part of the procedure map unit symbols and the location of map unit boundaries are recorded in a computer. The soil map is therefore stored in its color printed form, or as a black and white printout from the computer. Figure 1 shows the two forms from the northeast corner of the Lac la Hache-Clinton map. In conjunction with the computer map there is also a list of all the map unit symbols and the area they cover. This list is called the "map index linkage". A portion of the map index linkage for the Lac la Hache-Clinton map is shown in Figure 2. It includes, for example, all the map unit symbols for the Archie association, which may be found in various parts of Figure 1. Therefore, Agriculture Canada has the means to list, by their symbols, all the map units of a soil map, and to reproduce the map itself as lines and symbols on a plain transparent sheet of paper. This provides the basis for the production of additional types of derived or interpretive maps as the need arises.

It is possible that a map showing only the different types of geological materials is required. Such a map in fact has been made. The procedure involves replacing the original map unit symbol by a new symbol which indicates the type of geological material. The same boundaries are retained, with the exception of those that have the same new symbols on either side. In this case the boundary is deleted. No new boundaries are added. Figure 3 shows the gological materials map for the same area as Figure 1. The Archie, Rockland and Spout map unit symbols have now been replaced by, among others, symbols such as M and M8-R2. The new symbols denote moraine and moraine (80%) plus rockland (20%). The computer also prints out a table showing the total area and number of units represented by the new symbols. A portion of this table for the "M" and "M8-R2" symbols is also included in Figure 4.

So far the following derived or interpretive maps have been produced for the Lac la Hache-Clinton sheet:

Geological materials
Boulder fields
Soil moisture regimes
Organic soils
Capability for trailriding

A microfiche copy of these maps has been included in this report. Original full-size maps are available from The Library, Resource Analysis Branch, Ministry of Environment, Parliament Buildings, Victoria, B.C. V8V 1X4. Tel. (604) 387-6995.

If future users of the soil information need other types of derived or interpretive maps they should contact the senior author of this report at the following address:

British Columbia Pedology Unit
Agriculture Canada
6660 N.W. Marine Drive
Vancouver, British Columbia
V6T 1X2
Tel. (604) 224-4355

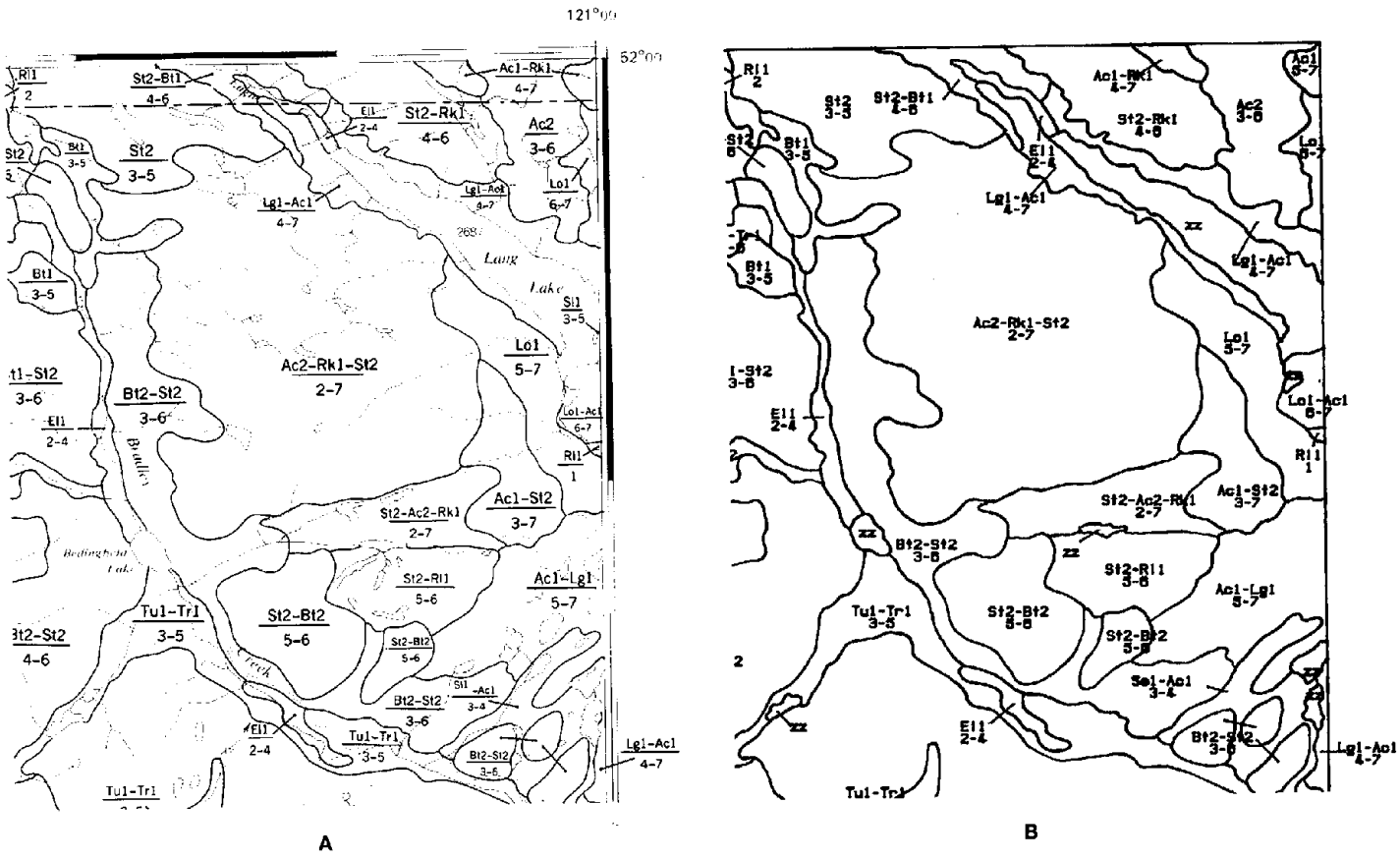
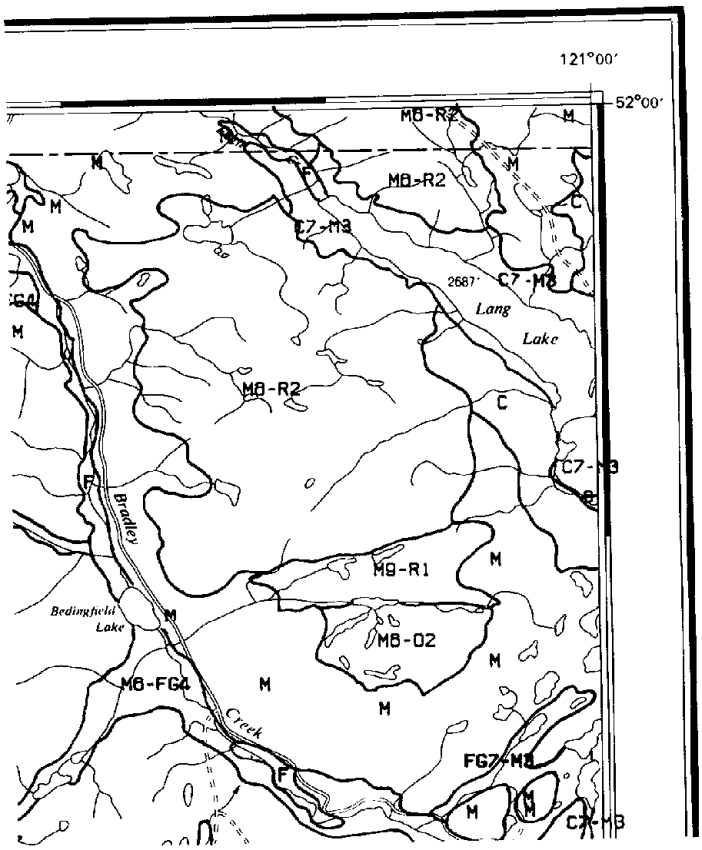


Figure 1. Northeast corner of the soil map; (A) printed, (B) computor. The printed map is published in color. The computor map is in black on a white sheet of paper, with no topographic or cultural information.

LNK0151 MAP INDEX LINKAGE FOR LLH-C 92P/NW,SW

NO. OF AREAS	TOTAL ACREAGE	TOTAL HECTARES	TOTAL SQ MILES		FIRST / UNIQUE SYMBOL
6	5433.6	2198.92	8.49	19	AC1
1	2278.4	922.03	3.56	20	AC1-LG1/5-7
1	190.8	77.22	0.30	21	AC1-RK1/4-7
1	371.5	150.32	0.59	22	AC1-RK1/5-7
1	1245.5	504.02	1.95	23	AC1-SI2/3-7
1	160.4	64.89	0.26	24	AC1/5-7
1	1187.2	480.46	1.86	25	AC1/6-7
2	13137.9	5316.80	20.53	26	AC2
1	11467.3	4640.75	17.92	27	AC2-RK1-SI2/2-7
1	1670.6	676.06	2.62	28	AC2/3-6

Figure 2. A portion of the map index linkage for the Lac la Hache-Clinton soil map. It shows the number of areas and their total acreage represented by the map units of the Archie Association - Acl and Ac2. (zz is a symbol used in the computor for water bodies - lakes etc).



RETRIEVE BY CLASS GEOLOGICAL MATERIALS MAP

NUMBER OF AREAS	ACRES	TOTAL AREA HECTARES	SQ MILES	
336	790376.5	319861.00	1234.97	M
13	30346.1	12280.87	47.42	M8-R2

Figure 3. A "Geological Materials" Map derived from the northeast corner of the Lac la Hache-Clinton soil map. The table shows the number of areas, and their total acreage, which have the symbols "M", "M8-R2" and "water". It is part of a larger table which lists all the geological materials symbols.

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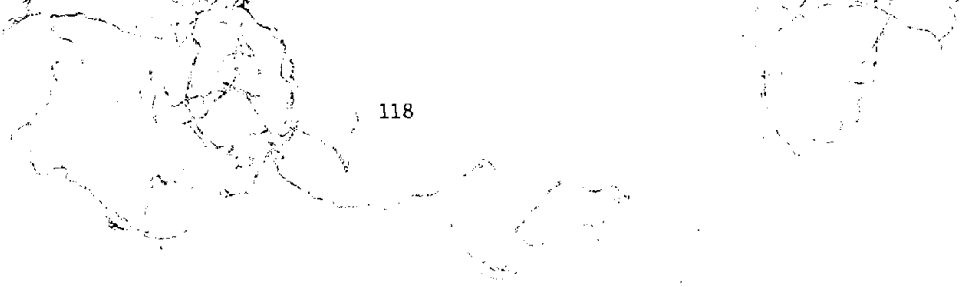

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