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WELDWOOD

OF CANADA LIMITED

00 054

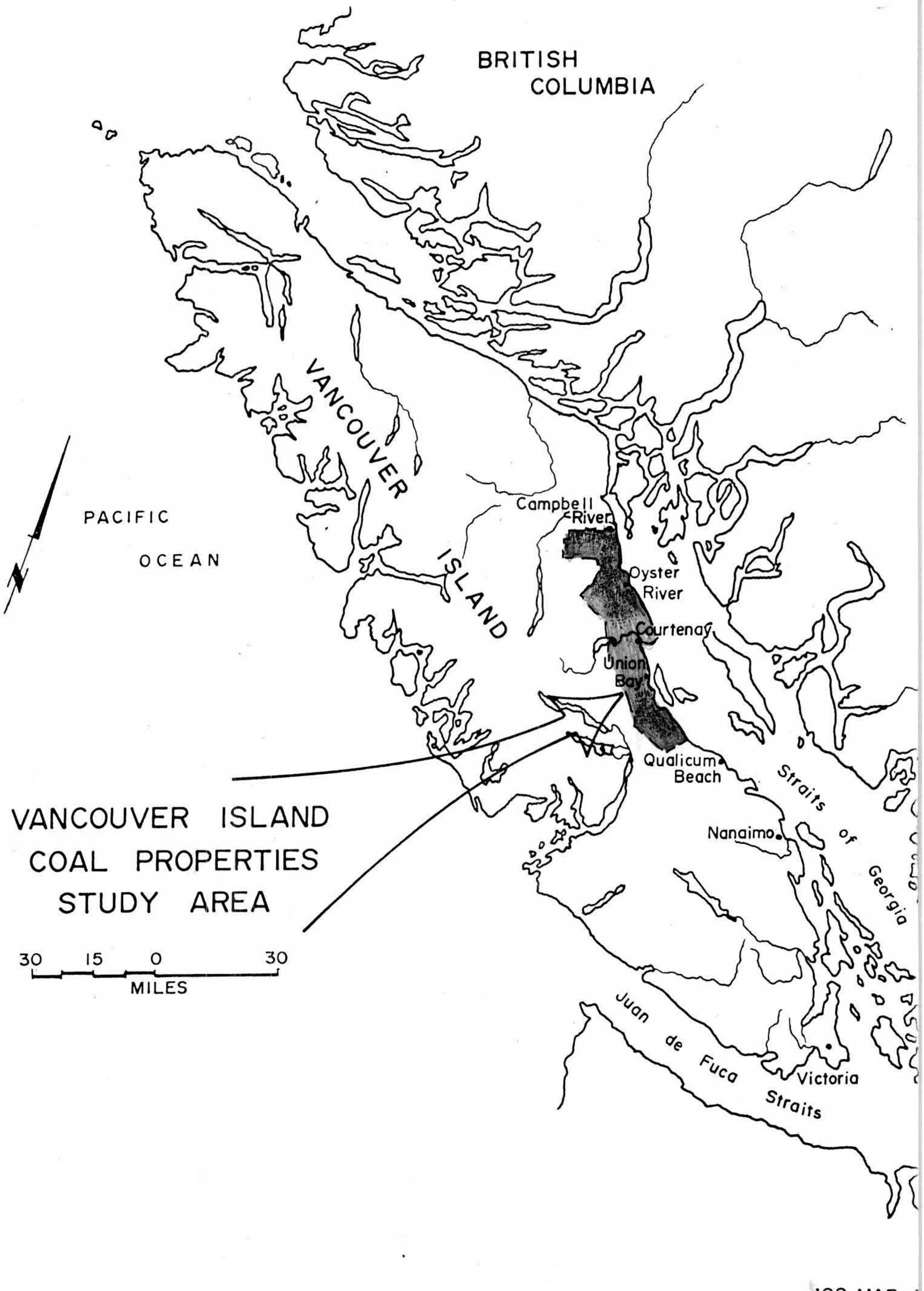
PRELIMINARY COAL REPORT

ON

ANDERSON LAKE
CUMBERLAND
T'SABLE RIVER

LOCATED ON

VANCOUVER ISLAND
BRITISH COLUMBIA


BRITISH
COLUMBIA
VANCOUVER
ISLAND
PACIFIC
OCEAN
Campbell
River
Oyster
River
Courtenay
Union
Bay
Qualicum
Beach
Nanaimo
Straits of Georgia
Juan de Fuca Straits
Victoria
VANCOUVER ISLAND
COAL PROPERTIES
STUDY AREA
30 15 0 30
MILES

S U M M A R Y

Coal mining on Vancouver Island contributed substantial to the economy of British Columbia and Canada until 1950.

The closure of the mines on Vancouver Island, and the loss of most records led to the belief that most of the coal on Vancouver Island had been mined out. This was supported by the mining methods that were carried on in the Island, whereby the coal operator was moving from area to area, which tended to imply the coal was running out. Thus with limited knowledge, and no real data Vancouver Island was removed from the list of potential coal reserves for British Columbia and Canada.

The subsequent location of records and the exploration, conducted has proven that coal reserves in the magnitude of one billion tons of coal exist on Vancouver Island, in the Comox-Nanaimo Series, about mid-island on the Strait of Georgia Coastline.

The movement of mining operators can be attributed to the unconformity of the Vancouver Group, basement, coupled with the structural faulting, either not known or not understood in the past.

The percentage of recoverable coal from the lower seam in all areas will be contingent on the methods of mining employed, taking into consideration that the faults may pose some structural constraints, or problems.

The majority of the coal considered to be economically extractable will require underground mining operations. However there is potentially some 96 million tons of coal available for strip mine operations.

The structural faulting while placing some constraints on mining, primarily in the down faulting displacements, (which may restrict mineable areas, and necessitate more entries), may in the final utilisation of the resource be a "double edge sword". Those same faults would form natural barriers should gasification of the upper non-mineable seams, prove feasible.

S U M M A R Y

The sulphur content of the coal, while higher than Alberta's prairie and foothill coal deposits, can be removed to a great extent through coal beneficiation. The major portions of the sulphur occur in a pyritic form and will readily wash out in the coal cleaning process.

Very definite economic advantages are available to these coal deposits, based on their tidewater situation, geographic location, and moderate climate.

Prompted by gloomy supply, and price projections for petroleum and natural gas, the world once again looks to coal as a primary source of energy and industrial chemicals. The synthesis-gas process to produce industrial chemicals is a process that gasifies coal to a hydrogen; carbon-monoxide synthesis gas, and go from that to such products as ammonia or methanol, from which a multitude of chemicals can be derived.

The location of the coal, the magnitude of the deposit, and the extraction or other utilisation of the resource, warrants serious consideration for exploitation of the coals on Vancouver Island, and may once more contribute substantially to the economy of British Columbia and Canada.

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ACKNOWLEDGEMENTS

The successful completion of any exploration program, is dependent on the abilities and co-operation of many individuals, each contributing their specialty, in order to obtain a better understanding of the area and to provide the best interpretation for the client.

The Vancouver Island Resource Study, conducted for the client, Weldwood of Canada Limited, had a very competent team, for which acknowledgement is due, and they are herewith listed with their contribution.

John E. Hughes P. Geologist	- Consulting Structural Geology
George Green P. Geologist	- Geological Supervisor
McAuley Drilling Co. Ltd.	- Drilling, Coring and Sampling
Great Guns Services Ltd.	- Geophysical Logging
Roke Enterprises Ltd.	- Geophysical Logging
Epec Consulting Western Ltd.	- Environmental Assessment
Bayrock-Reimchem Surfical Geology Ltd.	- Consulting Surfical Geology
Birtley Engineering Ltd.	- Coal Analysis
General Testing Ltd.	- Coal Analysis
Chem-Tech Industrial Designs Ltd.	- Drafting

Weldwood of Canada Ltd., provided the Administrative assistance for all financial, legal, and corresponding aspects, necessary for the completion of the program.

GENERAL GEOLOGY

The economic coal deposits in the Comox Field, occur in the Late Cretaceous Nanaimo Series.

The Comox Basin is generally considered to be from the first depositional cycle (Muller-Jeletzky 1971) and was heavily eroded in parts, prior to the second depositional cycle, from which most of the Nanaimo coal was removed; in the Wellington, Newcastle and Douglas seams.

In the Comox Basin, some of the coal seams are missing, due to the uneven unconformity surface, just below the deposit. This is evident in the irregularities of the coal beds within the Cretaceous, throughout the entire Comox Basin.

These irregularity and erosional factors are a result of the depositional characteristics.

The Comox Basin, comprising sediments of the Nanaimo Group, extends from Mud Bay to Campbell River, a distance of sixty miles, with a maximum inland extension of twelve miles.

In the Comox Basin the Nanaimo Series comprises of a four-fold division of the Nanaimo sequence into Comox formation; the Comox formation, consisting largely of sandstones, (varies from 80 to 1,000 feet thick), and the other three divisions, Haslam, Extension-Protection, and Cedar District formations, comprising mainly shales, interbedded sandstones and conglomerate. The coal seams are all confined to the Comox formation which rests unconformibly on a Pre-Cretaceous surface of quite variable relief.

GENERAL GEOLOGY

Table of Formations

PERIOD	FORMATION	LITHOLOGY
Recent and Pleistocene	Alluvium Glacial Deposits	Swamp and river alluvium Stratified sands and gravels. Till
	Unconformity	
Tertiary	Constitution Hill Sills & Laccoliths	Quartz Diorite-Porphyry
	Intrusive Contact	
Upper Cretaceous	Nanaimo Series Formation Haslam Extension-Protection Cedar District	Shales with interbedded Sandstones and conglomerate
	Comox Formation	Sandstone with shales, conglomerate, and coal seams
	Unconformity	
Jurassic and Triassic	Vancouver Group	Meta Volcanics argillites

GENERAL GEOLOGY

DESCRIPTION

VANCOUVER GROUP

The underlying basement rocks are hard, greenish fine, to visible crystalline rocks. They include amygdaloids, porphyries, tuffs and agglomerates which have been highly metamorphosed and in part recrystalized. They have in them bands of much altered and metamorphosed bands of argillites which are highly contorted and whose relations with the volcanics is not known. These volcanic rocks have been correlated with the Vancouver Volcanics of the Vancouver Group and are found practically all over the island.

NANAIMO SERIES

Resting unconformably on the Vancouver Group are the rocks of the Nanaimo Series. They have been subdivided into two formations. The Nanaimo Series Formation and the Comox Formation.

The Comox Formation is essentially a sandstone formation, the beds of which are thick bedded quartz sandstone with calcareous cement. In the northern portion of the area it has a decided greenish tint but still homogeneous and massive. The coal seams of economic importance all occur in the Comox Formation, in the lower one-third of the measure.

Overlying the Comox Formation and conformable with it are a three fold division of the Nanaimo Series, Haslam, Extension-Protection and Cedar District Formations. These are dominantly a shale formation. A fine grey clay shale with interbeds of sandstones and conglomerates. The shale is very homogeneous in colour and texture.

GENERAL GEOLOGY

TERTIARY INSTRUSIVE ROCKS

After these Cretaceous Strata were laid down and probably during Tertiary times the measures had intruded into them a laccolith of the cedar tree type, the trunk of which is Constitution Hill to the west of Headquarters. With this intrusion and originating from it, sills forced their way along between the strata for considerable distance. Anderson's Hill is the result of such a sill. There are also several such sills in the measure to west of Wolfe Lake. On both sides of the laccolith the measures have a severe tilt away from it indication a doming of the overlying strata.

RECENT AND PLEISTOCENE

The whole Lowland is drift covered with very few rocks exposures except in the stream beds. The stratified sands and gravels predominate below 700 feet elevation contour. Above this Till forms the surfical soil. Most of the stratified material is a coarse to medium sand with some gravel beds. (Sand and Gravel Study - Bayrock and Reimchem - For Weldwood of Canada Limited - 1975).

STRUCTURE

The Nanaimo strata of the Comox Basin are contained by downfaulting, depression and tilting to the northeast. They dip northeastwards at average of 5 to 7 degrees; younger formations outcrop progressively eastwards.

Three systems of faults are indicated: Linear faults of northwest trend; cross faults of northeast trend; oblique faults of several intermediate trends. The Linear faults tend to be dominant.

STRUCTURE CONT'D

They have the greater displacements overall, and they exerted major control on the distribution of outcrops. The Linear system has two components of faulting, separated by about 20 to 30 degrees of azimuth. In places the indicated cross faults and oblique faults transect or offset the Linear faults; those of minor displacements terminate against the Linear faults. The tectonic pattern is one of block faulting in response to the prevailing northeast tilt.

Within the fault sectors, the Nanaimo beds tend to uniform dip, modified in places by slight warping. Narrow sectors of steep dipping beds probably strain related to faulting in underlying Vancouver rocks.

GEOLOGY

DEPOSITIONAL CHARACTERISTICS

Depositional environment of peat-bogs, later transformed into coal had a bearing on the physical characteristics of the coal seams and the enclosing strata. The Nanaimo Group seams were probably deposited in a paralic coal-basin (i.e. a coal-basin formed in a coastal Lowland area), and the environment was probably a lagoon, separated from the sea by sand-bars. (Muller-1971).

In the Cumberland coalfield, the coal-bearing Comox Formation was deposited directly upon the Pre-Cretaceous unconformity. Relief on this old erosional surface is significant, in the order of 1,600 feet across a span of five miles and locally as steep as 500 feet per mile (MacKenzie, 1922; Atchison, 1968). This paleotopography exerted a profound influence on the nature and distribution of the immediately overlying sediments.

One such effect was confinement of the Benson (fluvial) conglomeratic facies to paleotopographically low areas, i.e. stream and river channels.

Another effect was localization of coal swamps between emergent land areas and offshore sandbars. Thus in places in the Cumberland field, the lower coal seams are interrupted by paleotopographic 'highs' whereas the upper seams are continuous across these buried hills.

As paleotopographic influence were eliminated with burial of the Pre-Cretaceous unconformity, the subsequent distribution of sediments must have been the result of other factors.

Atchison (1968) demonstrated that coal seams in the Cumberland field, although usually of limited lateral extent, tended to be thicker and more abundant in the same regions. The recurrence of localized swamp conditions thus implied was attributed to repeated build-up and destruction of marginal sandbars together with the effects of differential compaction. Atchison proposed that periodic spreading of these marginal sand accumulations over the swamps followed by greater compaction of the swamp sediments would lead to re-establishment of sandbars on the margins of subsidence. Thus, new swamps would tend to redevelop above older swamp deposits.

GEOLOGY

DEPOSITIONAL CHARACTERISTICS

MacKenzie (1922) believed that the thicker seams were formed near the base of the measures and that higher seams are generally unworkable. He further described the coal as follows:

"Characteristically, the coal is associated with layers of grey or brownish-grey shale. Rarely, a band of clean coal is enclosed between a sandstone roof and floor, ... and frequently the coal is wholly enclosed in shale. Like the seams in other parts of Vancouver Island, these have no trace of anything resembling underclays, nor have rootless, tree stems, branches, or leaves been observed in association with the coal .... Apart from the clay shale associated with the seams, more or less fissle carbonaceous shale, and the brown compact shale known as 'bone' occur interbedded with the coal itself. These impurities vary from a lamina, of paper thinness, to bands occupying most of the thickness of the seam; and instances occur where the seam consists of shale, or of coal so high in sediment as to be unworkable. This is particularily the case where the seam closely approaches the Pre-Cretaceous rocks. Neither in the outcrops nor in the bore holes had a clean seam of coal been observed resting directly on the old colcanics, though dirty coal, or shale with coaly streaks, frequently does so ....

"The thickness of coal in any given seam may vary from a fraction of an inch to many feet, 25 feet of coal being the thickest obtained in any single seam. This, however, included a band of shale four inches thick, and the coal was soft and shaly. A solid bench of bright hard clean coal exceeding 30 inches in thickness is an unusual occurrence." ....

Three seams were found to be mineable in the Cumberland area: No. 1; (2 feet 6 inches to 7 feet thick), No. 2; (3 feet 6 inches to 3 feet 9 inches thick), and No. 4; (3 feet to 7 feet thick). The three seams are quite variable in thickness in different parts of the field and tend in places to be split up by rock bands and sections of inferior coal. No. 4 seam is the lowest seam and each seam is separated by over 100 feet of sandstone and shales. Because No. 4 seam is near the base of the Comox formation, and the Pre-Cretaceous basement is irregular there are areas where this and sometimes the other seams are displaced by the older rocks.

GEOLOGY

DEPOSITIONAL CHARACTERISTICS

The three seams generally dip northeasterly at about six degrees.

No. 4 seam is the most extensive worked of the three seams. The seam outcrops for about four miles between Coal Creek on the east and of Comox Lake, and the Puntledge River. It was mined to a very limited extent a Nos. 1 and 2 slopes, both near Coal Creek and in the vicinity of the old Chinatown. It was also mined from No. 6 shaft, about a mile down dip, under the west end of Cumberland, where the lower seam was cut at a depth of 814 feet. The No. 4 seam was mined on a large scale from No. 4 mine. The workings extended for nearly one and a half miles to the dip and for over two miles along the strike. The No. 4 seam was also mined at No. 7 Mine, in the vicinity of Puntledge River. Attempts to mine No. 4 seam further to the dip were less successful. At No. 8 Mine, where the seam was 1,000 feet from the surface, bands of rock and inferior coal resulted in it being unworkable except in an extremely limited area.

No. 2 seam was worked quite extensively from No. 5 Mine and also from No. 8 Mine which was the last producing mine in the Cumberland area.

No. 1 seam was worked to a small extent at No. 2 slope, and quite extensively at No. 5 and 6 Mines under several hundred feet of cover. (Buckham 1947).

ANDERSON LAKE AREA

The Anderson Lake Area is that area adjacent to and south of the Campbell River area on Oyster River to Browns River. (Map 3 and 4)

In the middle of the property lies Constitution Hill an old Pre-Cretaceous promontory.

The Tsolum River and Black Creek are the only streams of importance in the area. There is one good outcrop of coal on the Tsolum River in Section 6.

STRATIGRAPHY

The Comox beds, north of Constitution Hill are quite different in appearance and composition. The sandstones are very coarse and quartzitic in nature, with no apparent coal measures in the Comox until you cross the Oyster River to the north.

It is possible that this may have been a subsurface high, non-receptive to the Comox deposition, as it occurred in the Cumberland area or T'Sable River area.

The area, south of Constitution Hill, lies between two Tertiary Intrusives, and although, some coal was encountered in the Comox, the area is highly disturbed.

The number and size of faults, located in the area, makes any stratigraphic projection, impossible to define with any certainty.

The Comox Formation is in the range of about 600 feet, of thickness, where encountered.

STRUCTURE

The structure control north of Constitution Hill to the boundary, varies dramatically from the structure of Constitution Hill to the Browns River.

STRUCTURE CONT'D

The Comox in the north contains two linear block faults, that dip to the northeast at about 9°. The displacement between the two faults is calculated to be in excess of 400 feet. The only significant block lies east of the Tsolum River with an elevation of 500 feet.

South of Constitution Hill, the Comox occurs between Dove Creek and Browns Creek.

The west half of the Comox, bounded on the east by an uplifted Vancouver has a series of cross faults, in a radial pattern.

The Comox dips to the northeast,at 10 degrees in the north half of this block and 5 degrees in the south half.

From two outcrops and Anderson Lake #2 borehole there appears to be a downfault from the Vancouver Group and an uplifting caused by the Tertiary Intrusive to the east, caused the blocks to tilt, or lift, to the extent that the lower members in some blocks are near to surface and in others sheared away.

From the Intrusive east, there is a downfault from the Intrusive with a displacement of about 100'. This appears to be a more stable block and contacts the other Nanaimo Series at the linear Fault that extends northeast through the middle of Wolfe Lake. Here normal sequence is observed in the Comox and Nanaimo Series, of Comox and Haslam.

CUMBERLAND AREA

The Cumberland area is bounded on the north by the Browns River and the Trent River delineates the southern limits. Its eastern margin is the Straits of Georgia and the western boundary is the erosional edge of the Cretaceous coal bearing strata beyond which are exposed the older volcanic rocks of the Vancouver Group. (Map 5)

STRATIGRAPHY

The Upper Cretaceous strata of the Comox Group described under the term Nanaimo Series, overlies older rocks of the Vancouver Group with unconformity.

The Nanaimo strata has been subject to several classifications and these have been revised by Muller and Jeletzky (1970), following biostratigraphic zonation by McGugan (1964) and Zeletzky (ibid).

A four fold division of the Nanaimo sequence into; Comox, Haslam, Extension-Protection and Cedar District Formations, occur in ascending order, (with allowances for unconformity, or channelled, or other relationship) in both the Cumberland and T'Sable River areas.

Field work indicates that the term Extension-Protection applies to stratigraphic identities:

(1) In the Cumberland area, north of the Trent River - conglomerates with sandstone, and shales, and shales with pebble beds of limited extent and consistent stratigraphic levels, 200 to 600 feet above the Comox Formation.

(2) South of the Trent River in the T'Sable River area, a sequence of sandstone and conglomerates overly the Comox Formation and extend to a thickness of 800 feet or more.

The absence of Extension-Protection beds in parts of the Cumberland and T'Sable River areas, makes a division of the shale sequence above the Comox uncertain - though perhaps differences in lithology and zonation may allow for some distinction.

CUMBERLAND AREA

COMOX FORMATION

The formation consists of marine and non-marine types, with shales and coal measures. Sandstones form about 80% of the unit, and occur in thick intervals to 60 feet. In the Cumberland area, the coal measures are present in seven cyclothems which tend to be widespread. Coal seams of economic interest are in the lower part of the formation, in Cumberland and T'Sable areas. The base of the formation is marked by varied relief of 100 to 200 feet, and extremes of 300 feet. Conglomerate interbeds are recorded in lower intervals in several drill holes, but the formation lacks a continuous basal unit of the Benson type. In the Cumberland coalfield, the Comox formation is 600 to 800 feet thick, for the most part, and the range thickness 460 to 880 feet largely depends on the relief of the Karmutsen surface and degree of transititio to Haslam. In the T'Sable area, Comox beds underlying Nanaimo Series amount to 60 to 200 feet; and to the southeast, south of Langley Lake the formation attains thickness of 250 to 700 feet.

HASLAM

This unit, consists of shales and mudstone, and in places contains few, thin beds of sandstones. Its contact with the Comox formation is marked by abrupt change of sedimentation, and in places a transition of interbedded shales and sandstones. Haslam where distinguished by overlying Extension-Protection is 200 to 300 feet thick. Elsewhere, and where mapping depends on records of drilling, the shales, Haslam and Cedar District are not separated. Therefore, Haslam is mapped only in parts of the Cumberland area, but it is considered in the T'Sable area south of Langely Lake, and south of T'Sable River.

EXTENSION-PROTECTION

The unit is mapped from exposures and records of drilling, and recognized in the Cumberland area. The beds comprise a sequence of conglomerates and sandstones, and in the upper part shales, and shales with conglomerate layers. In its fullest development Extension-Protection attains a thickness of 300 to 400 feet, present in subcrop.

CUMBERLAND AREA

NANAIMO SERIES

The term describes an assembleage of sandstones and conglomerates, - applying to outcrop and subcrop south of the Trent to the T'Sable River. Conglomerates form two or three intervals; a few shales intervals are present in the upper part. Nanaimo Series as defined here may include correlatives of the Extension-Protection, and not presently distinguished. Thickness of 600 to 800 feet can be ascribed to the Nanaimo Series. It includes about 800 feet of beds, in partial exposures at Bloedel Creek, but the upper boundary is concealed against an indicated fault.

CEDAR DISTRICT

In the Cumberland area it is continuous with outcrops which are assigned to the vancouverense zone, by Jeletzky (Muller and Jeletzky 1970). This ground is separated by faulting from outcrop and subcrop, mapped as the composite unit Haslam-Cedar District. The Cedar District consists of a sequence of shales, and shales with interlaminated siltstones; few thin beds, and passages of sandstones are recorded from drilling. It represents the youngest Cretaceous beds of the area. The combined shale sequence of Haslam-Cedar District amounts to 900 feet along the east coast.

STRUCTURAL GEOLOGY

Subsurface mapping, Figure 6, illustrates its general structure, and indicates the relief of the floor on which Comox sediments accumulated. Structures on the top and base of the Comox Formations share the same outlines. The main features: the prevailing northeast dip of about 500 feet per mile: and uplift in a salient of easterly trend passing through Cumberland.

The structure of the coalfield also includes faulting. Muller and Atchison (1971) record linear faults from plans of underground workings. Other faulting can be indicated, and much of its pattern explained by accommodation to movement on the north flank of the Cumberland uplift: the fault displacements are downthrown to the north and east. Seemingly a cross fault and branching faults close part of the Cumberland uplift on the south.

STRUCTURAL GEOLOGY CONT'D

On the west border of the area, Comox beds are downthrown against Karmutsen lavas, along a line of faulting trending northwest near Perseverance Creek. Comox outliers and fault sector are present west of this fault line on higher ground near Hamilton Lake and the Trent River. A stock quartz diorite (?) of Tertiary age intrudes Comox beds between Puntledge and Browns River, near the west border of the Cumberland area. Records of drilling nearby refer to conglomerates in the upper member of the Comox section.

T'SABLE RIVER AREA

The T'Sable River area extends from Trent River in the north to Rosewell Creek in the south. Its eastern margin is the Strait of Georgia, and the western boundary is the erosional edge of the Cretaceous coal bearing strata, beyond which are exposed the older volcanic rocks of the Vancouver Group. (Map 6)

STRATIGRAPHY

The stratigraphy of the T'Sable River area is described in the Cumberland area outline, as the two are related.

STRUCTURE

The area here defined extends from the Trent River to Rosewall Creek, and includes the coalfield of its main and south parts.

The T'Sable River cuts obliquely across the structural trend. Drilling and exposures along the valley show two subdivisions of the area: (1) north of the former T'Sable mine, ground with major outcrop of Nanaimo Series (2) on the south, and south of Langely Lake, outcrops of the Comox Formation in its full development, together with overlying shales of the Haslam and Cedar District Formations.

Comox outcrops are bounded on the west by a line of deformation and displacement with faulting of linear trend and downthrow to the east, - (Beaufort Fault Line). This line is marked by a fault extending from Bradley Lake to the Cumberland area. Its trace along the upper reaches of Bloedel Creek is obscurred by drift.

Linear faulting, (the Langely Fault Line), is inferred to extend from Langely Lake to Bloedel Creek. It is shown by a distinct lineament, and is probably a compound fault. This fault line may continue south of the T'Sable River.

STRUCTURE CONT'D

The sector enclosed by the Beaufort and Langely Fault lines contains the Nanaimo succession to shales of Haslam, and Cedar District Formation. The prevailing dip is to the northeast. Outcrops are distributed by faulting on several trends. Fault displacements are moderate, and for the most part, range about 250 feet and less. Downthrow to the northeast and east is inferred for linear and oblique faults. Views on fault displacements are subject to uncertainty for reasons of unconformity, or change in stratigraphy, and reference to boundaries of the Nanaimo Series.

The valley of Bloedel Creek and the interfleuve to the Trent River, is seemingly contained by faulting. Evidence for faults is open to question, as it referred to the mapping of Nanaimo Series, for which transgressive boundaries can be indicated. Along Bloedel Creek, beds of Nanaimo Series dip northeastwards in a step pattern, with two raises marked by dips of 20 to 25 degrees.

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Anderson Lake #1

LOCATION - Anderson Lake Area

ELEVATION - 1320

DATE - June 1977

Type of Cuttings	FEET FROM	FEET TO
Sandstone	0	48
Siltstone	48	52
Sandstone	52	145
Coal	145	145.5
Black Shale - coal traces	145.5	150
Sandstone	150	236
Carbonaceous Shale	236	237
Coal	237	237.5
Carbonaceous Shale	237.5	242
Coal	242	242.5
Carbonaceous Shale with Pyrites	242.5	245
Coal with Pyrites	245	245.5
Carbonaceous Shale	245.5	256
Grey Siltstone	256	275
Carbonaceous Shale	275	281
Soft Sandstone	281	305
Carbonaceous Shale	305	314
Siltstone	314	353
Carbonaceous Shale	353	355
Siltstone	355	364
Sandstone	364	370
Siltstone	370	381
Sandstone	381	422
Carbonaceous Shale	422	426
Siltstone	426	428
Carbonaceous Shale	428	430
Siltstone	430	439
Carbonaceous Shale	439	444
Siltstone	444	445
Carbonaceous Shale	445	451
Hard Sandstone	451	478
Soft Sandstone	478	479.5
Carbonaceous Shale	479.5	484
Sandstone	484	550
Carbonaceous Shale	550	557

cont'd ...

Borehole No. 1-Anderson Lake

Type of Cuttings	FEET FROM	TO
Silty Shale	557	565
Carbonaceous Shale	565	575
Siltstone	575	606
Carbonaceous Shale	606	618
Siltstone	618	626
Sandstone	626	641
Carbonaceous Shale	641	655
Hard Sandstone - white	655	680
Brown Sandstone	680	735
Siltstone	735	784
Carbonaceous Shale - coal lenses	784	798
Silty Shale	798	800
Carbonaceous Shale - coal stringers	800	801
Carbonaceous Shale	801	807
Siltstone	807	818
Sandstone	818	830

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Anderson Lake #2

LOCATION - Anderson Lake Area

ELEVATION - 1440

DATE - June 1977

Type of Cuttings	FEET FROM	FEET TO
Weathered Siltstone	0	4
Coal	4	8.5
Grey Shale	8.5	11
Coal	11	15.5
Grey Shale	15.5	20.3
Siltstone	20.3	23.5
Sandstone	23.5	45.5
Coal	45.5	46.5
Carbonaceous Shale	46.5	47
Coal	47	47.5
Grey Shale	47.5	48
Siltstone	48	52
Carbonaceous Shale	52	53.5
Siltstone	53.5	60
Carbonaceous Shale	60	71
Sandstone	71	89
Siltstone	89	92
Sandstone	92	98
Siltstone	98	106
Carbonaceous Shale	106	116
Sandstone	116	127
Carbonaceous Shale	127	129
Sandstone	129	150
Carbonaceous Shale	150	154
Sandstone	154	171
Siltstone	171	179
Silty Shale	179	188
Siltstone	188	191
Carbonaceous Shale	191	193
Sandstone	193	196
Silty Shale	196	203
Sandstone	203	207

cont'd ...

Borehole No. 2 - Anderson Lake

Type of Cuttings	FEET FROM	TO
Carbonaceous Shale	207	209
Siltstone	209	216
Carbonaceous Shale	216	221
Sandstone	221	255
Siltstone	255	263
Sandstone	263	269
Siltstone	269	277
Sandstone	277	347
Siltstone	347	355
Silty Shale	355	359
Sandstone	359	375
Basalt	375	400

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Anderson Lake #3

LOCATION - Anderson Lake Area

ELEVATION - 1410

DATE - July 1977

Type of Cuttings	FEET FROM	FEET TO
Sandstone	0	37
Grey Shale	37	46
Carbonaceous Shale & Coal Trace	46	48
Silty Shale	48	50
Siltstone	50	54
Carbonaceous Shale	54	64
Carbonaceous Shale & Coal Trace	64	69
Shale	69	70
Siltstone	70	86
Carbonaceous Shale & Coal Trace	86	87
Coal	87	88
Silty Shale	88	90
Carbonaceous Shale	90	91
Siltstone	91	104
Sandstone	104	108
Sandstone Grey	108	109
Carbonaceous Shale	109	109.7
Sandstone Dark Grey	109.7	112.6
Coal	112.6	115.2
Shale Black	115.2	116
Sandstone Grey	116	118
Shale with Coal Stringer	118	120.2
Sandstone Dark Grey	120.2	127.9
Carbonaceous Shale with Coal Stringer	127.9	133.2
Coal	133.2	133.8
Shale	133.8	134.2
Sandstone Grey Fine	134.2	147.5
Soft Grey Shale	147.5	149
Black Shale	149	151
Conglomerate	151	153
Dark Grey Sandstone	153	156
Sandstone Salt & Pepper	156	176
Black Siltstone	176	181
Dark Grey Sandstone	181	186.5
Shale with Coal Stringer	186.5	189
Shale Soft Dark Grey	189	191

cont'd ...

Borehole No. 3 - Anderson Lake

Type of Cuttings	FEET FROM	TO
Grey Siltstone	191	194
Grey Sandstone	194	211
Black Siltstone	211	220.8
Coal	220.8	224.5
Carbonaceous Shale	224.5	230
Black Siltstone	230	231
Dark Grey Sandstone	231	243
Salt & Pepper Sandstone	243	252
Sandstone	253	266
Siltstone	266	269
Sandstone	269	293
Siltstone	293	299
Sandstone	299	300
Siltstone	300	304
Carbonaceous Shale	307	325
Sandstone	325	350
Sandstone Salt & Pepper	350	355
Sandstone	355	357
Hard Siltstone	357	360
Basalt		

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Anderson Lake #4

LOCATION - Anderson Lake Area

ELEVATION - 1515

DATE - July 1977

Type of Cuttings	FEET FROM	FEET TO
Sandstone	0	51
Carbonaceous Shale	51	53.2
Coal	53.2	54.8
Carbonaceous Shale	54.8	61
Grey Shale	61	67.5
Coal	67.5	71.5
Shale	71.5	72
Coal	72	75
Shale	75	79
Sandstone	79	103.5
Coal	103.5	104.5
Shale	104.5	109
Sandstone	109	314
Siltstone	314	319
Sandstone	319	325
Siltstone	325	338
Shale	338	341
Siltstone	341	344.2
Carbonaceous Shale	344.2	356
Sandstone	356	374.2
Coal	374.2	374.9
Shale	374.9	375.3
Coal	375.3	380.2
Shale	380.2	383
Siltstone	383	388
Shale	388	399.2
Coal	399.2	403.2
Shale	403.2	424
Sandstone	424	433
Basalt	433	448

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Anderson Lake #5

LOCATION - Anderson Lake Area

ELEVATION - 1490

DATE - July 1977

Type of Cuttings	FEET FROM	FEET TO
Sandstone	0	7
Hard Sandstone	7	29
Carbonaceous Shale	29	33.5
Coal	33.5	35.5
Carbonaceous Shale	35.5	37
Grey Shale	37	38
Siltstone	38	39
Sandstone	39	45
Carbonaceous Shale	45	46
Grey Shale	46	47
Siltstone	47	48
Carbonaceous Shale	48	49
Grey Shale	49	50
Carbonaceous Shale & Coal Trace	50	51
Grey Shale	51	51.5
Carbonaceous Shale	51.5	52
Carbonaceous Shale & Coal Trace	52	53
Sandstone	53	56
Siltstone	56	58
Grey Shale	58	68
Carbonaceous Shale	68	72
Grey Shale	72	73
Carbonaceous Shale	73	75.5
Coal	75.5	76
Carbonaceous Shale & Coal Trace	76	78
Sandstone	78	82
Sandstone Hard Grey	80	167
Sandstone with Shale	167	169
Carbonaceous Shale with Coal Stringers	169	176
Siltstone Dark Grey	176	179.6
Coal	179.6	180.2
Shale with Coal Stringers	180.2	184
Coal	184	185
Shale	185	186
Sandstone Grey	186	198

cont'd ...

Borehole No. 5 - Anderson Lake

Type of Cuttings	FEET FROM	TO
Sandstone	198	220
Carbonaceous Shale	220	221
Grey Shale	221	223
Siltstone	223	224
Sandstone	224	245
Carbonaceous Shale & Coal Trace	245	246
Sandstone	246	262
Carbonaceous Shale	262	263
Coal & Carbonaceous Shale	263	264
Carbonaceous Shale	264	269
Siltstone	269	278
Carbonaceous Shale	278	282
Siltstone	282	283
Sandstone	283	313
Siltstone	313	314
Carbonaceous Shale	314	316
Sandstone	316	317
Carbonaceous Shale	317	319
Silty Shale	319	320
Carbonaceous Shale	320	322
Siltstone	322	326
Carbonaceous Shale	326	328
Silty Shale	328	330
Coal	330	332
Siltstone	332	335
Sandstone	335	336
Carbonaceous Shale	336	340
Carbonaceous Shale	340	343
Dark Grey Sandstone	343	346
Black Shale	346	349
Siltstone	349	353
Sandstone	353	371.4
Carbonaceous Shale with Coal Stringers	371.4	378
Siltstone	378	380
Dark Grey Sandstone	380	383
Grey Shale	383	386
Sandstone	386	400
Grey Shale	400	402
Soft Black Shale	402	404.5
Siltstone	404.5	419.3
Quartz	419.3	421
Sandstone White	421	429
Soft Grey Shale	429	431
Sandstone	431	442
Quartz	442	453
Sandstone White with Quartz	453	460
Sandstone & Quartz	460	462

cont'd ...

Borehole No. 5 - Anderson Lake

Type of Cuttings	FEET FROM	FEET TO
Siltstone	462	464
Sandstone	464	467
Hard Sandstone & Quartz	467	470
Siltstone	470	486
Sandstone	486	517
Sandstone Grey	519	525
Carbonaceous Shale	525	526
Siltstone	526	527.5
Carbonaceous Shale with Coal	527.5	529.5
Sandstone Fine Grey	529.5	536
Hard Black Sandstone	536	540
Basalt	540	547

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Anderson Lake #6

LOCATION - Anderson Lake Area

ELEVATION - 1620

DATE - July 1977

Type of Cuttings	FEET FROM	FEET TO
Gravel & Boulders	0	6
Frac. Shale	6	9
Sandstone	9	10.5
Carbonaceous Shale	10.5	11.5
Coal	11.5	13.5
Brown Shale	13.5	15
Shaley Coal	15	15.6
Grey Shale	15.6	17
Sandstone	17	26.2
Shale with Coal	26.2	27
Sandstone	27	33
Siltstone	33	35
Carbonaceous Shale	35	36
Coal	36	37.5
Carbonaceous Shale	37.5	42
Grey Shale	42	43
Carbonaceous Shale & Coal Trace	43	44
Grey Shale	44	45
Carbonaceous Shale	45	47
Grey Shale	47	48
Sandstone	48	51
Grey Shale	51	53
Siltstone	53	54
Grey Shale	54	55
Sandstone	55	60
Carbonaceous Shale	60	63
Siltstone	63	66
Grey Shale	66	69
Carbonaceous Shale & Coal Trace	69	70
Grey Shale	70	71
Carbonaceous Shale	71	72
Siltstone	72	73
Sandstone	73	116
Siltstone	116	148
Carbonaceous Shale	148	160

cont'd ...

Borehole No. 6 - Anderson Lake

Type of Cuttings	FEET	
	FROM	TO
Black Siltstone	162	169
Carbonaceous Shale Brown-Black	169	171
Dark Grey Sandstone Coarse	171	190
Black Siltstone	190	191.5
Sandstone	191.5	218
Conglomerate Basalt	218	219
Grey Sandstone	219	221
Soft Grey Shale	221	22.5
Conglomerate	22.5	226
Sandstone	226	308
Hard Sandstone	308	323
Sandstone Conglomerate	323	359
Basalt	359	372

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Anderson Lake #7

LOCATION - Anderson Lake Area

ELEVATION - 1495

DATE - July 1977

Type of Cuttings	FEET FROM	FEET TO
Sandstone	0	53
Carbonaceous Shale	53	56
Siltstone	56	57
Grey Shale	57	58
Sandstone	58	129
Carbonaceous Shale	129	135
Coal	135	135.5
Carbonaceous Shale	135.5	139
Coal	139	141
Carbonaceous Shale	141	146
Siltstone	146	148
Carbonaceous Shale	148	149
Coal	149	150
Carbonaceous Shale	150	151
Sandstone	151	189

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Anderson Lake #9

LOCATION - Anderson Lake Area

ELEVATION - 850

DATE - August 1977

Type of Cuttings	FEET FROM	FEET TO
Gravel and Clay	0	61
Sandstone	61	76
Carbonaceous Shale	76	90
Basalt	90	117

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Anderson Lake #10

LOCATION - Anderson Lake Area

ELEVATION - 955

DATE - August 1977

Type of Cuttings	FEET FROM	FEET TO
Gravel and Boulders	0	41
Basalt	41	50

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Anderson Lake #11

LOCATION - Anderson Lake Area

ELEVATION - 829

DATE - August 1977

Type of Cuttings	FEET FROM	FEET TO
Sand and Gravel	0	42
Basalt	42	52

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Browns River #2

LOCATION - Anderson Lake Area

ELEVATION - 620

DATE - June 1977

Type of Cuttings	FEET FROM	FEET TO
Gravel	0	30
Brown Clay, Gravel and Boulders	30	46
Soft Sandstone	46	63
Grey Sandstone	63	78
Coal with Shale Stringers	78	80
Carbonaceous Shale	80	81
Grey Sandstone	81	87
Grey Sandstone	87	103
Soft Sandstone	103	126
Carbonaceous Shale with Coal Traces	126	133
Siltstone	133	140
Carbonaceous Shale	140	142
Sandstone	142	192
Grey Sandstone	192	209
Black Shale	209	215
Brown Shale	215	227.5
Coal and Carbonaceous Shale	227.5	228.5
Coal	228.5	234.5
Coal	234.5	237
Grey Sandstone	237	245
Sandstone	245	274
Siltstone	274	282
Sandstone	282	290
Carbonaceous Shale	290	296
Sandstone	296	315
Carbonaceous Shale - Coal Traces	315	337
Grey Sandstone	337	345
Grey Sandstone	345	360
Black Shale - some Coal Traces	360	402
Green and Grey Siltstone	402	403
Basalt	403	425

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Browns River #3

LOCATION - Anderson Lake Area

ELEVATION - 490

DATE - August 1977

Type of Cuttings	FEET FROM	FEET TO
Gravel	0	35
Sandstone	35	80
Shale	80	106
Carbonaceous Shale	106	108
Coal	108	109.5
Carbonaceous Shale	109.5	123
Sandstone	123	144
Carbonaceous Shale	144	146
Sandstone	146	156
Carbonaceous Shale	156	159
Sandstone	159	184
Siltstone	184	190
Coal	190	192
Carbonaceous Shale	192	194
Sandstone	194	264
Grey Shale	264	287
Coal	287	290
Grey Shale	290	293
Sandstone	293	368
Shale	368	386
Carbonaceous Shale	386	388
Coal	388	389
Carbonaceous Shale	389	410
Sandstone	410	416
Basalt	416	430

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Headquarters Creek #1

LOCATION - Anderson Lake Area

ELEVATION - 250

DATE - June 1977

Type of Cuttings	FEET FROM	FEET TO
Grey Shale - small sandstone stringers	0	38
Grey Siltstone	38	75
Hard Grey Siltstone	75	112
Grey Shale	112	126
Hard Grey Siltstone	126	174
Dark Grye Sandstone - hard	174	175
Hard Grey Siltstone	175	239
Grey Siltstone	239	257
Grey Sandstone	257	262
Grey Silty Shale	262	356
Grey Sandstone	356	361
Grey Siltstone	361	376
Hard, Dark Grey Siltstone	375	426
Hard Sandstone	426	480
Grey Sandstone	480	675
Sandstone - grey, hard	675	690
Siltstone, dark grey	690	709
Sandstone	709	717

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Tsolum River #1

LOCATION - Anderson Lake Area

ELEVATION - 260

DATE - June 1977

Type of Cuttings	FEET FROM	FEET TO
Clay Top Soil	0	4
Soft Water-Soaked Shale	4	27
Muddy Shale	27	29
Grey Sandstone	29	47
Grey Shale Carbonaceous - Coal Stringers	47	58
Grey Sandstone	58	82
Grey Shale - Coal Stringers	82	100
Grey Sandstone	100	104.5
Grey Shale	104.5	131
Grey Sandstone	131	150
Grey Shale - Coal Stringers	150	153
Grey Sandstone	153	155
Grey Shale	155	159
Grey Sandstone	159	167.2
Carbonaceous Shale	167.2	169
Coal	169	169.9
Carbonaceous Shale	169.9	174
Coal	174	176
Shale	176	182
Dark Grey Siltstone	182	184
Shale - Coal Stringers	184	189
Soft, Grey Shale	189	194.8
Coal	194.8	198
Soft, Brown Shale	198	224.8
Coal	224.8	225.6
Shale	225.6	231
Coal	231	232.5
Shale - Coal Stringers	232.5	275.3
Coal	275.3	276.5
Shale	276.5	281
Sandstone - (Salt Water)	281	288
Soft, Grey Shale	288	301
Sandstone	301	305
Soft, Grey Shale	305	318
Hard, Grey Shale	318	333
Grey Siltstone	333	343
Basalt	343	365

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Tsolum River #2

LOCATION - Anderson Lake Area

ELEVATION - 420

DATE - June 1977

Type of Cuttings	FEET FROM	FEET TO
Till and Weathered Siltstone	0	6
Sandstone	6	366
Brown Shale with Coal Traces	366	367
Sandstone	367	376
Brown Carbonaceous Shale - Coal Traces	376	380.5
Grey Shale	380.5	382.5
Grey Siltstone	382.5	385
Sandstone	385	458
Brown Shale and Coal	458	458.6
Grey Shale	458.6	459.5
Carbonaceous Shale	459.5	459.8
Grey Shale	459.8	462
Carbonaceous Shale - Coal Traces	462	463
Grey Shale	463	466
Sandstone	466	498
Brown Siltstone	498	505
Carbonaceous Shale Layers	505	542
Brown Shale - Sandstone Stringers	542	565
Grey Siltstone	565	576
Grey Shale - Coal Streamers	576	577
Grey Sandstone	577	611
Carbonaceous Shale - Coal Streamers	611	620.5
Coaly Shale	620.5	631
Grey Sandstone	631	693
Brown Shale and Carbonaceous Shale	693	700
Sandstone	700	701
Grey and Brown Siltstone	701	725
Sandstone	725	777

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - T'Sable River #1

LOCATION - T'Sable River Area

ELEVATION - 460

DATE - May 1977

Type of Cuttings	FEET FROM	FEET TO
Sand and Gravel	0	23
Sandstone - light grey	23	25
Grey Sandstone	25	61
Carbonaceous Shale - coal traces	61	65.4
Grey Sandstone	65.4	79
Grey Shale	79	80.3
Grey Sandstone	80.3	147
Soft Sandstone - light grey	147	163
Hard Sandstone - grey, black & white	163	181
Coal	181	186
Coal and Shale	186	188
Soft Siltstone - dark grey shale stringers	188	194
Sandstone	194	216.5
Shale - coal stringers	216.5	218
Siltstone and Sandstone - grey, hard	218	232
Grey Sandstone	232	238
Grey Silty Shale	238	252.6
Shale	252.6	261.8
Grey Shaley Siltstone	261.8	269
Shale	269	272.6
Grey Siltstone	272.6	282
Shale - Coal traces	282	287
Coal	287	292
Grey Shale	292	293.6
Grey Sandstone	293.6	296
Grey Shaley Siltstone	296	326
Basalt	326	357

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - T'Sable River #2

LOCATION - T'Sable River Area

ELEVATION - 350

DATE - May 1977

Type of Cuttings	FEET FROM	FEET TO
Sand and Gravel	0	39
Grey Silty Shale	39	110.8
Grey Sandstone	110.8	117
Sandstone	117	136
Black Siltstone	136	147
Hard Shale - carbonaceous	147	156
Dark Grey Siltstone	156	187
Dark Grey Sandstone	187	192
Grey Sandstone	192	201
Grey Shale	201	208
Grey Sandstone	208	237
Dark Grey Sandstone	237	252.7
Carbonaceous Shale	252.7	255
Shale and Siltstone	255	259
Sandstone	259	261.5
Coal and Shale	261.5	262.3
Soft Brown Shale	262.3	263.5
Dark Brown Siltstone	263.5	265.5
Hard Sandstone - grey black	265.5	301
Dark Grey Sandstone	301	320
Sandstone	320	346.5
Coal and Shale	346.5	347.9
Shale	347.9	349
Siltstone	349	352.5
Coal	352.5	353.5
Siltstone and Sandstone	353.5	355
Grey Shale	355	356.1
Grey Sandstone	356.1	405.5
Coal	405.5	409.8
Grey Sandstone	409.8	412
Grey Shale	412	419
Grey Sandstone	419	507
Grey Sandstone	507	527
Dark Brown Shale	527	530.5
Coal with Shale	530.5	543.5
Siltstone - grey black	543.5	550
Grey Sandstone	550	565.8
Coal and some shale	565.8	567.8

cont'd ...

Borehole No. 2 - T'Sable River Area

Type of Cuttings	FEET FROM	FEET TO
Dark Grey Siltstone	567.8	574
Grey Siltstone	574	593
Hard Sandstone	593	643
Grey Sandstone	643	647
Grey Shale	647	654.4
Coal	654.4	666.5
Grey Shale	666.5	725
Carbonaceous Shale	725	755
Grey and Brown Shales	755	768
Grey Sandstone	768	779
Grey and Brown Shales	779	782.5
Grey Sandstone	782.5	792.8
Sand	792.8	799
Grey and Brown Siltstone - shaley	799	803
Carbonaceous Shale with Sandstone stringers	803	845

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - T'Sable River #3

LOCATION - T'Sable River Area

ELEVATION - 380

DATE - May 1977

Type of Cuttings	FEET FROM	FEET TO
Gravel	0	8
Grey Shale	8	10
Soft Grey Shale	10	37.5
Siltstone	37.5	74
Sandstone - dark grey	74	80
Soft Grey Shale	80	137
Sandstone	137	139
Grey Sandstone	139	175
Sandstone	175	196
Coal	196	198
Carbonaceous Shale and Coal	198	200
Sandstone	200	208
Grey Sandstone - medium & fine grain - few bentonitic bands	208	236
Sandstone	236	263
Carbonaceous Shale	263	263.5
Grey Sandstone	263.5	266
Sandstone	266	274
Shale - Coal trace	274	284
Brown Sandstone	284	292
Shale	292	298
Sandstone	298	314
Grey Sandstone	314	353.5
Grey and Brown Shale	353.5	354.3
Coal and Carbonaceous Shale	354.3	355.5
Grey Sandstone	355.5	358
Carbonaceous Shale and Coal	358	360
Grey Sandstone	358	360
Carbonaceous Shale - coal traces	369	371
Grey Sandstone	371	378
Sandstone	378	396
Carbonaceous Shale - coal traces	396	397
Sandstone	397	408
Grey and Brown Sandstone	408	473.3

cont'd ...

Borehole No. 3 - T'Sable River Area

Type of Cuttings	FEET FROM	FEET TO
Coal - few carbonaceous shale stringers	473.3	483
Brown Shale - silty	483	488
Grey Sandstone	488	489
Shale	489	499
Sandstone	499	510
Shale - coal trace	510	532
Soft Brown Sandstone	532	538
Sandstone	538	556
Shale - coal trace	556	558
Sandstone	558	565
Grey Sandstone	565	573
Carbonaceous Shales - coal traces	573	578.5
Coal - carbonaceous shale stringers	578.5	585.5
Carbonaceous Shales - coal traces	585.5	592.5
Grey Sandstone	592.5	595
Sandstone	595	598
Shale	598	610
Carbonaceous Shale - coal trace	610	613
Siltstone	613	632
Grey and Brown Siltstone	632	674
Grey Sandstone	674	708
White Sandstone	708	717
Grey Siltstone	717	732
Siltstone	732	736
Sandstone	736	750
Basalt	750	773

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Allan Lake #1

LOCATION - T'Sable River Area

ELEVATION - 650

DATE - May 1977

Type of Cuttings	FEET FROM	FEET TO
Sand and Gravel	0	2
Sandstone - light grey	2	25
Grey Sandstone	25	57.5
Brown and Carbonaceous Shales	57.5	60.2
Coal and Carbonaceous Shale interbedded	60.2	64.6
Brown Shale	64.6	67.2
Grey Sandstone	67.2	147.5
Grey Siltstone	147.5	152.3
Carbonaceous and Brown Shales - coal traces	152.3	156
Grey Siltstone	156	182.5
Grey Sandstone	182.5	238.5
Brown Siltstone - shaley bands	238.5	247.8
Grey Sandstone - silty bands	247.8	262.7
Brown and Carbonaceous Shales - odd coal trace	262.7	275.5
Grey Siltstone	275.5	278
Brown and Carbonaceous Shales - odd coal trace	278	280
Sandstone	280	281
Brown Shale - traces of coal	281	291
Coal	291	291.3
Siltstone	291.3	294.5
Coaly Shale	294.5	295.5
Coal	295.5	296.5
Silty Brown Shale	296.5	305
Hard Light Grey Sandstone	305	309
Siltstone	309	322
Shale - 0.1' coal @ 322.5'	322	322.8
Grey Siltstone	322.8	326
Grey Sandstone	326	366
Brown Fine Grained Siltstone	366	387
Shale and Coal	387	391.3
Brown and Silty Shale and Siltstone	391.3	401
Light Grey Sandstone	401	458
Siltstone	458	470
Grey Siltstone	470	476.5

cont'd ...

Borehole No. 1 - Allan Lake

Type of Cuttings	FEET	
	FROM	TO
Coal - few carbonaceous shale-bands	476.5	485.2
Coal Carbonaceous Shales	485.2	493
Brown Siltstone	493	509
Grey Basalt	509	520

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Langley Lake #1

LOCATION - T'Sable River Area

ELEVATION - 480

DATE - May 1977

Type of Cuttings	FEET FROM	FEET TO
Till - rocks	0	4
Grey Sandstone - weathered	4	14.5
Grey Shale - silty	14.5	19.8
Grey Siltstone - few shaley bands	19.8	92.4
Grey Sandstone	92.4	94.5
Conglomerate	94.5	101
Grey Sandstone - medium to coarse	101	241
Conglomerate	241	257.3
Grey Sandstone - silty bands	257.3	444
- at 258' - 0.9' carbonaceous shale and coal		
Conglomerate	444	448.5
Grey Sandstone	448.5	450
Sandstone	450	455
Conglomerate	455	458
Grey Sandstone	458	494
Grey Shale - silty	494	513
Grey Sandstone	513	522
Grey and Brown Shales - silty bands	522	526
- carbonaceous shale and coal bands - 524' - 526'		
Grey and Brown Sandstone	526	550
Hard Sandstone with small conglomerate layers	550	575
Grey and Brown Sandstone	575	581
Conglomerate and Sandstone banded	581	601

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Langely Lake #2

LOCATION - T'Sable River Area

ELEVATION - 370

DATE - May 1977

Type of Cuttings	FEET FROM	FEET TO
Gravel and Sand	0	27
Grey Shale	27	58
Soft Grey Shale	60	71
Hard Black Sandstone	71	74
Soft Grey Shale	74	94
Dark Grey Shale	94	126
Grey Sandstone	126	128
Grey Silty Shale	128	140
Hard Silty Shale - dark grey	140	200
Grey Silty Shale	200	243.5
Grey Siltstone	243.5	370
Grey Sandstone	370	371.8
Grey Silty Shale	371.8	510
Grey Shale - soft	510	553.5
Hard Siltstone	553.5	556
Dark Grey Shale - soft	556	575
Coarse Sandstone - grey, hard	575	586
Hard Sandstone - dark grey	586	600
Soft Brown Shale	600	601.3
Sandstone	601.3	605
Grey Shale	605	611
Dark Grey Sandstone - hard	611	624
Grey Shale	624	625
Grey Shale	625	648
Grey Silty Shale	648	698.5
Grey Sandstone	698.5	715

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Bradley Lake #2

LOCATION - T'Sable River Area

ELEVATION - 675

DATE - May 1977

Type of Cuttings	FEET FROM	FEET TO
Till - some Gravel	0	14
Grey Sandstone	14	17
Grey Shale - fractured basalt - fault	17	41
Fractured Rock Sandstone Basalt - fault formation	41	57

(Hole was abandoned due to drilling difficulties beyond reasonable risk.)

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Bradley Lake #1

LOCATION - T'Sable River Area

ELEVATION - 975

DATE - May 1977

Type of Cuttings	FEET FROM	FEET TO
Sand and Gravel	0	8
Clay-Till and Boulders	8	18.3
Coal, Shale and Carbonaceous Shale	18.3	20.3
Brown Shale	20.3	30
Grey Sandstone	30	35.6
Coal	35.6	37.3
Brown, Silty Shale	37.3	45
Coal & Shale	45	46.4
Brown & Grey Shale	46.4	48
Soft Light Grey Sandstone	48	107.7
Brown Shale - trace of coal	107.7	112
Silty Shale	112	116.7
Coal with Shale	116.7	120.8
Shale	120.8	122
Brown Siltstone	122	138
Grey Siltstone	138	146
Grey Sandstone	146	160
Coal - Shaley	160	187.5
Shale	187.5	188.5
Light Grey Sandstone	188.5	190
Brown Sandstone	190	238
Brown Sandstone with Shale	238	239
Silty Grey Brown Shale	239	242
Brown & Grey Siltstone - few carbonaceous	242	250
and brown shale bands	250	310
at 263' 0.9' carbonaceous shale and coal		
at 301' 1.2' carbonaceous shale and coal		
at 305' 0.8' carbonaceous shale and coal		
Grey Sandstone	310	317
Brown and Grey Siltstone	317	325
Grey Sandstone - medium	325	336
White Sandstone - coarse	336	342
Coal - odd carbonaceous shale band	342	352
Grey Shale - soft	352	353
Brown Siltstone	353	363
Basalt	363	380

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Cook Creek #1

LOCATION - T'Sable River Area

ELEVATION - 480

DATE - June 1977

Type of Cuttings	FEET FROM	FEET TO
Sand - few pebbles	0	17
Gravel	17	22
Grey and Brown Silty-Till - odd stones	22	52.5
Gravel - few sand bands	52.5	100
Cemented Gravel and Boulders	100	155
Basalt and Metamorphosized Sandstone	155	185
Basalt	185	188

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Bloedel Creek #1

LOCATION - T'Sable River Area

ELEVATION - 320

DATE - June 1977

Type of Cuttings	FE FROM
Sand, Gravel and Boulders	0
Cemented Gravel and Rock	8
Grey Clay and Rocks	31
Silt-Till, Boulders, Gravel and Sand Bands	36
Gravel and Sand	97
Boulders	106
Dense Grey-Till, Gravel and Boulders	109
Shale - Grey	132
Sandstone	178
Grey Shale - silty	190
Grey Shale	227
Grey Shaly Siltstone	313
Grey Sandstone	371
Siltstone - grey, soft	376
Soft Grey Shale	463
Sandstone - grey (salt water)	514
Grey Shale - soft	519
Grey Siltstone	529
Soft Grey Shale	533

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

BOREHOLE NO. - Rosewall #1

LOCATION - T'Sable River Area

ELEVATION - 315

DATE - May 1977

Type of Cuttings	FEET	
	FROM	TO
Sand and Gravel	0	22
Soft Grey Shale	22	26
Hard Black Siltstone	26	29
Conglomerate	29	36
Soft Grey Shale	36	37
Sand	37	43
Shattered Sandstone-Shale	43	84
Conglomerate	84	94

WELDWOOD OF CANADA LIMITED

VANCOUVER ISLAND
RESOURCE STUDY

HOLE NO. - Cowie Creek #1

LOCATION - T'Sable River Area

ELEVATION - 690

DATE - August 1977

Type of Cuttings	FEET FROM	FEET TO
Gravel and Boulders	0	53
Basalt	53	55

QUALITY OF COAL

The coal in the Comox-Nanaimo series deposits on Vancouver Island is a High Volatile A, Bituminous classification.

Two main seams in the lower cyclothem of the Comox were analysed for their chemistry, and these are indicated as Seam A, being the lowest, and Seam B, the next coal measure above.

In the T'Sable River and Cumberland Areas, the two seams exist very consistently. These areas, have fairly uniform ash and sulphur contents in both seams. (Table I-IV)

Further north, into the Anderson Lake Area, post deposition disturbances, primarily in the form of Tertiary Intrusives, along with a higher Vancouver Lava, has resulted in very definite increases in both ash and sulphur content. (Table III-IV)

The Anderson Lake Area appears to have been influenced in the northern portions by Constitution Hill, and in the southern portions by both Constitution Hill and a Tertiary Intrusive north of Browns River.

During their period of occurrance they had a definite influence on the coal measures not only in quality but in depositional changes. In the later case, the coal measures were disturbed by faults. In two limited fault blocks, the coal seams are near surface and tilted. In the other blocks which were downfaulted, the Vancouver Lava displaced the coal, during the Tertiary Intrusive period.

These depositional disturbances have had a major influence on the coal chemistry.

From Constitution Hill north and west into the Campbell River and Quinsam areas, the quality of coal is much different. This shows up distinctly in both the ash and sulphur contents. (Table II.) Here they are much lower in percentum then those coal seams south of the Browns River.

In addition only one coal seam is evident, comprising of 11 to 15 feet of coal with no separation.

As mentioned in the stratigraphy of the Anderson Lake Area, the sandstone changes in composition to coarse, quartzitic grains, and contains grains of Vancouver Lava, in all areas north of Constitution Hill.

Thus, the thickness of coal, (in one seam) the sandstone characteristics (Comox?) and the quality of coal would tend to support the theory that these areas are not part of the same depositions that occurred in the Cumberland and T'Sable River Areas.

A logical explanation for this phenomenon is that the area north of Constitution Hill was probably higher structure, and was not subject to deposition during the lagoon deposits in the Cumberland and T'Sable River Areas.

Thus, in summary, the physico-chemical properties of the coal, and the tectonical-volcanic action have been responsible for raising the rank, and bringing the coal seams in some areas to strippable limits.

The ash content variation in the areas has been caused by two processes--syngenetic and epigenetic with the coal formation.

Syngenetic: Here the fine now carbonaceous material was incorporated into the peat body before the consolidation into coal seams. This is reflected by the uniform distribution of ash throughout the various size ranges in the screen analyses.

Epigenetic: The tectonical and volcanic activities subsequent to coal formation have affected the rank of coal--by essentially raising its fixed carbon and reducing the volatile matter.

In order that such wide apparent variations in the ash content and consequently the fixed carbon can be equated to a common denominator for the purpose of rank classification and comparison between the seams or the same seam traced through different areas the Approximation Formula (ASTM D-388) was adopted. Here the fixed carbon is calculated on a dry mineral-matter-free basis (dry Mm-free basis) according to the following formula:

$$\text{Dry Mm-free FC} = \frac{FC}{[100 - (M + 1.1A + 0.1S)]} \times 100$$

Where: Mm = mineral matter

FC = % of fixed carbon

M = % of moisture

A = % of ash, and

S = % of sulphur

Seam 'A' the oldest and the most consistent seam in spatial distribution has been recorded in all the three areas. The dry Mm-free F.C. in the T'Sable River - Cumberland Area and the Anderson Lake Area are 60.13 and 60.90 respectively while that of Quinsam and Campbell River area is 54.82. A much greater depth of burial (300' to 636.0') and epigenetic effects in the former regions could be the main factors for the higher dry Mm-free F.C. However, the Quinsam-Campbell River area appears to be reflecting the more natural state of the coal seam.

Similarly, the Mm-free Calorific Value determination in the T'Sable River area appears to be unusually high both for Seam 'A' and the overlying seam 'B'. As such for the purposes of comparison, it was determined to restrict the comparables to mineral-matter-free fixed carbon only.

All the analytical data has been statistically verified by determining the standard deviation (σ) and the standard error, $S_{\bar{X}}$, in the determination of the arithmetic mean X_m .

For example in the dry Mm-free Calorific Value determination of Seam 'B' (Table IV), the standard error is 2,762 and the standard deviation is 4.784. Hence, the validity of such a data is questionable.

Standard deviation (σ) is used as a statistical method for describing the variation in the values of observation from the arithmetic mean, and is calculated as follows:

$$\text{Standard deviation } (\sigma) = \sqrt{\frac{[(X_1 - X_m)^2 + (X_2 - X_m)^2 + \quad}{n}}$$

Where X_1, X_2, X_3 are observations

X_m = Arithmetic mean of the observations

n = number of observations

Standard error, $S_{\bar{X}}$, determination gives in absolute terms the range within which the arithmetic mean, X_m, may vary

$$\text{Standard error } S_{\bar{X}} = \pm \frac{\sigma}{\sqrt{n}}$$

Where σ = Standard deviation

n = Number of observations

The analytical data, statistically compiled was not carried forward into the washability tests. All washabilities were conducted on the basis of after screening, the air dryed samples, and can only be considered as an indication.

It is obvious that with variation differences over the northern and southern zones, numerous tests would be required to obtain meaningful results.

Sodium and potassium analysis of coals were in the range of 0.18% to 0.31% for Sodium, and 0.33% to 0.70% for potassium, across the total area. These were based on composite samples from each hole tested.

Analysis of all the ash composites produced the following averages of minerals present.

Na_2O	1.05%	Al_2O_3	26.71%
K_2O	1.38%	SiO_2	43.40%
MgO	0.62%	SO_3	6.48%
CaO	8.68%	P_2O_5	0.58%
Fe_2O_3	6.93%	TiO_2	0.49%

The Alumina Oxide of 26.71% would be of economic importance, if a sufficient size coal operation were to proceed, allowing for the recovery of suitable quantities of Alumina Oxide to be economically interesting to Aluminum Producers.

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REGAN LAKE
TSOLUM
RIVER
TSOLUM No. 1
Tp. 4
Cm
K
NORTLY LAKE
BLACK
CREEK
Tp 7
CONSTITUTION HILL
Ti
WOLF
LAKE
HEADQUARTERS
CREEK
ANDERSON AREA
HEADQUARTERS
ANDERSON LAKE
Tp 6
RIVER
PIERCY
DOVE
CREEK
JACKPOT
ANDERSON
BROWN'S
Drill Log


ANDERSON AREA
Tp. 4
Tp. 5
Tp. 6
Tp. 7
TSOLUM No. 1
RIVER
TSOLUM
BLACK CREEK
NORTLY LAKE
BLACK CREEK
CONSTITUTION HILL
WOLF LAKE
HEADQUARTERS CREEK
HEADQUARTERS No. 1
ANDERSON LAKE
MERVILLE
DOVE CREEK
PIERCY CREEK
JACKPOT
BROWN RIVER
U of A Zoological Camp
Cm
K
Ti
WELDWOOD OF CANADA LIMITED
VANCOUVER ISLAND COAL PROPERTIES
ANDERSON LAKE AREA
Geology - Bore Holes - Property Boundary
Scale: 4 inches = 1 mile
Date: MAY
Drawn By:
MICHELE P. CURCIO - COAL CONSULTANT
WEST VANCOUVER, B.C.
Drawing No. 198-MAP-4
MAP UNITS
Tertiary Ti Intrusives
Upper Cretaceous
Cedar District Fm
Extension Protection Fm
Haslam Fm
Comox Fm - coal measures
Jurassic & Triassic K Vancouver Gp
SCALE
0 1/8 1/4 1/2 3/4 1 2 MILE
Legend
Formational Boundary
Fault inferred
Boundary of Drift
Bore Hole
WELDWOOD PROPERTIES
Coal Area Outline
X-Section
A A'
Drill Log
Coal seam thickness (ft)
Depth of seam (ft)
Km - Karmutsen
Tr - Trace
T.D. - Total Depth

CONFIDENTIAL

The best method to obtain reliable data on the coal washability would require bulk testing. It would be relatively simple to obtain bulk samples from the seams in Quinsam and Hamilton Lake as the Quinsam Area, and Cumberland Area have large exposed outcrops. This could be accomplished by blasting and tunnelling into the sections, to obtain bulk sample.

In the T'Sable River Area, the mine entry could be opened for very little cost, dewatered, and bulk sampled.

By doing this, a very definite coal recovery could be established across the total area.

In addition examination of the areas would prove to be beneficial for future mining, by examination of the coal seams in place, as well as hanging and footwall characteristics.

Composite float samples at 1.60 specific gravity were analysed for Ash Fusion on the T'Sable River Area.

The results of these were as follows:

ASH FUSION TEMPERATURES (^{o}F)

	Initial Deformation	Softening	Hemesphirical	Fluid
Oxidizing	2600	2600+		
Reducing	2480	2510	2540	2600

This coal would appear to be within acceptable limits, for some metalurgical processes.

00054 (2)

T'SABLE RIVER AREA

WELDWOOD OF CANADA

Vancouver Island Resource Study

T'Sable #3 Core Samples - "A" Seam

LAB NO. 3245

DEPTH 580'-585'

SIZE AND RAW ANALYSES

Size Fraction	Wt %	Ash %	Cum Wt %	Cum Ash %	R.M.	V.M.	F.C.	S.	B.T.U.	F.S.I.
1/4" X 65M	93.1	39.6	93.1	39.6						
65M X 0	6.9	36.8	100.0	39.4	1.2	27.6	34.4	1.80	8,310	4

	R.M.	Ash %	Vol.	F.C.	S.	B.T.U.	F.S.I.
Raw	1.4	39.1	25.0	34.5	1.37	8,320	4 1/2

SINK-FLOAT ANALYSES 1/4" X 65M

S.G. Fraction	Wt %	Ash %	Cum Wt %	Cum Ash %	R.M.	V.M.	F.C.	S.	B.T.U.	F.S.I.
-1.45	31.8	13.4	31.8	13.4	0.9	31.1	54.6	0.75	12,990	8
1.45-1.60	19.0	29.2	50.8	19.3	0.8	27.3	42.7	0.83	10,195	4
+1.60	49.2	60.6	100.0	39.6	0.9			1.31		

Above results are all on an air dried basis.

WELDWOOD OF CANADA

Vancouver Island Resources Study

T'Sable #3 Core Samples - "A" Seam

LAB. NO. 3244

DEPTH 577'-580'

SIZE AND RAW ANALYSES

Size Analyses	Wt %	Ash %	Cum Wt %	Cum Ash %	R.M.	V.M.	F.C.	S.	B.T.U.	F.S.I.
1/4" X 65M	92.1	28.4	92.1	28.4						
65M X 0	7.9	44.2	100.0	29.6	1.3	24.2	30.3	1.13	7,300	4

	R.M.	Ash %	Vol.	F.C.	S.	B.T.U.	F.S.I.
Raw	1.6	27.2	28.0	43.2	0.73	10,415	7

SINK-FLOAT ANALYSES 1/4" X 65M

S.G. Fraction	Wt %	Ash %	Cum Wt %	Cum Ash %	R.M.	V.M.	F.C.	S.	B.T.U.	F.S.I.
-1.45	56.7	10.5	56.7	10.5	0.9	32.0	56.6	0.68	13,435	8
1.45-1.60	18.8	28.8	75.5	15.1	0.9	28.1	42.2	0.62	10,245	4
+1.60	24.5	69.5	100.0	28.4	1.4			1.19		

Above results are all on an air dried basis.

WELDWOOD OF CANADA

Vancouver Island Resources Study

T'Sable #3 Core Samples - "B" Seam

LAB NO. 3243

DEPTH 479'-484'

SIZE AND RAW ANALYSES

Size Fraction	Wt %	Ash %	Cum Wt %	Cum Ash %	R.M.	V.M.	F.C.	S.	B.T.U.	F.S.I.
1/4" X 65M	92.1	32.6	92.1	32.6						
65M X 0	7.9	42.5	100.0	33.4	1.5	25.4	30.6	1.74	7,615	3

	R.M.	Ash %	Vol.	F.C.	S.	B.T.U.	F.S.I.
Raw	1.4	33.5	26.7	38.4	1.80	9,300	4

SINK-FLOAT ANALYSES 1/4" X 65M

S.G. Fraction	Wt %	Ash %	Cum Wt %	Cum Ash %	R.M.	V.M.	F.C.	S.	B.T.U.	F.S.I.
-1.45	46.9	12.8	46.9	12.8	0.6	32.4	54.2	1.13	13,155	8
1.45-1.60	18.4	28.2	65.3	17.1	0.7	27.9	43.2	1.49	10,480	3 1/2
+1.60	34.7	61.8	100.0	32.6	0.7			2.90		

Above results are all on an air dried basis.

T'SABLE RIVER AREA

WELDWOOD OF CANADA

Vancouver Island Resources Study

T'Sable #3 Core Samples - "B" Seam

LAB NO. 3242

DEPTH 474'-479'

SIZE AND RAW ANALYSES

Size Fraction	Wt %	Ash %	Cum Wt %	Cum Ash %	R.M.	V.M.	F.C.	S.	B.T.U.	F.S.I.
1/4" X 65M	90.1	40.3	90.1	40.3						
65M X 0	9.9	40.9	100.0	40.4	1.4	25.6	32.1	0.81	8,190	3 1/2

	R.M.	Ash %	Vol.	F.C.	S.	B.T.U.	F.S.I.
Raw	1.5	42.3	24.2	32.0	0.59	8,145	3 1/2

SINK-FLOAT ANALYSES 1/4" X 65M

S.G. Fraction	Wt %	Ash %	Cum Wt %	Cum Ash %	R.M.	V.M.	F.C.	S.	B.T.U.	F.S.I.
-1.45	40.1	11.2	40.1	11.2	0.9	33.1	54.8	0.77	13,485	8
1.45-1.60	12.3	33.6	52.4	16.5	0.9	27.7	37.8	0.53	9,680	3
+1.60	47.6	66.5	100.0	40.3	1.2			0.44		

Above results are all on an air dried basis.

WELDWOOD OF CANADA

Vancouver Island Resources Study

T'Sable #3 Core Samples

LAB NO. 3241

DEPTH 354'-355'

SIZE AND RAW ANALYSES

Size Fraction	Wt %	Ash %	Cum Wt %	Cum Ash %	R.M.	V.M.	F.C.	S.	B.T.U.	F.S.I.
1/4" X 65M	95.0	20.6	95.0	20.6						
65M X 0	5.0	22.7	100.0	20.7	1.4	30.9	45.0	1.80	10,930	5

	R.M.	Ash %	Vol.	F.C.	S.	B.T.U.	F.S.I.
Raw	1.5	19.4	28.7	50.4	1.13	11,775	5

SINK-FLOAT ANALYSES 1/4" X 65M

S.G. Fraction	Wt %	Ash %	Cum Wt %	Cum Ash %	R.M.	V.M.	F.C.	S.	B.T.U.	F.S.I.
-1.45	70.5	8.9	70.5	8.9	0.9	31.8	58.4	1.20	13,280	6 1/2
1.45-1.60	9.4	29.2	79.9	11.3	1.1	25.4	44.3	1.10	10,475	3 1/2
+1.60	20.1	57.5	100.0	20.6	1.3			1.03		

Above results are all on an air dried basis.

T'SABLE RIVER AREA

WELDWOOD OF CANADA
Vancouver Island Resources Study
T'Sable #3 Core Samples

LAB NO. 3237
DEPTH 196'-198'

SIZE AND RAW ANALYSES

Size Fraction	Wt %	Ash %	Cum Wt %	Cum Ash %	R.M.	V.M.	F.C.	S.	B.T.U.	F.S.I.
1/4" X 65M	92.1	28.5	92.1	28.5						
65M X 0	7.9	43.8	100.0	29.7	1.6	25.6	29.0	3.12	7,750	2 1/2

	R.M.	Ash %	Vol.	F.C.	S.	B.T.U.	F.S.I.
Raw	1.6	30.0	31.7	36.7	3.87	10,025	4

SINK-FLOAT ANALYSES 1/4" X 65M

S.G. Fraction	Wt %	Ash %	Cum Wt %	Cum Ash %	R.M.	V.M.	F.C.	S.	B.T.U.	F.S.I.
-1.45	52.8	12.4	52.8	12.4	0.9	34.7	52.0	3.58	12,980	7 1/2
1.45-1.60	14.6	29.8	67.4	16.2	1.1	29.6	39.5	4.56	10,340	3
+1.60	32.6	54.1	100.0	28.5	1.1			4.02		

Above results are all on an air dried basis.

ANDERSON LAKE AREA

WELDWOOD OF CANADA

Vancouver Island Resource Study

LAB NO. 7507-0708

DRILL CORE SAMPLES	MOISTURE %	ASH %	VOLATILE MATTER %	FIXED CARBON %	SULPHUR %	F.S.I.	CALORIFIC VALUE (BTU's/lb)
	RESULTS ON DRY BASIS						
Anderson Lake #2 11 - 15.5'	1.9	40.74	14.99	44.27	4.28	1/2	8669
Tolsum River #2 535 - 541'	2.0	69.96	17.58	12.46	4.21	0	4075
Brown River #2 229.5 - 234.5'	1.8	59.18	15.92	24.90	6.03	1	5548
Brown River #2 78 - 81'	1.9	67.34	14.05	18.61	3.18	1	4431

FLOAT (Minus 3 Mesh, Plus 65 Mesh)

	Specific Gravity 1.45	ASH	Specific Gravity 1.60	ASH
Anderson Lake #2 11 - 15.5'	39.3%	8.14%	48.3%	10.93%
Tolsum River #2 535 - 541'	11.5%	10.40%	14.9%	15.11%
Brown River #2 229.5 - 234.5'	23.6%	7.45%	27.9%	9.20%
Brown River #2 78 - 81'	13.0%	9.66%	15.7%	11.79%

TABLE IV

T'SABLE RIVER & CUMBERLAND AREA:

SEAM 'B'

HOLE AND LAB NO.	DEPTH FT.	RESIDUAL MOISTURE %	ASH %	VOL. MATTER %	FIXED CARBON %	SULPHUR %	CAL.VAL BTU/lb.	DMMF FIXED CARBON %	DMMF CAL.VAL BTU/lb.
T'SABLE RIVER #1 3076	181.0-186.0	0.9	47.3	26.4	25.4	2.10	11,775	54.20	25,128
T'SABLE RIVER #2	536.9-540.3	0.98	38.3	24.6	37.1	1.80	8,290	65.42	14,618
***[Seam 'C'	405.5-409.5	0.80	28.2	27.6	43.4	1.75	10,110	63.82	14,867]
T'SABLE RIVER #3	474.0-484.0	1.50	37.9	25.5	35.1	1.19	8,723	61.91	15,387
							Mean:	60.51	18,378
							Std.Devn. σ	4.69	4,784
							Std.Error	2.71	2,762

ANDERSON LAKE AREA:

SEAM 'B'

HOLE AND LAB NO.	DEPTH FT.	RESIDUAL MOISTURE %	ASH %	VOL. MATTER %	FIXED CARBON %	SULPHUR %	CAL.VAL BTU/lb.	DMMF FIXED CARBON %	DMMF CAL.VAL BTU/lb.
ANDERSON LAKE #2	11.0-15.5	1.90	40.74	14.99	42.37	4.28	8,669	80.16	16,400

***Seam 'C' is a local development only.

TABLE III

ANDERSON LAKE AREA:

SEAM 'A'

HOLE AND LAB NO.	DEPTH FT.	RESIDUAL MOISTURE %	ASH %	VOL. MATTER %	FIXED CARBON %	SULPHUR %	CAL.VAL BTU/lb.	DMMF FIXED CARBON %	DMMF CAL.VAL BTU/lb.
TSOLUM RIVER #2									
7507-0708	535.0-541.0	2.0	69.96	17.58	10.46	4.21	4,075	50.72	19,760
BROWN RIVER #2									
7507-0708	229.5-234.5	1.8	59.18	15.92	23.10	6.03	5,548	71.08	17,071
							Mean:	60.90	18,415
							Std. Devn. σ	10.18	1,344
							Std. Error	7.2	951

TABLE II

QUINSAM AREA

SEAM 'A'

HOLE AND LAB NO.	DEPTH FT.	RESIDUAL MOISTURE %	ASH %	VOL. MATTER %	FIXED CARBON %	SULPHUR %	CAL.VAL BTU.lb.	DMMF FIXED CARBON %	DMMF CAL.VAL BTU/lb.
ECHO LAKE #2									
7507-1409	114.5-123.0	4.92	25.80	32.78	36.50	0.19	10,146	54.74	15,216
ECHO LAKE #4									
7507-2311	254.5-268.3	6.0	14.99	35.06	43.95	0.27	11,791	56.72	15,217
ECHO LAKE #5									
7507-2311	161.0-173.0	5.66	21.04	35.81	37.49	0.24	10,948	52.68	15,382
	*[161.0-170.5	5.67	13.56	38.43	42.34	0.20	12,180	53.33	15,341]
ECHO LAKE #7									
7508-0612	129.0-138.0	0.55	17.03	38.22	44.20	5.93	11,642	55.16	14,530
ECHO LAKE #8									
7508-0612	180.0-191.0	0.53	29.54	33.55	36.38	5.97	9,876	54.81	14,878
	**[180.0-186.0	0.55	20.50	36.37	42.58	4.37	11,142	55.69	14,572]

Mean	54.82	15,045
Std.Devn σ	1.29	305
Std.Error	0.58	136

* Bottom 2.5' eliminated from the seam--not considered in the mean determination

** Bottom 5.0' eliminated from the seam--not considered in the mean determination

T'SABLE RIVER & CUMBERLAND AREA:

SEAM 'A'

HOLE AND LAB NO.	DEPTH FT.	RESIDUAL MOISTURE %	ASH %	VOL. MATTER %	FIXED CARBON %	SULPHUR %	CAL.VAL BTU/lb.	DMMF FIXED CARBON %	DMMF CAL.VAL BTU/lb.
T'SABLE RIVER #1 3077	287.0-292.0	0.5	36.6	30.9	32.0	1.8	12,140	54.18	20,555
T'SABLE RIVER #2 3070-74	655.0-665.0	0.7	29.8	26.8	42.7	1.80	9,310	64.37	14,034
T'SABLE RIVER #3	577.0-585.0	1.5	34.6	26.1	37.8	1.13	9,106	62.66	15,094
TRENT RIVER #1 (3213)	636.0-644	0.6	47.7	22.2	29.5	1.45	9,280	63.05	19,835
TRENT RIVER #2 (3082-3083)	335.0-343.0	0.6	39.9	28.3	31.2	1.70	10,870	56.38	19,642
							Mean:	60.13	17,832
							Std. Deviation σ:	4.06	2,706
							Std.Error	1.815	1,210