CANADIAN PACIFIC OIL AND GAS LIMITED
MINING DIVISION
REPORT ON
FORDING RIVER PROJECT, 1968
by
H.G. RUSHTON

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GEOLOGICAL BRANCH
ASSESSMENT REPORT

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CANADIAN PACIFIC OIL AND GAS LIMITED

M I N I N G D I V I S I O N

REPORT ON

FORDING RIVER PROJECT, 1968

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C O N T E N T S

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(a) Introduction

Exploration work was carried out between May 15 and October 2, 1968 on the Fording River property of Canadian Pacific Oil and Gas Limited. This work was a continuation of the program which commenced in 1967. The history, topography and geological sequence were described in the 1967 report, and will not be repeated here.

(b) Property

At the end of the 1967 season, Coal Licenses 314 to 364 were held by C.P.O.G. Up to the date of this report, Coal Licenses 419, 420, 507 to 511 and 536 to 538 have been acquired by the company for a total estimated area of 30,650 acres. An additional seven coal licenses, totalling some 2,400 acres, are presently under application.

(c) Exploration Program

As a result of studies made in the light of the 1967 program, work in 1968 was concentrated on both sides of the Fording River valley. The east side of the valley was studied in some detail in 1967, and this work was extended in 1968 by diamond drilling, trenching, geological mapping and the driving of a number of test adits. In 1967, no work had been done on the Green Hills area, lying west of the Fording River. This latter area was prospected, with follow-up diamond drilling, trenching, geological mapping and adits.

In summary, the 1968 program consisted of the following work:-

Number of adits	12
Footage of adits	1,871
Number of trenches	30
Number of diamond drill holes	39
Footage of diamond drill holes	30,934
Roads constructed	35 miles

1. Adits

Adit No.	Seam No.	General Location	Feet Advance
2	4	Eagle Mt.	157
3	2	"	113
4	12	"	202
5	4	"	153
6	G	Green Hills	148
7	F	"	199
8	5	Mt. Turnbull	184
9	7	Eagle Mt.	134
10	I	Green Hills	172
11	E	"	122
12	F	"	110
13	D	"	127
		TOTAL	1,871

All adits were driven down-dip on the footwall of the seam, except for adit 8, where the entry was on the hanging wall. Bulk samples of all adits were taken for further testing in Japan and Ottawa. Complete washability tests and analyses are currently underway on these samples.

2. Diamond Drilling

The percussion method utilized in 1967 was not satisfactory for sampling the coals. Diamond drilling, using HQ wireline, was employed throughout in 1968. This method yields a 2½" diameter core, and proved to be entirely satisfactory. The holes were cored throughout their length, and core recovery in the coals averaged 94.1% in the 3,725 feet of coal intersected.

The drilling carried out in 1968 is summarized in the following table:-

Hole No.	Depth	Intersected Seams	Location
5	940	9,7,5,4,3,2,1	Eagle Mt.
6	413	4,2,1	"
7	736	5,4,3,2,1	Castle Mt.
8	738	8,5,5,4,2,1	Eagle Mt.
9	900	7,5,	Clode Creek
10	416	7,5 (hole abandoned)	Castle Mt.
11	728	9,7,5,4,2,1	Eagle Mt.
12	706	9,7,5,	"
13	411	5,4 (part only) (hole abandoned)	Castle Mt.
14	1163	9,7	Eagle Mt.
15	592	7,5,4,1	"
16	967	7,5,4,3,1	Castle Mt.
17	1152	I,H,G,F.	Green Hills
18	1022	18,16,12,9	Mt. Turnbull
19	952	I,H,G	Green Hills
20	922	F,E,D,C,B,A	"
21	1218	7,5 (7 & 5 repetition also)	Mt. Turnbull
22	1200	H,G,F,E,D,C	Green Hills
23	1112	F,E,D,C,B	"
24	186	- (hole abandoned)	Mt. Turnbull
25	1196	I,H,G	Green Hills
26	926	F,E,D,C,B	"
27	1206	H,G,F,E,D,C	"
28	407	I,H	"

Hole No.	Depth	Intersected Seams	Location
29	521	C,B,A	Green Hills
30	632	12,10,9,7,5	Clode Creek
31	626	E,D,C,B,A	Green Hills
32	440	D,C,B,A	"
33	771	12,9	Mt. Turnbull
34	580	E,D,C,B,A	Green Hills
35	872	E,D,C,B	"
36	728	19 (?),18,16	Clode Creek
37	747	E,D,C,B	Green Hills
38	801	E,D	"
39	916	4 (repetition only)	Mt. Turnbull
40	851	E,D,C,B	Green Hills
41	621	Upper seams only	"
42	614	7,5	Mt. Turnbull
43	1005	12,10,9,7,5	Clode Creek
Total	30,934'		

3. Surveying

The initial aerial mapping done in 1967 used uncontrolled photography from which a map on the scale of 1" = 1000 feet was produced. New photography was taken in 1968 and a set of maps on the scale of 1" = 200 feet was produced, covering the main areas of interest. Prior to taking the new photography, targets were located, using theodolite and tellurometer triangulation from geodetic survey points adjacent to the area. Elevation control was also established along roads.

Two survey crews were employed throughout the 1968 program. All drill holes, adits, trenches and roads were located, and a survey

grid with latitudes and departures respectively normal and parallel to the regional strike was established. This survey was tied in with the aerial targets.

4. Sampling

A detailed program of sampling formed part of the 1968 program. Drill core was sampled in five-foot sections and the samples split into two equal portions. A raw coal proximate analyses was obtained on one half, while the other half was composited by seam and washed at 1.5 s.g. to obtain general criteria on seam washability and quality of clean coal product. Adits were channel-sampled, and bulk samples of seven tons each were sent to Japan with one ton sent to Edmonton for testing by the Department of Energy, Mines and Resources.

(d) Geology and Structure

1. General Stratigraphy

The general stratigraphic succession on the Fording River property is summarized in the following table:-

Lithology		Age
Sand, gravel, clay		Recent
Major Unconformity		
White pebble conglomerate	- Blairmore	Lower Cretaceous
Sandstone, shale, siltstone, minor coal	- Elk Series)	Lower
Sandstone, shale, siltstone, many coals	- Mutz Series)	Cretaceous
Pepper and salt sandstone	- Hillcrest Series)	Kootenay -to
Siltstone, intermittent sandstone, coal	- Adanac Series)	Upper
Current bedded sandstone	- Moose Mountain)	Jurassic
Transitional Contact		
Marine shale, minor sandstones	- Fernie	Jurassic
Regional Disconformity		
Shaly quartzite, sandy shales	- Spray River	Triassic
Unconformity		
Grey limestone	- Rundle	Mississippian

The oldest rocks present on the Fording River property are the limestones of the Rundle formation, which outcrop to the west of the Fording River near the southern boundary of the area. The limestone is indurated and of a grey-blue color, and where examined was non-fossiliferous. It is in faulted contact with Kootenay formation on its western margin, and in probable unconformable contact with Spray River quartzite on its northern limit. The latter contact was not found, but the intervening Rocky Mountain Quartzite (Pennsylvanian) was not found, and the lower contact of the Triassic is presumed to be unconformable with the Mississippian.

The shaly quartzite and sandy shale of the Spray River series are exposed at several localities in the valley of the Fording River and extensively in

the mountain ranges to the east of the property. The formation appears to have a thickness of 1000 feet in the area, but may show apparent thickening in places due to faulting.

The Fernie Shales of Jurassic age occur throughout the Fording River area, generally on the lower flanks of the mountains along the sides of the valleys. They are very poorly exposed, and where observed generally consist of bluish-black, somewhat nodular shales, with thin, calcareous sandstone bands. The shales are generally crushed and greatly contorted by minor structural features. They show no apparent unconformity with the Spray River series or with the overlying Kootenay formation. The Fernie is transitional from shales to the current-bedded basal sandstone of the Kootenay, and its top is generally placed at the point where distinct sandstone layers become frequent.

The basal member of the Kootenay formation is a medium to coarse-grained, current-bedded sandstone some 150 to 200 feet in thickness. This sandstone is common to all the Kootenay occurrences of the Rocky Mountains, and is a prominent cliff-marker in many localities. The sandstone represents the change from the marine conditions of the Fernie to the unstable, littoral conditions of the Kootenay.

In detail, the Kootenay formation, above the Moose Mountain sandstone at its base, is an extremely variable series, and while certain sandstone beds can be distinguished and traced on the ground over distances up to one-half mile, it is not feasible to correlate from one area to the next by means of detailed sections. Even the broader subdivisions of the series exhibit marked differences in detail, both in facies and in thickness. However, certain general subdivisions can be applied, and are used in this report.

Immediately overlying the Moose Mountain sandstone is the Adanac Series. This exhibits a slightly erosional relationship with the Moose Mountain. The Adanac Series may be further subdivided as follows:-

	Hillcrest
	Siltstone (sometimes absent)
	No. 4 coal seam
Adanac Series	Siltstone
	Sandstone (sometimes absent)
	Siltstone
	No. 2 seam
	Sandy siltstone
	No. 1 seam
	Moose Mountain

At the base, the lowest coal seams of the Kootenay are found. These seams, No. 1 and No. 2, were laid down in contact with the Moose Mountain sandstone, and observations indicate that deposition took place in shallow basins in the sandstone, giving rise to thinning of these seams to the edges of these basins and thickening near the centres. Several minor transgressions occurred, giving rise to a sandy siltstone between seam No. 1 and seam No. 2, and to a fairly consistent one-foot parting in the middle of seam No. 2. There is approximately 80 to 100 feet of sediments between the latter and seam No. 4. In about half the cases, this consists of intercalated, current-bedded siltstone and sandstone with sandstone being prominent elsewhere. Intermittent and impure coals are fairly common in this interval and are generally grouped as seam No. 3. Seam No. 4 is one of the thickest and most extensive seams on the Fording River property. As with all the thick coal seams present, it represents a remarkable continuity of slow subsidence over a long period. Some sedimentation was obviously active during the start of these conditions, as the bottom few feet of seam No. 4 contain a markedly higher content of impurities than the rest of the seam. Sedimentation and some subsequent erosion occurred following the deposition of seam No. 4, bringing the Adanac Series to a close.

The Adanac Series is immediately overlain by the Hillcrest Series. This series consists of a sandstone very similar in character to the Moose Mountain sandstone. The Hillcrest is quite variable in thickness, but is generally around 70 feet, and was laid down on the eroded top of the Adanac Series.

The erosion prior to deposition did not normally extend into the top of seam No. 4 although in local areas it appears that this was the case, notably south of Clode Creek. These cases are also accompanied by a thickening of the Hillcrest sandstone and may represent ancient watercourses. No coals are found within the Hillcrest, although coalified plant remains are common.

The deposition of the Hillcrest was followed by another period of erosion, during which the sandstone was removed completely in places, so that the Mutz Series is found occasionally in contact with the Adanac Series. Generally, however, the Hillcrest is present. The Mutz Series is a succession of cyclothems, with siltstone, coal and thin sandstones repeated many times. It contains seam No. 5 to seam No. 13, plus several succeeding upper seams. The most widespread and consistent of these cyclothems are represented by seam No. 5, seam No. 7 and seam No. 12, although several other widely distributed coal seams are also present. The first cyclothem above the Hillcrest is represented by seam No. 5, which is found throughout the basin, although there are indications on both sides of the Fording River that a lower seam was developed in a local area prior to this, particularly in the Green Hills where seam C is of fairly common occurrence.

Seam No. 6 is a rather local development in the type section, and probably represents a local split at the base of seam No. 7. This indicates that this local area was somewhat less stable than the surrounding basin, and was subject to a more rapid cyclothem period.

Seam No. 7 is the next important seam, and this cycle was widespread throughout the basin. This cycle is the second major one above the Hillcrest and is the last one which appears to be common to the basin as a whole. Coals continued to be deposited at fairly regular intervals over numerous succeeding cycles, the coal-bearing section above seam No. 7

being some 2,000 feet in thickness. The more widespread of these coals are shown on the maps, being seams F, G, H and I on the Green Hills and seams 9, 11, 12, 16 and 18 on the east side of the Fording River.

Rhythmic and variable sedimentation continued without interruption at the end of the Mutz Series. This overlying Elk Series of sandstones and siltstones differs only from the Mutz in the almost total absence of coal seams, although plant remains are quite common. In the Fording River area the Elk Series is estimated to be some 800 feet in thickness.

The youngest consolidated rock in the Fording River area is a white quartz-pebble conglomerate which is, apparently, conformable with the Elk Series. It is thought to be the basal member of the Blairmore of Lower Cretaceous age. The conglomerate is a prominent cliff-marker to the west of the Fording River, and its contact may be followed for several miles on the ground.

2. Structure

Subsequent to deposition, all the sediments described above were involved in the mountain-building movements of the Eocene period. The tectonic movements probably continued over a relatively long period of time. The major structural features of the Fording River property may be classed as the major north-south trending synclines east and west of the Fording River, with relatively high-angle west-dipping thrusts, some shallow east-dipping underthrusts and only a few normal faults. Some of the faults may have been folded later in the tectonic sequence.

From the sequence of structures observed in the present work, it is felt that the earliest event was the formation of the synclines now occupied by the Green Hills and the Eagle Mountain Range. The intervening anticline was subsequently faulted and the thrusting superimposed on the synclinal limbs.

The Eagle Mountain structure is an asymmetric syncline which can be traced from near the south boundary of the property to Clode Creek, a distance of some six miles. The coal seams on the western limb of this structure exhibit dips to the east of 20 to 25 degrees, gradually decreasing to zero as the axis is approached. The eastern limb of the syncline is more sharply upswept with dips of 20 degrees being attained some 2,000 feet east of the synclinal axis, followed by a further upsweep to dips in the 35 to 45 degree range. The syncline does not exhibit any marked plunge, although plunge reversals of a few degrees are apparent in longitudinal section. The continuation of the syncline to the north of Clode Creek is marked by a rapid increase in plunge to the north, and Mount Turnbull exhibits a series of en-echelon anticlinal and synclinal structures plunging both to the northeast and the southwest, which appear to have been superimposed on the western limb of the main syncline. These subsidiary folds are not well delineated, but may be associated with the known faulting and underthrusting present in the Fording River Valley to the west. The Eagle syncline is further modified by a subsidiary anticline-syncline pair in the vicinity of Kilmarnock Creek, both of which have faulting associated with them. The western fault of this pair appears to be almost vertical, with a displacement of east side down, while the eastern fault dips to the east and shows a displacement of west side down. The eastern limb of the main syncline is overthrust, causing a repetition of the lower coal seams in this part of the area.

The contact of the Kootenay and Fernie on the west limb of this syncline is the locus for a shallow east-dipping series of underthrust faults. These structures are mainly located in the Fernie Shales, but do extend into the lower part of the Kootenay at Clode Creek and on Castle Mountain. Their effect is to cause a repetition, or series of repetitions, of the basal sandstone and the lower coal seams on the side of the mountain, and

also to cause an apparent thickening of the Fernie Shales on the east side of the Fording River. These structures may also be synclinal in form, and may reappear as westerly-dipping thrusts on the east side of the syncline. As has been noted by other workers in the area (2), the main deformational stresses tend to have been localized in the Fernie Shale and only extend upwards a few hundred feet into the overlying Kootenay, if at all. The effect of this faulting is well displayed near the axis of the syncline in lower Kootenay measures on Kilmarnock Creek.

The Fording River follows the course of the original anticline through the property. As a result, lower beds in the stratigraphic succession are exposed here, together with much evidence of faulting. At the south end, the Rundle Limestone is in faulted contact with the Fernie Shales. This fault trends northwest and dips to the northeast at 65°. The fault itself governs the course of the Fording River over considerable distances, and terminates against the Ericson Fault at its northwest end.

The Ericson Fault runs along the base of the Green Hills on the west side of the Fording River. This structure is one of the major through-going faults of the area. At the south end of the property it brings the Kootenay in contact with the Rundle Limestone, then progressively with the Spray River, the Fernie and finally with lower Kootenay beds north of Lake Mountain. This fault has an apparent horizontal displacement of some 3,000 feet, and the formations to the west side are downthrown. The fault dips to the west at 65° to 70°, and may be classed as a steeply west-dipping normal fault. The Fernie formation on the immediate western side of this fault is thrown into several tight folds, which have little or no expression in the Kootenay. A sharp, steeply northwest plunging anticline is thought to be present near the base of the Kootenay near the south end of Lake Mountain. The latter structure may be associated with the transition

from the Green Hills syncline to the other syncline to the north of Lake Mountain.

The Green Hills syncline is a mirror image of the Eagle Mountain structure. Here the eastern limb dips to the west at a relatively shallow angle, with dips in the 28 to 15 degree range, while the western limb exhibits dips in the 45 to 35 degree range. The axis of this asymmetric syncline trends some degrees west of north, and is truncated by the Ericson Fault near the south boundary of the property. As was noted above, the transition of this syncline to the other trend north of Lake Mountain is apparently marked by a series of plunging cross-folds. This belt of cross-folding may originally have been related to similar structures already noted on Mount Turnbull, and lying to the east of this area.

To the north and west of Lake Mountain a shallow, northwest trending syncline is present, terminating against the Ericson Fault near Henretta Creek and continuing over into the Elk River Valley. This structure has not been studied in detail as the only beds exposed on the C.P.O.G. property are those of the upper Kootenay and the Blairmore. This syncline probably represents the continuation of the plunging Eagle Mountain syncline west of the Ericson Fault.

3. Geological Correlation of Coal Seams

Throughout the exploration program at the Fording River property emphasis was laid on obtaining as close a correlation of coal occurrences as conditions would permit. With the lack of continuous sandstone exposures or beds, and the observed variability of facies within the succession, it was realized that the only certain method of correlating coal occurrences was by stripping the outcrop with a bulldozer. This was done on seams 4, 7 and 12 on Eagle Mountain, and allowed a complete knowledge of the correlation to be built up.

The geological staff were all made thoroughly familiar with the type sections on Eagle Mountain and a great deal of time and effort was expended in following coal occurrences and geological trends on the ground. The drill holes were controlled by this work, and many of the field observations were essential to a satisfactory correlation.

One of the most difficult parts of the correlation is to relate the coals of the Green Hills to the seams on Eagle Mountain. In the initial work, seams in the Eagle section had been numbered from the base upwards. To avoid confusion (and the making of assumptions), all seams in the Green Hills were lettered alphabetically from the base upwards. Once the basic subdivisions of the Kootenay were known, and definitions of coal seams were made in these terms, it became a relatively simple matter to correlate the seams on Eagle Mountain with those on the Green Hills. These definitions, and their application to the cross-valley correlation, are summarized in the following table:-

Seam Number Eagle	Stratigraphic Definition	Equivalent Seam Green Hills
1 and 2	Immediately overlies basal sandstone on an erosional surface.	A
4	Thick seam, dirty in bottom few feet, some 80 to 100 feet above basal sandstone. Overlain by some siltstone with Hillcrest Sandstone directly on top of seam in places.	B
5	Thick seam, first continuous seam above Hillcrest, with thin seam underlying at south end of area.	D
7	Thick seam, second continuous seam above Hillcrest with split on bottom of seam at south end of area.	E

Further correlations in the upper seams have not been made, as these seams appear to be more variable in their occurrence and extent. The

letter system has been retained for the Green Hills area for greater convenience in dealing with the two proposed mining areas, but for correlation purposes the letters and numbers are interchangeable as far as seam nomenclature is concerned. The correlation is further confirmed by a study of seam analyses.

(e) Coal Reserves and Quality

As a result of the above program, it is calculated that there is sufficient coal available for strip mining in seams 4, 5 and 7 (B, D and E) to warrant a production rate of 3,000,000 long tons per annum for a fifteen-year contract with the Japanese steel mills. Additional strippable reserves also exist in the higher seams.

The sampling indicates that the seams have the following average raw coal analyses and widths:-

Seam	Average Width	Moisture	Ash	Volatile Matter	Fixed Carbon	Sulphur	Free Swelling Index
4	30'	0.77	12.61	21.65	64.97	0.35	5 - 8
5	18'	1.09	14.17	21.88	62.86	0.38	3 - 8
7	25'	0.99	14.84	23.08	61.09	0.44	5 - 9
B	26'	0.85	17.63	20.51	61.01	0.30	2 - 7
D	27'	0.92	12.07	21.62	65.39	0.31	3 - 8
E	31'	0.77	16.99	22.78	59.46	0.37	3 - 8
9	18'	1.10	15.22	24.42	59.26	0.62	6
12	12'	1.19	11.08	27.38	60.35	0.59	8
F	20'	1.25	15.38	23.17	60.20	0.41	7
G	13'	1.44	16.08	26.26	56.22	0.58	8
H	18'	1.70	11.14	27.75	59.41	0.52	8
I	15'	1.61	8.80	30.05	59.54	0.48	8

(f) Current Studies and Planning

A complete feasibility study is underway with a view to supplying the Japanese steel mills with 3,000,000 long tons of clean coal per annum.

The following general statements may be made:-

1. Mining

Mining will be by draglines with supplementary shovels and trucks for delivery of raw coal to the plant site. Due allowance is being made in methods and cost estimates for thorough reclamation following mining.

2. Plant

The washing plant will be designed to eliminate any pollution of the rivers and streams. Tailings will be discharged for settling into sealed-off ponds, with the washing plant reusing the clarified water from the tailings pond. Only a minimal amount of replacement water for plant losses is required.

3. Railway

A complete survey of a railway line has been made to the property from Natal. Grades are not excessive. Distance of new line is some 32 miles. Unit trains will haul the coal to Roberts Bank.

4. Townsite

Preliminary studies indicate that use will be made of existing townsites in the area, with possibly rapid rail-transit available for workers to travel to the mine site.

5. Power

Existing power facilities in the area will be extended to serve the plant and mine.

6. Roads

An all-weather access road will be part of the project.

7. Port

Use will be made of facilities at Roberts Bank for storage and vessel loading.

Negotiations are currently in progress with the Japanese steel mills. A new company, Fording Coal Company Limited, has been formed in conjunction with Cominco Ltd. for the future development of the property.

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Mining Division.

December 31, 1968.

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A D D E N D U M

WEARY RIDGE EXPLORATION PROGRAM

Under an exploration agreement with C.P.O.G., North American Coal Company carried out a program of trenching and percussion drilling on Coal Licenses 314 and 315 held by C.P.O.G. during 1968. Results of this work have not been assessed in detail, but are presented with this report.

The work consisted of the following:-

(a) Trenching

Eight trenches were excavated by bulldozer along the crest of Weary Ridge. These were sampled by North American, with the following results:-

Seam	M	A	VM	FC	S	BTU	FSI
Q	0.60	31.77	21.34	46.29	0.42	10,354	7
P	1.45	8.18	26.29	64.08	0.69	13,698	4½
N	3.24	8.65	22.27	66.84	0.69	12,824	Nil
L-M	2.98	32.83	18.04	46.15	0.66	8,832	"
K	4.87	10.93	35.53	48.67	0.60	11,028	"
J	1.05	14.45	18.54	65.96	0.46	12,550	"
I	6.96	9.45	33.11	50.48	0.42	11,053	"
H	3.22	29.75	17.59	49.44	0.45	9,431	"

(b) Drilling

Percussion drilling was employed, with two holes, No. 2 and No. 3, being drilled on the C.P.O.G. property. No samples were obtained.

Gamma-ray neutron logs were run in the holes. C.P.O.G. has not been supplied with survey data as yet on these holes, and the only data available is as follows:-

Hole 2 (collared on crest of Weary Ridge, near trench on seam I)

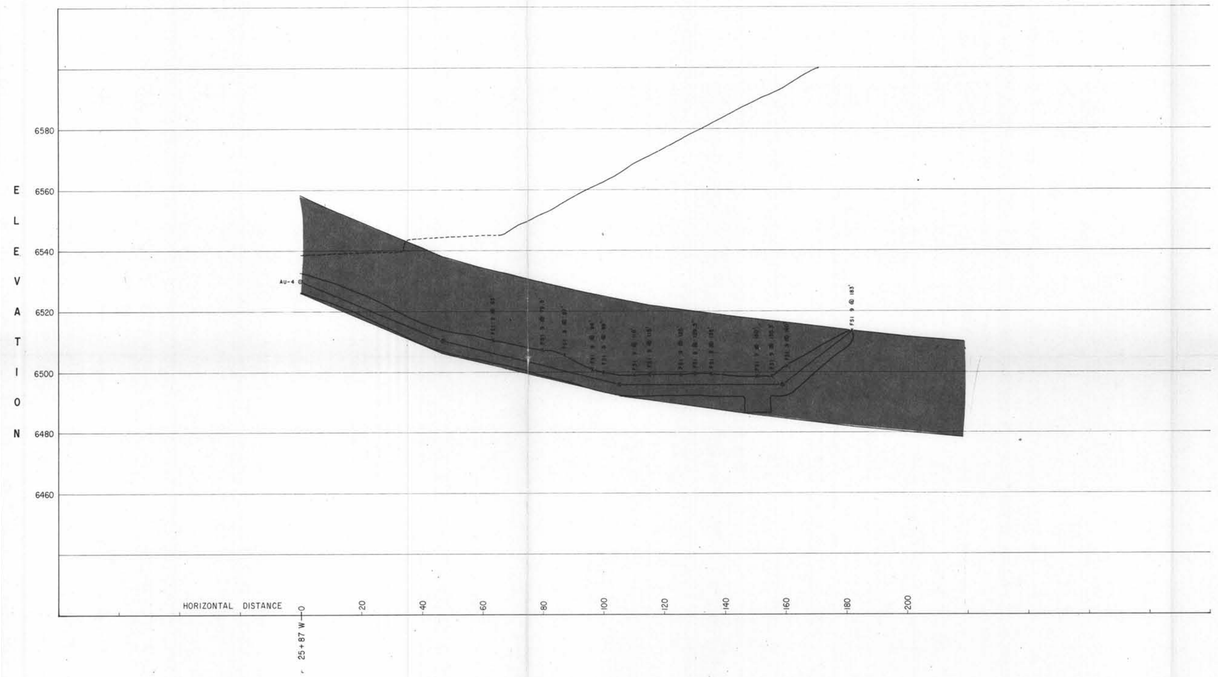
0 - 3' coal and shale	563 - 565' shale
3 - 57' shale	565 - 573' sandstone
57 - 58' sandstone	573 - 574' shale
58 - 85' shale	574 - 581' sandstone
85 - 100' coal	581 - 585' shale
100 - 287' shale	585 - 390' sandstone
287 - 289' coal	590 - 598' shale
289 - 362' shale	598 - 604' coal
362 - 387' sandstone	604 - 606' sandstone
387 - 391' coal	606 - 609' shale
391 - 442' shale	609 - 611' coal
442 - 453' sandstone	611 - 668' sandstone
453 - 483' shale	668 - 688' shale
483 - 524' sandstone	688 - 706' sandstone
524 - 554' shale	706 - 708' shale and coal
554 - 563' coal	708 - 810' sandstone
	810 - END OF HOLE

Hole 3 (collared on west side of Weary Ridge)

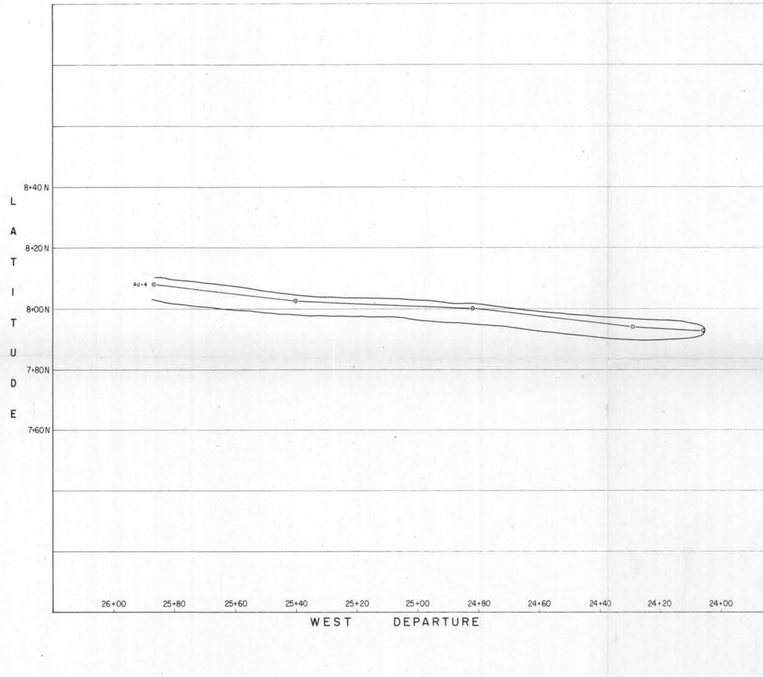
0 - 11' overburden	252 - 262' coal
11 - 45' shale	262 - 266' coal and shale
45 - 85' sandstone	266 - 307' shale
85 - 96' shale	307 - 309' coal
96 - 135' sandstone	309 - 409' shale
135 - 140' shale and coal	409 - 422' coal
140 - 142' coal	422 - 425' shale
142 - 252' shale	425 - END OF HOLE

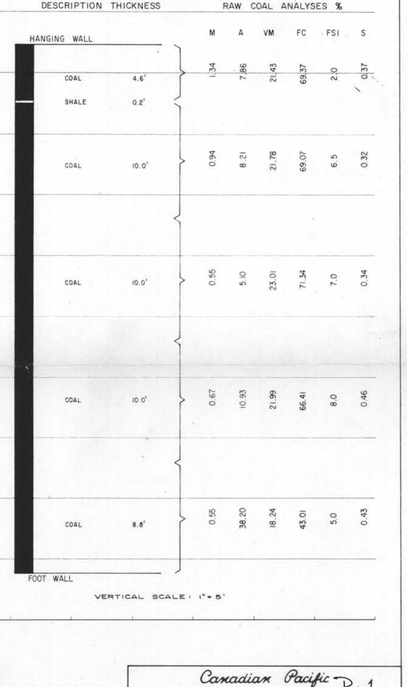
None of this work can be correlated as yet, as no geological data have yet been supplied by North American.

E-W ELEVATION



PLAN





Canadian Pacific OIL AND GAS LIMITED
MINING DIVISION

P-1

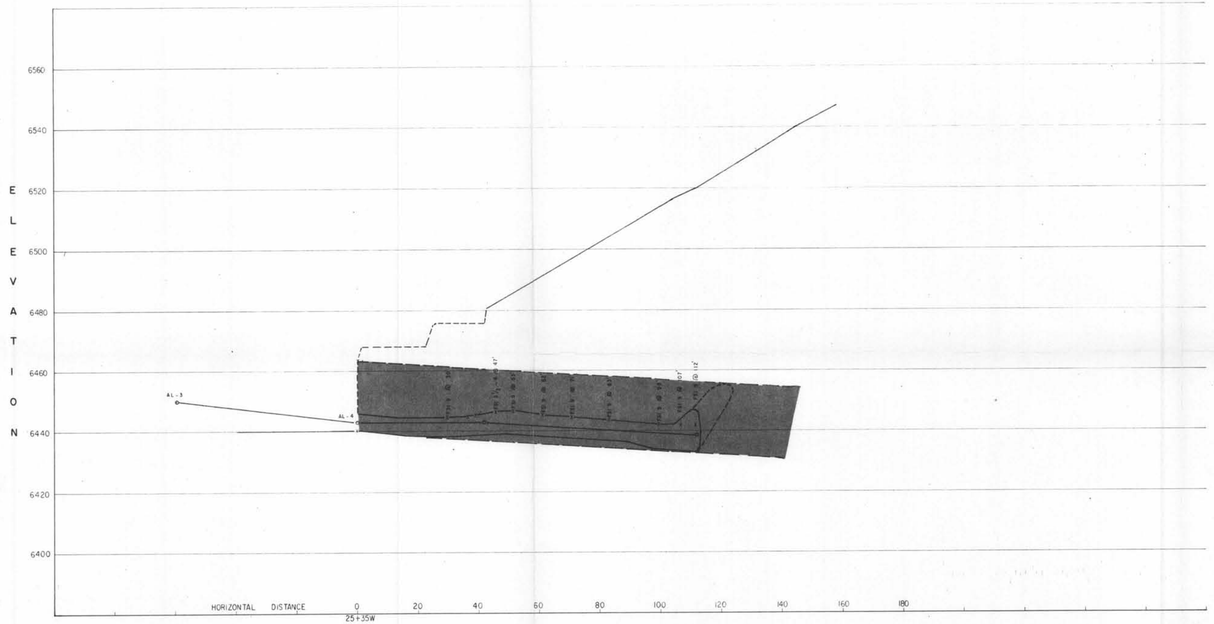
FORDING RIVER PROJECT
ADIT No.2
(SEAM No. 4)

DATE: AUG. 20/68
SAMPLE BY: H.G.R.
AUTHOR: R.T.M.
APPROVAL BY: R.T.M.
SCALE: 1" = 20 Ft.
SURVEYED BY: H.G.

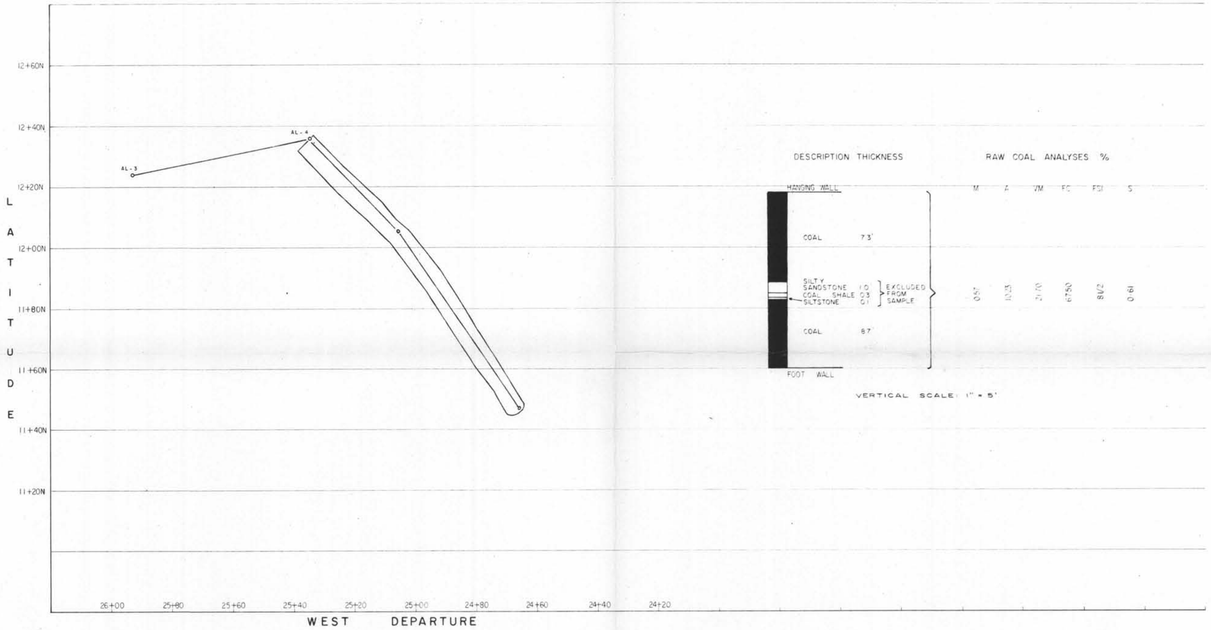
309

FR-68(S)A

E-W ELEVATION



PLAN



Canadian Pacific OIL AND GAS LIMITED MINING DIVISION

P-2

FORDING RIVER PROJECT

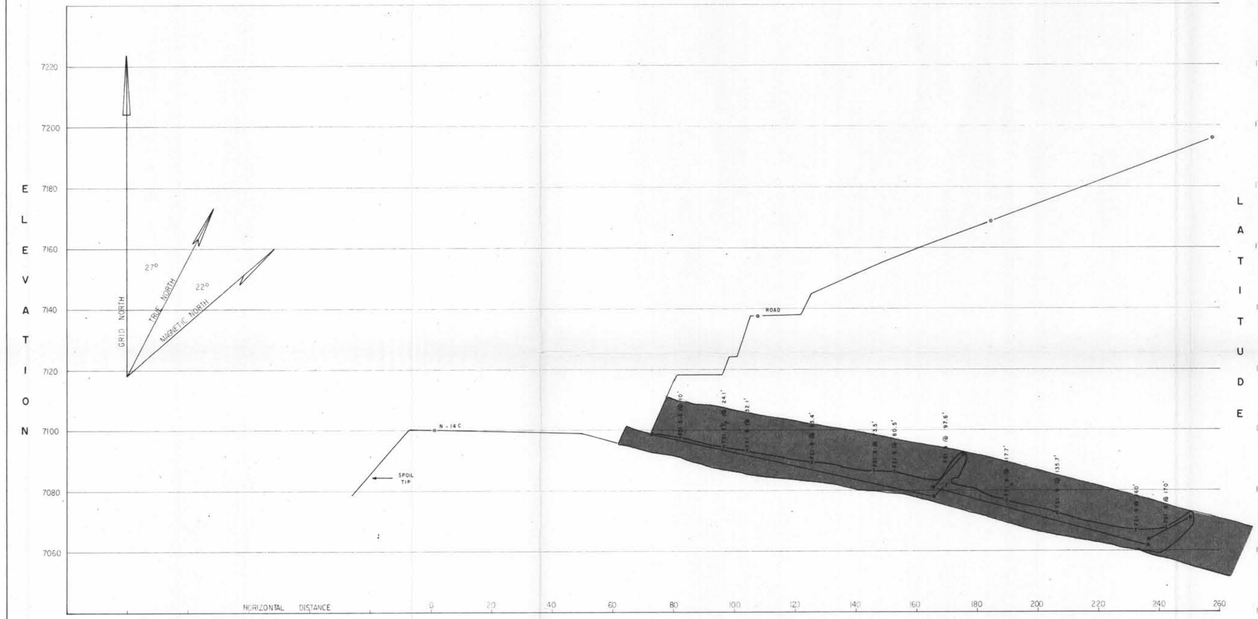
ADIT No.3
(SEAM No.2)

DATE: NOV. 68
SAMPLE BY: R.S.R.
AUTHOR: R.T.M.
APPROVAL BY: R.T.M.
SCALE: 1" = 50 Ft.
SURVEYED BY: J.C.

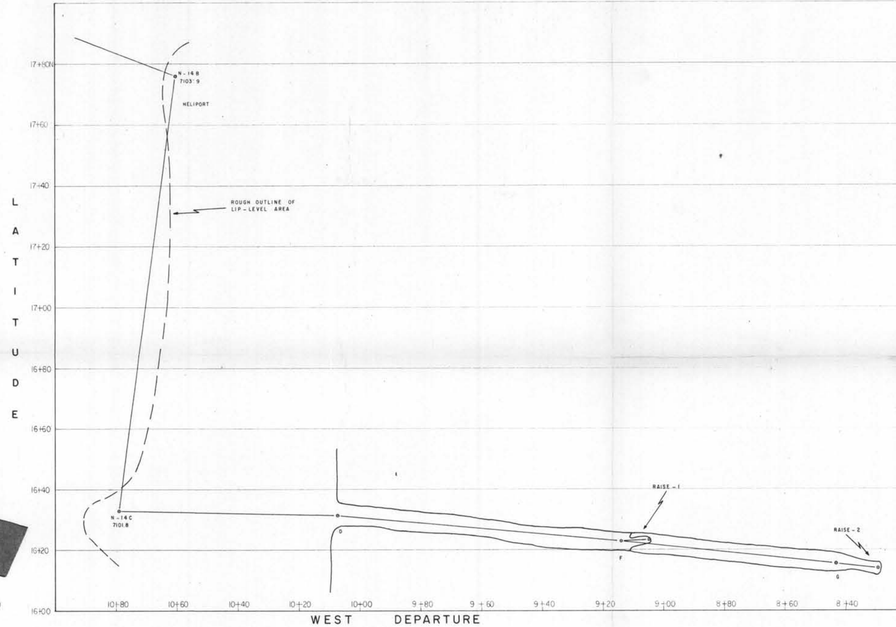
309

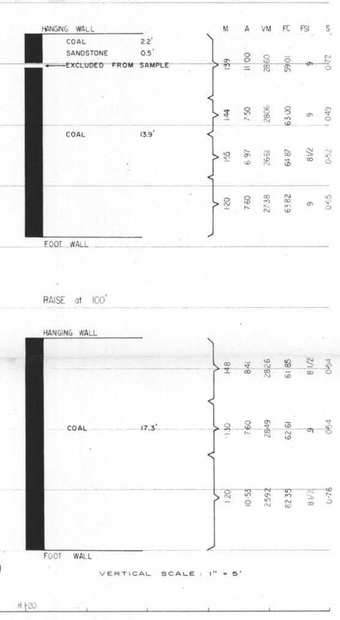
FR 68(5)A

E-W ELEVATION



PLAN

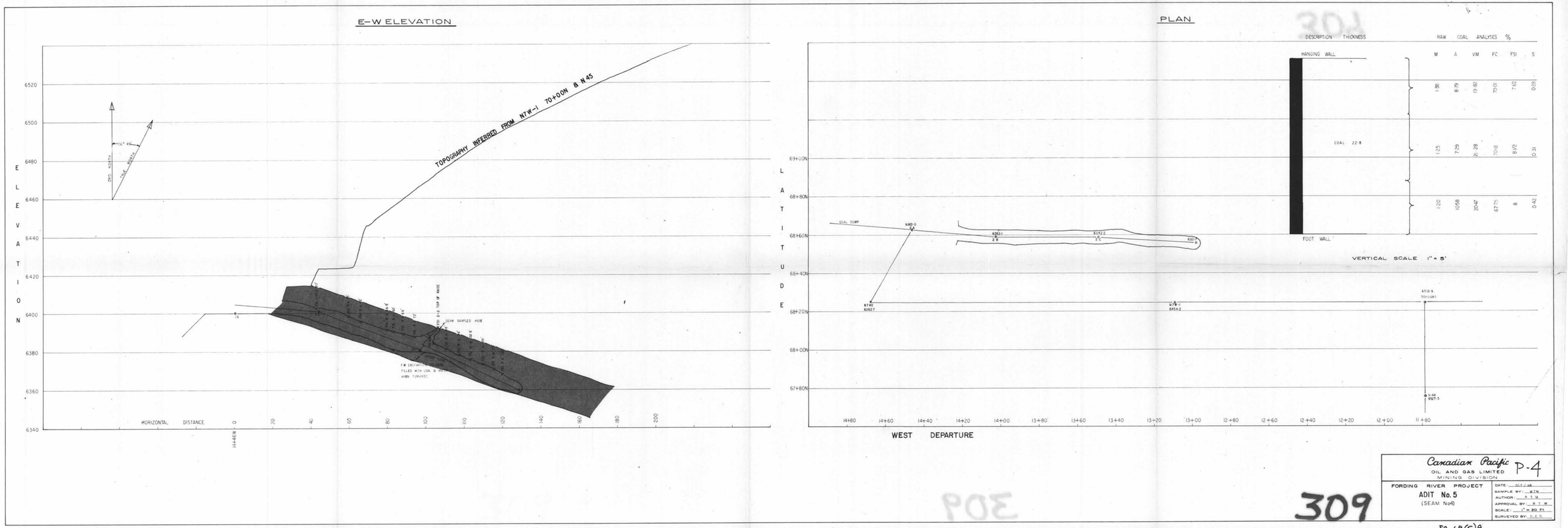




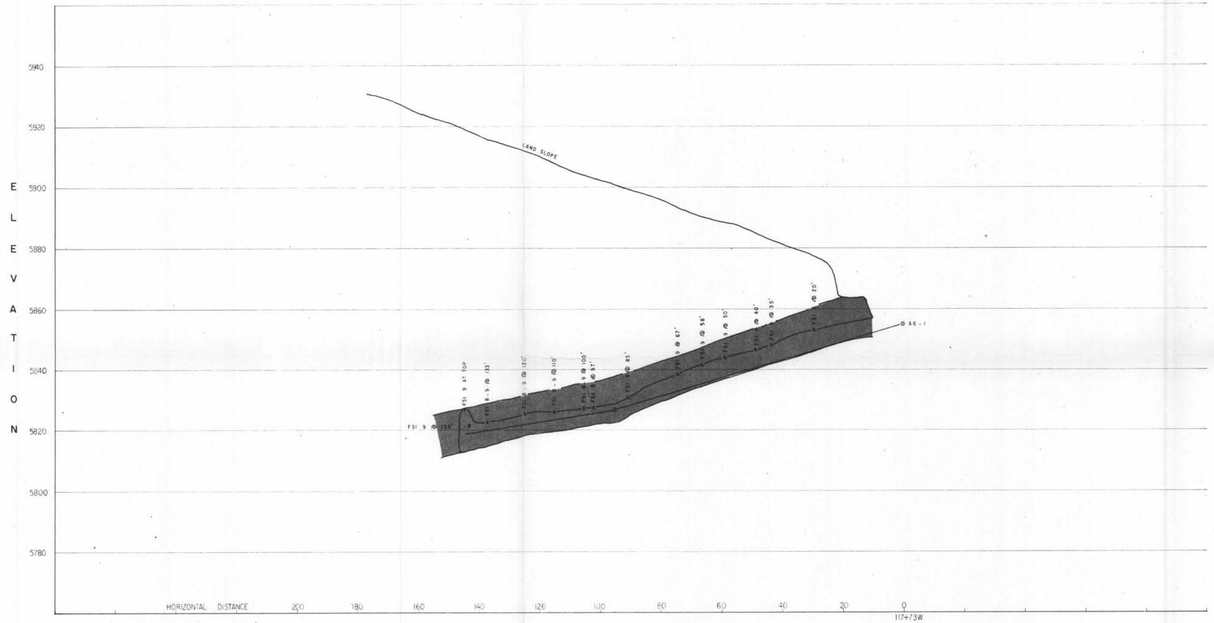
Canadian Pacific OIL AND GAS LIMITED MINING DIVISION	P-3
FORDING RIVER PROJECT	DATE NOV. 69
ADIT No. 4 (SEAM No. 12)	SAMPLE BY J.Y.W.
	AUTHOR R.T.M.
	APPROVAL BY R.T.M.
	SCALE 1" = 20 Ft.
	SURVEYED BY D.C.D.

309

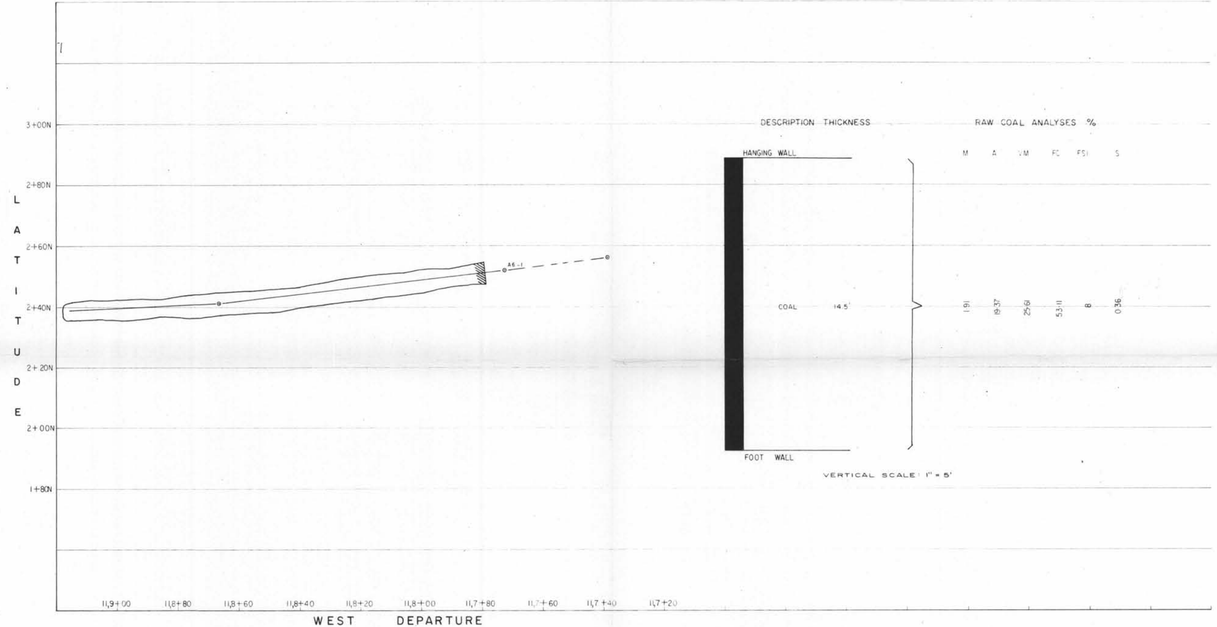
FR 68(5)A


E-W ELEVATION
PLAN
ELEVATION
6520
6500
6480
6460
6440
6420
6400
6380
6360
6340
TOPOGRAPHY INFERRED FROM N7W-1 70+00N & N45
ORIG NORTH
TRUE NORTH
SEAM SAMPLED HERE
HORIZONTAL DISTANCE
0
20
40
60
80
100
110
120
140
160
180
200
14+46W
LATITUDE
69+00N
68+80N
68+60N
68+40N
68+20N
68+00N
67+80N
COAL DUMP
N7W-1
6454.2
6515.9
70+00N
14+80
14+60
14+40
14+20
14+00
13+80
13+60
13+40
13+20
13+00
12+80
12+60
12+40
12+20
12+00
11+80
WEST DEPARTURE
DESCRIPTION THICKNESS
HANGING WALL
COAL 22.8
FOOT WALL
RAW COAL ANALYSES %
M A VM FC FSI S
1.38 8.79 19.82 70.01 7.1/2 0.28
1.25 7.29 21.28 70.18 8.1/2 0.31
1.20 10.58 20.47 67.75 8 0.42
VERTICAL SCALE 1" = 5'
Canadian Pacific
OIL AND GAS LIMITED
MINING DIVISION
P-4
FORDING RIVER PROJECT
ADIT No. 5
(SEAM No4)
DATE:
SAMPLE BY:
AUTHOR:
APPROVAL BY:
SCALE: 1" = 20 FT.
SURVEYED BY:
309
FR 68(5)A

E-W ELEVATION



PLAN



Canadian Pacific P-5
OIL AND GAS LIMITED
MINING DIVISION

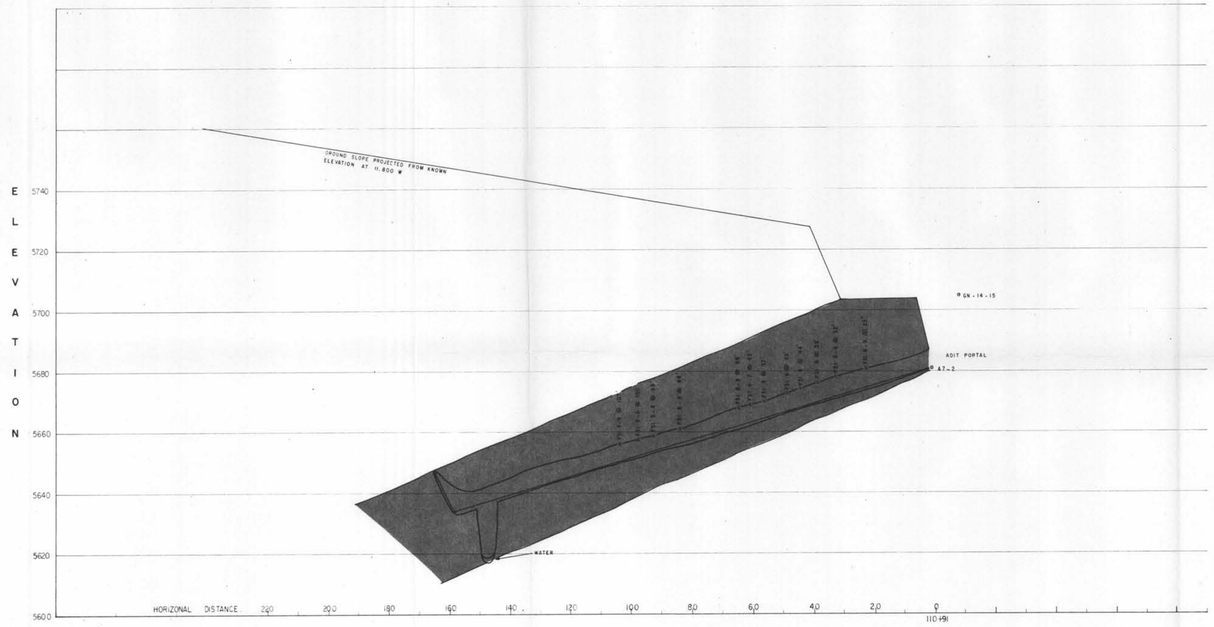
FORDING RIVER PROJECT
ADIT No. 6
(SEAM G)

DATE NOV. 68
SAMPLE BY W.T.M.
AUTHOR W.T.M.
APPROVAL BY W.T.M.
SCALE: 1" = 20 Ft.
SURVEYED BY J.C.

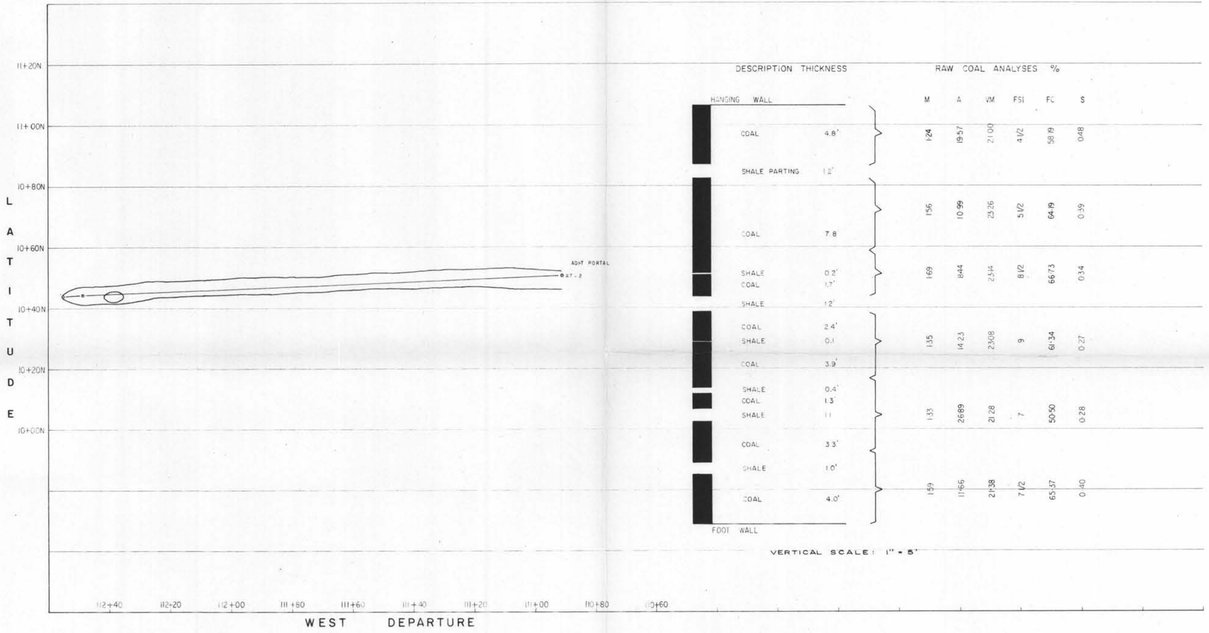
309

FR 68 (5)A

E-W ELEVATION



PLAN



DESCRIPTION	THICKNESS	RAW COAL ANALYSES % M	A	VM	FSI	FC	S
HANGING WALL							
COAL	4.8'	1.24	8.57	21.00	4 1/2	58.89	0.48
SHALE PARTING	1.2'						
COAL	7.8'	1.56	10.99	23.36	5 1/2	64.19	0.39
SHALE	0.2'	1.69	8.44	23.44	8 1/2	66.73	0.34
COAL	1.7'						
SHALE	1.2'						
COAL	2.4'	1.35	14.23	23.08	9	61.34	0.27
SHALE	0.1						
COAL	3.9'						
SHALE	0.4'						
COAL	1.3'	1.33	26.89	21.28	7	50.50	0.28
SHALE	1.1						
COAL	3.3'						
SHALE	1.0'						
COAL	4.0'	1.59	11.66	24.38	7 1/2	65.37	0.40
FOOT WALL							

VERTICAL SCALE: 1" = 5'

Canadian Pacific OIL AND GAS LIMITED MINING DIVISION

FORDING RIVER PROJECT

ADIT No. 7
(SEAM F)

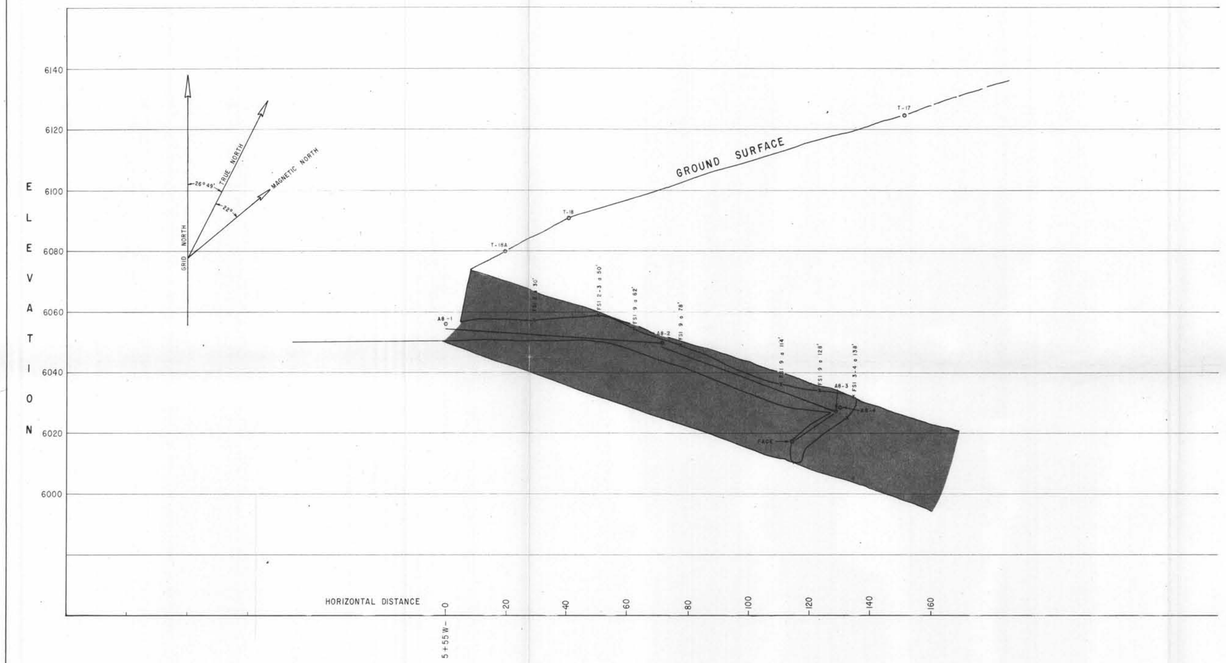
P-6

DATE NOV. 88
SAMPLE BY W.T.M.
AUTHOR W.T.M.
APPROVAL BY W.T.M.
SCALE 1" = 20 Ft.
SURVEYED BY J.C.

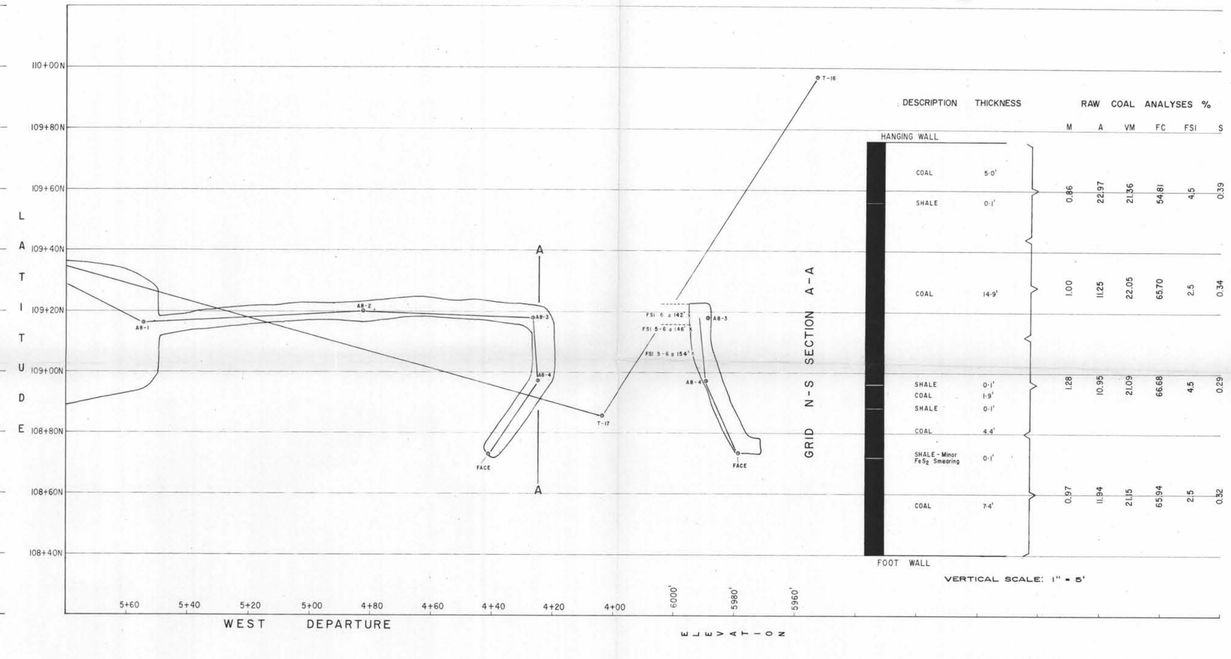
309

FR 88(5)A

E-W ELEVATION



PLAN



GRID N-S SECTION A-A

RAW COAL ANALYSES %

	M	A	VM	FC	FSI	S
COAL 5-0" / SHALE 0-1"	0.86	22.97	21.36	54.81	4.5	0.39
COAL 14-9"	1.00	11.25	22.05	65.70	2.5	0.34
SHALE 0-1" / COAL 1-9" / SHALE 0-1" / COAL 4-4" / SHALE - Minor Fe2g Smearing 0-1"	1.28	10.95	21.09	66.68	4.5	0.29
COAL 7-4"	0.97	11.94	21.15	65.94	2.5	0.32

Canadian Pacific OIL AND GAS LIMITED MINING DIVISION

P-7

FORDING RIVER PROJECT

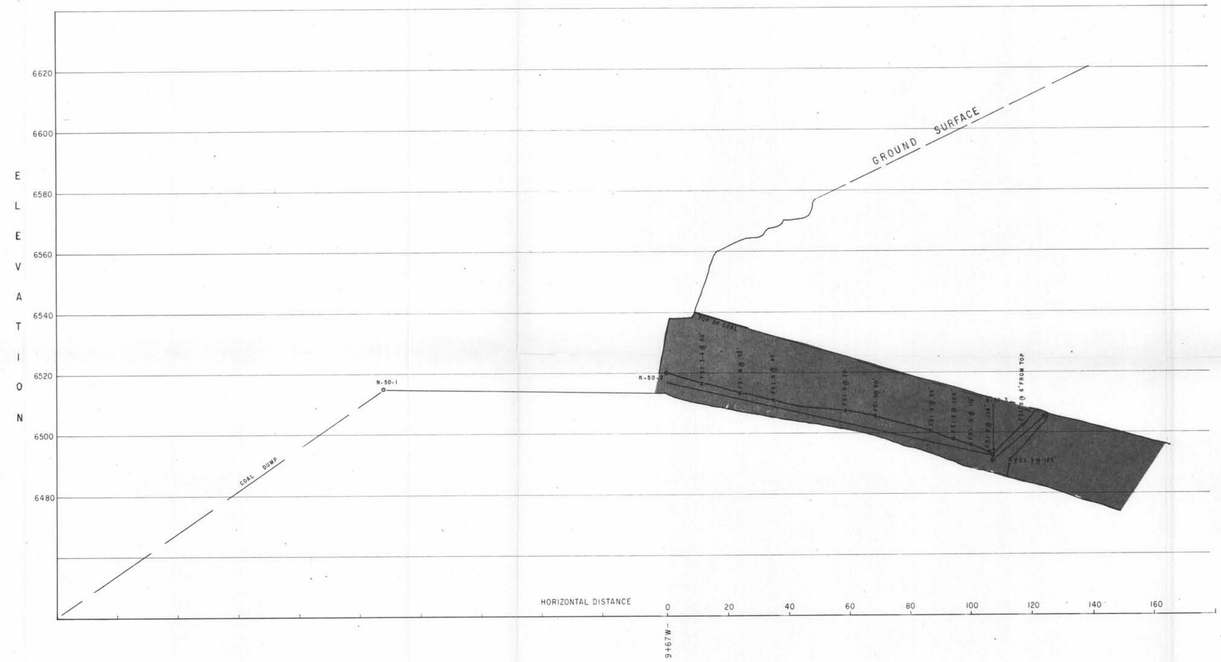
ADIT No.8 (SEAM No.5)

DATE: AUG. 20/68
SAMPLE BY: W.T.M.
AUTHOR: R.T.M.
APPROVAL BY: R.T.M.
SCALE: 1" = 20 Ft.
SURVEYED BY: D.G.D.

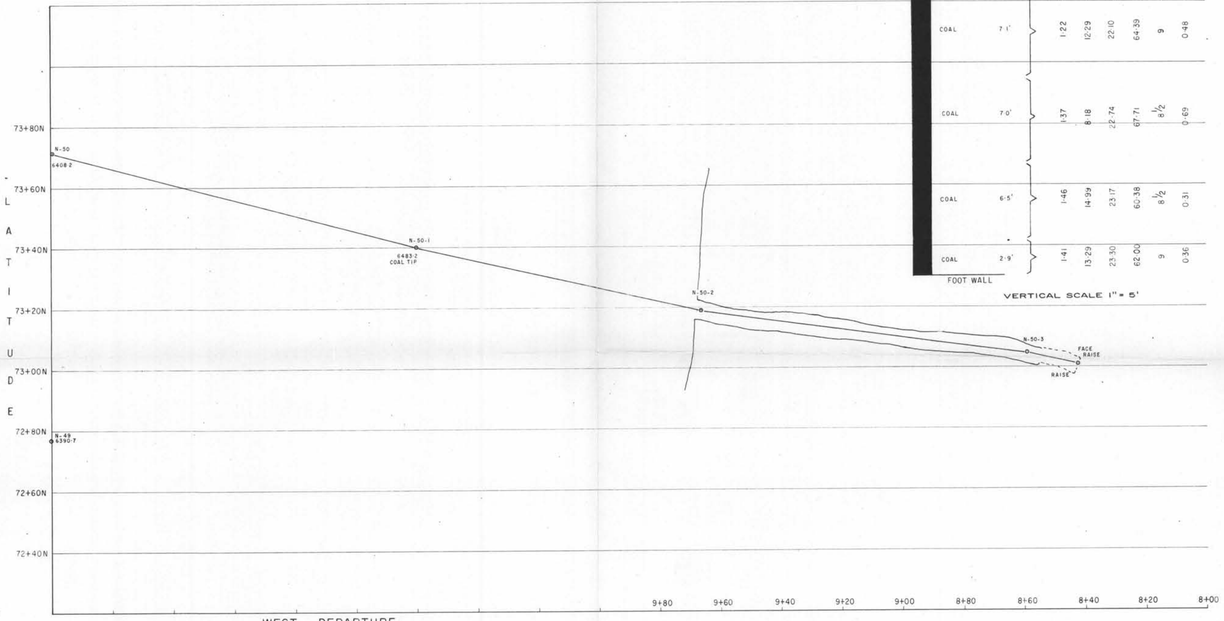
309

FR 68(5)A

E-W ELEVATION



PLAN



Canadian Pacific OIL AND GAS LIMITED
MINING DIVISION

P-8

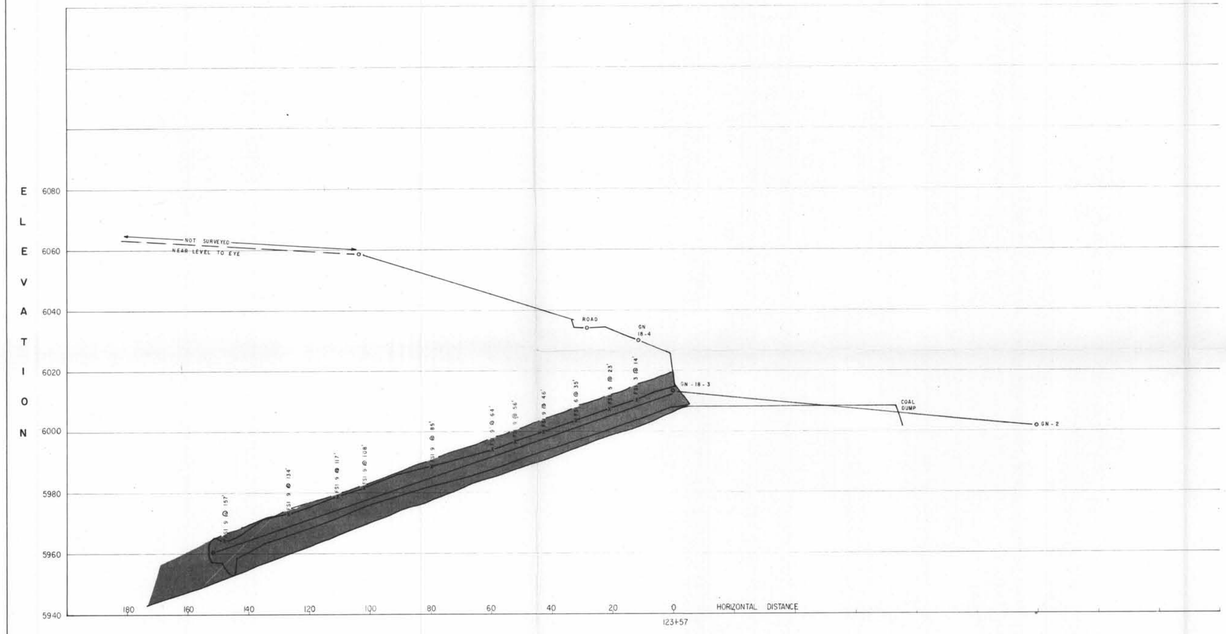
FORDING RIVER PROJECT
ADIT No. 9
(SEAM No. 7)

DATE: AUG. 20/68
SAMPLE BY: W.T.M.
AUTHOR: W.T.M.
APPROVAL BY: W.T.M.
SCALE: 1" = 20 Ft.
SURVEYED BY: D.C.D.

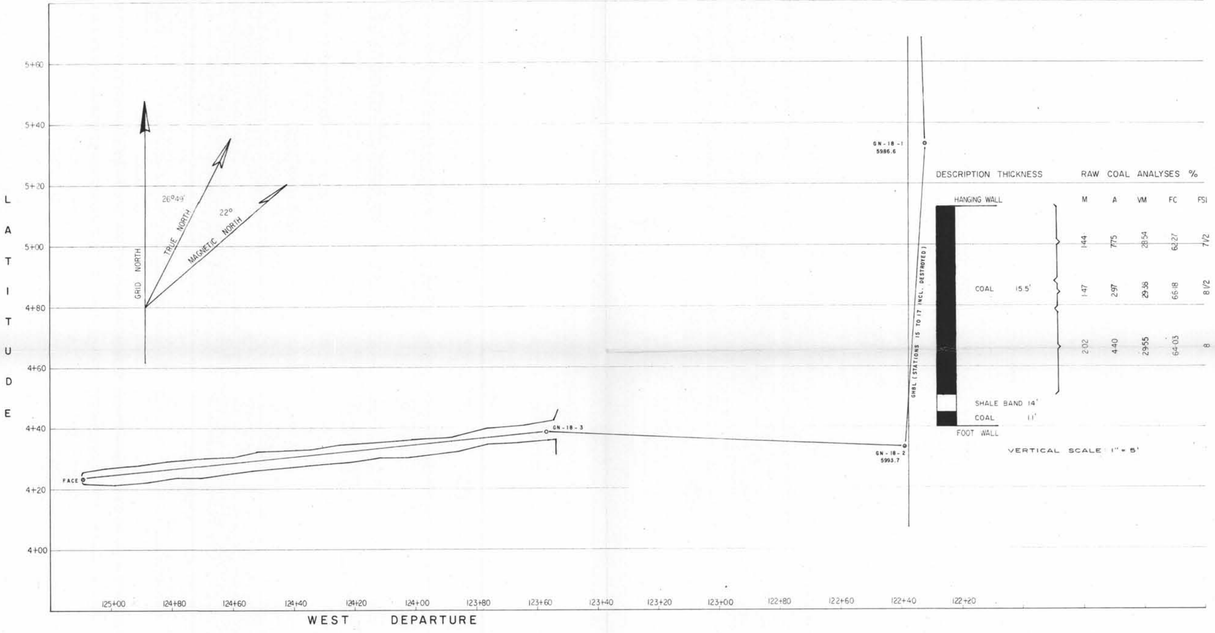
309

FR 68(S)A

E-W ELEVATION



PLAN



Canadian Pacific OIL AND GAS LIMITED P-9

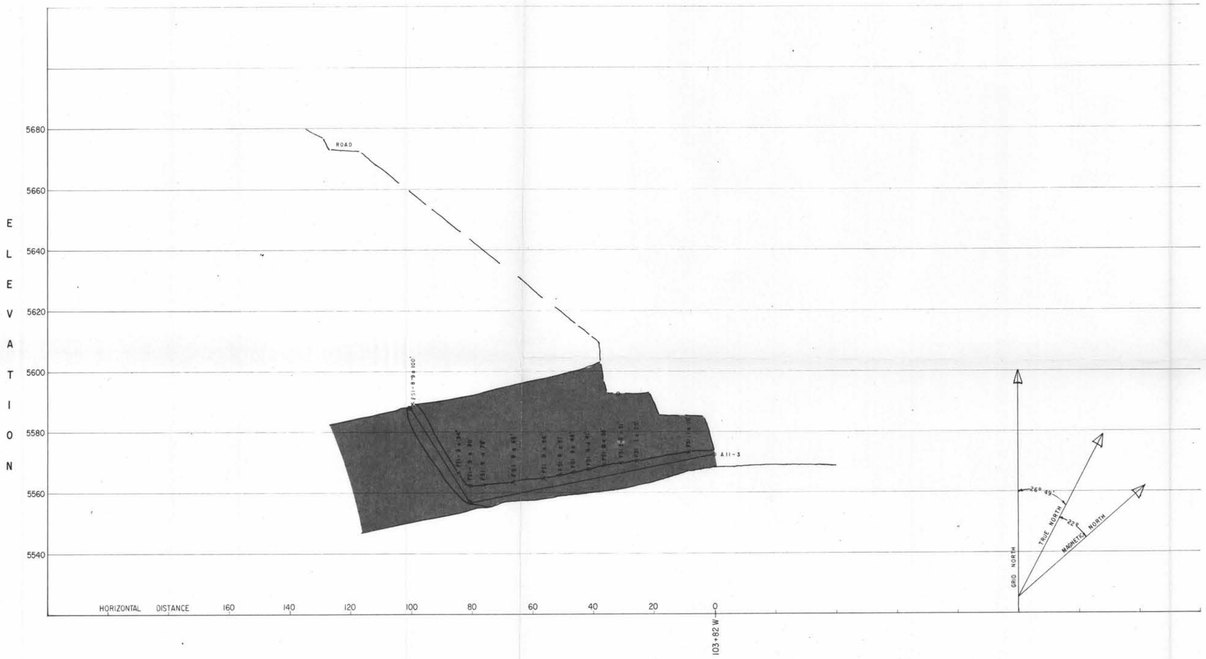
FORDING RIVER PROJECT
ADIT No. 10
(SEAM I)

DATE AUG. 22/68
SAMPLE BY W.T.M.
AUTHOR W.T.M.
APPROVAL BY W.T.M.
SCALE 1" = 20 Ft
SURVEYED BY D.C.D.

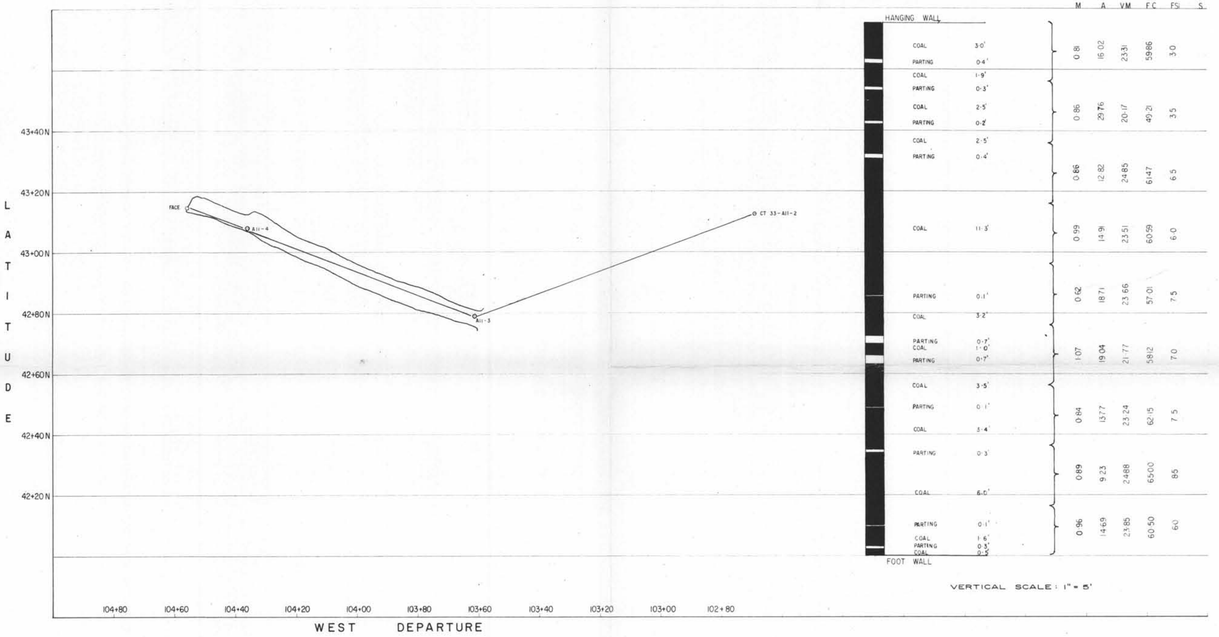
309

FR 68(S)A

E-W ELEVATION



PLAN



DESCRIPTION	THICKNESS	RAW COAL ANALYSES % M	A	VM	FC	FS	S
HANGING WALL							
COAL	3·0"	0.8	16.02	23.51	59.86	3.0	
PARTING	0·4"						
COAL	1·9"						
PARTING	0·3"						
COAL	2·5"	0.86	29.76	20.17	49.23	3.5	
PARTING	0·2"						
COAL	2·5"						
PARTING	0·4"	0.66	12.82	24.85	61.47	6.5	
COAL	11·5"	0.59	14.9	23.51	60.59	6.0	
PARTING	0·1"	0.62	18.71	23.66	57.01	7.5	
COAL	3·2"						
PARTING	0·7"						
COAL	1·0"	1.07	19.04	21.77	58.12	7.0	
PARTING	0·7"						
COAL	3·5"						
PARTING	0·1"	0.84	13.77	23.24	62.15	7.5	
COAL	3·4"						
PARTING	0·3"						
COAL	6·0"	0.89	9.23	2.488	6500	85	
PARTING	0·1"						
COAL	1·6"	0.96	14.69	24.85	60.50	6.0	
PARTING	0·3"						
COAL	0·5"						
FOOT WALL							

VERTICAL SCALE: 1" = 5'

Canadian Pacific OIL AND GAS LIMITED MINES DIVISION

P-10

FORDING RIVER PROJECT

ADIT No. II

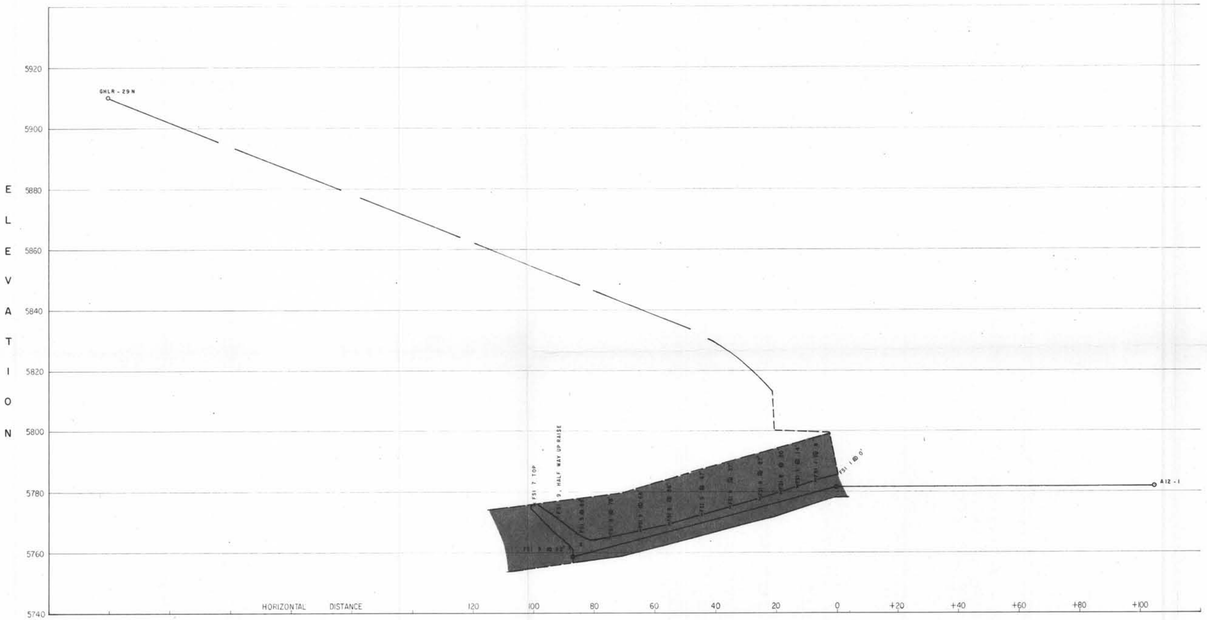
(SEAM E)

DATE AUG. 20/68
SAMPLE BY W.T.M.
AUTHOR R.T.M.
APPROVAL BY R.T.M.
SCALE 1" = 20 Ft.
SURVEYED BY D.C.D.

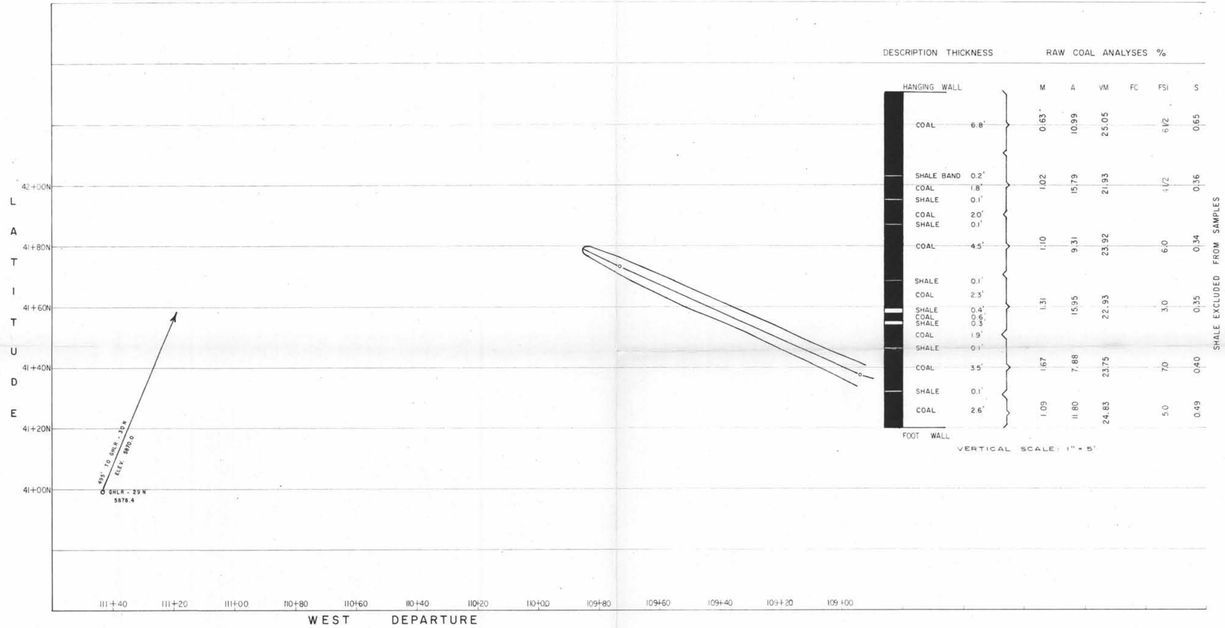
309

FR. 68(5)A

E-W ELEVATION



PLAN



DESCRIPTION THICKNESS — RAW COAL ANALYSES %

		M	A	VM	FC	FSI	S
HANGING WALL							
COAL	6.8'	0.63	10.99	25.05		6½	0.65
SHALE BAND	0.2'						
COAL	1.8'	1.02	15.79	21.93		4½	0.36
SHALE	0.1'						
COAL	2.0'						
SHALE	0.1'						
COAL	4.5'	1.10	9.31	23.92		6.0	0.34
SHALE	0.1'						
COAL	2.3'						
SHALE	0.4'	1.31	15.95	22.93		3.0	0.35
COAL	0.6'						
SHALE	0.3'						
COAL	1.9'						
SHALE	0.1'						
COAL	3.5'	1.67	7.88	23.75		7.0	0.40
SHALE	0.1'						
COAL	2.6'	1.09	11.80	24.83		5.0	0.49
FOOT WALL							

SHALE EXCLUDED FROM SAMPLES

VERTICAL SCALE: 1" = 5'

Canadian Pacific OIL AND GAS LIMITED — P-11

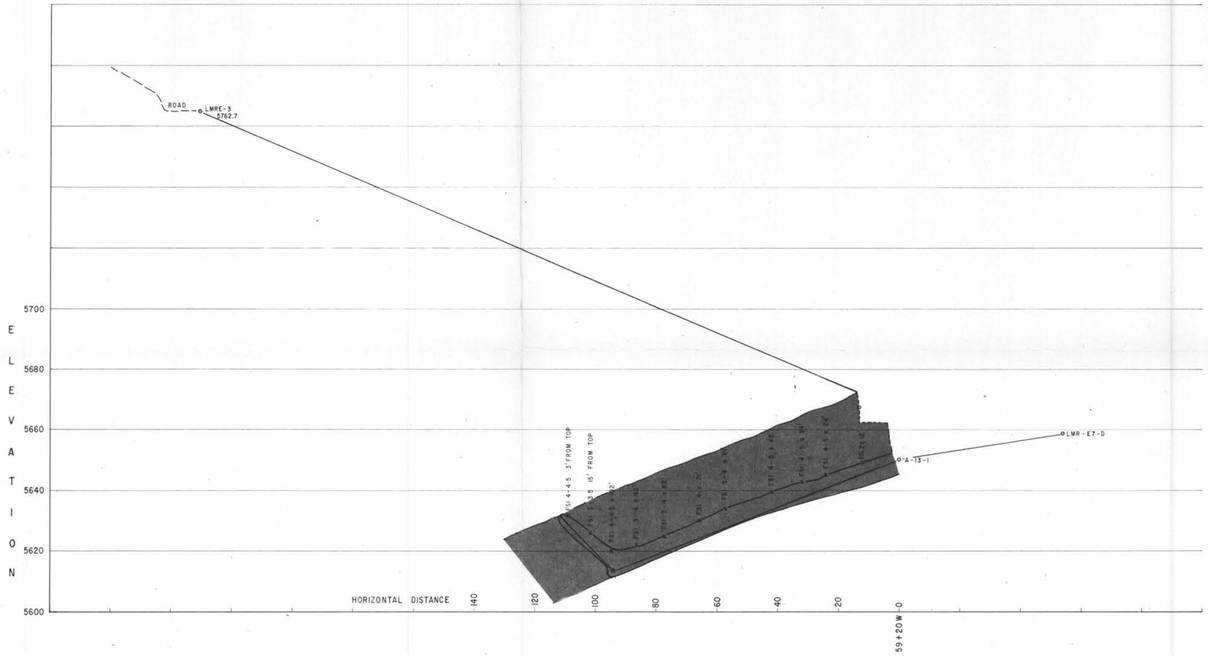
FORDING RIVER PROJECT
ADIT No.12
(SEAM F)

DATE NOV. 68
SAMPLE BY W.T.M.
AUTHOR W.T.M.
APPROVAL BY W.T.M.
SCALE 1" = 80 FT.
SURVEYED BY J.E.

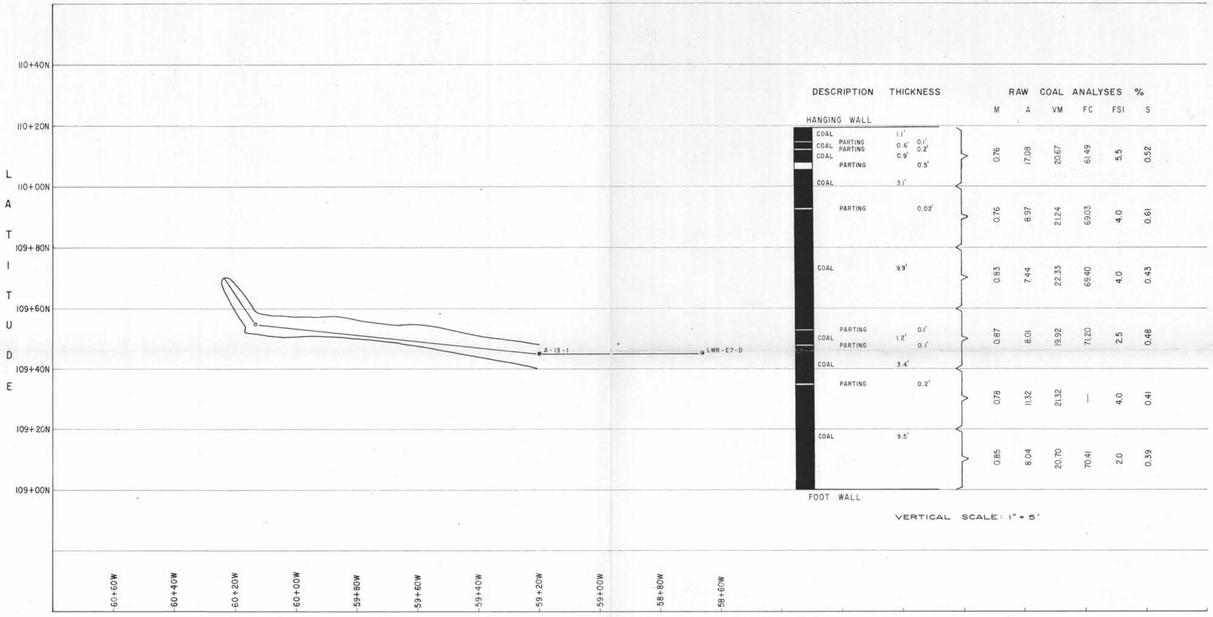
309

FR-68(5)A

E-W ELEVATION



PLAN



DESCRIPTION	THICKNESS	RAW COAL ANALYSES % M	A	VM	FC	FSI	S
HANGING WALL							
COAL	1.1'						
PARTING	0.1'						
COAL	0.6'						
PARTING	0.2'						
COAL	0.9'						
PARTING	0.5'	0.76	17.08	20.67	61.49	5.5	0.52
COAL	3.1'						
PARTING	0.02'	0.76	8.97	21.24	69.03	4.0	0.61
COAL	9.9'	0.83	7.44	22.33	69.40	4.0	0.43
PARTING	0.1'						
COAL	1.2'						
PARTING	0.1'	0.87	8.01	19.92	71.20	2.5	0.48
COAL	3.4'						
PARTING	0.2'	0.78	11.32	21.32	—	4.0	0.41
COAL	9.5'	0.85	8.04	20.70	70.41	2.0	0.39
FOOT WALL							

VERTICAL SCALE: 1" = 5'

Canadian Pacific
OIL AND GAS LIMITED
MINING DIVISION

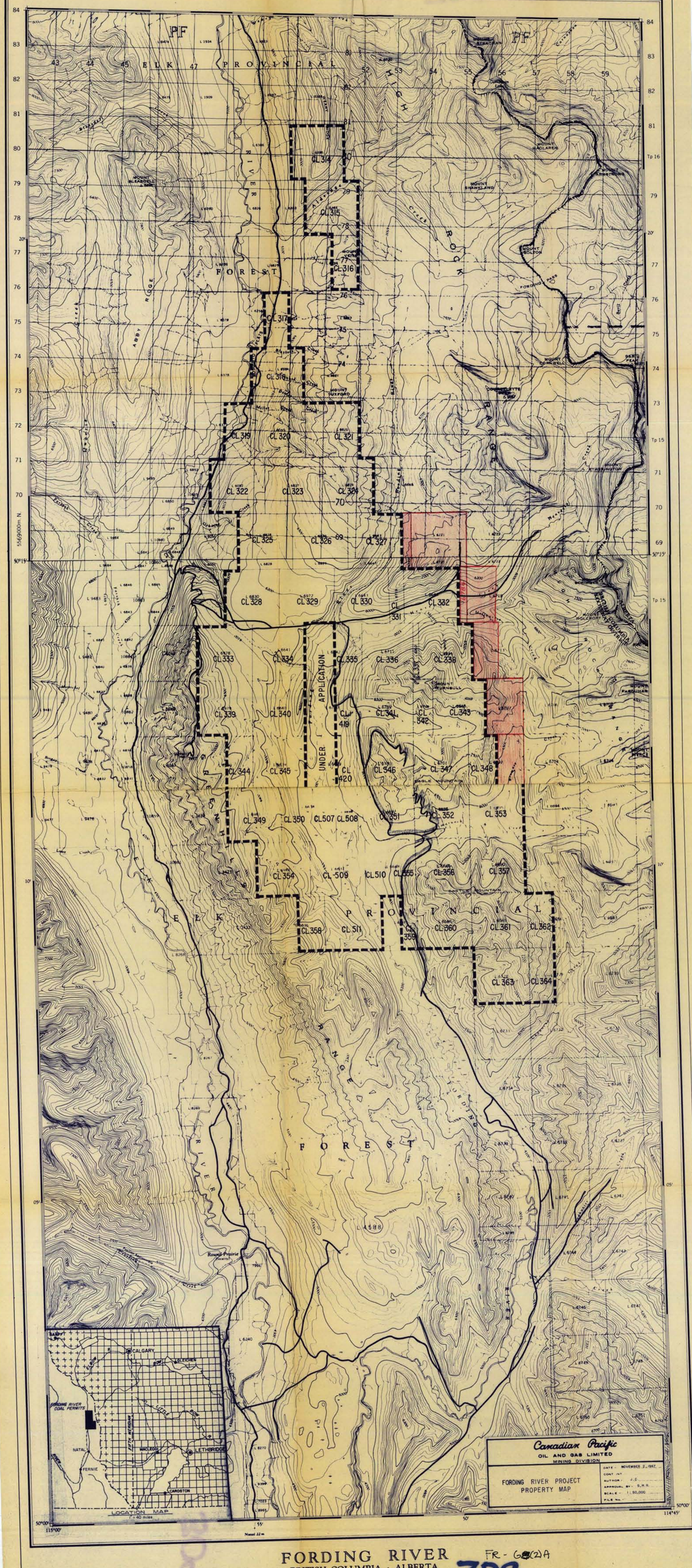
P-12

FORDING RIVER PROJECT
ADIT No.13
(SEAM D.)

DATE AUG. 20/68
SAMPLE BY W.T.M.
AUTHOR R.T.M.
APPROVAL BY R.T.M.
SCALE 1" = 20 Ft.
SURVEYED BY J.C.

309

FR 68(5)A



FORDING RIVER

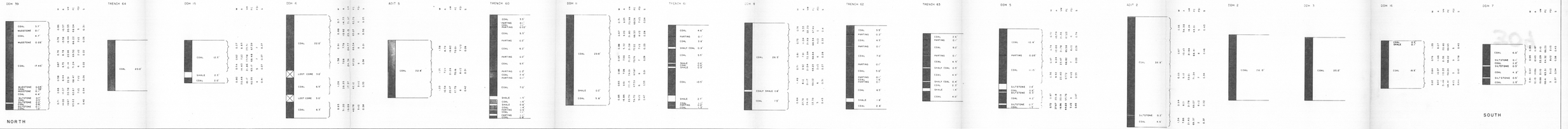
BRITISH COLUMBIA · ALBERTA

WEST OF FIFTH MERIDIAN · OUEST DU CINQUIÈME MÉRIDIEN

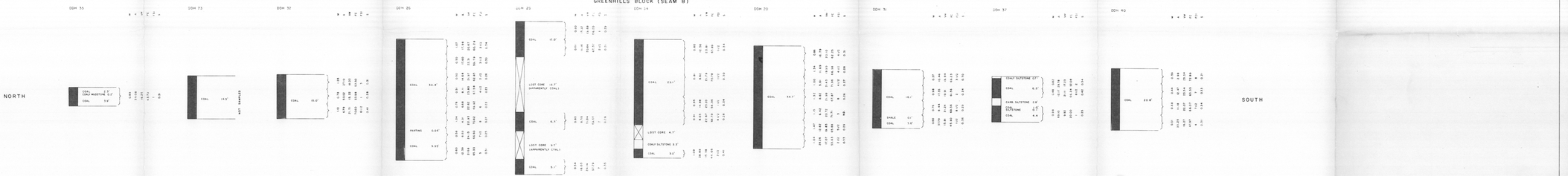
FR-G&O(2)A

309

MOUNT TURNBULL, EAGLE MOUNTAIN AND CASTLE MOUNTAIN BLOCKS
(SEAM 4)



GREENHILLS BLOCK (SEAM B)



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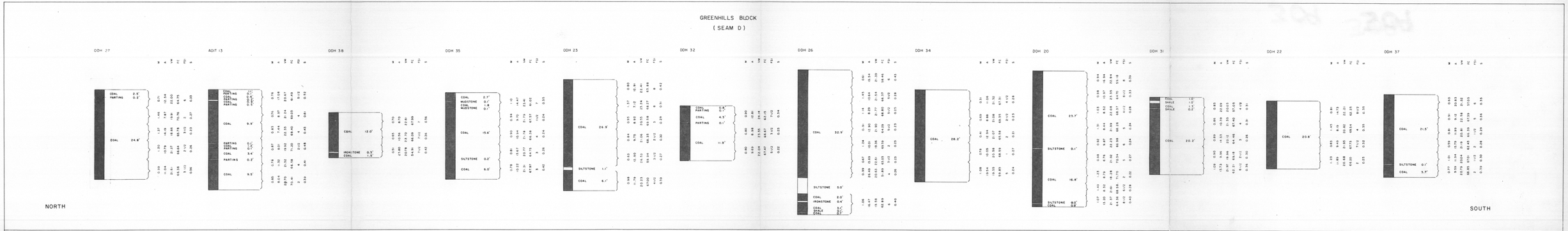
Canadian Pacific OIL AND GAS LIMITED

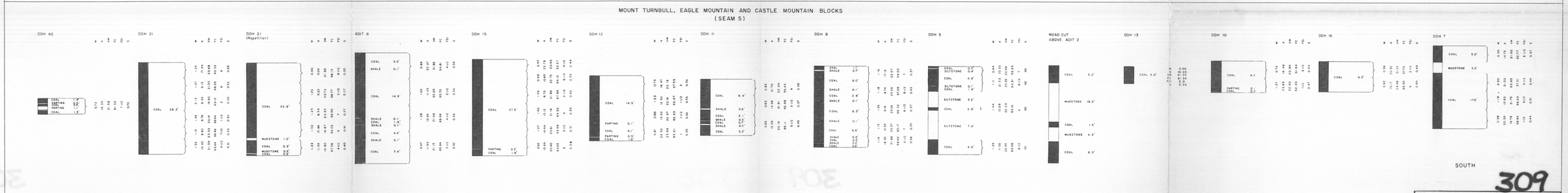
FORDING RIVER PROJECT

COLUMNAR SECTIONS
SEAM 4 (B)

S-1

FR 68(2)A





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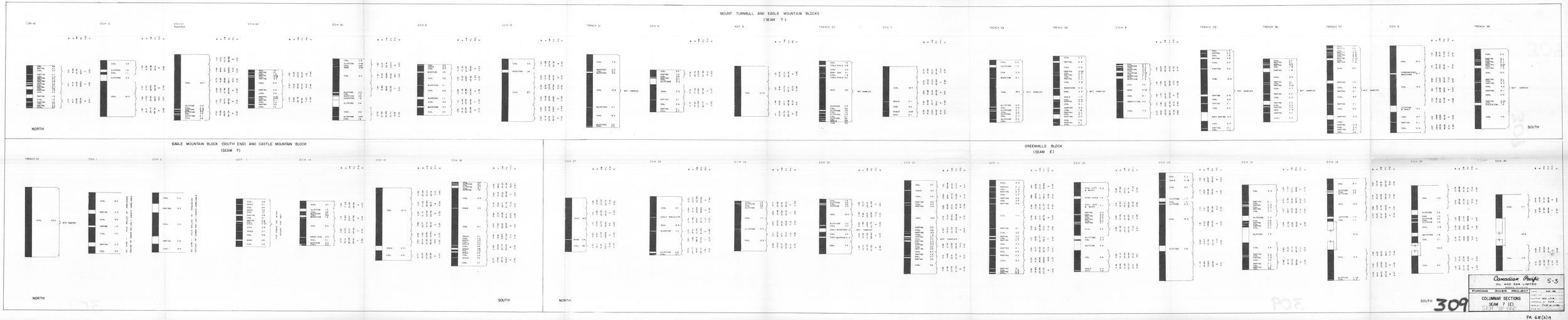
Canadian Pacific S-2
OIL AND GAS LIMITED
MINING DIVISION

FORDING RIVER PROJECT

COLUMNAR SECTIONS
SEAM 5 (D)
SEM 5D SEC

DATE NOV/68
CONT. NO.
DESIGN J.T.W.
APPROVED BY H.G.B.
SCALE 1:100
FILE NO.

FR 68(2)A


MOUNT TURNBULL AND EAGLE MOUNTAIN BLOCKS
(SEAM 7)
EAGLE MOUNTAIN BLOCK (SOUTH END) AND CASTLE MOUNTAIN BLOCK
(SEAM 7)
GREENHILLS BLOCK
(SEAM E)
NORTH
SOUTH
Canadian Pacific
OIL AND GAS LIMITED
S-3
FORDING RIVER PROJECT
COLUMNAR SECTIONS
SEAM 7 (E)
309
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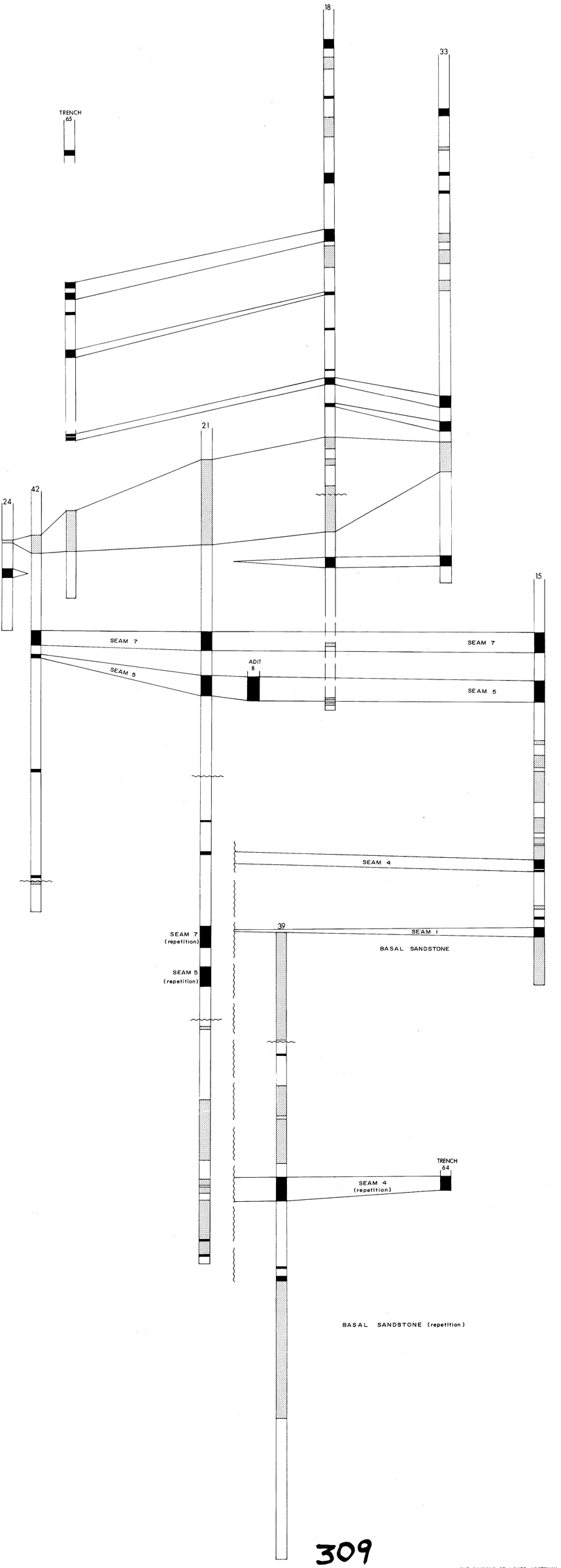

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CANADIAN PACIFIC OIL AND GAS LIMITED
MINING DIVISION

C-1

FORDING RIVER PROJECT

CORRELATION CHART – MOUNT TURNBULL BLOCK

VERTICAL SCALE: 1" = 50 Feet (1:600)

FR-68(2)A

SUB DIVISIONS OF LOWER KOOTENAY

K4	MUTZ SERIES
K3	HILLCREST SANDSTONE
K2	ADANAC SHALE
K1	MOOSE MOUNTAIN SANDSTONE

41
19
17
25
27
SEAM I
ADIT
10
28
22
SEAM H
23
SEAM G
ADIT
6
26
35
20
ADIT
12
SEAM F
ADIT
7
38
37
31
34
40
ADIT
11
SEAM E
(#7)
32
29
ADIT
13
SEAM D (#5)
SEAM C
SEAM B (#4)
BASAL SANDSTONE

SUB-DIVISIONS OF LOWER KOOTENAY

K4	MUTZ SERIES
K3	HILLCREST SANDSTONE
K2	ADANAC SHALE
K1	MOOSE MOUNTAIN SANDSTONE

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C-2

FR-68(2)A

CANADIAN PACIFIC OIL AND GAS LIMITED
MINING DIVISION

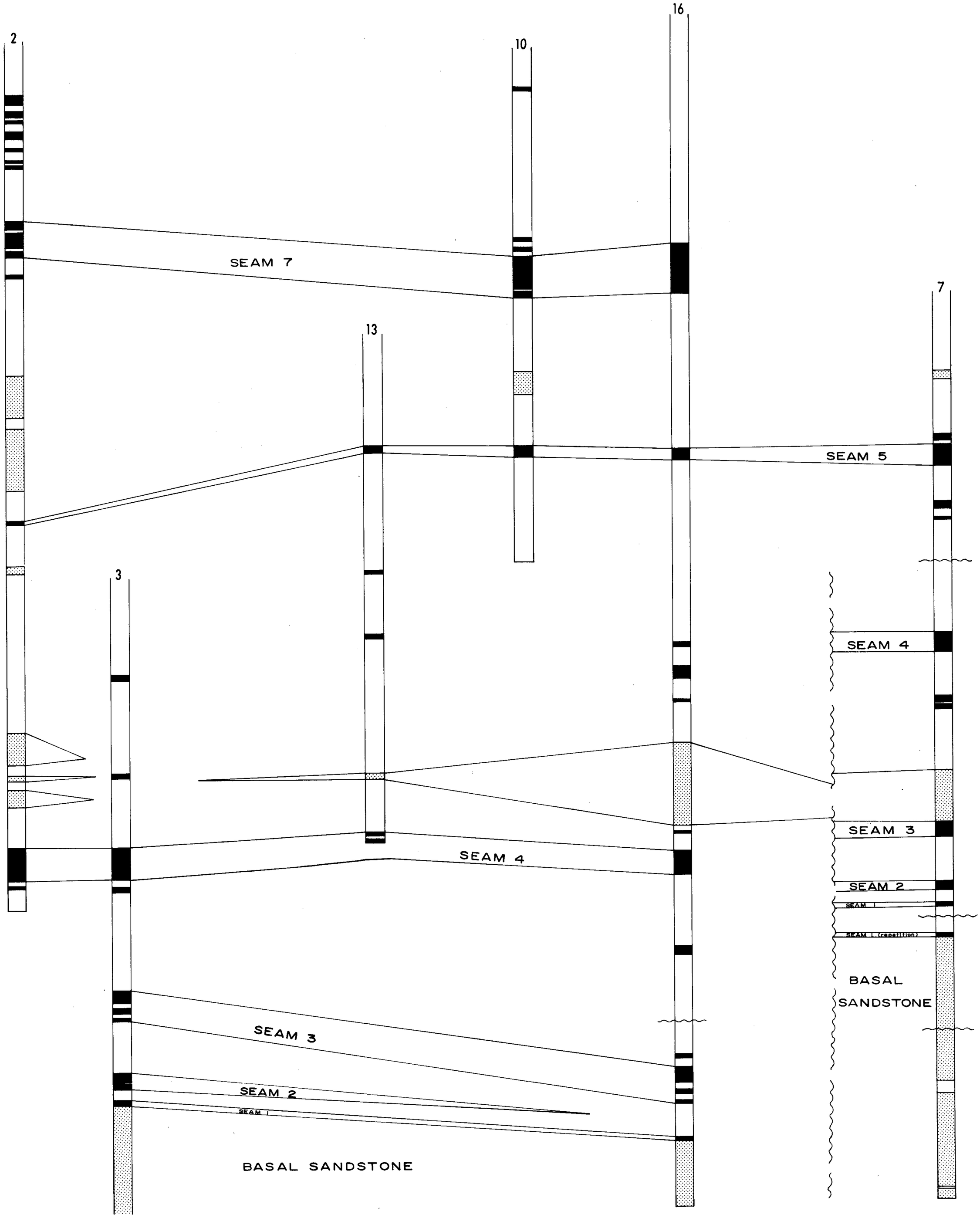
FORDING RIVER PROJECT

CORRELATION CHART - GREENHILLS BLOCK

VERTICAL SCALE : 1" = 50 Feet (1:600)

NORTH

SOUTH



SUB-DIVISIONS OF LOWER KOOTENAY

K4	MUTZ SERIES
K3	HILLCREST SANDSTONE
K2	ADANAC SHALE
K1	MOOSE MOUNTAIN SANDSTONE

CANADIAN PACIFIC OIL AND GAS LIMITED

MINING DIVISION

FORDING RIVER PROJECT

309

CORRELATION CHART—CASTLE MOUNTAIN BLOCK

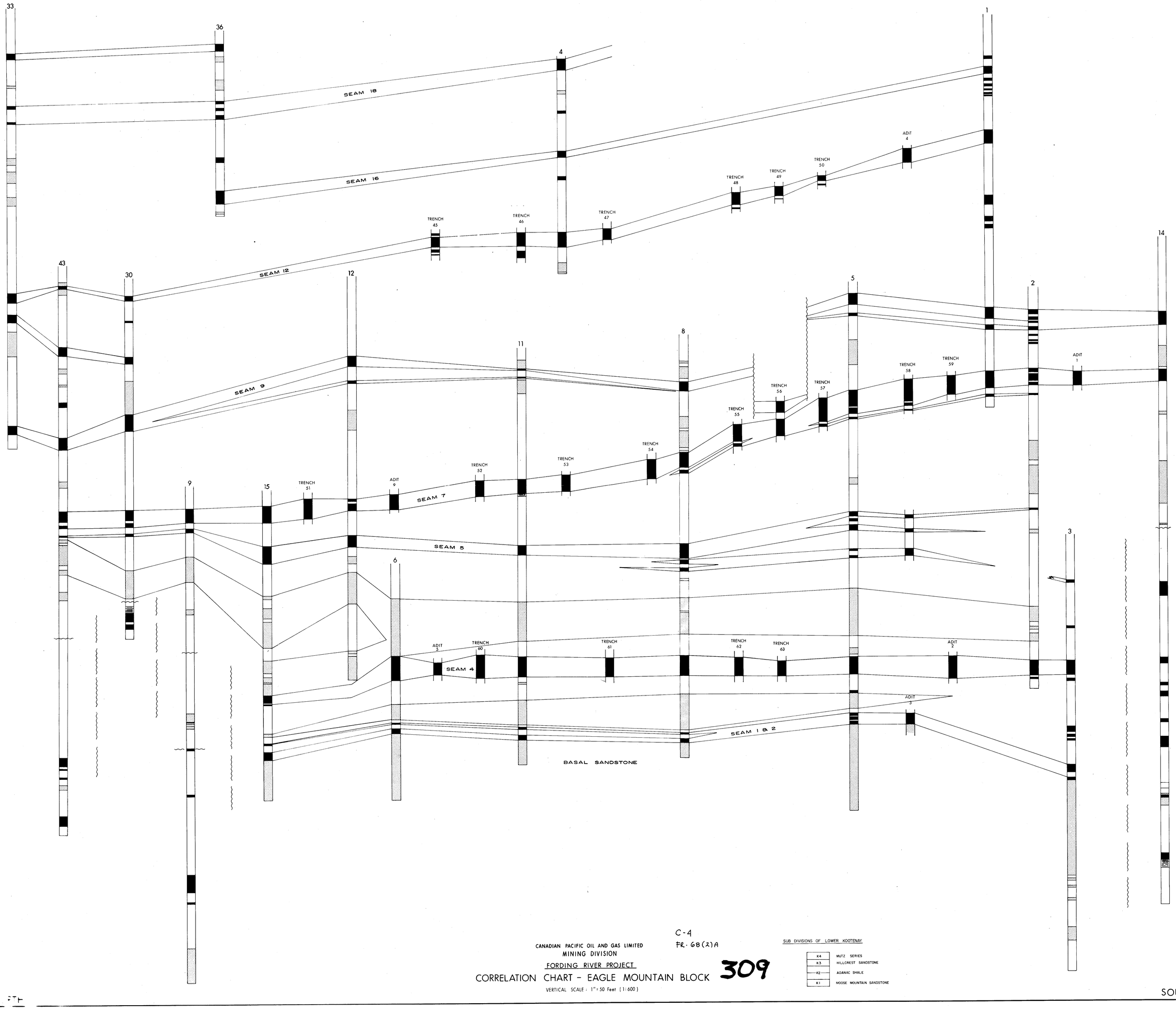
VERTICAL SCALE: 1"= 50 Feet (1:600)

C-3

FR-68(2)A

NORTH

SOUTH



CANADIAN PACIFIC OIL AND GAS LIMITED
MINING DIVISION

FORDING RIVER PROJECT

CORRELATION CHART - EAGLE MOUNTAIN BLOCK

VERTICAL SCALE : 1" = 50 Feet (1:600)

C-4
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SUB DIVISIONS OF LOWER KOOTENAY

K4	MUTZ SERIES
K3	HILLCREST SANDSTONE
K2	ADANAC SHALE
K1	MOOSE MOUNTAIN SANDSTONE

NORTH

SOUTH

TOPOGRAPHIC LEGEND

- WAGON ROAD
- TRAIL
- RIVER
- STREAM
- LAKE
- WOODED AREA
- INDEX CONTOUR — 6200
- INTERMEDIATE — 6150
- DEPRESSION
- SPOT ELEVATION — 6202
- PHOTO CENTRE — + 27

GEOLOGICAL LEGEND

CONGLOMERATE		BLAIRMORE	CRETACEOUS
CONFORMABLE CONTACT			
INTERBEDDED SILTSTONE, SANDSTONE AND SHALE – COAL BEARING IN LOWER HALF	ELK & MUTZ SERIES		
SANDSTONE – CURRENT BEDDED	HILLCREST SERIES	KOOTENAY	
SILTSTONE AND SANDSTONE – CURRENT BEDDED	ADANAC SERIES		
SANDSTONE – CURRENT BEDDED	MOOSE MOUNTAIN		
TRANSITIONAL CONTACT			
SHALE AND MUDSTONE		FERNIE	JURASSIC
UNCONFORMITY			
QUARTZITIC SILTSTONE		SPRAY RIVER – TRIASSIC	
UNCONFORMITY			
LIMESTONE		RUNDLE – MISSISSIPPIAN	

SYMBOLS

- FAULT
- THRUST
- FLAT LYING STRATA
- STRIKE AND DIP — 20°
- ANTICLINAL AXIS AND PLUNGE
- SYNCLINAL AXIS AND PLUNGE
- CONTACT – DEFINED
- CONTACT – ASSUMED
- COAL SEAM – OUTCROP – DEFINED
- COAL SEAM – OUTCROP – ASSUMED
- DDH 10 — DRILL HOLE
- A-5 — ADIT LOCATION

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Canadian Pacific OIL AND GAS LIMITED — MINING DIVISION

G-1

FORDING RIVER PROJECT

GENERAL GEOLOGICAL MAP

DATE –: NOV 15/68
CONT. INT. –:
AUTHOR –: H.G.R.
APPROVAL BY –: H.G.R.
SCALE –: 1" = 1000'
FILE No. –:

FR-68(2)A Hunter, 1968

GEOLOGICAL LEGEND
CONGLOMERATE
BLAIRMORE
CONFORMABLE CONTACT
INTERBEDDED SILTSTONE, SANDSTONE AND SHALE - COAL BEARING IN LOWER HALF
ELK & MUTZ SERIES
SANDSTONE - CURRENT BEDDED
HILLCREST SERIES
SILTSTONE AND SANDSTONE - CURRENT BEDDED
ADANAC SERIES
SANDSTONE - CURRENT BEDDED
MOOSE MOUNTAIN
KOOTENAY
CRETACEOUS
TRANSITIONAL CONTACT
SHALE AND MUDSTONE
FERNIE
JURASSIC
UNCONFORMITY
QUARTZITIC SILTSTONE
SPRAY RIVER - TRIASSIC
UNCONFORMITY
LIMESTONE
RUNDLE - MISSISSIPPIAN
4 COAL SEAM
WEST
GREENHILLS RANGE
EAGLE MOUNTAIN
EAST
5000' ABOVE SEA LEVEL
5000' ABOVE SEA LEVEL
SYNCLINAL AXIAL PLANE
SYNCLINAL AXIAL PLANE
SYNCLINAL AXIAL PLANE
DDH 20
DDH 34
DDH 5
Fording River
JF
KB
TRIASSIC
MISSISSIPPIAN
309
Canadian Pacific
OIL AND GAS LIMITED
MINING DIVISION
G-2
FORDING RIVER PROJECT
GENERAL GEOLOGICAL SECTION 2000 N
DATE - OCTOBER, 1968
CONT INT -
AUTHOR - H.G.R.
APPROVAL BY - H.G.R.
SCALE - 1" = 1000 FT.
FILE No. -

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