No. 14

PR-CARBON CREEK 45(1)A

CONFIDENTIAL

PRELIMINARY REPORT

on the

COAL DEPOSITS OF

CARBON CREEK

Peace River district, B. C.
Lat 55°, Long 122°, NW

by W.H.Mathews
B.C.Dept of Mines
Jan 1945

Maps are in folder in front of file.

CONTENTS

In Rear

1

COAL DEPOSITS

CARBON CREEK.

PEACE RIVER AREA.
British Columbia

By W. H. Mathews,
January/45.

Location and Accessibility:

Carbon Creek, in the eastern part of the Rocky Mountains, flows into the Peace River from the south. It lies 45 miles (airline) east of Finlay Forks and 30 miles (airline) west of Hudson Hope. The nearest railways are at Dawson Creek, 95 miles (airline) to the east and at Prince George, 135 miles (airline) to the south.

The mouth of Carbon Creek is reached by boat from Gold Bar Post Office, on the north side of the Peace River, 10 miles to the east. Gold Bar is at the end of the road from Hudson Hope and Fort St. John. From the mouth of Carbon Creek a pack trail leads southward to the coal showings around 11 mile creek. Trappers trails, some in poor condition, lead from this pack trail to some of the showings on creeks tributary to the Carbon.

Ownership:

Many of the coal showings occur in lots 319 to 328, 10 square miles in all, held by a small group of which the controlling interest is in the hands of the Burns Foundation, estate of the late Senator Pat Burns of Calgary. Other showings occur on unalienated land.

General Statement:

Over a great part of the Carbon Creek Valley, bed-

rock, comprising conglomerate, sandstone, shale and coal, is concealed beneath an overburden of sand, gravel, slide rock, and glacial debris. Exposures of coal are confined almost entirely to the banks of streams. Information on the extent of individual coal seams is, therefore, fragmentary. The results of a comprehensive program of core drilling will be necessary before estimates of tonnages of available coal can be given. Nevertheless on the basis of the present information some generalizations can be made.

The coal occurs in the upper part of a succession of sediments referred to the Bullhead group of Lower Cretaceous age. These sediments were laid down as flat-lying beds which were subsequently folded. Erosion has removed the upper coal-bearing beds from all but the central part of an elongated basin-shaped structure. Most of the coal seams are confined to the central part of this basin, within an area extending south-east along the west side of Carbon Creek from 10 Mile Creek for at least 5 miles. The southern termination of this central area has not been established. The width of the coal-bearing area reaches 1 mile. Outside this central area other coal seams are known but they are, for the most part, thinner and less common, but several seams greater than 4 feet in thickness, and, therefore, of commercial interest, have been found.

11-Mile Creek.

The most complete exposures of the coal-bearing strata in the Carbon Creek area lie in the canyon of 11-Mile Creek, tributary to the Carbon from the west. Here th basin-shaped structure, described above, is found to be complicated by two or

three subsidary folds. Thus some coal seams appear at the surface several times. The correlation of seams is confused by two features, first, the strata apparently thicken ~~markedly~~ towards the west and, consequently, the intervals between the seams increase in that direction, and second the strata are broken along two and possibly four fractures planes to produce abrupt discontinuities in the exposed succession of rocks.

The coal seam highest in the succession on 11 Mile Creek, and referred to in private reports as 'seam A', has been preserved from erosion only in the centre of the structural basin, where it is of very limited extent. Seams lower in the succession, however, are preserved over greater areas and are, therefore, much more attractive. The seams of interest are listed below together with their thicknesses, or known range of thicknesses, separation, and analyses. (Tables ~~I and II~~)

Outside the 11 Mile Creek area, six coal seams are known to exceed 3 feet in thickness. The precise relationship of these to one another and to those of the 11 Mile Creek section has not been established. Thickness, analyses, and approximate location of these seams, together with those from a few seams of smaller size, are given in Table ~~III~~ II.

Grade of Coal:

All samples obtained by the writer from the Carbon Creek area were from the surface outcrops of the coal seams with the exception of samples 240J, 241J, 244J, 249J, and 250J which were obtained from cuts and short headings at distances of not more than 20 feet from the surface. Hence the analyses are of more or less weathered coals, and it may be expected that fresh coal,

such as would be mined, would contain somewhat less moisture and possess somewhat higher calorific value than is indicated in the analyses. Moreover, both as a result of weathering and the infiltration of soil particles into the surface coals, the ash content of the samples may be considerably higher than would be the case in fresh coal from the same seam. Greater emphasis should be placed on the analyses of samples 240J, 241J, 244J, 249J and 250J than on the others in assessing the grade of Carbon Creek coals.

As indicated by the samples obtained, Carbon Creek coals can be classed as from medium to low volatile bituminous. The ash content of the coals, even in the surface samples, compares very favourably with that from other North American fields, and the calorific value is high. With one exception all samples were found to be of non coking coal.

Thickness and Continuity of Seams:

The thickness of coal seams of the Carbon Creek field, like those of other fields, show locally marked variations as a result of deformation. The seams exposed on the south branch of 11 Mile Creek 0.5 miles south of the forks are markedly thicker at the centre of a fold than on either flank. A similar variation is noted in seam 'C' in which the thickness varies from 62" near the centre of a fold to 45" only 6 feet away on the flank of the fold. For this reason the thickness, 17 feet, of seam 'F' at the forks of 11 Mile Creek, and 8'9", of the seam about 4 miles south of the forks of the Carbon, both of which were measured at points close to the crests of folds, may be unduly great.

Of more importance is the range of thickness of the seams where they have been relatively undisturbed. Wherever a seam varies markedly in thickness, however, its correlation between isolated outcrops becomes uncertain, whereas if a seam has a uniform thickness its exposures can be much more reliably correlated. Hence in an undeveloped coal field it is easier to establish uniformity of thickness than to establish marked variability in thickness.

Several of the seams in the 11 Mile Creek area show considerable uniformity in thickness. Exposures C, C", and E, apparently all on a single seam, range in thickness between 48 and 51 inches in a distance of 0.35 miles. Seam G, exposed at three points near the forks of 11 Mile Creek, and once 0.75 miles to the south, varies in thickness between 66 and 75 inches. On the other hand seam F in the same distance ranges between 204 inches and 124 inches (including shale partings) although, as mentioned above, this variation in thickness may be explained in part at least by the squeezing of coal towards the crest of a fold. Seam D, consisting of an upper 9 inches of coal and a lower 35 inches separated by a 7 inch shale parting, apparently corresponds to two seams about 15 feet below seam E which consist of 16 and 26 inches of coal respectively, separated by 40 inches of shale and sandstone. Moreover seams F+170' and F+125', each over 4 feet thick, were exposed 0.15 miles south of the forks of 11 Mile Creek may correspond to two seams each about 1 foot in thickness at the forks themselves. The possibility of faulting in the latter locality, however, renders this correlation uncertain. A pair of seams in the upper canyon of Carbon Creek, each over 4 feet thick, may correspond to a pair of seams at the foot of the lower canyon between 1 and 2 feet thick, but here again the correlation is not certain.

The available information, therefore, indicates a fair continuity to some of the seams, but in view of the possible variations indicated in some of the seams it is imperative that further information be obtained by drilling before any large capital expenditures are made.

Structure:

The coal occurs, as mentioned above, in an elongated basin-shaped structure. Near the mouth of Carbon Creek this structure is relatively simple but on 11 Mile Creek it is complicated by minor folds and several breaks (N.B. sections). Moreover, as is indicated by the structural sections, there is a marked increase in complexity between the north and south branches of 11 Mile Creek with two subsidiary folds developing in the short distance between the two creeks. It was not found possible to trace minor structures upstream (southerly) from 11 Mile Creek, but the major structure extends for at least 9 miles to the south-east. The shallowness, probably less than 1000 feet, to which the coal seams may be expected to extend at the centre of the basin would be of advantage in mining, while the presence of minor folds and breaks in the structure would undoubtedly lead to difficulties in development and extraction of coal but the problems are apparently not markedly greater than those encountered and overcome in coal mining elsewhere in the foothills of the Rockies.

Summary:

It is believed that at least 10 coal seams exceeding 4 feet in thickness are represented in the Carbon Creek coal field, but of these only two exceed 6 feet in thickness. Until further information is available on the extent of the individual seams no estimate of tonnage can be given. The exposures of the coal seams occur in an area at least 12 miles long and locally 2 miles wide, but most of the seams are confined to a central area probably at least 5

5 miles long and up to 1 mile wide (see map). The coal is medium- to low-volatile bituminous and non-coking except for one or two seams. The ash content of most of the larger seams compares favourably with those of other coal fields, and some of the seams are exceptionally clean. The complexity of the structure is of the same order as that of some of the fields elsewhere in the foothills. The comparative shallowness of the coal seams, probably less than 1000 feet, favours development and mining.

TABLE I

Coal Seams, 11 Mile Creek, Carbon Creek Coal Basin

Correlated seams	Sample		Thickness	Spacing	Roof	Floor	H_2O	V.C.M.	F.C.	Ash	B. T. U.	S.
A	252J		42"		Shale	Shale	3.41	30.43	52.64	13.52	11,830	0.56
				120'								
B	251J		21"		Shale	Shale						
E+10'	245J		20"		Shale	Shale	3.44	29.24	60.95	6.37	12,670	0.85
				10'			4.48	29.75	60.4	5.37	12,730	0.73
C	250J		49"		Shale	Shale, 2' on ss						
C'	249J		51"		Shale	Shale, 3' on ss	3.31	26.97	66.37	3.35	13,150	0.57
C"'	246J		62"(62-45")		Shale	Shale, 1' on ss	1.87	27.21	68.67	2.25	13,980	0.77
E	244J		52"		Shale	Shale, 1' on ss	4.04	28.52	64.96	2.38	13,530	0.57
				15'-47'			3.45	26.05	67.39	3.11	13,620	0.49
D	248J[1]		9"+7"[2]+35"		Shale	Shale						
D'	247J		31"		Shale	Shale, 1½' on ss						
E-15'	243J	242J	16"+40"[2]+26"		Shale, ½' under ss	Shale, 1', on ss	4.00	24.72	63.03	8.25	12,510	0.57
				120'			3.51	27.23	65.13	4.13	13,450	0.64
H'	241J	240J	13"+43"[2]+34"		Sandstone, Congl.	Shale	{2.70	24.89	56.79	15.62	12,000	0.70}
				?			{3.72	27.74	66.88	2.66	13,630	0.67}
H	262J		48"		Shaly sandstone	Sandstone	{2.24	29.43	65.8	2.53	13,750	0.79
				25'			{3.44	24.45	68.43	3.68	13,150	0.70
I	261J		72"		Shale	Shale	2.99	19.51	46.06	31.44	9,140	0.44
				100'?								
F+170'	260J		52"		Ss. 2-3' under sh.	Shale, 1½', on ss	3.33	23.3	70.69	2.68	13,650	0.59
				18'								
F+150'	259J		53"		Shale	Ss, few in. on shale	7.19	25.29	57.27	10.25	10,950	0.59
				25'								
F+125'	256J		51"		Shale	Ss, 3', on shale	9.59	20.52	54.86	15.03	10,360	0.47
				125'								
F	253J[1]		204"		Shaly sandstone	Sh. 0-3' on ss	5.52	25.1	67.7	1.68	12,700	0.53
F"	235J+236J		18"+14"[2]+92"		Shale, 1', under ss	Sandstone						
				15'-20'			{2.21	25.07	58.15	14.57	11,840	0.62
G	254J		72"		Sh, 1' under ss	Sandstone	{2.98	26.8	64.91	5.31	13,270	0.63
G'	255J		75"		Sh, 3' under ss	Sandstone, shaly	{2.91	23.0	56.47	17.62	11,460	0.48
G"	237J		67"		Sandstone	Sandstone	2.60	25.53	69.16	2.71	13,970	0.61
				?			7.16	25.63	63.99	3.22	12,230	0.48
			48"-72"[4]		---	---	3.55	23.9	70.14	2.41	13,580	0.61
				15'-18'[4]								
G?	232J		67"		Sandy shale	Shale 1', on ss						
							7.25	22.74	55.42	14.59	10,620	0.48

[1]Sample exclusive of shale partings. Sh - shale Ss - sandstone

[2]Shale parting. [3]Upper 40" only, sampled

[4]Reported by Beltz and Stines

TABLE II

Coal Analyses - Carbon Creek Field

Thickness	Sample	H_2O	V.C.M.	F.C.	Ash	B. T. U.	S	Location
35"	263J	3.28	21.61	70.15	4.96	13,590	0.49	5 Mile Cr. 0.35 miles from mouth
28"	215J	2.75	24.17	64.12	8.96	13,320	0.65	7 Mile Cr. 1.5 miles from mouth
26"	216J	4.17	21.4	61.01	13.42	12,040	0.58	18 feet above last
36"	217J	2.57	17.88	49.86	29.69	9,580	0.54	1.9 miles from mouth
60"	218J	5.83	24.33	64.61	5.23	12,800	0.52	2.2 miles from mouth
50" +	239J	2.75	25.84	63.94	7.47	12,930	0.67	9 Mile Cr. 1.2 miles from mouth
34"	238J	4.40	25.64	65.34	4.62	12,850	0.57	10 Mile Cr. 0.45 miles from mouth
35"	219J	2.66	18.25	57.69	21.40	11,410	0.71	Carbon Cr. at 6 Mile
(31"	222J	5.63	20.2	52.11	22.06	10,200	0.48	Top (crushed)
64" (8"	221J	5.81	27.11	50.74	16.34	11,110	0.47	(bone) 0.45 mi. SE of last
(25"	220J	4.44	18.58	70.54	6.44	13,000	0.46	Base (clean coal)
64" total		5.18	20.40	59.17	15.25	11,410	0.47	
31"	223J	4.98	19.47	72.16	3.39	13,320	0.46	N Fk. 11 Mi. Cr. 5 miles above Carbon Ck
41"	228J	1.47	30.17	64.34	4.02	13,980	0.78	Carbon forks
30" +	229J	1.79	21.45	75.64	1.12	14,620	0.52	ditto Upper part of 5-6' seam
34"	230J	1.97	19.97	69.78	8.28	13,470	0.76	Carbon Cr. 1.3 miles above forks
30"	231J	2.45	16.41	77.59	3.55	14,180	0.50	Carbon Cr. 2.5 miles above forks
(15"	227J	5.24	16.45	71.53	6.78	12,930	0.28	Top
105" (23"	226J	4.40	15.49	56.44	23.67	10,280	0.31	1.3 miles S of last
(67"	225J	4.41	15.53	69.50	10.56	12,530	0.39	Bottom
105" total		4.54	15.65	66.91	12.90	12,090	0.36	
26"	224J	6.19	16.57	58.12	19.12	10,690	0.43	Same locality - top? of last seam

see Bull. 24

COAL DEPOSITS

CARBON CREEK

PEACE RIVER AREA, BRITISH COLUMBIA.

By W. H. Mathews,
January, 1945.

Location and Accessibility:

Carbon Creek, in the eastern part of the Rocky Mountains, flows into the Peace River from the south. It lies 45 miles (airline) east of Finlay Forks and 30 miles (airline) west of Hudson Hope. The nearest railways are at Dawson Creek, 95 miles (airline) to the east and at Prince George, 135 miles (airline) to the south.

The mouth of Carbon Creek is reached by boat from Gold Bar Post Office, on the north side of the Peace River, 10 miles to the east. Gold Bar is at the end of the road from Hudson Hope and Fort St. John. From the mouth of Carbon Creek a pack trail leads southward to the coal showings around 11 mile creek. Trappers trails, some in poor condition, lead from this pack trail to some of the showings on the creeks tributary to the Carbon.

Ownership:

Many of the coal showings occur in lots 319 to 328, 10 square miles in all, held by a small group of which the controlling interest is in the hands of the Burns Foundation, estate of the late Senator Pat Burns of Calgary, Other showings occur on unalienated land.

General Statement:

Over a great part of the Carbon Creek Valley, bedrock, comprising conglomerate, sandstone, shale and coal, is concealed beneath an overburden of sand, gravel, slide rock, and glacial debris. Exposures of coal are confined almost entirely to the banks of streams. Information on the extent of individual coal seams is, therefore, fragmentary. The results of a comprehensive program of core drilling will be necessary before estimates of tonnages of available coal can be given. Nevertheless on the basis of the present information some generalizations can be made.

The coal occurs in the upper part of a succession of sediments referred to the Bullhead group of Lower Cretaceous age. These sediments were laid down as flat-lying beds which were subsequently folded. Erosion has removed the upper coal-bearing beds from all but the central part of an elongated basin-shaped structure. Most of the coal seams are confined to the central part of this basin, within an area extending south-east along the west side of Carbon Creek from 10 Mile Creek for at least 5 miles. The southern termination of this central area has not been established. The width of the coal-bearing area reaches 1 mile. Outside this central area other coal seams are known but they are, for the most part, thinner and less common, but several seams greater than 4 feet in thickness, and, therefore, of commercial interest, have been found.

11 Mile Creek:

The most complete exposures of the coal-bearing strata in the Carbon Creek area lie in the canyon of 11-Mile Creek,

tributary to the Carbon from the west. Here the basin-shaped structure, described above, is found to be complicated by two or three subsidary folds. Thus some coal seams appear at the surface several times. The correlation of seams is confused by two features, first, the strata apparently thicken towards the west and, consequently, the intervals between the seams increase in that direction, and second, the strata are broken along two and possibly four fractures planes to produce abrupt discontinuities in the exposed succession of rocks.

The coal seam highest in the succession on 11 Mile Creek, and referred to in private reports as 'seam A,' has been preserved from erosion only in the centre of the structural basin, where it is of very limited extent. Seams lower in the succession, however, are preserved over greater areas and are, therefore, much more attractive. The seams of interest are listed below together with their thicknesses, or known range of thicknesses, separation, and analyses. (Table 1)

Outside the 11 Mile Creek area, six coal seams are known to exceed 3 feet in thickness. The precise relationship of these to one another and to those of the 11 Mile Creek section has not been established. Thickness, analyses, and approximate location of these seams, together with those from a few seams of smaller size, are given in Table 11.

Grade of Coal:

All samples obtained by the writer from the Carbon Creek area were from the surface outcrops of the coal seams with the exception of samples 240J, 241J, 244J, 249J, and 250J, which were

obtained from cuts and short headings at distances of not more than 20 feet from the surface. Hence the analyses are of more or less weathered coals, and it may be expected that fresh coal, such as would be mined, would contain somewhat less moisture and possess somewhat higher calorific value than is indicated in the analyses. Moreover, both as a result of weathering and the infiltration of soil particles into the surface coals, the ash content of the samples may be considerably higher than would be the case in fresh coal from the same seam. Greater emphasis should be placed on the analyses of samples 240J, 241J, 244J, 249J and 250J than on the others in assessing the grade of Carbon Creek coals.

As indicated by the samples obtained, Carbon Creek coals can be classed as from medium to low volatile bituminous. The ash content of the coals, even in the surface samples, compares vary favourably with that from other North American fields, and the calorific value is high. With one exception all samples were found to be of non-coking coal.

Thickness and Continuity of Seams:

The thickness of coal seams of the Carbon Creek field, like those of other fields, show locally marked variations as a result of deformation. The seams exposed on the south branch of 11 Mile Creek 0.5 miles south of the forks are markedly thicker at the centre of a fold than on either flank. A similar variation is noted in seam 'C' in which the thickness varies from 62" near the centre of a fold to 45" only 6 feet away on the flank of the fold. For this reason the thickness, 17 feet, of seam 'F' at the

forks of 11 Mile Creek, and 8'9", of the seam about 4 miles south of the forks of the Carbon, both of which were measured at points close to the crests of folds, may be unduly great.

Of more importance is the range of thickness of the seams where they have been relatively undisturbed. Wherever a seam varies markedly in thickness, however, its correlation between isolated outcrops becomes uncertain, whereas if a seam has a uniform thickness its exposures can be much more reliably correlated. Hence in an undeveloped coal field it is easier to establish correlation with uniformity of thickness than to establish marked variability in thickness.

Several of the seams in the 11 Mile Creek area show considerable uniformity in thickness. Exposures C, C', and E, apparently all on a single seam, range in thickness between 48 and 51 inches in a distance of .35 miles. Seam G, exposed at three points near the forks of 11 Mile Creek and once 0.75 miles to the south, varies in thickness between 66 and 75 inches. On the other hand, seam F in the same distance ranges between 204 inches and 124 inches (including shale partings) although, as mentioned above, this variation in thickness may be explained in part at least by the squeezing of coal towards the crest of a fold. Seam D, consisting of an upper 9 inches of coal and a lower 35 inches separated by a 7 inch shale parting, apparently corresponds to two seams about 15 feet below seam E which consist of 16 and 26 inches of coal respectively, separated by 40 inches of shale and sandstone. Moreover, seams F+170' and F+125', each over 4 feet thick, were exposed 0.15 miles south of the forks of 11 Mile

Creek may correspond to two seams each about 1 foot in thickness at the forks themselves. The possibility of faulting in the latter locality, however, renders this correlation uncertain. A pair of seams in the upper canyon of Carbon Creek, each over 4 feet thick, may correspond to a pair of seams at the foot of the lower canyon between 1 and 2 feet thick, but here again the correlation is not certain.

The available information, therefore, indicates a fair continuity to some of the seams, but in view of the possible variations indicated in some of the seams it is imperative that further information be obtained by drilling before any large capital expenditures are made.

Structure:

The coal occurs, as mentioned above, in an elongated basin-shaped structure. Near the mouth of Carbon Creek this structure is relatively simple but on 11 Mile Creek it is complicated by minor folds and several breaks (N.B. sections). Moreover, as is indicated by the structural sections, there is a marked increase in complexity between the north and south branches of 11 Mile Creek with two subsidiary folds developing in the short distance between the two creeks. It was not found possible to trace minor structures upstream (southerly) from 11 Mile Creek, but the major structure extends for at least 9 miles to the south-east. The shallowness, probably less than 1000 feet, to which the coal seams may be expected to extend at the centre of the basin would be of advantage in mining, while the presence of minor folds and breaks in the structure would undoubtedly lead to difficulties in development and extraction of coal but the problems are apparently not markedly greater than those encountered and over-

come in coal mining elsewhere in the foothills of the Rockies.

Summary:

It is believed that at least 10 coal seams exceeding 4 feet in thickness are represented in the Carbon Creek coal field, but of these only two exceed 6 feet in thickness. Until further information is available on the extent of the individual seams no estimate of tonnage can be given. The exposures of the coal seams occur in an area at least 12 miles long and locally 2 miles wide, but most of the seams are confined to a central area probably at least 5 miles long and up to 1 mile wide (see map). The coal is medium to low volatile bituminous and non-coking except for one or two seams. The ash content of most of the larger seams compares favourably with ~~these~~ that of similar seams of other coal fields, and some of the seams are exceptionally clean. The complexity of the structure is of the same order as that of some of the fields elsewhere in the foothills. The comparative shallowness of the coal seams, probably less than 1000 feet, favours development and mining.

COAL DEPOSITS

CARBON CREEK

PEACE RIVER AREA, BRITISH COLUMBIA.

By W. H. Mathews,
January, 1945.

Location and Accessibility:

Carbon Creek, in the eastern part of the Rocky Mountains, flows into the Peace River from the south. It lies 45 miles (airline) east of Finlay Forks and 30 miles (airline) west of Hudson Hope. The nearest railways are at Dawson Creek, 95 miles (airline) to the east and at Prince George, 195 miles (airline) to the south.

The mouth of Carbon Creek is reached by boat from Gold Bar Post Office, on the north side of the Peace River, 10 miles to the east. Gold Bar is at the end of the road from Hudson Hope and Fort St. John. From the mouth of Carbon Creek a pack trail leads southward to the coal showings around 11 mile creek. Trappers trails, some in poor condition, lead from this pack trail to some of the showings on the creeks tributary to the Carbon.

Ownership:

Many of the coal showings occur in lots 319 to 328, 10 square miles in all, held by a small group of which the controlling interest is in the hands of the Burns Foundation, estate of the late Senator Pat Burns of Calgary. Other showings occur on unalienated land.

General Statement:

Over a great part of the Carbon Creek Valley, bedrock, comprising conglomerate, sandstone, shale and coal, is concealed beneath an overburden of sand, gravel, slide rock, and glacial debris. Exposures of coal are confined almost entirely to the banks of streams. Information on the extent of individual coal seams is, therefore, fragmentary. The results of a comprehensive program of core drilling will be necessary before estimates of tonnages of available coal can be given. Nevertheless on the basis of the present information some generalizations can be made.

The coal occurs in the upper part of a succession of sediments referred to the Bullhead group of Lower Cretaceous age. These sediments were laid down as flat-lying beds which were subsequently folded. Erosion has removed the upper coal-bearing beds from all but the central part of an elongated basin-shaped structure. Most of the coal seams are confined to the central part of this basin, within an area extending south-east along the west side of Carbon Creek from 10 Mile Creek for at least 5 miles. The southern termination of this central area has not been established. The width of the coal-bearing area reaches 1 mile. Outside this central area other coal seams are known but they are, for the most part, thinner and less common, but several seams greater than 4 feet in thickness, and, therefore, of commercial interest, have been found.

11 Mile Creek:

The most complete exposures of the coal-bearing strata in the Carbon Creek area lie in the canyon of 11-Mile Creek,

tributary to the Carbon from the west. Here the basin-shaped structure, described above, is found to be complicated by two or three subsidary folds. Thus some coal seams appear at the surface several times. The correlation of seams is confused by two features, first, the strata apparently thicken towards the west and, consequently, the intervals between the seams increase in that direction, and second, the strata are broken along two and possibly four fractures planes to produce abrupt discontinuities in the exposed succession of rocks.

The coal seam highest in the succession on 11 Mile Creek, and referred to in private reports as 'seam A,' has been preserved from erosion only in the centre of the structural basin, where it is of very limited extent. Seams lower in the succession, however, are preserved over greater areas and are, therefore, much more attractive. The seams of interest are listed below together with their thicknesses, or known range of thicknesses, separation, and analyses. (Table 1)

Outside the 11 Mile Creek area, six coal seams are known to exceed 3 feet in thickness. The precise relationship of these to one another and to those of the 11 Mile Creek section has not been established. Thickness, analyses, and approximate location of these seams, together with those from a few seams of smaller size, are given in Table 11.

Grade of Coal:

All samples obtained by the writer from the Carbon Creek area were from the surface outcrops of the coal seams with the exception of samples 240J, 241J, 244J, 249J, and 250J, which were

obtained from cuts and short headings at distances of not more than 20 feet from the surface. Hence the analyses are of more or less weathered coals, and it may be expected that fresh coal, such as would be mined, would contain somewhat less moisture and possess somewhat higher calorific value than is indicated in the analyses. Moreover, both as a result of weathering and the infiltration of soil particles into the surface coals, the ash content of the samples may be considerably higher than would be the case in fresh coal from the same seam. Greater emphasis should be placed on the analyses of samples 240J, 241J, 244J, 249J and 250J than on the others in assessing the grade of Carbon Creek coals.

As indicated by the samples obtained, Carbon Creek coals can be classed as from medium to low volatile bituminous. The ash content of the coals, even in the surface samples, compares very favourably with that from other North American fields, and the calorific value is high. With one exception all samples were found to be of non-coking coal.

Thickness and Continuity of Seams:

The thickness of coal seams of the Carbon Creek field, like those of other fields, show locally marked variations as a result of deformation. The seams exposed on the south branch of 11 Mile Creek 0.5 miles south of the forks are markedly thicker at the centre of a fold than on either flank. A similar variation is noted in seam 'C' in which the thickness varies from 62" near the centre of a fold to 45" only 6 feet away on the flank of the fold. For this reason the thickness, 17 feet, of seam 'F' at the

forks of 11 Mile Creek, and 8'9", of the seam about 4 miles south of the forks of the Carbon, both of which were measured at points close to the crests of folds, may be unduly great.

Of more importance is the range of thickness of the seams where they have been relatively undisturbed. Wherever a seam varies markedly in thickness, however, its correlation between isolated outcrops becomes uncertain, whereas if a seam has a uniform thickness its exposures can be much more reliably correlated. Hence in an undeveloped coal field it is easier to establish correlation uniformity of thickness than to establish marked variability in thickness.

Several of the seams in the 11 Mile Creek area show considerable uniformity in thickness. Exposures C, C', and E, apparently all on a single seam, range in thickness between 48 and 51 inches in a distance of .35 miles. Seam G, exposed at three points near the forks of 11 Mile Creek and once 0.75 miles to the south, varies in thickness between 66 and 75 inches. On the other hand, seam F in the same distance ranges between 304 inches and 124 inches (including shale partings) although, as mentioned above, this variation in thickness may be explained in part at least by the squeezing of coal towards the crest of a fold. Seam D, consisting of an upper 9 inches of coal and a lower 35 inches separated by a 7 inch shale parting, apparently corresponds to two seams about 15 feet below seam E which consist of 16 and 26 inches of coal respectively, separated by 40 inches of shale and sandstone. Moreover, seams F+ 170' and F+ 135', each over 4 feet thick, were exposed 0.15 miles south of the forks of 11 Mile

Creek may correspond to two seams each about 1 foot in thickness at the forks themselves. The possibility of faulting in the latter locality, however, renders this correlation uncertain. A pair of seams in the upper canyon of Carbon Creek, each over 4 feet thick, may correspond to a pair of seams at the foot of the lower canyon between 1 and 2 feet thick, but here again the correlation is not certain.

The available information, therefore, indicates a fair continuity to some of the seams, but in view of the possible variations indicated in some of the seams it is imperative that further information be obtained by drilling before any large capital expenditures are made.

Structure:

The coal occurs, as mentioned above, in an elongated basin-shaped structure. Near the mouth of Carbon Creek this structure is relatively simple but on 11 Mile Creek it is complicated by minor folds and several breaks (N.B. sections). Moreover, as is indicated by the structural sections, there is a marked increase in complexity between the north and south branches of 11 Mile Creek with two subsidiary folds developing in the short distance between the two creeks. It was not found possible to trace minor structures upstream (southerly) from 11 Mile Creek, but the major structure extends for at least 9 miles to the south-east. The shallowness, probably less than 1000 feet, to which the coal seams may be expected to extend at the centre of the basin would be of advantage in mining, while the presence of minor folds and breaks in the structure would undoubtedly lead to difficulties in development and extraction of coal but the problems are apparently not markedly greater than those encountered and over-

come in coal mining elsewhere in the foothills of the Rockies.

Summary:

It is believed that at least 10 coal seams exceeding 4 feet in thickness are represented in the Carbon Creek coal field, but of these only two exceed 6 feet in thickness. Until further information is available on the extent of the individual seams no estimate of tonnage can be given. The exposures of the coal seams occur in an area at least 12 miles long and locally 2 miles wide, but most of the seams are confined to a central area probably at least 5 miles long and up to 1 mile wide (see map). The coal is medium to low volatile bituminous and non-coking except for one or two seams. The ash content of most of the larger seams compares favourably with ~~those of~~ that of similar seams of other coal fields, and some of the seams are exceptionally clean. The complexity of the structure is of the same order as that of some of the fields elsewhere in the foothills. The comparative shallowness of the coal seams, probably less than 1000 feet, favours development and mining.

Summary by Alan P. Frankley

June 19, 1947.

W. H. Mathews (1946): Geology and Coal Resources of the Carbon Creek Mount Bickford Map-area. B. C. Dept. of Mines, Bull. 24.

Age	Group	Formation	Character & Remarks
Recent Pleistocene		0-1,080±ft.	Alluvium, terraced drift, and till. Glaciation to at least 6,000 ft., mov. to east. Terraces at 2,050 and 2,400 ft. elev.
Up. Cret.		Dunvegan, 200±	Ss. & cong.
L. Cret	FT. ST. JOHN	Cruiser 1,000± Goodrich Hasler 2,500 Commotion 1,300-1,500 Moosebar 800±	Sh. Ss., cong. Sh. some ss. Ss., qtzite, cong., sh., a resistant formation. Marine sh., cong. at base.
L. Cret	BULLHEAD	Gething (Coal-measures) 4,000-4,500	Alternating sh. and ss., coal, cong. often at base, near top and at hor. 1,500 above base. Also called "non-marine Bullhead" which is approx. same as Gething.
L. Cret or Up. Jurassic	BULLHEAD	Dunlevy (Marine Bullhead) Monach 300-400 Beattie Peaks 750-1,200 Monteith 1,000-1,700	Marine ss., resistant beds often x-bedded. Weakly resistant sh. and sand sh. 10-30 ft. beds of dark grey as interbedded with narrow sh. beds. Upper 500 ft. is white qtzite. Very resistant form. found topping most of higher summits in area.
Jurassic		Fernie 500-800	Marine, predom. sh., some f.g. ss. in upper part.
Triassic		Schooler Creek 2,500±	V.f.g. calcareous ss. and siltstone and impure ls.

STRUCTURE

Folds trent N.N.W.

Mainly reverse faults with moderate to steep west dips. Major faults usually follow antiriinal axes, 15 mile long fault Mt. McAllister to Peace river, dip 60°W, displacement 3,000-10,000 ft.

COAL DEPOSITS

Coal confined to non-marine Bullhead(Gething) formation; reported also in Dunvegan and Commotion formations in adjacent areas.

Most of the thicker coal seams occur in upper 1,000 ft. of the Bullhead group, this upper section found in central part of Carbon Creek basin, Fisher Creek syncline, and eastern limb of anticline near Crassier creek.

In Carbon Creek basin - at least 10 seams over 4 ft. thick.
" " 5 " 3-4 " "

In Fisher Creek syncline - at least 3 seams over 4 ft. thick.
" " 2 " 3-4 ft. "

Coal - called a medium-volatile bituminous coal.
- over 13,000 BTU/lb when less than 5% ash.
- often less than 5% ash.
- carbon-ratio averages 2.5

Dr. J.F. Walker,

Deputy Minister of Mines,

Buildings.

March 6 46

File 55° 122°

Re: Coal, Peace River Area

Herewith is a copy of Mathews' Preliminary Report on the Coal Deposits of Carbon Creek, January 1945, samples of coal seams in the Carbon Creek basin taken in 1944 and as no further seams were found in 1945, no samples were taken that year. It is possible that you have a copy of this report in your file. In due course I should like it returned for our file. *

Also herewith is a series of three Assay Certificates containing analyses of coal samples taken in 1945 by Mathews. The localities have been written in on the Assay Certificates. Mr. Mathews has no copy of these certificates, therefore, please let him have them back when you have had a chance to look them over. They refer principally to coal on Pine River.

HS/rc
Attach.

Chief Mining Engineer.

Memo. to Mr. Yarwood dated Feb. 5/45 on file 3030E

* returned Oct. 13/50 KP.

493

~~3030-E~~
x ref. L55-122 ✓

c
o
p
y

November 16, 1950.

Mr. John Burns,
P. Burns Coal Mines Ltd.,
31 Michael Building,
Calgary, Alta.

Dear Mr. Burns:

I have just learned with much regret of the death of J.O. Howells. I am sure that you will feel it a great loss. I had a letter ready to to go Mr. Howells when I learned of his death. It related to a map prepared by Dr. Mathews based on his 1944 field work on Carbon Creek. You may know that Dr. Mathews accepted an appointment on the staff of the Department of Geological Sciences, University of California, a year ago last autumn. In connection with his teaching Dr. Mathews would like a copy of a map at 1 mile to the inch of the Carbon Creek coal field based on his 1944 field work only. This map was at a scale of 1 mile to one inch and covered Carbon Creek from its outlet at the Peace River to a point about five miles south of Eleven Creek. We have a map at 800 feet to the inch covering leases 319, 320, 321, and 322 and showing most of Eleven Creek and a small part of the main Carbon Creek, but we have not found the map at 1 mile to the inch which Dr. Mathews wants. The latter map was prepared as a tracing and showed outcrops of beds by double lines. Dr. Mathews thinks that a copy may have been sent to your office along with his preliminary report in the spring of 1945 or that a copy may have gone to J.O. Howells along with detailed stratigraphic columns prepared by Dr. Mathews. Mr. Howells had offered to have the sections drafted in final form and that was done. I think the sections were sent to Mr. Howells under cover of a letter dated June 2, 1945 of which a copy accompanies the present letter.

If the map should be in your files or in other files of which you know, I should appreciate it greatly if you can arrange for us to obtain a copy. We should be glad to pay for having the map photostated or if you could arrange to have it sent to us, we could have it copied here and returned to you.

If you can do anything to assist us in obtaining a copy, it will be very much appreciated. I should like to be able to meet Dr. Mathews' need for a copy and also to have the record of some detail that does not appear on lithographed map that accompanied Bulletin 24.

Thanking you,

Yours truly,

"H. Sargent"
Chief Mining Engineer

HS/rm
Enc.

493

#493

OPEN FILE

FROM: COAL DEPOSITS
FILE No. 2000 E
(old no. 547E)
Dead Files Box ?
-Betw. June 9/45 letter + Jan 9/46 letter

Section of Bore Hole on Blair Flat.

167'	clay
4'	boulders
24'	clay with rocks
17'	hard pan clay & rocks
15'	clay & boulders
2'	boulders
13'	clay & boulders
3'-10"	boulder, clay & gravel
5'- 6"	sandstone
4'- 2"	sticky shale
27'	shale & sandstone
8'	sticky shale
19'	sandstone
21'	dark sticky shale
25'	sticky shale
19'	dark shale
8'	sticky shale
11'-11"	coal
1'	black shale
3'	mud
7'-10"	Coal - 2" band of shale
1'	mud
2'	fireclay
3'	shale & sandstone
0'-11"	mud seam
3'- 3"	coal - 2" band of shale
1'- 0"	shale
2'- 3"	mud seam
5'- 4"	shale
2'- 0"	shaly sandstone
17'	hard sandy shale
6'	sandstone
16'	sandstone
2'	mud & traces of coal
10'	sandstone
26'	sandstone
18'	sandstone
5'	shale
8'	shale
7'	coal
1'	broken shale
10'	sandstone
3'	broken shale
5'	black mud

FROM COAL DEPOSITS
FILE NO. 2000 E
(dd no. 547 E)
Dead Files Box ?

RE: Ingenika Mines Limited Property - Extracts from R. R. Wilson M.E. Report

in letter rec'd 7/3/49

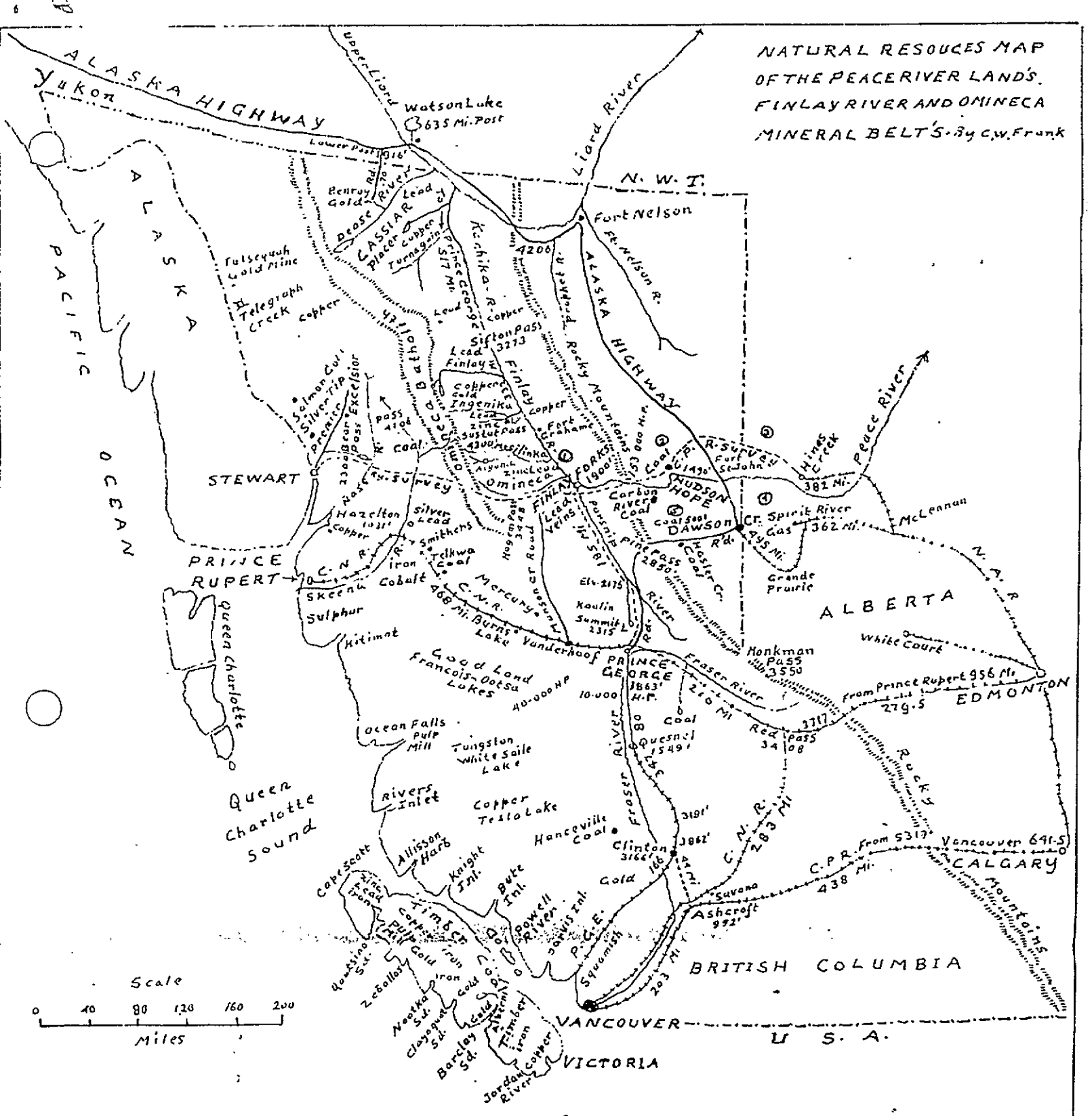
Ore - An average of about 150 channel samples, cut by four competent mining engineers from surface cuts, averaged about 15% lead, 7.5% zinc, 6. pz. silver. Samples from both surface and preliminary sampling of underground development to date indicates an average of about 12% lead, 7.5% zinc and 4. oz. silver per ton.

Ore Reserves - Sufficient development work has not yet been done to make accurate estimates of ore reserves. It is, however, reasonable to assume from the results of development on the 200 and 400 levels, that the property will produce at least several hundred thousand tons of ore and also to conclude that there is a splendid chance of developing a very large tonnage of medium grade milling ore throughout the Company's property.

Onward group: Important surface shewings of ore have been found on the Onward Group about a mile and a half from the Ingenika Mine - and on the Indian showing about three quarters of a mile to the east of the mine.

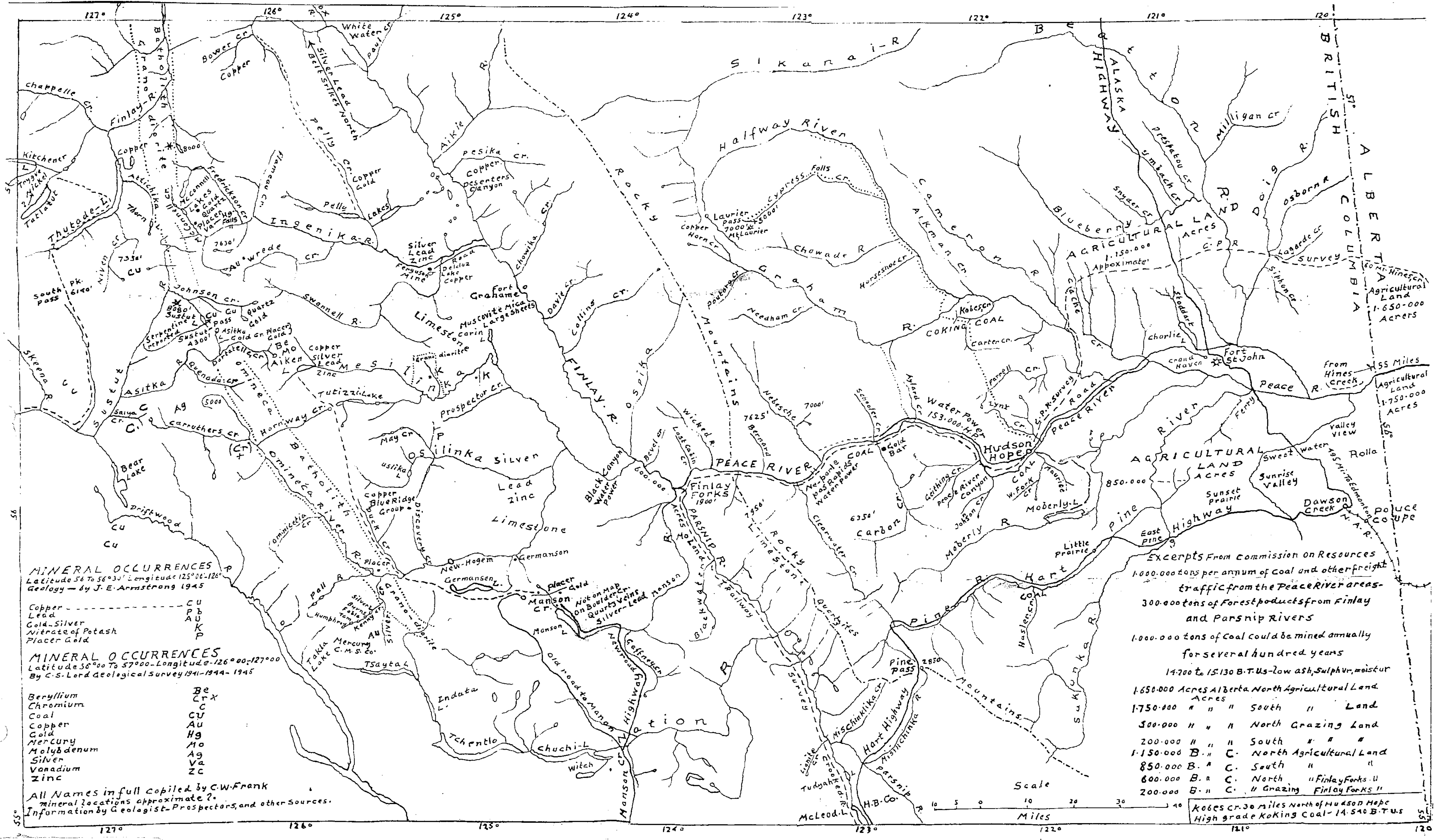
Remarks: The Known ore bodies occur as replacement deposits in limestone, and appear to favor where the limestone rocks have been extensively folded, faulted and sheared.

Authorized Share Capital	$3,000,000.
Issued	1,346,675.
Balance in Treasury	1,653,325.



1	Finlay and Parsnip Rivers Agricultural Land	600·000	Acres
2	B·C· North	1·150·000	"
3	B. C. South	850·000	"
3	Alberta North	1·650·000	"
4	Alberta South	1·750·000	"
	...sts, Finlay and Parsnip Rivers, a year	300·000	Tons
	Coal - Carbon River - and Hudson Hope, a year	1·000·000	"
	From Hudson Hope via Peace Pass to Squamish	692	Miles
	" " " " P.G.E. and Ashcroft - Vancouver	773	"
	" " " " C.N.R. To Prince Rupert	753	"
	" " " " C.N.R. Thompson River Vancouver	961	"

Minerals of the Omineca District "areas"
West of the Rocky Mountains mainly Copper-Gold
West of the Finlay River - Lead-Zinc-Copper-Mica-Gold-Silver-Limestone-Garnets-Quartz-
East Slope of Omineca Batholith - by C.S. Lord 1944-45 geological report - Beryllium Chromium - Coal-Copper-Gold-Mercury-Molybdenum-Silver-Vanadium-Zinc. Prospectors report, Siderite iron Niccolite - Large gold vein 3 miles east of McConnell Lake, Ingenika River.


MINERAL OCCURRENCES
Latitude 56 To 56°30' Longitude 125°00'-126°
Geology — by J. E. Armstrong 1945
Copper — CU
Lead Pb
Gold-Silver AU
Nitrate of Potash K
Placer Gold P
MINERAL OCCURRENCES
Latitude 56°00 To 57°00 - Longitude - 126°00 - 127°00
By C. S. Lord Geological Survey 1941-1944-1945
Beryllium Be
Chromium Cr x
Coal C
Copper CU
Gold Au
Mercury Hg
Molybdenum Mo
Silver Ag
Vanadium Va
Zinc ZC
All Names in full copiled by C. W. Frank
mineral locations approximate ?.
Information by Geologist-Prospectors, and other Sources.
Excerpts From commission on Resources
1.000.000 tons per annum of Coal and other freight
traffic from the Peace River areas-
300.000 tons of Forest poducts from Finlay
and Parsnip Rivers
1.000.000 tons of Coal could be mined annually
for several hundred years
14.700 to 15.130 B.T.Us-low ash, Sulphur, moistur
1.650.000 Acres Alberta North Agricultural Land
1.750.000 " " " South " Land
500.000 " " " North Grazing Land
200.000 " " " South " " "
1.150.000 B. " C. North Agricultural Land
850.000 B. " C. South " "
600.000 B. " C. North " Finlay Forks "
200.000 B. " C. " Grazing Finlay Forks "
Kobes Cr. 30 Miles North of Hudson Hope
High grade Koking Coal - 14.540 B.T.U.s
Scale
Miles
ALBERTA
BRITISH COLUMBIA
PEACE RIVER
Peace R.
Finlay Forks 1900'
Hudson Hope
Fort St John
Fort Grahame
Dawson Creek
Pouce Coupe
ALASKA HIGHWAY
Hart Highway
Pine Pass
Manson Cr.
Germanson
McLeod L.
AGRICULTURAL LAND 1.150.000 Acres Appoximate
AGRICULTURAL LAND Acres 850.000
Agricultural Land 1.650.000 Acres
Agricultural Land 1.750.000 Acres
Water Power 153.000 H.P.
Rocky Mountains
FINLAY R.
PARSNIP R.
Omineca River
Halfway River
Ingenika R.
Mesilinka R.
Osilinka Silver
Sikanai-R
Graham R.
Moberly R.
Pine R.
Nation
Limestone
Lead Zinc

FROM: COAL - DEPOSITS OF
FILE NO.: 2000 E (old 549 E)

Betw Nov 17/44 letter
& May 15/46 letter

PRELIMINARY REPORT

on the

COAL DEPOSITS OF

CARBON CREEK

Peece River District, B.C.
Lat. 55°, Long. 122° NW

by W.H. Mathews
B.C. Dept. of Mines
January, 1945.

CONTENTS

COAL DEPOSITS

CARBON CREEK

PEACE RIVER AREA
British Columbia

By W.H. Mathews,
January, 1945.

Location and Accessibility:

Carbon Creek, in the eastern part of the Rocky Mountains, flows into the Peace River from the south. It lies 45 miles (airline) east of Finlay Forks and 30 miles (airline) west of Hudson Hope. The nearest railways are at Dawson Creek, 95 miles (airline) to the east and at Prince George, 135 miles (airline) to the south.

The mouth of Carbon Creek is reached by boat from Gold Bar Post Office, on the north side of the Peace River, 10 miles to the east. Gold Bar is at the end of the road from Hudson Hope and Fort St. John. From the mouth of Carbon Creek a pack trail leads southward to the coal showings around 11 mile creek. Trappers trails, some in poor condition, lead from this pack trail to some of the showings on creeks tributary to the Carbon.

Ownership:

Many of the coal showings occur in lots 319 to 328, 10 square miles in all, held by a small group of which the controlling interest is in the hands of the Burns Foundation, estate of the late Senator Pat Burns of Calgary. Other showings occur on unalienated land.

General Statement:

Over a great part of the Carbon Creek Valley, bedrock, comprising conglomerate, sandstone, shale and coal, is concealed beneath an overburden of sand, gravel, slide rock, and glacial debris. Exposures of coal are confined almost entirely to the banks of streams. Information on the extent of individual coal seams is, therefore, fragmentary. The results of a comprehensive program of core drilling will be necessary before estimates of tonnages of available coal can be given. Nevertheless on the basis of the present information some generalizations can be made.

The coal occurs in the upper part of a succession of sediments referred to the Bullhead group of Lower Cretaceous age. These sediments were laid down as flat-lying beds which were subsequently folded. Erosion has removed the upper coal-bearing beds from all but the central part of an elongated basin-shaped structure. Most of the coal seams are confined to the central part of this basin, within an area extending south-east along the west side of Carbon Creek from 10 Mile Creek for at least 5 miles. The southern termination of this central area has not been established. The width of the coal-bearing area reaches 1 mile. Outside this central area other coal seams are known but they are, for the most part,

thinner and less common, but several seams greater than 4 feet in thickness, and, therefore, of commercial interest, have been found.

11-Mile Creek.

The most complete exposures of the coal-bearing strata in the Carbon Creek area lie in the canyon of 11-Mile Creek, tributary to the Carbon from the west. Here the basin-shaped structure, described above, is found to be complicated by two or three subsidary folds. Thus some coal seams appear at the surface several times. The correlation of seams is confused by two features, first, the strata apparently thicken towards the west and, consequently, the intervals between the seams increase in that direction, and second the strata are broken along two and possibly four frectures planes to produce abrupt discontinuities in the exposed succession of rocks.

The coal seam highest in the succession of 11 Mile Creek, and referred to in private reports as 'seam A', has been preserved from erosion only in the centre of the structural basin, where it is of very limited extent. Seams lower in the succession, however, are preserved over greater areas and are, therefore, much more attractive. The seams of interest are listed below together with their thicknesses, or known range of thicknesses, separation, and analyses. (Table I)

Outside the 11 Mile Creek area, six coal seams are known to exceed 3 feet in thickness. The precise relationship of these to one another and to those of the 11 Mile Creek section has not been established. Thickness, analyses, and approximate location of these seams, together with those from a few seams of smaller size, are given in Table II.

Grade of Coal:

All samples obtained by the writer from the Carbon Creek area were from the surface outcrops of the coal seams with the exception of samples 240J, 241J, 244J, 249J, and 250J which were obtained from cuts and short headings at distances of not more than 20 feet from the surface. Hence the analyses are of more or less weathered coals, and it may be expected that fresh coal, such as would be mined, would contain somewhat less moisture and possess somewhat higher calorific value than is indicated in the analyses. Moreover, both as a result of weathering and the infiltration of soil particles into the surface coals, the ash content of the samples may be considerably higher than would be the case in fresh coal from the same seam. Greater emphasis should be placed on the analyses of samples 240J, 241J, 244J, 249J and 250J than on the others in assessing the grade of Carbon Creek coals.

As indicated by the samples obtained, Carbon Creek coals can be classed as from medium to low volatile bituminous. The ash content of the coals, even in the surface samples, compares very favourably with that from other North American fields, and the calorific value is high. With one exception all samples were found to be of non coking coal.

Thickness and Continuity of Seams:

The thickness of coal seams of the Carbon Creek field, like those of other fields, show locally marked variations as a result of deformation. The seams exposed on the south branch of 11 Mile Creek 0.5 miles south of the forks are markedly thicker at the centre of a fold than on either flank. A similar variation is noted in seam 'C''' in which the thickness varies from 62" near the centre of a fold to 45" only 6 feet away on the flank of the fold. For this reason the thickness, 17 feet, of seam 'F' at the forks of 11 Mile Creek, and 8'9", of the seam about 4 miles south of the forks of the Carbon, both of which were measured at points close to the crests of folds, may be unduly great.

Of more importance is the range of thickness of the seams where they have been relatively undisturbed. Wherever a seam varies markedly in thickness, however, its correlation between isolated outcrops becomes uncertain,

whereas if a seam has a uniform thickness its exposures can be much more reliably correlated. Hence in an undeveloped coal field it is easier to establish uniformity of thickness than to establish marked variability in thickness.

Several of the seams in the 11 Mile Creek area show considerable uniformity in thickness. Exposures C, C', and E, apparently all on a single seam, range in thickness between 48 and 51 inches in a distance of 0.35 miles. Seam G, exposed at three points near the forks of 11 Mile Creek and once 0.75 miles to the south, varies in thickness between 66 and 75 inches. On the other hand seam F in the same distance ranges between 204 inches and 124 inches (including shale partings) although, as mentioned above, this variation in thickness may be explained in part at least by the squeezing of coal towards the crest of a fold. Seam D, consisting of an upper 9 inches of coal and a lower 35 inches separated by a 7 inch shale parting, apparently corresponds to two seams about 15 feet below seam E which consist of 16 and 26 inches of coal respectively, separated by 40 inches of shale and sandstone. Moreover seams F+170' and F+125', each over 4 feet thick, were exposed 0.15 miles south of the forks of 11 Mile Creek may correspond to two seams each about 1 foot in thickness at the forks themselves. The possibility of faulting in the

latter locality, however, renders this correlation uncertain. A pair of seams in the upper canyon of Carbon Creek, each over 4 feet thick, may correspond to a pair of seams at the foot of the lower canyon between 1 and 2 feet thick, but here again the correlation is not certain.

The available information, therefore, indicates a fair continuity to some of the seams, but in view of the possible variations indicated in some of the seams it is imperative that further information be obtained by drilling before any large capital expenditures are made.

Structure:

The coal occurs, as mentioned above, in an elongated basin-shaped structure. Near the mouth of Carbon Creek this structure is relatively simple but on 11 Mile Creek it is complicated by minor folds and several breaks (N.B. sections). Moreover, as is indicated by the structural sections, there is a marked increase in complexity between the north and south branches of 11 Mile Creek with two subsidiery folds developing in the short distance between the two creeks. It was not found possible to trace minor structures upstream (southerly) from 11 Mile Creek, but the major structure extends for at least 9 miles to the south-east. The shallowness, probably less than 1000 feet, to which the coal seams may be expected

to extend at the centre of the basin would be of advantage in mining, while the presence of minor folds and breaks in the structure would undoubtedly lead to difficulties in development and extraction of coal but the problems are apparently not markedly greater than those encountered and overcome in coal mining elsewhere in the foothills of the Rockies.

Summary:

It is believed that at least 10 coal seams exceeding 4 feet in thickness are represented in the Carbon Creek coal field, but of these only two exceed 6 feet in thickness. Until further information is available on the extent of the individual seams no estimate of tonnage can be given. The exposures of the coal seams occur in an area at least 12 miles long and locally 2 miles wide, but most of the seams are confined to a central area probably at least 5 miles long and up to 1 mile wide (see map). The coal is medium- to low-volatile bituminous and non-coking except for one or two seams. The ash content of most of the larger seams compares favourably with those of other coal fields, and some of the seams are exceptionally clean. The complexity of the structure is of the same order as that of some of the fields elsewhere in the foothills. The comparative shallowness of the coal seams, probably less than 1000 feet, favours development and mining.

Coal Seams, 11 Mile Creek, Carbon Creek Coal Basin

TABLE I

Correlated seams	Sample	Thickness	Spacing	Roof	Floor	H_2O	V.C.M.	F.C.	Ash	B.T.U.	S.
A	252J	42"		Shale	Shale	3.41	30.43	52.64	13.52	11,830	0.56
			120'								
B	251J	21"		Shale	Shale	3.44	29.24	60.95	6.37	12,670	0.85
E+10'	245J	20"		Shale	Shale	4.48	29.75	60.4	5.37	12,730	0.73
			10'								
C	250J	49"		Shale	Shale, 2' on ss	3.31	26.97	66.37	3.35	13,150	0.57
C'	249J	51"		Shale	Shale, 3' on ss	1.87	27.21	68.67	2.25	13,980	0.77
C"[1]	246J	62" (62-45")		Shale	Shale, 1' on ss	4.04	28.62	64.96	2.38	13,530	0.57
E	244J	52"		Shale	Shale, 1' on ss	3.45	26.05	67.39	3.11	13,620	0.49
			15'-47'								
D	248J[1]	9"+7"[2]35"		Shale	Shale	4.00	24.72	63.03	8.25	12,510	0.57
D'	247J	31"		Shale	Shale, 1½' on ss	3.51	27.23	65.13	4.13	13,450	0.64
E-15'	243J + 242J	16"+40"[2]+26"		Shale, ½'under ss	Shale, 1', on ss	(2.70	24.89	56.79	15.62	12,000	0.70)
			120'			(2.72	27.74	66.88	2.66	13,650	0.67)
H'	241J + 240J	13"+43"[2]+34"		Sandstone, Congl.	Shale	(2.24	29.43	65.8	2.53	13,750	0.79
			?			(3.44	24.45	68.43	3.68	13,150	0.70
H	262J	48"[3]		Shaly sandstone	Sandstone	2.99	19.51	46.06	31.44	9,140	0.44
			25'								
I	261J	72"		Shale	Shale	3.33	23.3	70.69	2.68	13,650	0.59
			100'?								
F+170'	260J	52"		Ss. 2-3' under sh.	Shale, 1½', on ss	7.19	25.29	57.27	10.25	10,950	0.59
			18'								
F+150'	259J	53"		Shale	Ss, few in. on shale	9.59	20.52	54.86	15.03	10,360	0.47
			25'								
F+125'	256J	51"		Shale	Ss, 3', on shale	5.52	25.1	67.7	1.68	12,700	0.53
			125'								
F	253J[1]	204"		Shaly sandstone	Sh. 0-3' on ss	2.21	25.07	58.15	14.57	11,840	0.62
F"	235J+236J	18"+14"[2]+92"		Shale, 1', under ss	Sandstone	(2.98	26.8	64.91	5.31	13,270	0.63)
			15'-20'			(2.91	23.0	56.47	17.62	11,460	0.48)
G	254J	72"		Sh. 1' under ss	Sandstone	2.60	25.53	69.16	2.71	13,970	0.61
G'	255J	75"		Sh. 3' under ss	Sandstone, shaly	7.16	26.63	63.99	3.22	12,230	0.48
G"	237J	67"		Sandstone	Sandstone	3.55	23.9	70.14	2.41	13,580	0.61
			?								
		48"-72"[4]		------	------						
			15'-18'[4]								
G?	232J	67"		Sandy shale	Shale 1', on ss	7.25	22.74	55.42	14.59	10,620	0.48

[redacted]

[1]Sample exclusive of shale partings. [2]shale parting. [3]Upper 40" only, sampled.
Sh - shale, Ss - sandstone. [4]Reported by Belts and Stines

TABLE II

Coal Analyses - Carbon Creek Field

Thickness	Sample	H_2O	V.C.M.	F.C.	Ash	B.T.U.	S	Location
35"	263J	3.28	21.61	70.15	4.96	13,590	0.49	5 Mile Cr. 0.35 miles from mouth
28"	215J	2.75	24.17	64.12	8.96	13,320	0.65	7 Mile Cr. 1.5 miles from mouth
26"	216J	4.17	21.4	61.01	13.42	12,040	0.58	18 feet above last
36"	217J	2.57	17.88	49.86	29.69	9,580	0.54	1.9 miles from mouth
60"	218J	5.83	24.33	64.61	5.23	12,800	0.52	2.2 miles from mouth
50"+	239J	2.75	25.84	63.94	7.47	12,930	0.67	9 Mile Cr. 1.2 miles from mouth
34"	238J	4.40	25.64	65.34	4.62	12,850	0.57	10 Mile Cr. 0.45 miles from mouth
35"	219J	2.66	18.25	57.69	21.40	11,410	0.71	Carbon Cr. at 6 Mile
64" (31"	222J	5.63	20.2	52.11	22.06	10,200	0.48	Top (crushed)
64" (8"	221J	5.81	27.11	50.74	16.34	11,110	0.47	(bone) 0.45 mi. SE of last
64" (25"	220J	4.44	18.58	70.54	6.44	13,000	0.46	Base (clean coal)
64" total		5.18	20.40	59.17	15.25	11,410	0.47	
31"	223J	4.98	19.47	72.16	3.39	13,320	0.46	N Fk. 11 Mi. Cr. 5 miles above Carbon
41"	228J	1.47	30.17	64.34	4.02	13,980	0.78	Carbon forks
30"+	229J	1.79	21.45	75.64	1.12	14,620	0.52	ditto Upper part of 5-6' seam
34"	230J	1.97	19.97	69.78	8.28	13,470	0.76	Carbon Cr. 1.3 miles above forks
30"	231J	2.45	16.41	77.59	3.55	14,180	0.50	Carbon Cr. 2.5 miles above forks
105" (15"	227J	5.24	16.45	71.53	6.78	12,930	0.28	Top
105" 23"	226J	4.40	15.49	56.44	23.67	10,280	0.31	1.3 miles S of last
105" (67"	225J	4.41	15.53	69.50	10.56	12,530	0.39	Bottom
105" total		4.54	15.65	66.91	12.90	12,090	0.36	
26"	224J	6.19	16.57	58.12	19.12	10,690	0.43	Same locality - top? of last seam

FROM: COAL - DEPOSITS OF
FILE NO. 2000 E (old 547 E)
from letter dated May 14/46

BRITISH COLUMBIA ELECTRIC POWER AND GAS COMPANY, LTD.

Vancouver, B.C.

Coal Carbonized or Used in Gas Plants - for two Years - December 31, 1944 - 1945.

Name of Coal	Origin	Carbonized	Price at Mine per S. Ton	Price at Plant per S. Ton	Average Laboratory Analyses: Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Fusion Point of Ash °F
1944										
Comox	Vanc'r Island	39,013	$ 4.98	$ 5.46	6.5%	30.1%	53.5%	16.4%	2.69%	2,190
Western Fuel	Vanc'r Island	35,322	$ 4.98	$ 5.35	7.3%	34.9%	48.3%	16.8%	.63%	2,302
Total Island Coal		74,335								
Michel	Michel, B.C.	29,075	$ 3.89	$ 8.21	2.5%	22.9%	64.8%	12.3%	.66%	2,820
Cadomin	Cadomin, Alta.	7,135	$ 4.00	$ 8.22	5.7%	24.9%	59.4%	15.7%	.37%	2,840
x Miscellaneous x (High Ash)	Vanc'r Island Eastern B.C., Alberta	2,547	$ 3.00	$ 4.62						
Total		113,092								
1945										
Comox	Vanc'r Island	25,781	$ 4.98	$ 5.50	6.3%	30.2%	53.2%	16.6%	2.80%	2,180
Western Fuel	Vanc'r Island	12,532	$ 4.98	$ 5.37	7.3%	35.1%	47.9%	17.0%	.69%	2,266
Total Island Coal		38,313								
Michel	Michel, B.C.	18,694	$ 3.79	$ 8.21	4.0%	22.8%	65.6%	11.6%	.59%	2,790
Cadomin	Cadomin, Alberta	49,600	$ 4.00	$ 8.22	4.7%	25.2%	60.7%	14.1%	.34%	2,741
Blairmore	Blairmore, Alberta	2,915	$ 3.47	$ 8.09	4.0%	23.7%	58.4%	17.9%	.45%	2,860
Mountain Park,	Mt. Park, Alberta	141	$ 3.90	$ 8.22	5.9%	24.7%	62.5%	12.8%	-	-
Diamond Vale	Coutlee, B.C.	71	$ 4.25	$ 6.07	5.2%	33.5%	48.8%	17.7%	.51%	2,282
x Miscellaneous x (High Ash)	Vanc'r Island Eastern B.C., Alberta	7,531	$ 3.00	$ 4.42	13.1%	31.1%	41.3%	27.6%	-	-
Total		117,265								

Average Cost of Coal Carbonized per 2,000 lbs. 1944 - $ 5.89

Average Cost of Coal Carbonized per 2,000 lbs. 1945 - $ 6.99

letter dated May 14/46
Coal used by BC Electric Co. Ltd
Coal used at Vanc only not Victoria or Burnwood

FROM: COAL - DEPOSITS OF
FILE NO. 2000 E (old 547 E)
from letter dated May 14/46

BRITISH COLUMBIA ELECTRIC POWER & GAS COMPANY, LTD.

Mainland

Coal Purchased

		Comox	Western Fuel	Total	Other Coals	Total
		S. Tons	S. Tons	S. Tons	S. Tons	S. Tons
Year Ended June 30,	1937	37,191	27,886	65,077	3,416	68,493
" " " "	1938	48,500	33,448	81,948	726	82,674
" " " "	1939	43,170	28,005	71,175	637	71,812
Six Months Ended Dec. 31,	1939	20,860	18,368	39,228	203	39,431
Year Ended Dec. 31,	1940	28,818	43,996	72,814	399	73,213
" " " "	1941	30,106	52,326	82,432	-	82,432
" " " "	1942	31,552	52,038	83,590	17,097	100,687
" " " "	1943	23,376	29,771	53,147	80,310	133,457
" " " "	1944	38,518	34,910	73,428	37,559	110,987
" " " "	1945	28,025	13,780	41,805	73,954	115,759

"Typewritten" for B.F. Hamel, B.Sc., Chief, Division of Fuels & Fuel Testing, Dept. of Mines & Resources, Ottawa

PRELIMINARY NOTES ON THE POSSIBLE UTILIZATION OF COAL FROM THE WASHERY WASTE DUMP AT CASSIDY, B.C.

May 15/46.

Gm: Coal-Deposits of
Can. No. 2000 E (old 547 E)

Situation:

The waste dump under discussion is situated at Cassidy, about one-quarter mile from the Island Highway, and approximately nine miles each way from Nanaimo and Ladysmith. It lies approxiamtely 600 yards from the Nanaimo River, and 150 yards from Haslaw Creek, and close to power lines.

History:

The dump is composed of refuse from the coal washer operated by Granby Mining Smelting and Power Co. Ltd. in conjunction with their Granby Colliery. A total of 2,500,000 long tons was produced from the Douglas seam during the period of 1918 to 1932. Owing to the crushed condition of the seam in this section less than 20% of the coal mined was sold in lump form, the remainder being washed to yield marketable fines and refuse. A large proportion of washed coal was shipped to the Company's smelter at Anyox for conversion to metallurgical coke.

The washer comprised two, 2-compartment jigs and nine Deister coal tables with auxiliary equipment including mechanical screens, a 75 foot Dorr Thickener, and an Oliver filter. Flotation was also provided for treatment of fines but proved unsuccesful.

Records show that approxiamtely 440,000 long tons of waste was discarded onto the present dump during the fourteen years of washer operation. An unspecified amount of this was re-washed at various times from which 13,400 long tons of marketable coal was obtained. An unknown but probably negligible amount of washer refuse was sluiced directly back to the workings for stowing.

Description of Dump:

Inasmuch as the dump occupies an irregular depression its

average depth cannot be satisfactorily estimated. Assuming, however, the obviously conservative figure of 15 feet, the pile would contain over 200,000 tons. On the basis of the old records mentioned above 400,000 long tons would probably be closer to the amount actually available taking into consideration various small lots which have been removed during the past ten years.

The dump is composed of loose material ranging in size from about three-quarters of an inch to dust.

Two samples, taken from pits at widely separated points and representing depths of about fifteen feet in each case, contained 35.7 and 37.5 per cent ash respectively. These were combined for the washing tests described in the following pages accompanying report.

Only total ash was determined in the two samples mentioned above. However, after washing, cleaned coal would be expected to resemble coal from the Douglas seam obtained elsewhere, but of comparable ash content of comparable ash content. The following analysis # of run-of-mine coal from the Douglas seam, No. 10, South Wellington Mine, should therefore give a rough indication of the product obtainable from the dump.

Report of Investigations, Carbonization Section, 175,-Fuel Research Laboratory, Bureau of Mines, Ottawa, Can.-E. Swartzman, June 1942.

Ash	Volatile	Fixed Carbon	Sulphur	Calorific Value
16.5%	36.4%	47.1%	0.5%	12130BTU/Lb.

Analysis of Ash

SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO	MnO	Na_2O	K_2O	P_2O_5	TiO_2	SO_3
38.0	7.8%	20.5%	18.6%	5.8%	0.1%	0.5%	1.1%	1.2%	0.9%	5.3

Washing Tests:

Results of investigations are given in the accompanying report. Sink-and-float tests indicate a theoretically possible yield of 41% by weigth in a float product containing 16% ash. A recovery of 32% was made in a product containing 16% ash by a combination of heavy liquid

separation of the plus 10 mesh fraction and tabling of the minus 10 plus 90 mesh fraction. This recovery could be raised somewhat should a greater ash content be permissible.

Preliminary investigations made to date demonstrate that marketable coal can be produced from the waste dump without apparent difficulty. Further tests must be made on a larger scale, however, to establish most efficient treatment methods, cost of plant, and to allow an estimation to be made of operating costs and recoveries which may be anticipated in practice.

The following points should be noted in discussing the dressing of this material:

(1) A combination of heavy-medium separation of coarser sizes with tabling of finer sizes should be investigated further on a larger scale with standard test equipment. This is necessary to establish the size ranges of feed amendable to treatment by each method. In the accompanying report 10 mesh was arbitrarily chosen as the dividing point between the two processes but is not necessarily the most economic size division for practical treatment.

(2) Tabling the minus 10 plus 90 mesh fraction gave a product containing 16% ash and equal to 42% by weigth of table feed or 22% of originals heads. No tests were run on minus 4 plus 10 mesh or minus 90 mesh fractions. Yield from the fine fraction, however, would only increase overall recovery by 2% under optimum conditions.

The minus 4 plus 10 mesh fraction should respond fairly well to tabling although further tests are required to establish its amendability to this form of treatment. Assuming comparable efficiency to that obtained with the finer fraction a recovery of 26%, equivalent to 6% of total feed, would be possible. On this basis the combined yield by tabling all the minus 4 mesh fraction would be about 28%. In practice this could probably be attained only by sizing the feed into plus and minus 10 mesh fractions and

tabling each separately.

The plus 4 mesh product, equal to 20% by weight of heads, is too coarse to respond well to tabling. Jigging would be difficult as well, owing to the flat slab-like shape of larger pieces. This fraction would require to be crushed to at least 4 mesh to make it amendable to treatment methods other than sink-and-float. By tabling the crushed product a recovery of 20 to 25 % might be obtained in a product containing 16% ash. This would be equivalent to 4 or 5 % of total heads.

In review it appears likely that a total of 31 to 33 % by weight of heads could be recovered in a minus 4 mesh product by screening, crushing oversize, screening to give roughly sized table feed, and tabling. Test-work should be carried out long these lines to establish recoveries possible in practice, and to contrast results with those obtained by sink-and-float testing as suggested in the previous section. In passing it should be noted that apart from other considerations which may arise when test-work is complete, the sink-and-float or heavy-medium method of treatment would be advantageous inasmuch as 10 or 12 % of the coal recovered would be marketable as pea coal.

Throughout the above discussion an ash content of 16 % in the cleaned product was assumed. Should 20 % ash be permissible, recoveries in the order of 40 %, instead of 32 %, would be possible.

Markets:

Irrespective of the treatment used the bulk of cleaned coal products would be classed as slack or washed smalls. In 1941 production of this grade of material from Vancouver Island collieries was about 122,000 tons, none of which was sold for domestic purposes. Among the chief users of washed slack are gas manufacturers and pulverized coal coal fired installations.

Statistics show that about 70,000 tons of coal are used annually in Vancouver and Victoria for the manufacture of gas. The proportion of

washed slack used for this purpose is not known.

Chief consumers of slack for pulverized coal firing are the B.C. Cement Co. at Bamberton, B.C. and the B.C. Sugar Refinery Ltd., in Vancouver. Boilers at the B.C. Electric power station at Brentwood are being converted to use pulverized coal at present and this plant will also constitute and important consumer. To date data has been obtained on only the B.C. Cement Company's installation at Bamberton. Consumption there is in the order of 35,000 tons per year at the present rate of production. Washed slack from Canadian Collieries plant at Nanaimo is brought in by scow at a delivered cost of $4.50 per short ton, of which 47 cents is the cost of scowing from Nanaimo to Bamberton. Ash content is in the order of 16 % but it is understood that a higher figure would be permissible as long as variations were minimized and the necessary heat could be obtained.

In general the average selling price for washed slack coal has been in the order of $4.25 per ton f.o.b. Nanaimo in recent months.

Approximate Cost Estimates for Producing Coal from Cassidy Dump:

The following estimates are very rough and are intended to serve only as a guide to the economic possibility of treating the waste dump at Cassidy. More accurate estimates must await the determination of the most satisfactory treatment methods to be employed and the scale of operation.

In arriving at the following figures the dump was assumed to contain only 300,000 short tons, of which 100,000 tons would be recoverable in a product containing 16 % ash.

Cost of Plant:

Washer--(100T/2 shifts production or 300 T/2 shifts of dump material.		$ 30,000
Excavating equipment, etc.		10,000
	Total	40,000
Water, Power, dockage, etc.		10,000
	Total	50,000

Operating Costs: (on basis of cleaned coal)

Excavating-- @ 10¢ per ton -------	$0.30 per ton
Washing ---- @ 30¢ per ton -------	.90 " "
Trucking---- 9 mi. @ 10¢ a mi. ---	.90 " "
Scow, Haulage--Vanc. or Bamberton--	.50 " "
Amortization--$50,000 on 100,000 T.-	.50 " "
Overhead and Misc.-- @ 10 % -----	.30 " "
Total cost per ton cleaned coal produced and delivered.	$ 3.40 per ton.

At present delivered costs of comparable material this would allow a difference of approxiamtely $1.00 to cover royalty and profit. The above cost estimates are considered to be conservative and might be reduced somewhat in practice.

In view of the present labor shortage the following comparison is interesting:

Tons of coal mined per day per employee--

South Wellington, #10 Mine, Nanaimo---	3.23
Wellington Mine ---	2.95
Comox Colliery, #5 Mine ---	1.36
Comox Colliery, #8 Mine ---	2.05

Tons of coal produced per day per employee (estimated)

Cassidy Waste dump ---	10-15

Summary and Conclusions:

(1) The waste coal dump at Cassidy is estimated to contain at least 100,000 tons of recoverable coal with a 16 % ash content. This is based on preliminary examination, old records, and small scale washing tests. Before final estimates can be made the dump should be systematically drilled and larger scale washing tests made on truly representative samples.

(2) Rough estimates demonstrate the possibility of producing washed slack from this source at lower cost delivered to Vancouver or Bamberton than the present selling price for washed smalls produced by Canadian Collieries at Nanaimo. Furthermore the production per man per day would greatly exceed that possible from a mining operation.

J. M. Cummings,
Mining Engineer,
Department of Mines,
Victoria, B.C.

PRELIMINARY NOTES ON THE POSSIBLE UTILIZATION OF COAL FROM THE WASHERY WASTE DUMP AT CASSIDY, B.C.

Situation:

The waste dump under discussion is situated at Cassidy, about one-quarter mile from the Island Highway, and approximately nine miles each way from Nanaimo and Ladysmith. It lies approximately 600 yards from the Nanaimo River, and 150 yards from Haslaw Creek, and close to power lines.

History:

The dump is composed of refuse from the coal washer operated by Granby Mining Smelting and Power Co. Ltd. in conjunction with their Granby Colliery. A total of 2,500,000 long tons was produced from the Douglas seam during the period of 1918 to 1932. Owing to the crushed condition of the seam in this section less than 20% of the coal mined was sold in lump form, the remainder being washed to yield marketable fines and refuse. A large proportion of washed coal was shipped to the Company's smelter at Anyox for conversion to metallurgical coke.

The washer comprised two, 2-compartment jigs and nine Deister coal tables with auxiliary equipment including mechanical screens, a 75 foot Dorr Thickener, and an Oliver filter. Flotation was also provided for treatment of fines but proved unsuccessful.

Records show that approximately 440,000 long tons of waste was discarded onto the present dump during the fourteen years of washer operation. An unspecified amount of this was re-washed at various times from which 13,400 long tons of marketable coal was obtained. An unknown but probably negligible amount of washer refuse was sluiced directly back to the workings for stowing.

Description of Dump:

Inasmuch as the dump occupies an irregular depression its average depth cannot be satisfactorily estimated. Assuming, however, the obviously conservative figure of 15 feet, the pile would contain over

200,000 tons. On the basis of the old records mentioned above 400,000 long tons would probably be closer to the amount actually available taking into consideration various small lots which have been removed during the past ten years.

The dump is composed of loose material ranging in size from about three-quarters of an inch to dust.

Two samples, taken from pits at widely separated points and representing depths of about fifteen feet in each case, contained 35.7 and 37.5 per cent ash respectively. These were combined for the washing tests described in the following pages.

Only total ash was determined in the two samples mentioned above. However, after washing, cleaned coal would be expected to resemble coal of comparable ash content from the Douglas seam obtained elsewhere. The following analysis(#)of run-of-mine coal from the Douglas seam, No. 10, South Wellington Mines, should therefore give a rough indication of the product obtainable from the dump.

Report of Investigations, Carbonization Section, 175,-Fuel Research Laboratory, Bureau of Mines, Ottawa, Can.-E. Swartzman, June 1942.

Ash	Volatile	Fixed Carbon	Sulphur	Calorific Value
16.5%	36.4%	47.1%	0.5%	12130 BTU/Lb.

Analysis of Ash.

SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO	MnO	Na_2O	K_2O	P_2O_5	TiO_2	SO_3
38.0	7.8%	20.5%	18.6%	5.8%	0.1%	0.5%	1.1%	1.2%	0.9%	5.3

Washing Tests:

Results of investigations are given in the accompanying report. Sink-and-float tests indicate a theoretically possible yield of 41% by weight in a float product containing 16% ash. A recovery of 32% was made in a product containing 16% ash by a combination of heavy liquid separation of the plus 10 mesh fraction and tabling of the minus 10 plus 90 mesh fraction. This recovery could be raised somewhat should a greater ash

content be permissible.

Preliminary investigations made to date demonstrate that marketable coal can be produced from the waste dump without apparent difficulty. Further tests must be made on a larger scale, however, to establish most efficient treatment methods, cost of plant, and to allow an estimation to be made of operating costs and recoveries which may be anticipated in practice.

The following points should be noted in discussing the dressing of this material:

(1) A combination of heavy-medium separation of coarser sizes with tabling of finer sizes should be investigated further on a larger scale with standard test equipment. This is necessary to establish the size ranges of feed amendable to treatment by each method. In the accompanying report 10 mesh was arbitrarily chosen as the dividing point between the two processes but is not necessarily the most economic size division for practical treatment.

(2) Tabling the minus 10 plus 90 mesh fraction gave a product containing 16% ash and equal to 42% by weight of table feed or 22% of originals heads. No tests were run on minus 4 plus 10 mesh or minus 90 mesh fractions. Yield from the fine fraction, however, would only increase overall recovery by 2% under optimum conditions.

The minus 4 plus 10 mesh fraction should respond fairly well to tabling although further tests are required to establish its amendability to this form of treatment. Assuming comparable efficiency to that obtained with the finer fraction a recovery of 26%, equivalent to 6% of total feed, would be possible. On this basis the combined yield by tabling all the minus 4 mesh fraction would be about 28%. In practice this could probably be attained only by sizing the feed into plus and minus 10 mesh fractions and tabling each separately.

The plus 4 mesh product, equal to 20% by weight of heads, is too coarse to respond well to tabling. Jigging would be difficult as well, owing to the flat slab-like shape of larger pieces. This fraction would require to be crushed to at least 4 mesh to make it amendable to treatment methods other than sink-and-float. By tabling the crushed product a recovery of 20 to 25% might be obtained in a product containing 16% ash. This would be equivalent to 4 or 5% of total heads.

In review it appears likely that a total of 31 to 33% by weight of heads could be recovered in a minus 4 mesh product by screening, crushing oversize, screening to give roughly sized table feed, and tabling. Test-work should be carried out along these lines to establish recoveries possible in practice, and to contrast results with those obtained by sink-and-float testing as suggested in the previous section. In passing it should be noted that apart from other considerations which may arise when test-work is complete, the sink-and-float or heavy-medium method of treatment would be advantageous inasmuch as 10 or 12% of the coal recovered would be marketable as pea coal.

Throughout the above discussion an ash content of 16% in the cleaned product was assumed. Should 20% ash be permissible, recoveries in the order of 40%, instead of 32%, would be possible.

Markets:

Irrespective of the treatment used the bulk of cleaned coal products would be classed as slack or washed smalls. In 1941 production of this grade of material from Vancouver Island collieries was about 122,000 tons, none of which was sold for domestic purposes. Among the chief users of washed slack are gas manufacturers and pulverized coal fired installations.

Statistics show that about 70,000 tons of coal are used annually in Vancouver and Victoria for the manufacture of gas. The proportion of

washed slack used for this purpose is not known.

Chief consumers of slack for pulverized coal firing are the B.C. Cement Co. at Bamberton, B.C. and the B.C. Sugar Refinery Ltd., in Vancouver. Boilers at the B.C. Electric power station at Brentwood are being converted to use pulverized coal at present and this plant will also constitute an important consumer. To date data has been obtained on only the B.C. Cement Company's installation at Bamberton. Consumption there is in the order of 35,000 tons per year at the present rate of production. Washed slack from Canadian Collieries plant at Nanaimo is brought in by scow. Ash content is in the order of 16% but it is understood that a higher figure would be permissible as long as variations were minimized and the necessary heat could be obtained.

Summary and Conclusions:

(1) The waste coal dump at Cassidy is estimated to contain at least 100,000 tons of recoverable coal with a 16% ash content. This is based on preliminary examination, old records, and small scale washing tests. Before final estimates can be made the dump should be systematically drilled and larger scale washing tests made on truly representative samples.

(2) Rough estimates demonstrate the possibility of producing washed slack from this source at lower cost delivered to Vancouver or Bamberton than the present selling price for washed smalls produced by Canadian Collieries at Nanaimo. Furthermore the production per man per day would greatly exceed that possible from a mining operation.

The preceding is taken from report by --- J. M. Cummings, Mining Engineer, Department of Mines, Victoria, B. C.

1943