TK - MORICE RIVER 68(1)A

TELKWA

SUMMARY REPORT

- EXPLORATORY INVESTIGATIONS

MORICE RIVER AREA

OPEN FILE

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R.E. ANDERSON

FEB. 1969

~~93-1-6~~ TK- MORICE RIVER 68(1)A

SUMMARY REPORT

EXPLORATORY INVESTIGATIONS

COAL LICENCES

LOTS #139, #4806, #4807, #4808, #4809, #4810,

#4811, #4812, #4813, #4814, #4815

RANGE 5, COAST DISTRICT

MORICE RIVER AREA

OMINECA MINING DIVISION

BY

R.E. ANDERSON, P.ENG.

FEBRUARY, 1969.

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SUMMARY REPORT

EXPLORATORY INVESTIGATIONS

MORICE RIVER COAL DEPOSIT

OMINECA MINING DIVISION

INTRODUCTION

Bethlehem Copper Corporation Ltd., with offices located at #1818 - 355 Burrard Street, Vancouver 1, B.C., is the holder of a block of 11 contiguous coal licences located in the Morice River area of north-central British Columbia. These are more particularly described as Lots #139, #4806, #4807, #4808, #4809, #4810, #4811, #4812, #4813, #4814, #4815, Range 5, Coast District.

The investigation of coal deposits in this area was most active during the period 1907-17, when several private companies attempted to establish a marketable coal reserve for use by the Grand Trunk Railroad. Although production was not achieved during this period and no work had been done on the property subsequent to 1917, the early investigations were successful in developing an indicated reserve of 40 - 50 million tons, of which some 30 million tons was reported as being of coking quality.

Data obtained from early private and government reports is summarized as follows:

Seam	Thickness	Area	Contents	Quality
#1 Upper	4½ feet	3200 acres	14,400,000 T.	coking coal
#2 Middle	5½ feet	3200 acres	17,600,000 T.	coking coal
#3 Lower	7 feet	3200 acres	22,400,000 T.	steam coal

COAL ANALYSIS

An analysis of coal samples, obtained from surface exposures, was reported in 1917 as follows:

Moisture	2.5
Volatile matter	30.5
Fixed carbon	60.8
Ash	6.2
Sulphur - not more than	.05%

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The coal licences were acquired from the Provincial Government by Bethlehem Copper Corporation Ltd. in February, 1968. Initial exploratory investigations, undertaken by Bethex Explorations Ltd. (N.P.L.) on behalf of Bethlehem Copper Corporation Ltd., commenced in early June and continued through to mid-September, 1968. Field programs, consisting of geological mapping, bulldozer trenching and diamond drilling were of a reconnaissance type and were directed primarily towards obtaining sufficient information to either confirm or disprove the data reported by earlier operators.

LOCATION AND ACCESS

The coal property is located within the Omineca Mining Division, lying near the headwaters of Denys Creek, approximately 35 miles due south of Smithers, B.C. The terrain is moderately wooded and mountainous, with topographic relief ranging from 3700 to 5500 feet above sea level.

Access is difficult as no roads or logging trails are known to exist within a ten-mile radius of the licence block. The closest access road, which is situated some ten miles to the north of Denys Creek, links the Norcan Mines' property with the town of Telkwa, B.C. Supplies and equipment required for the summer program were trucked to Norcan Mines and then transported by helicopter to the Morice River property.

EXPLORATORY DRILLING

In 1912, Mr. A.J. Beaudette, an engineer employed by the Grand Trunk Pacific Railroad, is reported to have drilled three vertical bore holes to depths of 360 feet, 560 feet and 740 feet. The original drill site locations and the main camp site were relocated during the past summer (see Geological Plan).

Canadian Longyear Drilling Co., under contract to Bethex Explorations Ltd. (N.P.L.), completed three additional holes to respective depths of 526 feet, 686 feet and 776 feet during the period July 28th to August 17th. Continuous "N" size core was recovered from each test and coal samples were forwarded to the Department of Energy, Mines and Resources for analysis. A summary of results submitted by the Department accompany this report.

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REGIONAL GEOLOGY

The property lies within the southern half of the area covered by G.S.C. Map #44-23, the only recent larger scale geological map available. The geology of the country south of Telkwa River as shown on this map differs little from the original interpretation made by Mr. W.W. Leach in 1907 (the Telkwa River and vicinity G.S.C. Publication #988, 1907).

The greater part of the area surrounding the Morice River coal property is shown as being underlain by volcanics and related intrusives of the Hazelton Group reputed to be of Jurassic to Cretaceous age. Scattered throughout the area and located in well defined creek valleys are small, irregular areas of coal-bearin sedimentary rocks. Doubt exists as to the exact age of these sediments but they are shown on current G.S.C. maps as being part of the Hazelton Group of possible upper Jurassic, lower Cretaceous age. The largest known sedimentary basin, three miles southwest of Telkwa village, has supported small scale coal mining ventures for several years. Recent work by the G.S.C. concludes that the coal from the Telkwa Basin represents a lacustrine deposit formed in an errosional depression.

MORICE RIVER COAL PROPERTY

The sedimentary basin lying within the valley of Denys Creek has an irregular, elliptical shape trending northeast and is 13,000 feet long and maximum of 6,000 feet wide. Elevations in the map area range from 3700 feet to 5500 feet.

The sedimentary rocks are generally soft and erode readily, consequently outcropping is sparse and generally restricted to steep-sided creeks along the flan of the basin. The actual contact between the sediments and the underlying volcanic was not exposed, but there is a noticeable steepening of the hill slope as the contact is crossed from sediments to volcanics.

LITHOLOGY

Sediments

The sediments consist of a variable series of mudstones, siltstones and greywackes, which attain a maximum thickness of about 1100 feet in the northeastern part of the basin. Diamond drilling has shown that the coal seams occur within the

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lower 320 feet of the sedimentary sequence, but the thickness of the coal-bearing rocks varies considerably - in Diamond Drill Hole #1 it is 300 feet; in Diamond Drill Hole #2 - 220 feet and in Diamond Drill Hole #3 - 190 feet. The coal seams vary greatly in both frequency of occurrence and thickness - in D.D.H. #1, 13 sea- were intersected; in D.D.H. #2 - 11 and in D.D.H. #3 - 8. Thickness ranges from 0.5 feet to 7.5 feet. This lateral and vertical variability in the coal is also found in the host sediments and consequently it is difficult to correlate either the coal seams or the lithological variations within the enclosing sediments.

The dominant rock type within the sediments is a dark grey, soft mudstone, which crumbles readily upon exposure to the air. It only rarely displays any recognizable bedding, although it may be shaley in areas of strong deformation. Concretionary nodules of calcareous composition ranging in size from less than 1 inch to over a foot in diameter were noted, both in outcrop and in drill core within the mudstones at several different horizons. Fossils are frequently found within the mudstones and often appear associated with the nodules. Mudstones adjacent to coal seams are quite frequently highly carbonaceous and are, in some places, transitional with the coal.

The mudstones are transitional with fine grained, finely laminated and banded siltstones which in turn pass both laterally and vertically into fairly coarse grained, coarsely bedded, to massive greywackes. These greywackes are more competent and resistant to erosion than the finer grained mudstones and siltstones, but are not as widely developed.

It has not been possible to establish a sequence within the sedimentary units but there is a general tendency for decrease in grain size with depth and for the coal seams to occur within the finer grained mudstones.

Coal

Detailed descriptions of the more important coal seams are given in the columnar logs accompanying this report. In general, the coal is predominantly dull black, usually well bedded, with fine laminae of brittle bright coal which usually becomes more abundant towards the foot wall of the seam. The seams are generally dirty with numerous shards, layers and occasional narrow bands of

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fireclay/calcareous mud. This is reflected by the high ash content of the coals. Pyrite is quite common as scattered fine blebs and films along slip planes. The coal seams have been partially affected by deformation and small scale folding and shearing, locally intense, is found in most of the seams. As mentioned above, correlation is difficult, but on the basis of drill hole data, probable upper, middle and lower seams are recognizable although the thicknesses vary in each section.

	D.D.H. #1	D.D.H. #2	D.D.H. #3
Upper Seam	5.8 feet	4.0 feet	absent
Middle Seam	4.5 feet	1.0 feet	4.3 feet
Lower Seam	absent	2.4 feet	7.4 feet

Coal samples, obtained from these and other prominent seams, were forwarded to the Department of Energy, Mines & Resources at Edmonton and Ottawa for detailed analysis. Their results accompany this report.

Volcanics

The contact between the sediments and the underlying volcanics was not exposed on surface, but drill core evidence suggests an erosional contact. The volcanics consist of very variable pale to dark green and brown andesites and tuffs. Several outcrops of a pink, coarse grained granite, apparently intruding volcanics, were found on the upper slopes of the western side of the Denys Creek valley.

STRUCTURE

Surface mapping, aided by bulldozer trenching and diamond drilling, has shown that the sedimentary basin is considerably more complex in structure than was presumed by the early workers, although there is still insufficient data to provide a clear picture.

The overall structure is comprised of a series of parallel folds, the axis of which plunges gently to the northeast.

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The central long axis of the elliptical-shaped basin appears to coincide with the axis of an anticline flanked by complementary synclines. All the bulldozer trenches in the south and western part of the basin have revealed very tight folding and strong shearing with local over-folding and displacements. This suggests that there is probably considerable structural complication of the fold structure which the present, rather sparse, data indicates.

Numerous faults and shear zones have been observed in both outcrop and drill core and there is evident minor displacement in many places. However, no evidence was seen that would suggest major movements.

In view of the highly variable nature of the coal and its host sediments, and also because of the obvious complexity of the structure, it is highly conjectural that the correlation of coal outcrop and borehole intersections made by early workers has any validity.

CONCLUSIONS

Analysis of the coal samples, as reported by the Department of Energy, Mines & Resources, clearly indicates the reserves contained in the Morice River deposit have limited economic potential. The high ash and sulphur content and non-coking characteristics reported by the Department vary considerably from the results reported by earlier operators. In addition, data obtained from geological mapping, trenching and exploratory drilling programs suggests the sediments have been subjected to structural changes in the form of minor faulting and shearing. Consequently, continuity of lithologic horizons and individual coal seams over extensive areas is questionable. Underground mining operations would be costly and hazardous because of the incompetent mudstones which occupy the hanging wall and foot wall sections of the coal seams.

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In view of the foregoing, continued exploration is unwarranted and we therefore recommend the coal licences be surrendered as anniversary dates fall due.

R.E. Anderson
Prof. Eng. - British Columbia

February 27, 1969.

APPENDIX

SCHEDULE OF COAL LICENCES

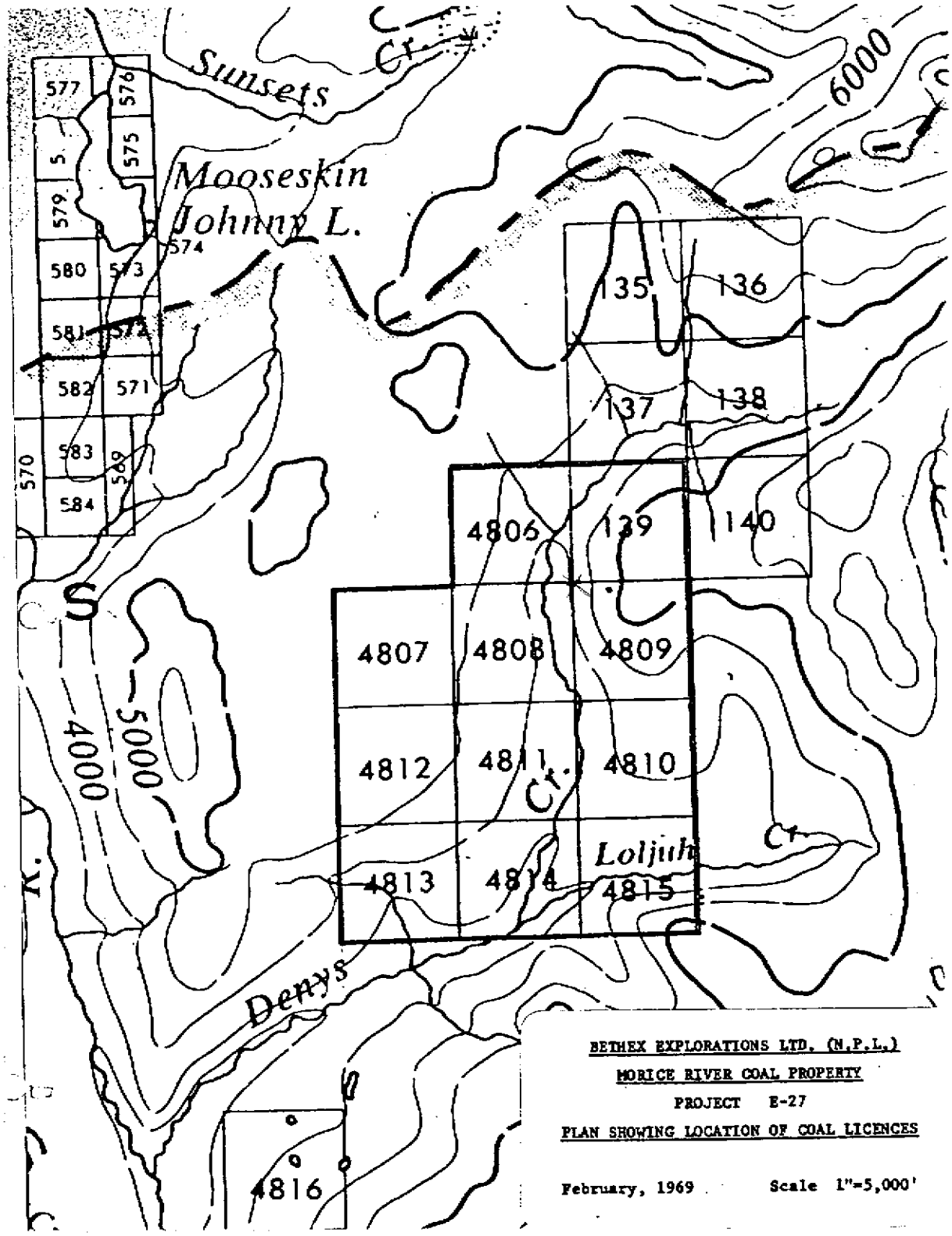
MORICE RIVER AREA - OMINECA MINING DIVISION

RANGE 5, COAST DISTRICT

LICENCE NO.	LOT NO.	ACRES	DATE ISSUED	EXPIRY DATE
435	4806	640	Feb. 26, 1968	Feb. 26, 1969
436	139	640	"	"
437	4808	640	"	"
438	4809	640	"	"
439	4811	640	"	"
440	4810	640	"	"
441	4814	640	"	"
442	4815	640	"	"
512	4807	640	Sept. 6, 1968	Sept. 6, 1969
513	4812	640	"	
514	4813	640	"	

Total Acreage - 7,040 acres

Prepaid Rentals @ 50 cents/acre - $3,520.00



BETHEX EXPLORATIONS LTD. (N.P.L.)

MORICE RIVER COAL PROPERTY

PROJECT E-27

PLAN SHOWING LOCATION OF COAL LICENCES

February, 1969 Scale 1"=5,000'

GEN - MORICE RIVER 68(1)A

Department of Energy, Mines and Resources
Ministère de l'Énergie, des Mines et des Ressources

CANADA

Mines Branch
Direction des mines

File Number
No à rappeler

Fuels Research Centre
555 Booth Street
Ottawa, Ontario
February 10, 1969

Mr. R. E. Anderson
Bethlehem Copper Corporation Limited
Suite 1818 Marine Building
355 Burrard Street
Vancouver, British Columbia

Dear Mr. Anderson:

Further to my telex of December 13, 1968, this letter confirms that we have examined ten sectional samples by microscopy, and found four of these samples worthy of further examination.

After removing the ash from these four samples (Nos. 2, 4, 5 and 10), we examined the dilatation and then made a second microscopic examination. The dilatation tests show that this coal does not possess the proper fusing characteristics to produce metallurgical coke. The microscopic examination of the washed coal suggests that the reason for the lack of proper coking properties is the presence of too much fusinite and semi-fusinite and not due to oxidation or other related effects. The hole-core sample was divided into six inch longitudinal intervals, and the three best sections at the bottom were selected and the ash removed. Again the dilatation tests indicated lack of fusion, and the samples must therefore be classed as unsatisfactory from the coking point of view.

It is always possible that for economic or other reasons, your coal may find application, but the high sulphur level of some samples suggests that acceptability will be difficult on that account.

We regret the delay in sending you the detailed results, but we have been involved in a relocation of our laboratories which has set back our program.

Yours very truly,

D. S. Montgomery, Head
Fuels Research Centre

DSM:sr
Encl.

cc Dr. J. Visman

Gen - Morice River 68C(1)A

DEPARTMENT OF ENERGY, MINES AND RESOURCES

TABLE 1

227 (1)

ANALYSES OF DIAMOND DRILL HOLE CORE SAMPLES OF COAL FROM MORICE RIVER COAL PROPERTY SUBMITTED BY BETHLEHEM COPPER CORPORATION LIMITED
(Central British Columbia Coal District, Telkwa Coalfield, Smithers, BC)

Identification										
Date Received	22/12/68	22/12/68	22/12/68	22/12/68	22/12/68	22/12/68	22/12/68	22/12/68	22/12/68	22/12/68
Laboratory Number	2047-69	2048-69	2049-69	-	2050-69	2051-69	2052-69	2053-69	2054-69	2055-69
Description	✓	✓	✓	✓						
Bethex Sample No.	2	4	10	5	1	3	6	7	8	9
Sample preparation	cleaned	cleaned	cleaned	cleaned	raw	raw	raw	raw	raw	raw
DDH No.	1	2	3	2	1	2	2	2	3	3
	453.2 to 456.5	318.0 to 320.0	626.0 to 633.6	411.0 to 412.2	401.6 to 403.5	268.1 to 272.2	412.2 to 412.8	412.8 to 414.0	450.0 to 452.0	566.5 to 570.3
Seam	UPPER	MIDDLE	LOWER	LOWER	UPPER	UPPER	LOWER	LOWER	UPPER	MIDDLE
Classification										
Specific Volatile Index.....	160	144*	161		163	158	*	150*	157*	153
Volatile Matter (dmmf).....%	30.6	36.1	30.5		31.0	30.9	86.2*	40.7*	35.0*	32.9
Proximate Analysis (db)										
Ash.....%	10.0	29.0	10.1	insufficient	21.6	20.5	82.0	53.1	35.5	19.2
Volatile Matter.....%	28.3	28.2	28.1	coal	26.6	26.1	14.3	21.9	25.1	27.9
Fixed Carbon.....%	61.7	42.8	61.8	for analyses	51.8	53.4	3.7	25.0	39.4	52.9
Sulphur (db).....%	0.85	5.42	0.49		3.69	1.82	3.73	3.61	3.28	0.81
Gross Calorific Value (dmmfb).....Btu/lb	14,950	14,460	14,980	--	15,067	14,900	1,137	14,716	14,920	14,750
Free Swelling Index (ASTM)	1 1/2	1	1	--	--	--	--	--	--	1
Ruhr Dilatometer										
Softening Point (ϕ_s).....°C	400	390	415	408						
Contraction (C).....%	18	22	15	7						
Dilatation.....%	--	--	--	--						
Temp. of Max. Dil.....°C	--	--	--	--						
Temp. of Max. Cont. (ϕ_c).....°C	519	519	530	458						
Plasticity Index C/ϕ_c - ϕ_s). (G-Value) →	0.15	0.17	0.12	0.14						

only contracts -

* Very difficult to determine a realistic value due to high ash levels and abnormal calorific values resulting from excessive oxidation.

D.D.H. #2 - 268.1 - 272.2 "Upper Seam"

Footage	Graphic Log		Description
266		- 268.1	Siltstone, grey green, finely bedded, very sparsely and finely micaceous, abundant small particles and shards coal throughout groundmass. Local minor contortion - slumping, current bedding. Beds 85°/C.A.
267			
268			268.0 - 268.1 - Mud, buff, calcareous, numerous carbonaceous fragments, sparse fine pyrite.
268.1	Calc. mud	268.1 - 272.2	Coal, dominantly dull black, finely banded with bright coal. Pyrite throughout as sparse dusting, fine wisps, occasional thin lenses. Very fine tight fracturing, parallel to C.A. Bedding 85°/C.A.
	Py		(See Government Analyses)
269			
269.2	Calc. mud		269.2 - 269.4 - Mud, buff, similar to 268.0 - 268.1 above.
269.4	Py		
270			
271			
			Fine fracturing, more intense over lower 0.5' of seam.
272			F.W. contact, irregular, transitional.
272.2		272.2 -	Mudstone, grey, fine grained, finely laminated, becoming more silty down hole Beds 85°/C.A.
273			

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Gen - Morice River 68(1)A

BETHEX EXPLORATIONS LTD. N.P.L.			
PROPERTY: Morice River Coal Project E-27 D.D.H. #2			
Detail Log & Section - Coal Seam 268.1 - 272.2			
FIELD WORK BY	DRAWN BY IMW	TRACED BY	APPROVED BY
DATE	DATE	SCALE	

D.D.H. #2 - 318' - 320' - Seam Approximately 35' Above Horizon of "Middle Seam"

Footage	Graphic Log	Description
		- 318.0 Mudstone, grey, fine, poorly bedded, numerous minute carbonaceous fragments and shards throughout.
		Beds 80°/C.A.
		Lower contact with coal seam transitional 317.8 - 318.0
		318.0 - 320.0 Coal, dominantly dull black, with narrow bands and laminae bright coal, finely fractured throughout, most intense within 4" of H.W. and F.W., fractures calcite lined, generally parallel to C.A., except at F.W. where parallel to beds.
		Pyrite scattered throughout seam, as laminae and thin lenses along bedding planes.
		Minor calcareous mudstone as small lenses (1/2") and discontinuous laminae.
		(See Government Analyses)
		Lower contact sharp, 77°/C.A.
		320.0 - Siltstone, pale grey, slightly coarser than H.W. mudstone. Sparsely and finely micaceous. A few scattered coalified plant fragments.
		Beds 75°-80°/C.A., poor.

316 317 318 319 320 321 322

227 (3)

Gen - Morice River 68(1)A

BETHEX EXPLORATIONS LTD. N.P.L.			
PROPERTY: Morice River Coal Project E-27 D.D.H. #2			
Detail Log & Section - Coal Seam 318' - 320'			
FIELD WORK BY	DRAWN BY IMW	TRACED BY	APPROVED BY
DATE	DATE	SCALE 1" = 0.5'	

D.D.H. #1 - Sample Section 453.2 - 456.5 "Upper Seam" (Split Core)

Footage	Graphic Log		Description
451		- 452.1	Silty mudstone, grey, finely bedded, soft, tends to crumble. Sparse minute mica flakes throughout. Beds 70°/C.A. Shearing, parallel to bedding, along contact with underlying carbonaceous mudstone.
452			
452.1		452.1 - 453.2	Carbonaceous mudstone, grey mudstone finely interbedded with thin coal layers and laminae. Coal content increases down hole. Sparse fine mica along bedding planes. Minor pyrite as fine lenses, shards.
	Py		
453			
453.2		453.2 - 456.5	Coal - dominantly dull black amorphous, with frequent narrow bands and partings bright coal. Scattered very small shards, clay material. Seam slightly sheared, shearing becoming more intense towards F.W. Lower 0.5' highly distorted, numerous fine calcite lined fractures.
			(See Government Analyses)
	Broken Core 453.2 - 454.4		
454			
	Py Clay Frags.		
455			
	½" Clay parting		
456			
	Hair line calcite lined fracts		
	Polished slip-plane		
456.5		456.5 - 457.0	Carbonaceous mudstone, grey, with numerous narrow bands and laminae bright coal.
457		457.0 -	Mudstone, grey, soft, crumbly, sparsely and finely micaceous.
	⅛" Calcite lined slip		
458			

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Gen - Morice River 68(1)A

BETHEX EXPLORATIONS LTD. N.P.L.

PROPERTY: Morice River Coal
Project E-27
D.D.H. #1

Detail Log & Section - Coal Seam 453.2 - 456.5

FIELD WORK BY	DRAWN BY	TRACED BY	APPROVED BY
	IMW		
DATE	DATE	SCALE	1" = 0.5'

D.D.H. #1 - Sample Section - 401.6 - 403.5 (Split Core) - Seam Approximately 50' Above Horizon of "Upper Seam"

Footage	Graphic Log		Description
401		- 401.6	Mudstone, grey, fine grained, soft, crumbly, poorly bedded, tends to cleave along bedding planes. Scattered, very fine wisps and shards coal.
401.6		401.6 - 403.5 1.9 sec	Coal, dominantly dull, black, several narrow (1/8" - 1/4") bands bright coal in lower 6" of seam. Upper 6" of seam 'muddy', contains numerous minute mica flakes, becoming cleaner down hole. Beds - 75°/C.A., but largely obscured by shearing, fine fracturing. Shearing and fracturing 45°/C.A., and approximately perp. to bedding.
402	Py		(See Government Analyses)
403	Mud seam		
403.5	Coal frags.	403.5 -	Mudstone, similar to that above. A few small irregular fragments coal in mudstone immediately below coal seam F.W.
404			

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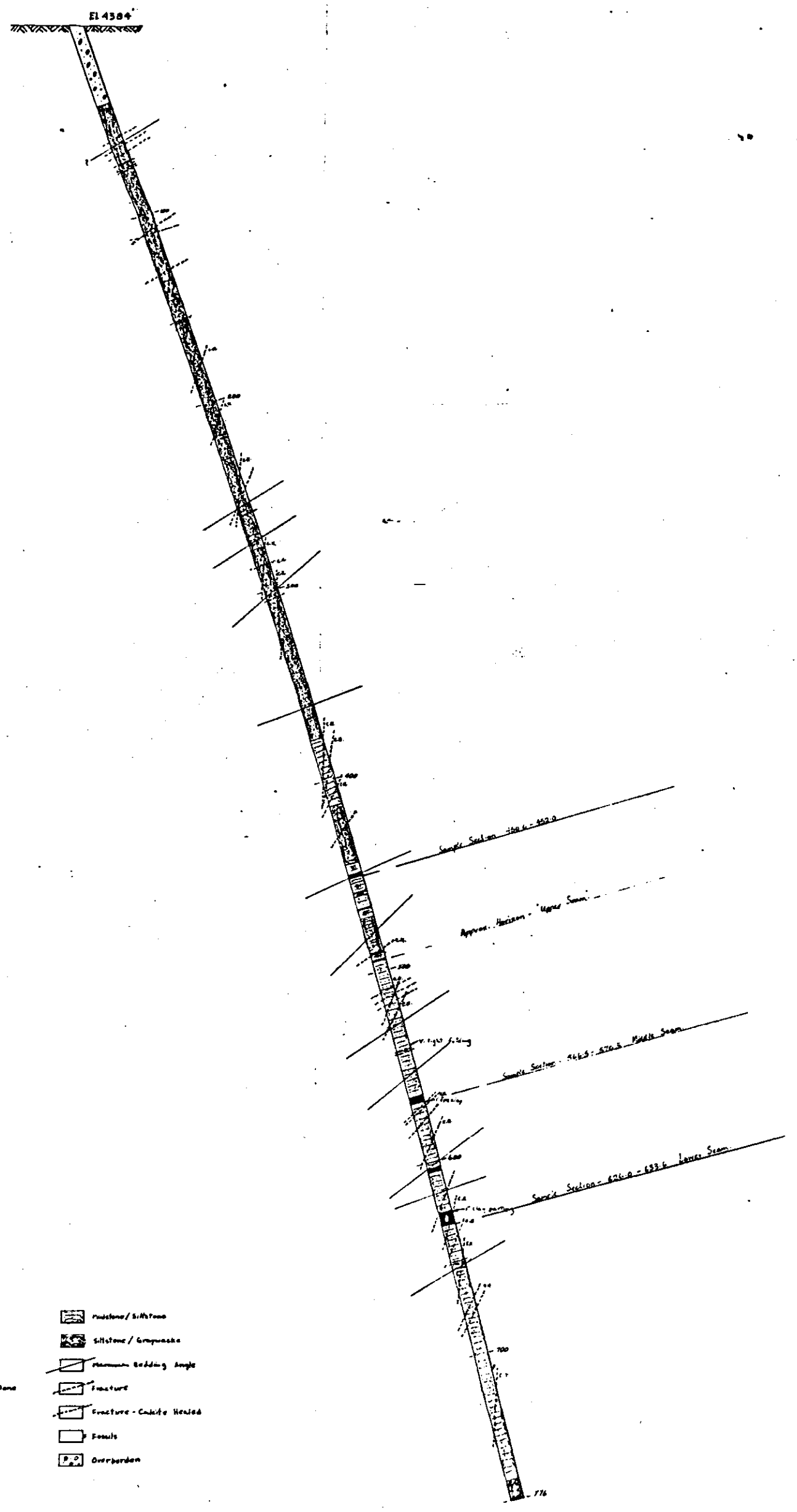
GEN-MORICE RIVER 68(1)A

BETHEX EXPLORATIONS LTD. N.P.L.			
PROPERTY: Morice River Coal Project E-27 D.D.H. #1			
Detail Log & Section - Coal Seam 401.6 - 403.5			
FIELD WORK BY	DRAWN BY IMW	TRACED BY	APPROVED BY
DATE	DATE	SCALE	

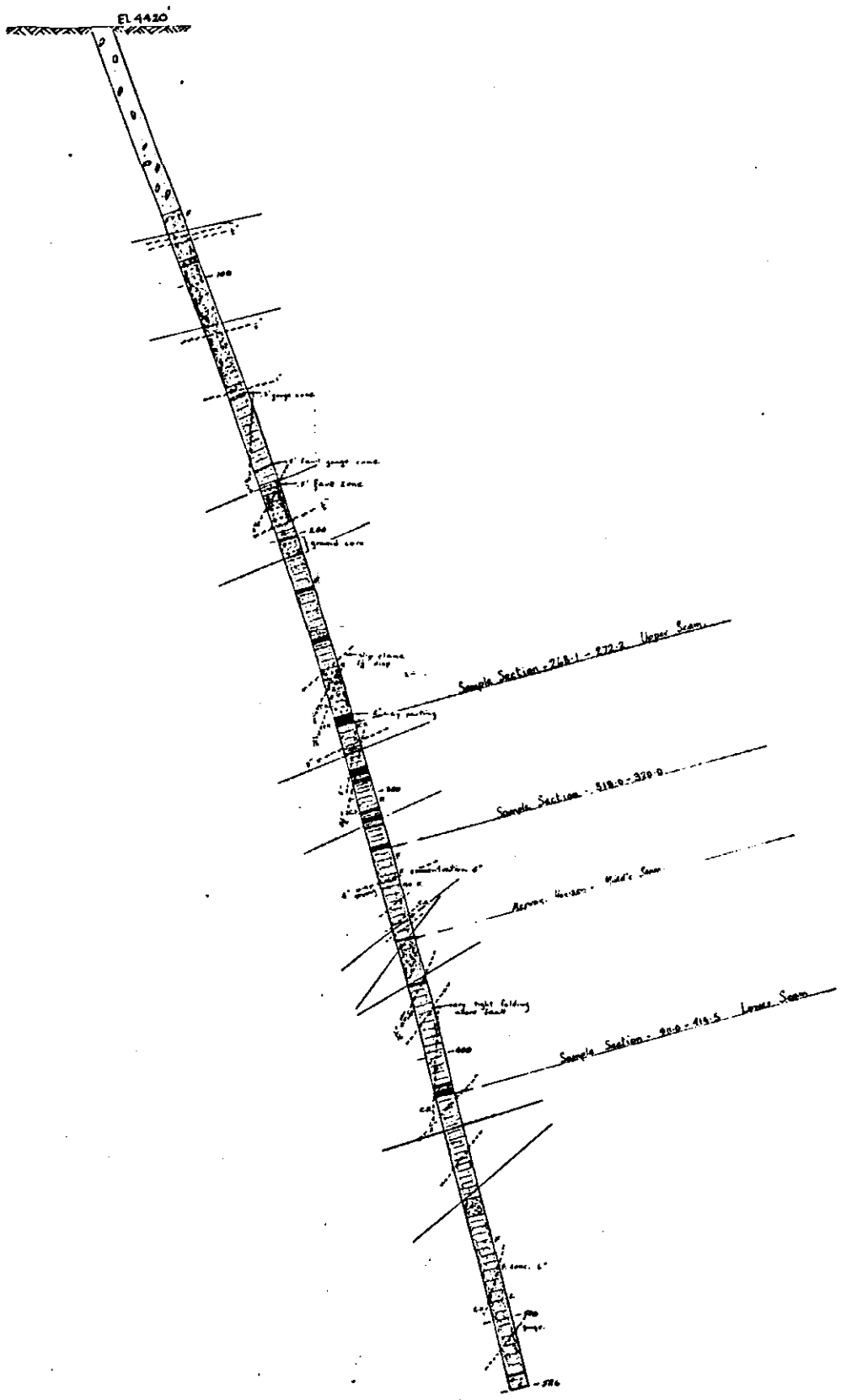


227 (6)

BETHEX EXPLORATIONS LTD.
PROJECT E 27
MORICE RIVER COAL PROPERTY
Section DDH - 3
(Section along azimuth of hole)
Angle - 70°
Azimuth - 238°
Scale 1" = 30' August 1968
DAVID J. ROLAND

(4)

Gen - Morice River 68(1)A



Mudstone
Siltstone
Greywacke
Coal
Fossils

Mudstone / Siltstone
Siltstone / Greywacke
Maximum Bedding Angle
Fracture
Fossils

CAUTION
50%
OF ORIGINAL SIZE

BETHEX EXPLORATIONS LTD.
PROJECT E 27
MORICE RIVER COAL PROPERTY
Section DDH - 2
(Section along azimuth of hole)
Angle - 70°
Azimuth - 235°
Scale 1" = 30' August 15/68
DAVID J. ROLAND

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(3)

Gen - MORICE RIVER GPC(1)A

D.D.H. #1 - Sample Section - 542.5 - 546.9 "Middle Seam" (Whole Core)

Footage	Graphic Log		Description
541		- 542.5	Mudstone, dark grey, finely bedded, occasional narrow layers, pale grey siltstone. Very fine carbonaceous material throughout, as fine 'dusting' and as minute particles. Sparse, very fine mica along bedding planes. Beds 73°/C.A.
542			
542.5	Mdst., coal frags.	542.5 - 546.9	Coal, dominantly dull black, with numerous narrow bands and laminae bright coal (H.W. contact - strong slip, slickensided, calcite lined (55°/C.A.)
	½" pink carbonate vein, Py.		542.9 - 1" 'bone layer', pale buff, soft, calcareous. Beds 68°/C.A., steepening to 55°/C.A.
543	Slip, slickensides. Py		Moderately sheared and fractured, generally 25°-30°/C.A. Fracturing more intense down hole especially lower 1' of seam.
	Py		(See Government Analyses)
544			
545	Py		
546			
546.9		546.9 -	546.9 - F.W. at strong undulating slip. Mudstone, dark grey, finely laminated with pale grey siltstone, soft, crumbly, finely fractured, approx. parallel/C.A.
547			Beds 55°/C.A.
548			

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Gen - Morice River 68(1)A

BETHEX EXPLORATIONS LTD. N.P.L.			
PROPERTY: Morice River Coal Project E-27 D.D.H. #1			
Detail Log & Section - Coal Seam 542.5 - 546.9			
FIELD WORK BY	DRAWN BY IMW	TRACED BY	APPROVED BY
DATE Aug./68	DATE Oct./68	SCALE 1" = 0.5'	

D.D.H. #3 - 450.0 - 452.0 (Seam 40' Above Horizon of Upper Seam.)

Footage	Graphic Log		Description
448		- 450.0	Carbonaceous mudstone, Dark grey, Fairly massive, occasional small shards and fragments coal. Bedding poorly developed 85°/C.A.
449			
450	Py	450.0 - 452.0	Coal, dominantly dull, with numerous narrow bands and laminae bright coal, weakly and finely fractured throughout, fracturing intense at F.W. contact. Bedding perp./C.A.
	Broken Core.		450.2 - 450.5 - Broken core.
			(See Government Analyses)
451			
452	Py	452.0 -	Siltstone, dark grey, finely bedded (80°/C.A.), and banded 3/4" zone - small lenses fine pyrite, immediately below coal seam F.W.
453			

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Gen - Morice River 68(1)A

BETHEX EXPLORATIONS LTD. N.P.L.			
PROPERTY: Morice River Coal Project E-27 D.D.H. #3			
Detail Log & Section - Coal Seam 450.0 - 452.0			
FIELD WORK BY	DRAWN BY IMW	TRACED BY	APPROVED BY
DATE Aug /68	DATE Dec /68	SCALE	

D.D.H. #3 - 566.5 - 570.3 - Middle Seam

Footage	Graphic Log		
566		- 566.5	Siltstone, medium grey, fine grained, finely micaceous beds 70°/C.A.
			Lower contact sharp 70°/C.A.
566.5		566.5 - 570.3	Coal, dominantly dull black, well bedded with numerous narrow bands (up to 1/2"), bright coal, sheared throughout - numerous polished slip planes. Also frequent fine, calcite lined fractures, especially over lower 9" of seam.
567			(See Government Analyses)
568			
569			569.0 - Irregular lens, brownish calcareous mud
570			
570.3		570.3 -	570.3 - F.W. contact, sharp along strong slip plane 65°/C.A. Siltstone, dark grey, finely banded, beds 55°/C.A. 570.3 - 570.6 - strong shear zone Numerous highly polished slips 70°-80°/C.A., some showing 1" - 2" displacement.
571			
572			

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Gen - Morice River 68(1) A

BETHEX EXPLORATIONS LTD. N.P.L.			
PROPERTY: Morice River Coal Project E-27 D.D.H. #3			
Detail Log & Section - Coal Seam 566.5 - 570.3			
FIELD WORK BY	DRAWN BY IMW	TRACED BY	APPROVED BY
DATE	DATE	SCALE 1" = 0.5'	

D.D.H. #3 - 626.0 - 633.6 - Lower Seam

Footage	Graphic Log	Description	
		- 626.0	Mudstone, very dark grey, nodular. Beds 83°/C.A.
626	½" Mud Seam.	626.0 - 633.6	Coal, dominantly dull black, numerous narrow bands and laminae bright coal, which become markedly abundant over lower 2' of seam, strong to intense shearing and fracturing throughout. Shearing generally at 50°-60°/C.A., finer calcite lined fractures generally normal to bedding. No visible pyrite Beds 65°-70°/C.A., becoming 80°/C.A. at F.W.
	2" Clay Seam		626.0 - 1/2" mud seam at H.W. contact. 626.6 - 2" clay seam, pale buff, sheared.
627			(See Government Analyses)
628			
629			
630			
631			631.0 - Beds 65°/C.A.
			631.5 - 633.6 - Bright coal bands becoming increasingly frequent.
632			
633			
633.6		633.6 -	F.W. contact sharp, 80°/C.A. Mudstone, pale grey, strongly banded, 80°/C.A.

227 (11)

Gen - Morice River 68(1)A

BETHEX EXPLORATIONS LTD. N.P.L.

PROPERTY: Morice River Coal
Project E-27
D.D.H. #3

Detail Log & Section - Coal Seam 626.0 - 633.6

FIELD WORK BY	DRAWN BY	TRACED BY	APPROVED BY
	IMW		
DATE Aug./68	DATE Oct./68	SCALE 1" = 0.5'	

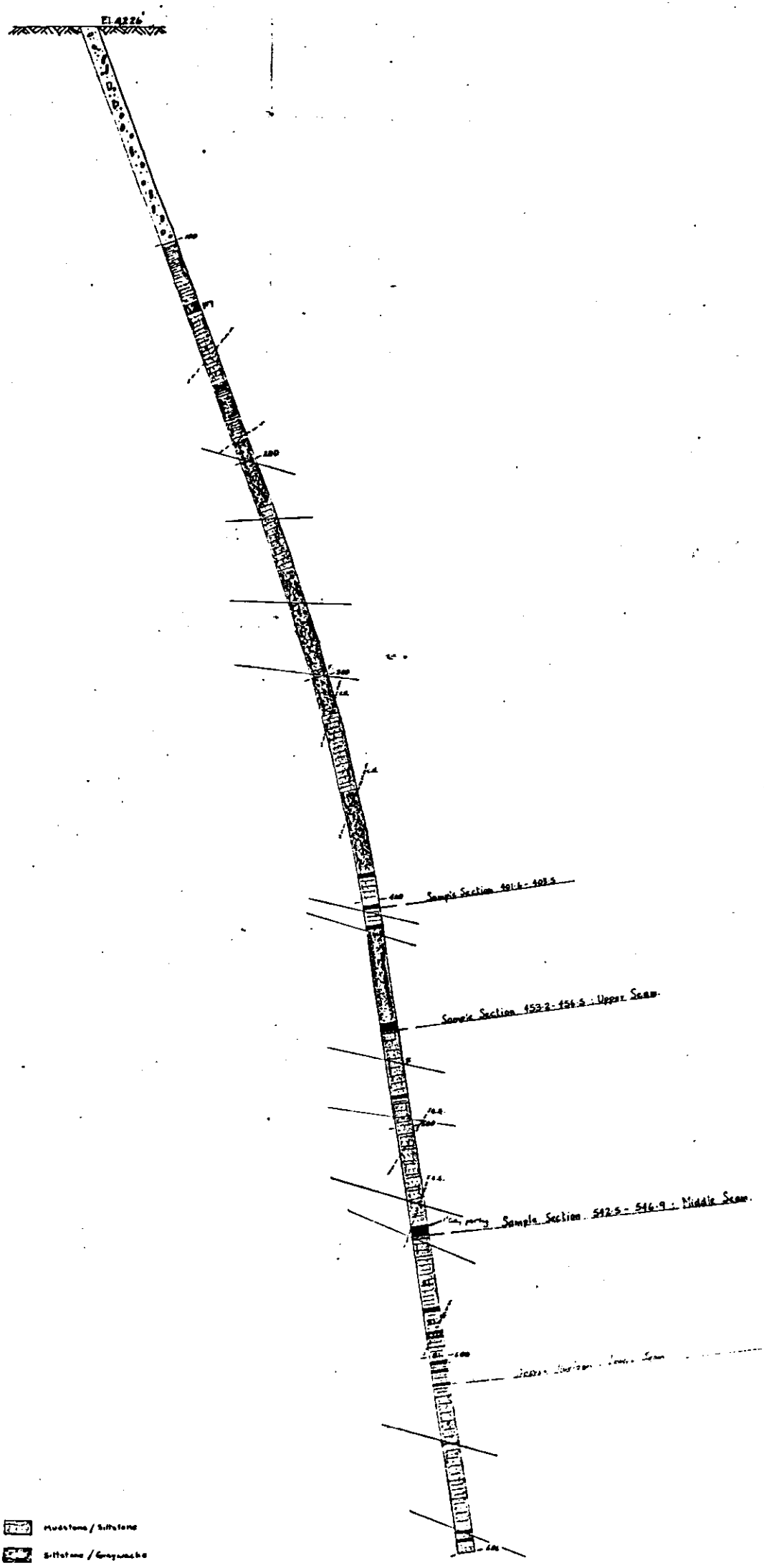
D.D.H. #2 - 411.0 - 414.5 "Lower Seam"

Footage	Graphic Log		Description
		- 411.0	Mudstone, dark grey, carbonaceous, highly sheared, fractured, shearing 40°/C.A.
410			
			Lower contact along slip - 40°/C.A.
411		411.0 - 412.2	Coal, intensely sheared, numerous slickensided slip planes (core broken)
			(See Government Analyses)
412			Lower contact along strong slip
412.2		412.2 - 412.8	Mudstone, dark grey, intensely sheared
			(See Government Analyses)
412.8		412.8 - 414.5	Coal, dominantly dull black, intensely deformed and sheared fine calcite-healed fracturing, strongest over lower 6" of seam
413			(See Government Analyses)
414			F.W. contact along flat lying slip
414.5		414.5 -	Mudstone grey, intensely sheared and fractured. Beds - 85°/C.A.
415			
416			

227 (12)

Gen-Morice River 68(1)A

BETHEX EXPLORATIONS LTD. N.P.L.			
PROPERTY: Morice River Project E-27 D.D.H. #2 Detail Log & Section - Coal Seam 412.8 - 414.5			
FIELD WORK BY	DRAWN BY IMW	TRACED BY	APPROVED BY
DATE	DATE	SCALE 1" = 0.5'	



Mudstone
Siltstone
Greywacke
Grey - Black Mudstone
Coal
Fireclay
Volcanics
Mudstone / Siltstone
Siltstone / Greywacke
Maximum Bedding Angle
Fracture
Fracture - Calcite Sealed
Fossils
Overburden

CAUTION
50%
OF ORIGINAL SIZE

227 (13)

BETHEX EXPLORATIONS LTD.
PROJECT E 27
MORICE RIVER COAL PROPERTY
Section DDH - 1
(Section along azimuth of hole)
Angle - 70°
Azimuth - 298°
Scale 1" = 30' August 9/68
DAVID J. ROLAND

(2)
Gen - Morice River 68(1)A

CAUTION
50%
OF ORIGINAL SIZE

LEGEND

GEOLOGY

- Sandstone
- Mudstone, Siltstone
- Carbonaceous Mudstone
- Andesite, minor Diorite
- Granite
- Coal Seam

SYMBOLS

- Coal Lease Boundary
- Coal Float
- Outcrop
- Fracture
- Fault
- Trench
- Diamond Drill Hole (DETAILED)
- Bore Hole
- Coal Trench
- Coal Road
- Stream

TRUE NORTH
MAGNETIC NORTH
30°

BETHEX EXPLORATIONS LTD. (N.P.L.)

MORICE RIVER COAL PROPERTY

PROJECT E-27

GEOLOGICAL PLAN

SCALE

FIELD WORK BY: D. J. ROLAND
DATE: AUGUST — 1968

227
(14)
Gen - Morice River 68(1)A