GEOLOGICAL REPORT AND ASSESSMENT OF ECONOMIC POTENTIAL, MCINTYRE COAL RESERVATIONS IN THE FERNIE AREA

BY
J. W. ANTAL

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Edmonton, Alberta,
Dedember, 1967

SUMMARY:

This report describes the economic potential of coal reserves held by McIntyre Porcupine Mines Ltd. in the Fernie Area of Southeastern British Columbia.

McIntyre holds about 90 square miles in reservations in the above mentioned area and there is a large amount of coal in place upon McIntyre's reservations. Due, however, to the complications in structure in the area, much of the coal cannot be mined either by underground methods or strip operation. From our observation, it is felt that there is approximately 11 million tons of recoverable coal on the ridge east of Line Creek in the northern reservation. The area which has been explored is a very small portion of this ridge and it is felt that further exploration northward should increase greatly the amount of recoverable reserves which McIntyre has on its properties.

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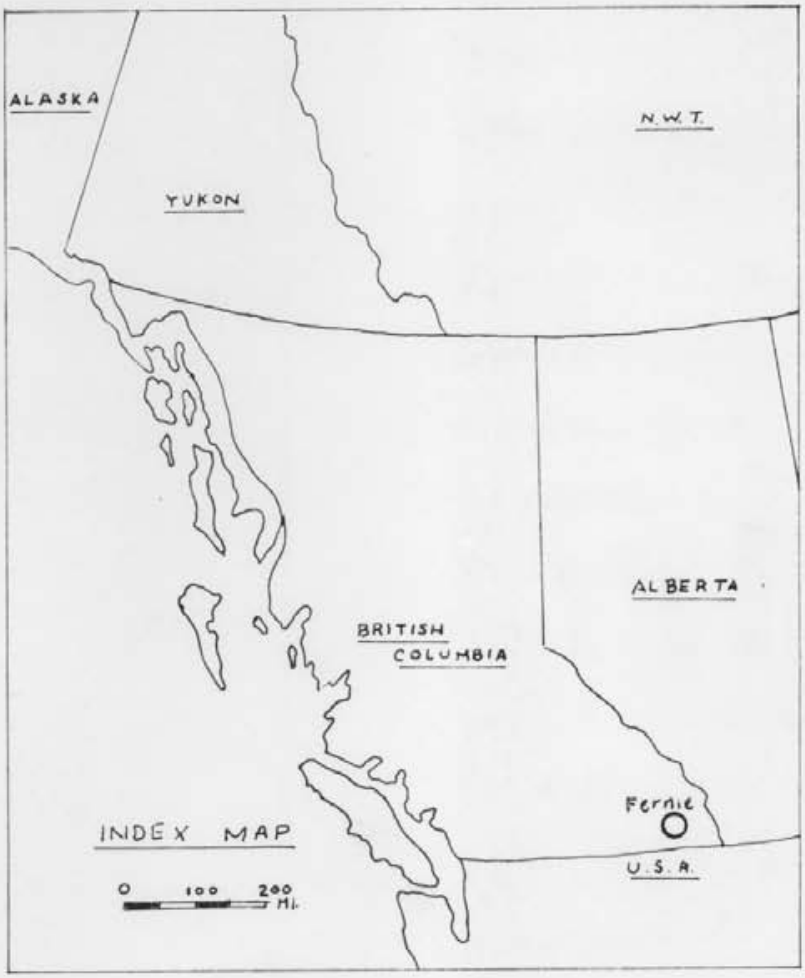
ALASKA
YUKON
N.W.T.
ALBERTA
BRITISH
COLUMBIA
Fernie
U.S.A.
INDEX MAP
0 100 200
Mi.

MAP I

INTRODUCTION:

This report describes the economic potential of coal reservations held by McIntyre Porcupine Mines Ltd. in the Fernie area of south-eastern British Columbia.

The property is located approximately three miles north of the C.P.R. Railway and five miles east of the town of Michel. It extends for several miles due north in Elk Provincial Park. The reservation consists of two separate blocks, the more southerly block is approximately ten square miles, and is on the west bank of Alexander Creek. The northerly block is in the Line Creek area and includes the Horse Shoe Ridge. It consists of approximately 85 square miles. This block, for convenience, has been divided into two separate areas. The Horse Shoe Ridge area, which is on the east bank of Line Creek, and that ridge on the west bank of Line Creek, which we are calling the Line Creek Ridge.

The most recent report of the area is Paper 61-24, Geological Survey of Canada Report, entitled, "Fernie Map Area, East Half - Alberta and British Columbia," by R. A. Price.

ACCESS:

The Alexander Creek Area can be reached by logging road which goes directly north from the No. 3 Highway and follows Alexander Creek to the reservation. The northern block can be reached by a logging road which leaves Sparwood on the No. 3 Highway, followed northward along the Elk River valley and then turns west along Line Creek, into the reservation.

GEOLOGY:

STRATIGRAPHY:

General:

The coal measures are found in the Kootenay formation which grades in age from Jurassic to Cretaceous.

The Kootenay formation comprises grey and black carbonaceous sandstones, siltstoned, mudstones and shales with interbeds of coal and quartzite, pebble conglomerates and conglomerate sandstones.

The base of this formation is formed of neritic deposits passing upwards through littoral type deposits and into deposits of paralic swamp type, which are represented by the coal beds.

Conglomerates occurring in the upper part of the Kootenay formation are similar to those that characterize the lower part of the overlying

GEOLOGY:

STRATIGRAPHY:

General (continued)

Blairmore group. However, conglomerates in the Kootenay formation occur as intercalations in a sequence of rock consisting mainly of much finer clastics, and easily distinguished in the base by their dark carbonaceous character. In general, no distinctive marker beds can be found in the Kootenay formation, and the best correlation can be made on the coal beds themselves.

Within the area in question, five separate coal seams or groups of coal seams, have been found, (See Plate 4). The lowest coal seam which we have called B-1, is near the base of the Kootenay formation. This seam consists of approximately 18 feet of medium to high ash coal. Above this seam, at an interval of approximately 80 feet comes the Balmer Seam. The Balmer Seam is 35 feet thick. The coal is of very high quality and contains a large percentage of vitrain. Overlying the Balmer Seam, comes a seam which we have designated as B+1. This seam, which appears to be of variable thickness, consists of a medium to high ash coal, and is in excess of 20 feet in thickness. The interval between the Balmer and B+1 is

GEOLOGY:

STRATIGRAPHY:

General (continued)

approximately 100 feet but may vary greatly, due to tectonics, and in many cases, it is found to be considerably thicker than this dimension.

Overlying the B+1 Seam, is the B+1.5 Seam. This is actually a zone of interbedded coal, sandstone, and shale. The thickness of the bed is in the vicinity of 35 feet. Several coal beds may be found in this zone, none of which exceeds 5 feet in thickness. Generally, the coal is of poor quality and contains a very high ash content. Above B+1.5 comes the Seam B+2 which consists of approximately 20 feet of reasonably good coal of medium to high ash, with considerable vitrain.

Line Creek Area:

Coal Section No. 1, (See Plate 1), in the Line Creek Area shows a good section through the Balmer Seam. In this area the seam is approximately 35 feet thick with interbeds of shale and sandstone. There are 27 feet 1 inch of good coal, with low ash and high percentage of vitrain. Some 9 feet below the top of the seam we find a bed of brick red shale and silt which is 4 feet 5 inches thick. Other than this band, very little shale or sand can be found interbedded with this seam. Generally speaking, it is a very good seam of coal.

GEOLOGY:

STRATIGRAPHY:

Line Creek Area:

Coal Section No. 2 shows the B-1 Seam which underlies the Balmer Seam in this area. It is 19 feet thick with 16 feet 4 inches of coal, the remainder being bands of shale, and sandstone. In general, the coal is medium to high ash content.

Coal Section No. 3 is on the Seam B+1. It is 25 feet thick. There are 22 feet of coal, medium to high ash and 3 feet of shale and sandstone.

Coal Section No. 4 is on the B+2 Seam. There are 17 feet 6 inches of a medium to high ash coal, containing considerable vitrain.

Horse Shoe Ridge:

On Horse Shoe Ridge we have Coal Sections 5 to 10 inclusive. (See Plate 2 and 2A).

In this area, the Balmer Seam is represented by Coal Sections 7 and 9.

Coal Section 7 shows only part of the Balmer Seam in that the base of the described section begins on top of the red siltstone and shale which has previously been described as being within the top third of the Section. The measured thickness, at this locality is 35 feet. Of this thickness, 18 feet 5 inches consists of a medium quality coal ranging from low ash to a very high

GEOLOGY:

STRATIGRAPHY:

Horse Shoe Ridge: (continued)

ash. The thickness of this seam is excessive in that it represents only part of the Balmer Seam; the thickening is attributed to tectonics.

Coal Section 9 is also on the Balmer. It contains a total thickness of 44 feet of which 35 feet 6 inches of the section is coal. The upper 21 feet of the seam is a low ash coal of high quality. Below this section, the ash increases and shale interbeds become frequent. Visual observation indicates that there is some thickening of the seam due to tectonics.

Coal Section No. 8 represents B-1 Seam. This seam consists of 18 feet of reasonably good coal most of which is medium ash, the lower three feet is high ash.

Coal Section No. 10 is on the B+1 Seam. The seam is 34 feet thick of which 27 feet 4 inches consists of coal. In general, the coal is medium to very high ash.

Coal Section #5 represents Seam B+2; it has a total thickness of 19 feet. Thirteen feet of this section consists of a medium to high ash coal.

GEOLOGY:

STRATIGRAPHY:

Horse Shoe Ridge: (continued)

Coal Section No. 6 does not correlate readily with the other seams, it is felt that this section represents a portion of B+1.5. The exposure shows 5 feet of good low ash coal.

Alexander Creek:

At Alexander Creek, are Coal Sections 11 to 15 inclusive. Plates 3 and 3A. Due to tectonics, the strategraphic position of coal Section 11 is uncertain, it is probably Seam B-1. The total thickness of this section is slightly in excess of 30 feet. It contains 24 feet 6 inches of medium to very high ash coal.

Coal Section No. 15 shows B+1.5. This seam consists of 34 feet of interbedded coal, siltstone, shale and sandstone. Only about 13 feet of this section is made up of coal.

Coal Sections 12, 13 and 14 are on Seam B+2. The thickness is constant but apparently the amount of ash increases northward.

Coal Section 12 with a total thickness of 19 feet has 15 feet 2 inches of coal, containing high ash.

Coal Section No. 13 has 19 feet of coal and shale. Of this, 17 feet 2 inches consists of

GEOLOGY:

STRATIGRAPHY:

Alexander Creek: (continued)

a good quality coal with from low to high ash.

Coal Section No. 14 which is further north, has a thickness of 17 feet. It contains 10 feet of coal from low to medium ash.

STRUCTURE:

General:

The area is a large synclinal structure, the axis of which is occupied by the Kootenay formation. The depressions on the flanks of the structure are formed by the Triassic formation on the west. This depression is dominated by the up-thrust Paleozoic formations, which formations rise more gently on the east flank of the syncline.

To the east, the area is cut off by the Lewis Trust and to the west the major fault is the Erickson fault. Considerable thrusting and faulting of lesser nature can be found within the area itself.

Alexander Creek Area:

In the Alexander Creek Area the synclinal structure is cut by a fault which begins as a strike fault to the south (See Map No. II), and turns into a transverse fault toward the northern part of this sheet, upthrusting the part of the structure with relation to the south part of the structure.

Of all the coal outcrops, in the area,

GEOLOGY:

STRUCTURE:

Alexander Creek Area:

the only one which we have been able to trace consistently has been the B+2. These seams below it have not been sufficiently opened up and the complicated tectonics below this seam, makes it difficult to project the trace of the seams. It is noted that the above mentioned fault cuts through the Kootenay formation and does not create a boundary between the Kootenay and the underlying Triassic formations. At a point noted B on the map, we notice that the Balmer Seam is underneath the thrust fault, and a whole series of complicated structures under the fault are obvious. Due to this complication, no structural diagram has been made. Over the fault, the structural trends are aberrant and severe complications can be expected. Attempted stratigraphic sections through the area have been highly anamalous and have not been considered in this report. In general the structure on this mountain is complicated, and steep dips are the general rule.

Horse Shoe Ridge Area:

In the Horse Shoe Ridge Area there is considerable complication of structure. (See Map III). The dips are generally steep and at least one and possibly two strike faults are in existence.

GEOLOGY:

STRUCTURE:

Horse Shoe Ridge Area: (continued)

Ita will be noticed that the Balmer seam is cut off towards the south by a fault. Overlying this fault is the B+1 Seam which is drag-folded. To the east of the fault, all the structures are complicated and the dips are steep. To the west of the fault, the trace of the Balmer Seam has been projected northward; the other seams have not been observed. It should be noted that, the Balmer seam east of the fault dips at approximately 50 degrees. This is considerably steeper than the slope and the seam should plunge to depth quite rapidly.

Line Creek Ridge:

The ridge to the west of Line Creek forms the west flank of the major syncline which we have discussed previously. (See Map III). In general, the dips are gentle although occasionally some steep dips do occur. There are no major structural disturbances in the area.

GEOLOGY:

ECONOMIC GEOLOGY:

General:

The coal reservations held by McIntyre Porcupine Mines Ltd. contain five separate seams of coal. In total, there is a very large tonnage of coal within the area involved. There are however, complications in structure and variations in coal quality which makes the feasibility of mining coal in the area open to some question. In that no fresh samples were available because no adits were run into the coal, no sampling or testing of coal samples has been carried out. The quality of the coal, as described in this report, is based strictly upon visual observations. In this report, any coal which is below 10% ash has been regarded as a low ash coal. This percentage is based upon visual observation; the color of the streak reddens as the ash content approaches 10%. Anything above 10% or what we have arbitrarily called 12% is considered to be medium ash coal. Somewhere in the range of 17% ash, the red streak on the

GEOLOGY:

ECONOMIC GEOLOGY:

General:
(continued)

coal deepens, and at this point the coal is referred to as being a high ash coal. When the amount of ash in the coal is observable by the naked eye, that is to say, if there are thin lenses of sand or shale within the coal, it is considered that this coal will have an ash content of upwards of 20% and more likely upwards of 30%. In such cases, we have called this a very high ash coal. The heft of the coal increases with increase in ash content.

The only seam within the area which shows large thicknesses of good quality coal is the Balmer Seam. This seam is a low ash coal generally under 10%. Of the other four seams, three seams; B-1; B+1 and B+2 have sufficient thicknesses to be considered as a reasonable target for strip mining operation. The quality of these measures is variable; it is highly probable that they are coking coals. Generally, these coals are medium and high and sometimes very high ash.

Without washibility tests on these coals, it is difficult to tell what the recovery will be

GEOLOGY:

ECONOMIC GEOLOGY:

General: (continued)

after washing. Because of the high ash content of seams B-1; B+1 and B+2, the recovery after washing has been placed at 65%. Recovery from the Balmer seam after washing, has been raised to 85% because it is a low ash coal. These recoverability factors are very conservative, but must be considered as only estimates.

The mining loss, in a strip operation, is generally relegated to 1 or 1-1/2 feet of coal at the bottom and top of the seam. However, in that the dips of the coal are generally in the vicinity of 30 - 35 degrees, it can be expected that there will be considerable slumping and considerable coal will be lost, over and above what is lost in the actual mining operation. It is felt that a mining loss of 20% is more than sufficient to allow both for the actual operation and for losses caused by a slumping of the coal bed.

Past performance indicates that the cost of moving material at a strip mine, in the Foothills, is about 50 cents per ton. In that a mining cost of $5.00 per ton is considered economical, the

GEOLOGY:

ECONOMIC GEOLOGY:

General (continued)

maximum ratio of overburden to coal should not exceed 10:1.

It may be argued that having a maximum ratio of 10:1 would give a lower average ratio, however, other factors must be taken into consideration:

1. This would be a multiple seam operation and therefore relatively more expensive.
2. A back slope of 50 degrees should be maintained, thereby increasing the amount of overburden to be moved.
3. Much of the paripheral, or shallow coal will be weathered.

It is therefore not advisable to strip coal in the Foothills, if the maximum ratio of overburden to coal is more than 10:1.

From past information and from observations in the field, it is considered that the Balmer Seam is a high quality coal and will be the primary target in a mining operation. However, in that the dip on this coal is 35 degrees, or more, an underground mining project cannot presently be considered to be feasible. On the other hand a

GEOLOGY:

ECONOMIC GEOLOGY:

General: (continued)

strip operation of the Balmer seam looks very attractive. Unfortunately, the ratio of overburden to coal, when considering the Balmer seam alone, becomes too high to extract any more than that coal which is along or near the outcrop.

It is therefore regarded that the exploitation of the Balmer Seam is contingent upon the economic exploitation of Seams B+1 and B+2 in order to lower the ratio of overburden to coal above the Balmer. If the Balmer seam is exploited, then the recovery of the underlying B-1 Seam becomes a very profitable endeavor, in that the ratio of overburden to coal is very low.

Alexander Creek:

The structure of the Alexander Creek area is considered to be too complicated and the dips are too steep for the efficient extraction of coal from this area, either by underground mining or by strip mining. The only seam which has been traced in this area is the B+2 Seam. The lower seams have not been followed on continuous outcrop and where they have been found, the contortion has been so extreme as to make the mining of these seams unfeasible.

GEOLOGY:

ECONOMIC GEOLOGY:

Alexander Creek:
(continued)

The Balmer Seam itself, has only been found under the thrust fault as indicated on Map No. 4. The point has been shown as Point B. It will be remarked that at Point B, the dip on the coal is 70 degrees. Unfortunately, the complicated tectonics have broken the coal up sufficiently, that no continuous section could be made on it.

Other coal outcrops to the north and west of the Balmer are hard to correlate with the existing beds, except for Coal Section 12. Above and to the west of the fault, as has been mentioned previously, the coal is highly contorted.

It seems likely that there is a thrust plane between the B+2 Seam and those coal seams which have been observed lower down. However, in the event that this is not so, it is possible that the other seams may be found on the east slope of the mountain down-section. If a thrust fault exists, then the possibility of having any strippable coal in the area, is negligible.

With the information presently available, it is not considered that the Alexander Creek area is amenable to strip mining operations.

GEOLOGY:

ECONOMIC GEOLOGY:

Horse Shoe Ridge:

The Horse Shoe Ridge forms the east flank of the major syncline which we have previously discussed. (See Map III). What appears to be a major fault, runs north-south and separates the east slope of the ridge from the west slope. West of the fault can be found a small tight syncline exhibiting steep dips. (See Map IV). At Cross-Section D, the Seam B+1 is in contact with the above mentioned fault and forms a tight recumbant fold; the Balmer Seam is not present. Several feet to the north, the Balmer Seam has been picked up east of the fault. It probably follows the ridgeline on its outcrop.

No economic strip, or underground mining operation can be carried out in this area. East of the fault, the Balmer seam where it has been observed, dips at about 50 degrees to the west. In that the dip of the seam is much greater than the slope of the ridge, it is not considered that the overburden:coal ratio would be such to make this seam amenable to a strip operation.

GEOLOGY:

ECONOMIC GEOLOGY:

Line Creek Ridge:

The Line Creek Ridge forms the west flank of the major synclinal structure which we have been discussing all along. In general, the dips on this flank are reasonably shallow. (See Map III). In certain areas steeper dips and some structural complications can be encountered, however, these complications appear to be localized.

All five seams of coal have been found in this area. It is considered that, due to the relative consistency of the structures, a strip mining operation in this area could be carried out.

The main objectives in a mining venture in this area would be the Balmer Seam. Discounting all the other coal in the area, there are approximately 3,900,000 tons of Balmer coal in place which would be amendable to mining at a ratio of 10:1 or less. (See Chart 1) The total reserve of Balmer coal in the area is just over 8,500,000 tons. In order to have access to the entire amount of coal in place, it would be necessary to strip overburden in excess of ratios of 20:1 so that in order to make it an economic procedure, it would be necessary to take advantage of the

ECONOMIC GEOLOGY:

Line Creek Ridge:
(continued)

overlying coal seams, namely; Seams B+1 and B+2. Therefore, the mining of the Balmer Seam in sufficient tonnage to make it economically sound is contingent upon mining the upper seams. The total reserve of the B+1 Seam is about 3,100,000 tons. And the total reserve in the B+2 Seam in the area is over 500,000 tons. Upon the exploitation of the Balmer Seam, it would be advantageous to exploit the underlying Balmer-1 which has more than 6,500,000 tons in place.

If the total available seams which have been exposed to date can be exploited, over 18,800,000 tons of coal can be found in place. The total recoverable reserves, in this area, would come to about 11,469,000 tons. (See Chart 2).

It is considered that further exploration northward along the ridge could expose additional tonnage.

RESUME AND CONCLUSION:

1. The coal reservations held by McIntyre Porcupine Mines Ltd., consists of approximately 90 square miles, north and east of the town of Michel, divided into two blocks, the more southerly being on Alexander Creek and the more northerly being on Horse Shoe Ridge.

2. Four mineable seams of coal had been observed, they are: B-1; Balmer; B+1 and B+2, in that order, from bottom to top.

3. The reservations contain a large amount of coal in place.

4. Complications in structure limit the areas amenable to mining, and from the existing information, only the coal on Line Creek Ridge in the more northerly block, can be mined.

5. This area could be mined by strip mining.

6. Only if all the seams in the area are mined, does the overburden to coal ratio become low enough to ensure an economic mining operation.

RESUME AND CONCLUSION:

(continued)

7. Total recoverable reserves in this area are in excess of 11,000,000 tons.

8. Further recoverable reserves could probably be found by extending the exploration northward, along Line Creek Ridge.

From the limited data available, it is considered that there is the prospect of economic coal deposits on the more northerly reservation, if all four of the major seams can be exploited. Additional reserves of coal on the west side of Line Creek, are probably present.

RECOMMENDATIONS:

It is recommended that:

1. Adits be run into the coal Seam B-1; Balmer; B+1 and B+2 in the northerly reservation, on Line Creek Ridge.

2. Sample testing be carried out in order to evaluate the quality of the coal.

3. If the coal quality is acceptable, further geologic mapping be carried out

RECOMMENDATIONS: (continued) along this trend.

4. Upon geological evidence, carry out drilling program to prove up additional coal reserves.

5. Carry out any further exploration work, as further geological data may indicate.

Respectfully submitted,

J. W. ANTAL

COAL RESERVES IN PLACE

LINE CREEK RIDGE

Seam	Thickness Inches	Tons per Acre Inch	Tons Per Acre	Area Acres	0-10:1	10-20:1	20+/1	Total
B-1	196	135	26,460	246				6,509,160
Balmer	325	135	43,875	90	3,948,750			
				78		3,422,250		
				27			1,184,625	
				195				8,555,625
B+1	267	135	36,045	69	2,487,105			
				19		684,855		
				88				3,171,960
B+2	210	135	28,350	12	340,200			
				8		226,800		
				20				567,000

CHART 1.

RECOVERABLE RESERVE

LINE CREEK RIDGE

Seam	Coal in Place	Mine Recovery	Cleaning and Handling	Reserves
B-1	6,509,160	85%	65%	3,586,310
Balmer	8,555,625	85%	80%	5,817,823
B+1	3,171,960	85%	65%	1,752,507
B+2	567,000	85%	65%	313,267

CHART 2.

KELLING CREEK HORSESHOE RIDGE (1/16)

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McINTYRE
PORCUPINE MINES LIMITED

EXPLORATION OFFICES
SUITE 1410
25 KING STREET WEST
TORONTO 1, ONTARIO

February 13, 1968

McINTYRE PORCUPINE MINES LIMITED

Statement of amounts expended on
Coal Licences 264 - 313 incl, 365 to 373 incl, and 408

Period January 1st, 1967 to February 6, 1968

	Amount
Rent and Services	$ 107.70
General Field Work	2,325.34
Scouting and Prospecting	25.62
Camp & Road Construction	971.00
Camp Supplies & Food	1,041.28
Stripping	11,996.99
Transportation	2,920.14
Patent & Lease Expense	8,651.17
Legal Fees	688.65
	$28,727.89

Certified Correct

McINTYRE PORCUPINE MINES LIMITED

S. R. Varley,
Comptroller.

K-SHELL - LINE CREEK -
HORSESHOE RIDGE 67(2)A

MAPS

MCINTYRE PORCUPINE MINES LTD.

VI. SKETCH MAP - LINE CREEK RIDGE & ISORATIO MAP ON SEAMS B + 1 AND B + 2

LH 67 (2) A

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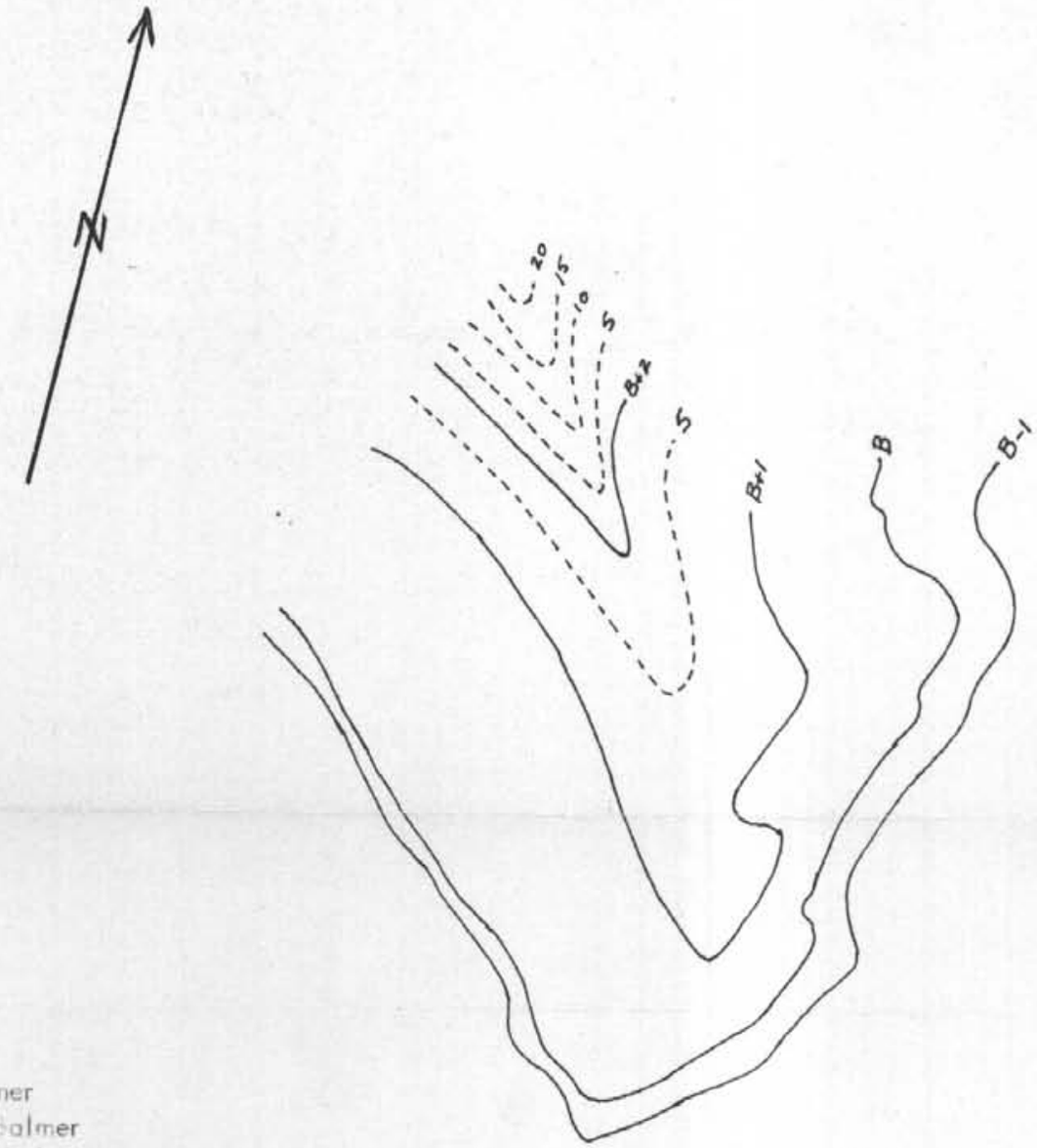

LEGEND

Fault trace

Fault trace assumed

Coal Seam, B - Balmer
B - 1 Below Balmer
B + 1 1st above Balmer
B + 1.5 2nd above Balmer
B + 2 3rd above Balmer

Isoratio contour o/b/coal 10/1

Scale - 1" = 1,000'

V. ISORATIO MAP ON BALMER
AND
CROSS SECTIONS
LINE CREEK RIDGE

LH 67(2)A

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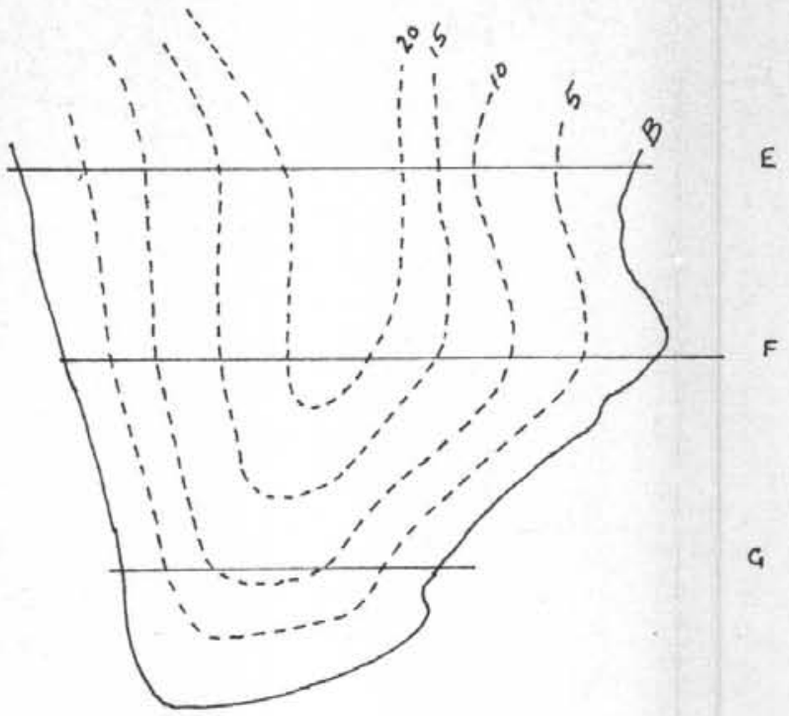

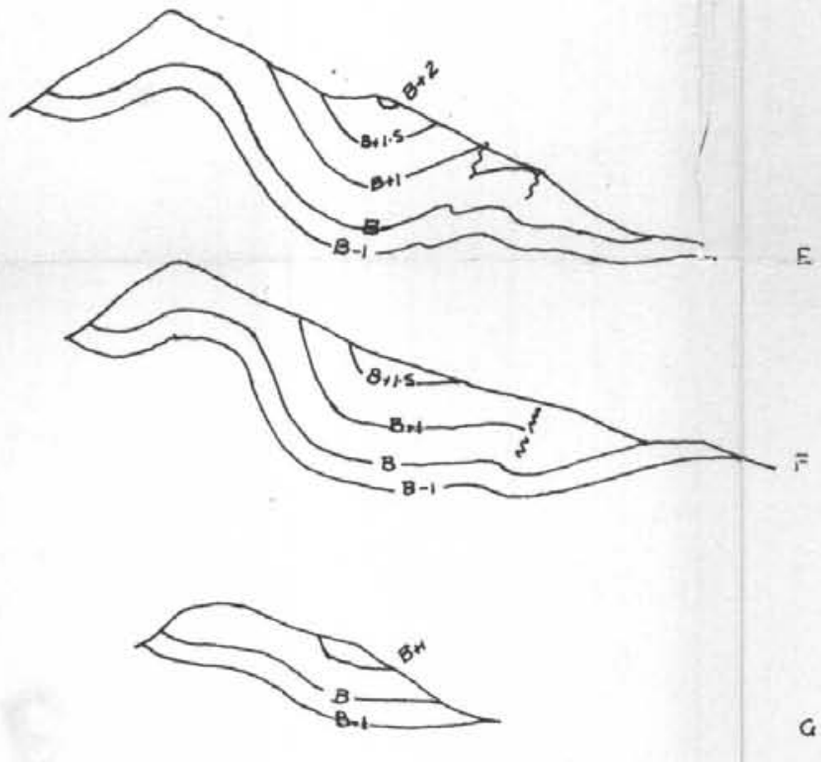

LEGEND

Fault trace

Fault trace assumed

Coal seam, B – Balmer
B – 1 Below Balmer
B + 1 1st above Balmer
B + 1.5 2nd above Balmer
B + 2 3rd above Balmer

Isoratio contour a/b/coal
10/1

Cross Section E

Scale – 1" = 1,000'

IV. SKETCH MAP & CROSS SECTIONS
HORSE SHOE RIDGE

LH 67(2)A

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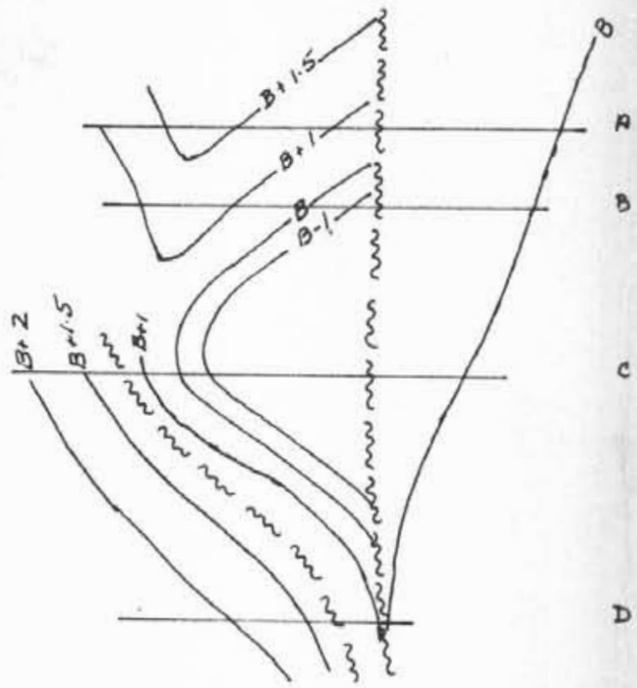
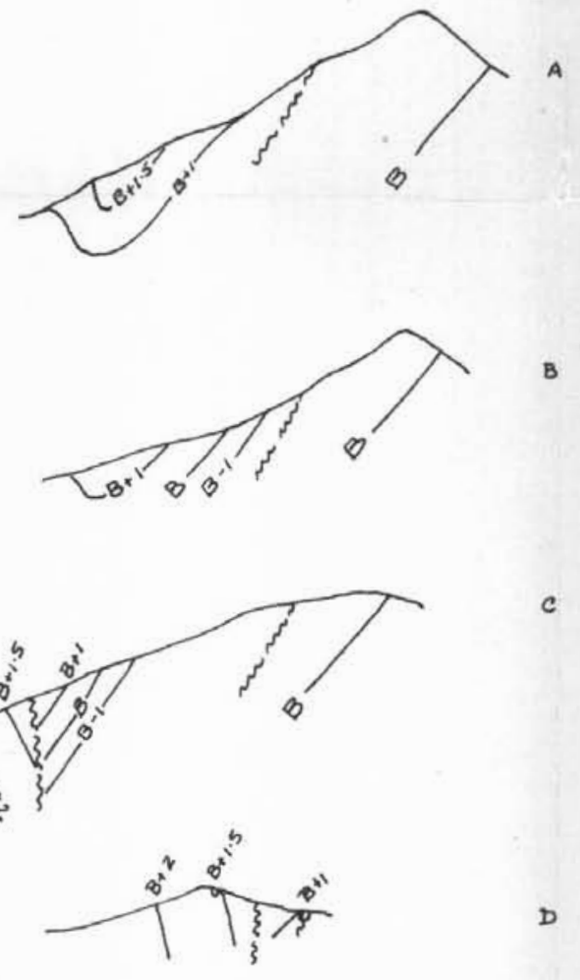


LEGEND

	Fault trace	
	Fault trace assumed	
B-	Coal seam, B -	Balmer
	B - 1	Below Balmer
	B + 1	1st above Balmer
	B + 1.5	2nd above Balmer
	B + 2	3rd above Balmer
A	Cross Section A	

Scale - 1" = 1,000'



11. GEOLOGIC MAP
ALEXANDER CREEK AREA

LEGEND

- Fault trace
- Fault trace assumed
- Coal seam, B – Balmer
  - B – 1 Below Balmer
  - B + 1 1st seam above Balmer
- Coal seam assumed
  - B + 1.5 2nd seam above Balmer
  - B + 2 3rd seam above Balmer
- Lithologic boundary
- O_{15} Coal section 15
- Recumbant fold

Scale - 1" = 1,000'

III. GEOLOGIC MAP
LINE CREEK RIDGE AND
HORSE SHOE RIDGE

LH 67(2)A

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LEGEND

Fault trace

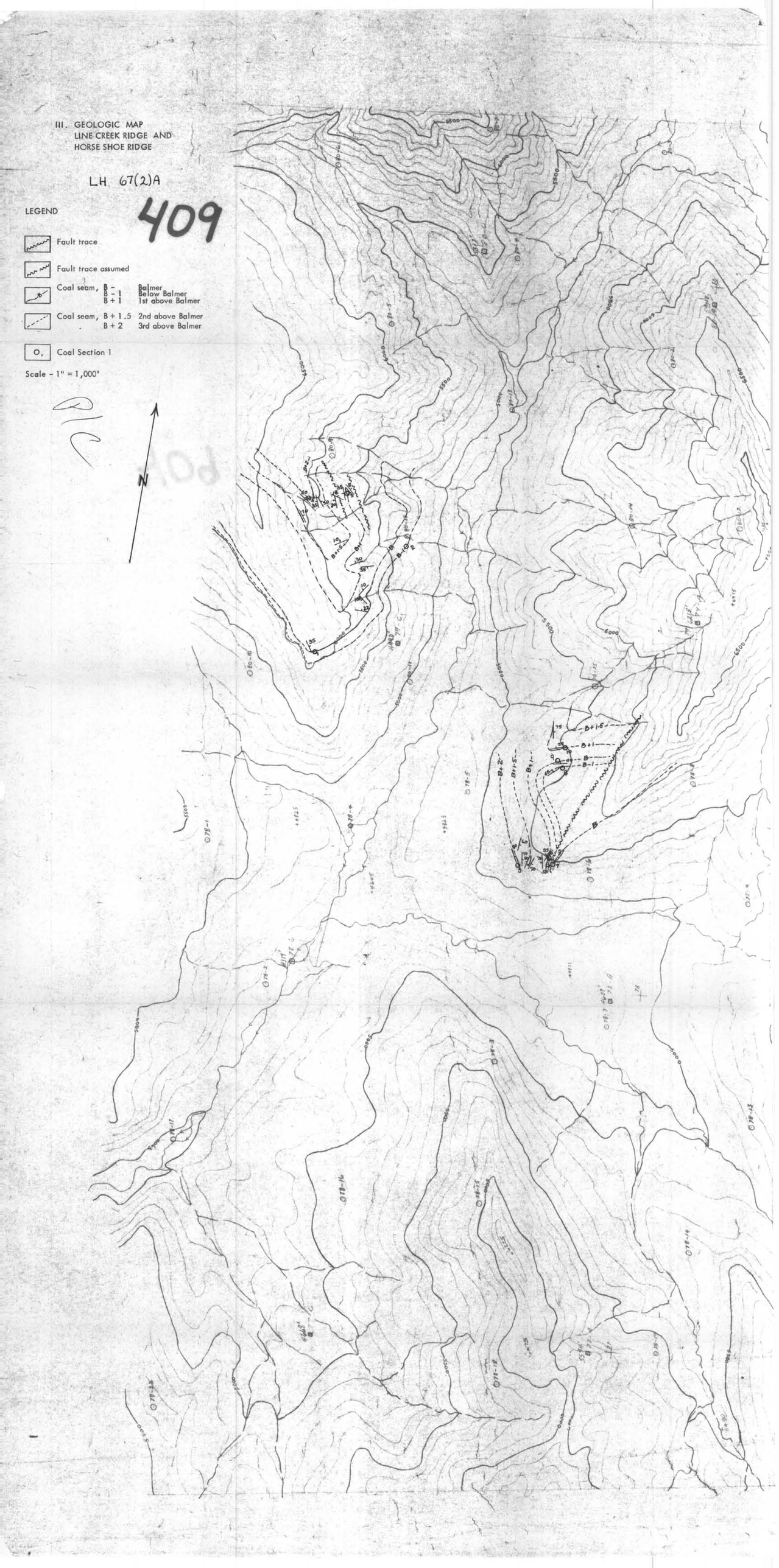
Fault trace assumed

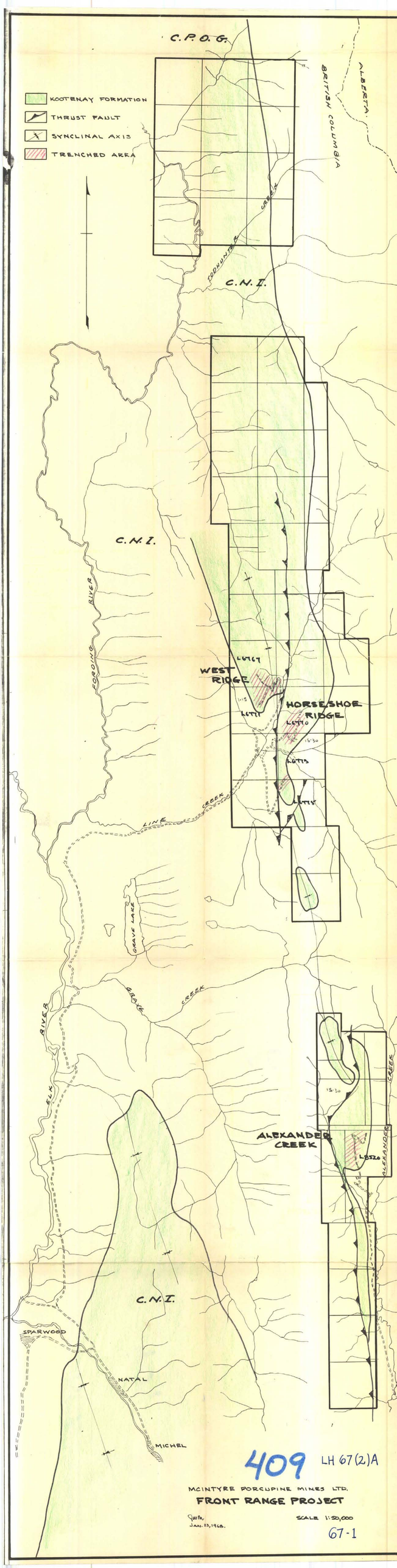
Coal seam, B – Balmer
B – 1 Below Balmer
B + 1 1st above Balmer

Coal seam, B + 1.5 2nd above Balmer
B + 2 3rd above Balmer

Coal Section 1

Scale - 1" = 1,000'




KOOTENAY FORMATION
THRUST FAULT
SYNCLINAL AXIS
TRENCHED AREA
C.P.O.G.
ALBERTA
BRITISH COLUMBIA
TOBUNTER CREEK
C.N.I.
C.N.I.
FORDING RIVER
L6767
WEST RIDGE
L6771
HORSESHOE RIDGE
L6770
L6773
L6774
LINE CREEK
GRAVE LAKE
BRULEY CREEK
ELK RIVER
ALEXANDER CREEK
L6826
ALEXANDER CREEK
C.N.I.
SPARWOOD
NATAL
MICHEL
409
LH 67(2)A
MCINTYRE PORCUPINE MINES LTD.
FRONT RANGE PROJECT
JAN. 23, 1968.
SCALE 1:50,000
67-1

K-SHELL-LINE CREEK-
HORSESHOE RIDGE G 7(5) A.

COAL SEAM DATA.

MCINTYRE-PORCUPINE MINES LT.D.

LEGEND

- Sandstone
- Siltstone
- Mudstone
- Argillaceous siltstone
- Carbonaceous shale
- Coal
- Ironstone
- Covered

#1

fusain, with bands vitrain 2' 0"

durain, bands of vitrain comprise 20% ± of total

4' 8"

fusain, 2' 0"

0' 10" durain

shale & silt, nodular weathers brick red, some coal.

4' 5"

fusain, with some vitrain 3' 8"

0' 2"

0'-1-1/2"

0' 4"

durain, some vitrain

ss. with ferruginous nodules 4' 3"

0' 3"

0' 6" fusain

0' 3" vitrain

coal-slickensided

1' 8"

0' 2"

coal, slickensided 0' 3"

coal, slickensided, some vitrain recognizable 1' 2"

coal, crushed high ash (20% ±)

3' 8"

#2

0' 4" 0' 6" durain

0' 2" vitrain

0' 10" coal, crushed

0' 10"

1' 6" durain hard metallic grey

0' 2" 1' 8"

coal slickensided high ash bands of vitrain

0' 6" 4' 6"

ss. with iron nodules

fusain, soft black powdery

0' 0" 2' 8" shale

bloom

4' 0"

#3

coal, very high ash (20% +) 8' 0"

0' 6" coal, very high ash 0' 8"

carb. mudstone 1' 4"

coal, high ash (18% ±) 2' 3"

0' 3" ferrug. nodules

coal, high ash (18% ±) 2' 0"

0' 3" mudstone

coal, with thin bands mudstone, very high ash

4' 4"

0' 4" ironstone

coal, fractured, vitrain low ash (10% ±) 2' 0"

coal, black powdery high ash (19% ±)

3' 0"

#4

coal, medium ash (12% ±) 10' 0"

0' 2"

coal, crushed high ash (18% ±) 3' 0"

coal, very high ash (20% +)

4' 6"

PLATE 1
Coal Sections
Line Creek
Scale -- 1" = 4'

409

K-SHELL-LINE OR. HORSESHOE RIDGE 67(5)A.

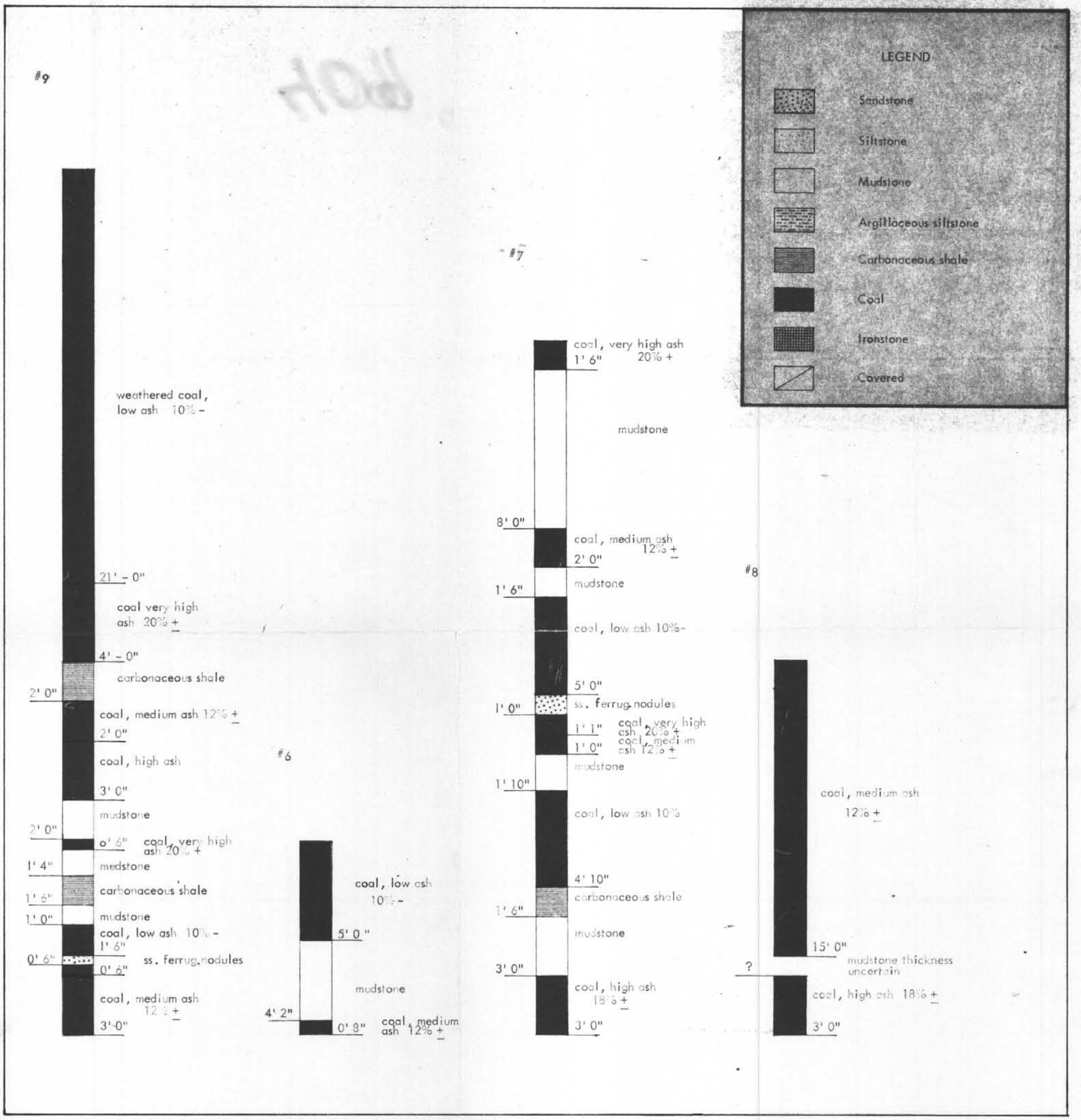
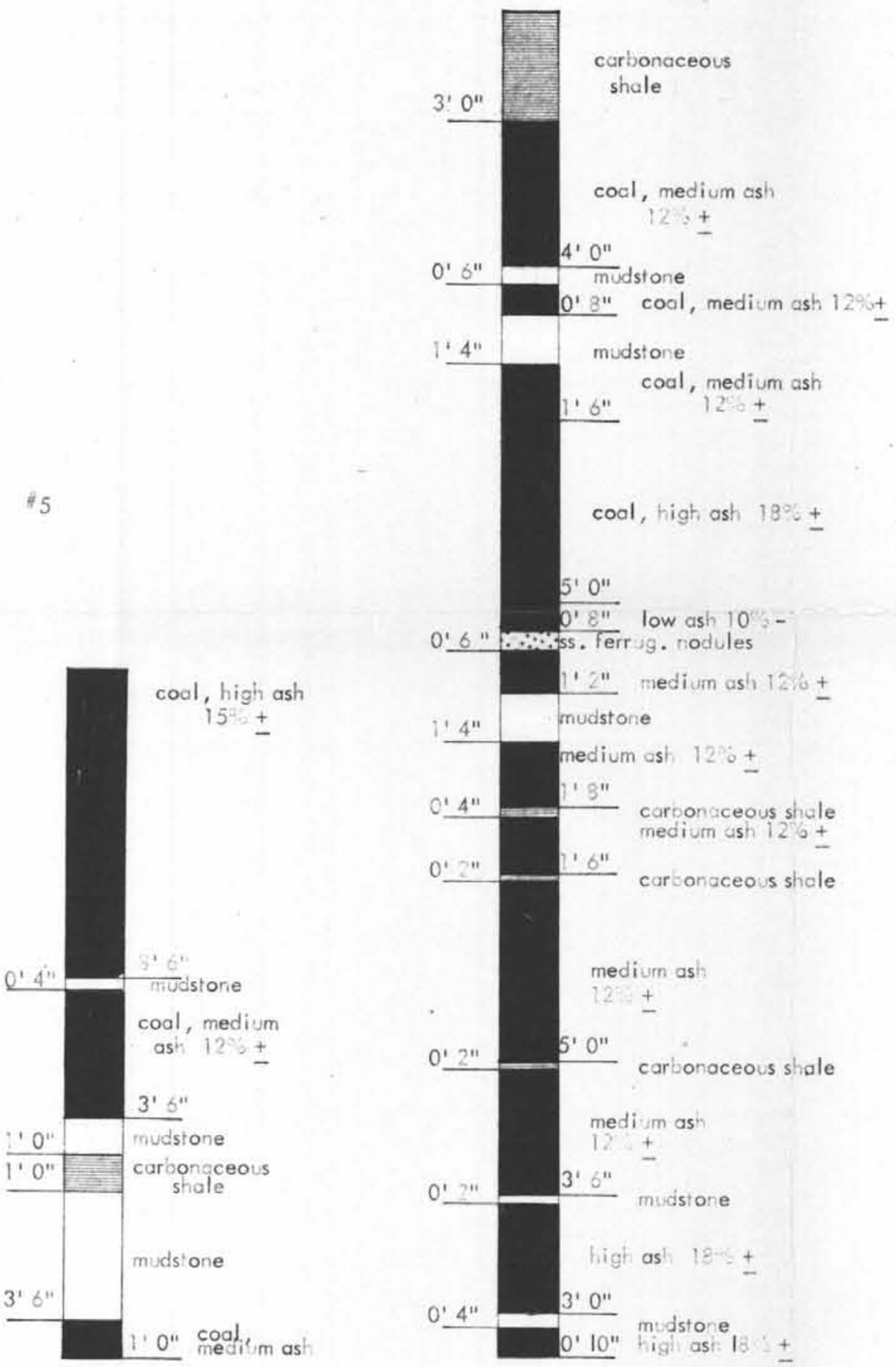


PLATE 2
Coal Sections
Horse Shoe Ridge
Scale -- 1" = 4'

409

K-SHELL · LINE CREEK
HORSESHOE RIDGE 6715)A.



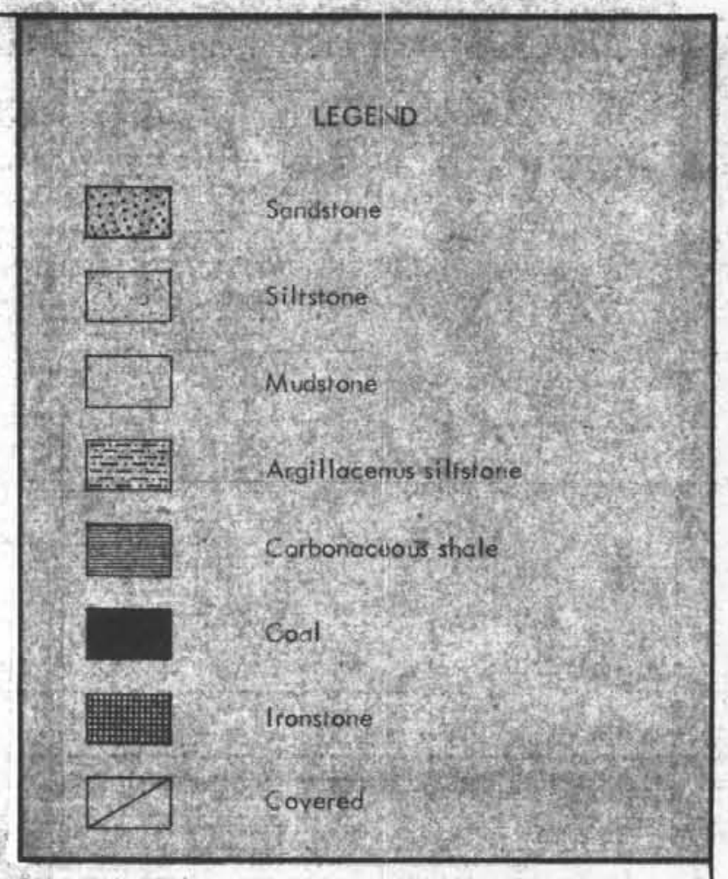


PLATE 2 A
Coal Sections
Horse Shoe Ridge
Scale -- 1" = 4'

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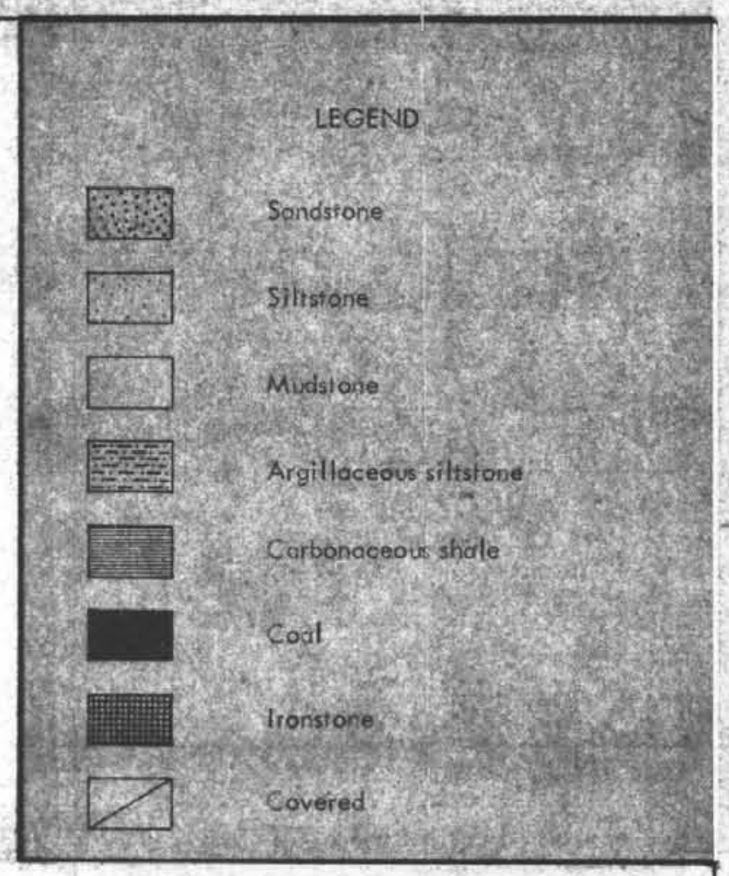
K-SHELL - LINK CREEK -
HORSESHOE RIDGE 67(5)A.



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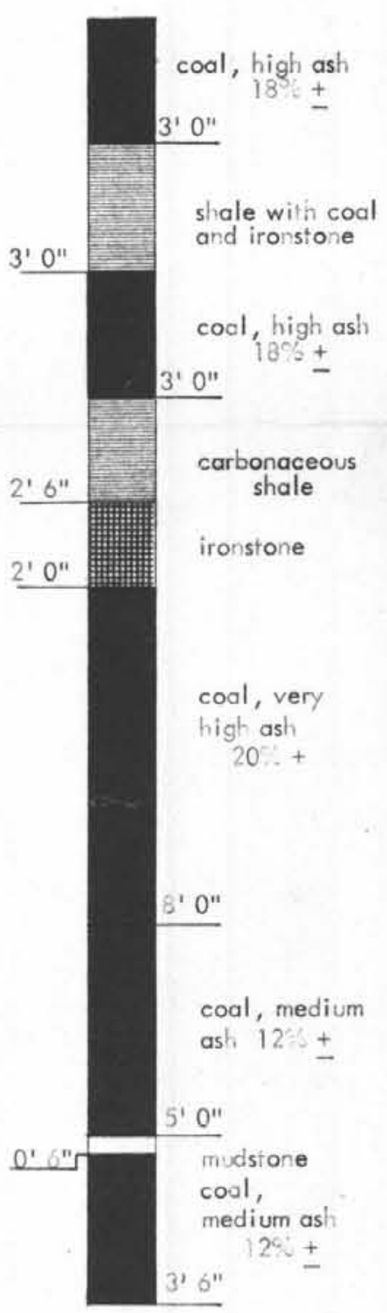

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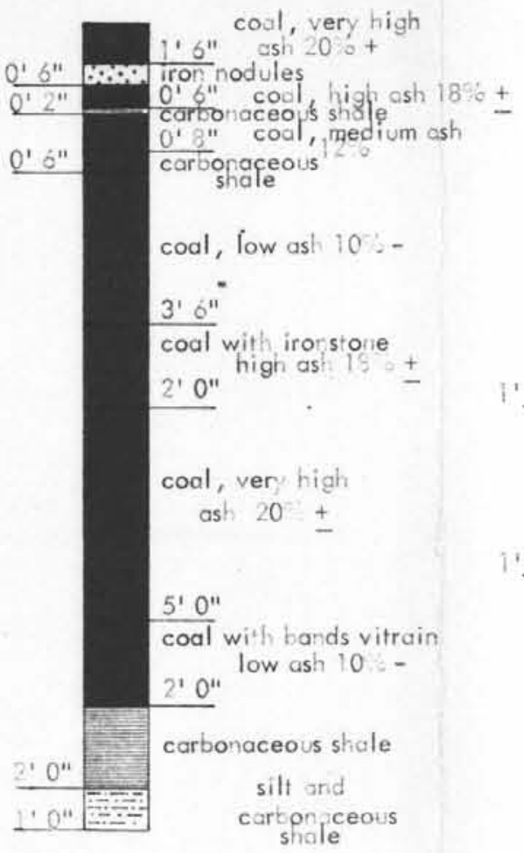

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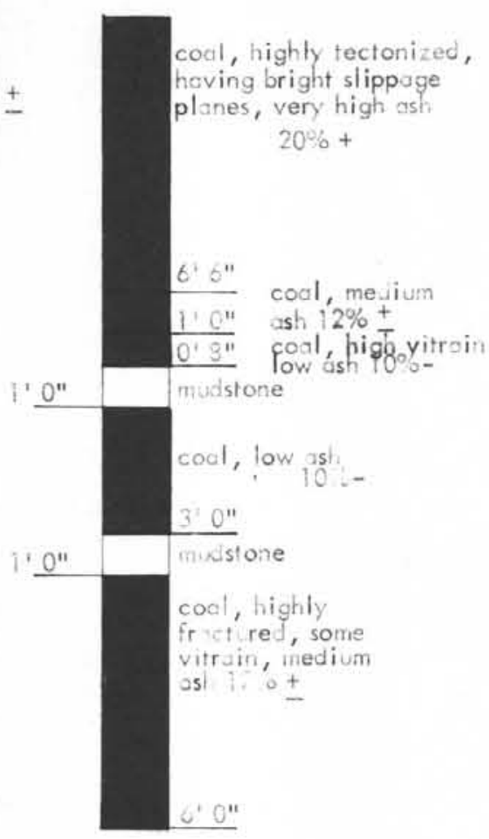


#14

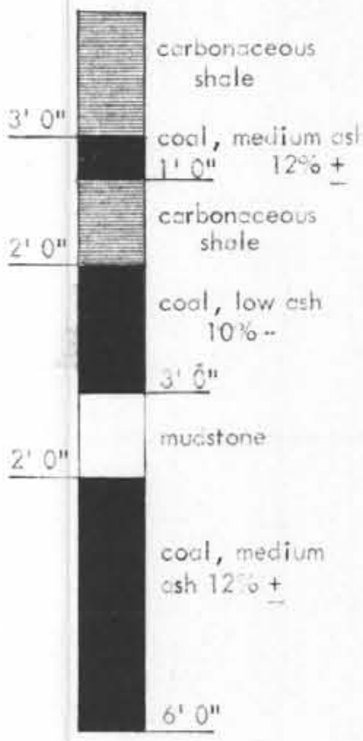


PLATE 3
Coal Sections
Alexander Creek
Scale -- 1" = 4'

409

K-SHELL-LINE CREEK
HORSESHOE RIDGE 67(5)A

#15

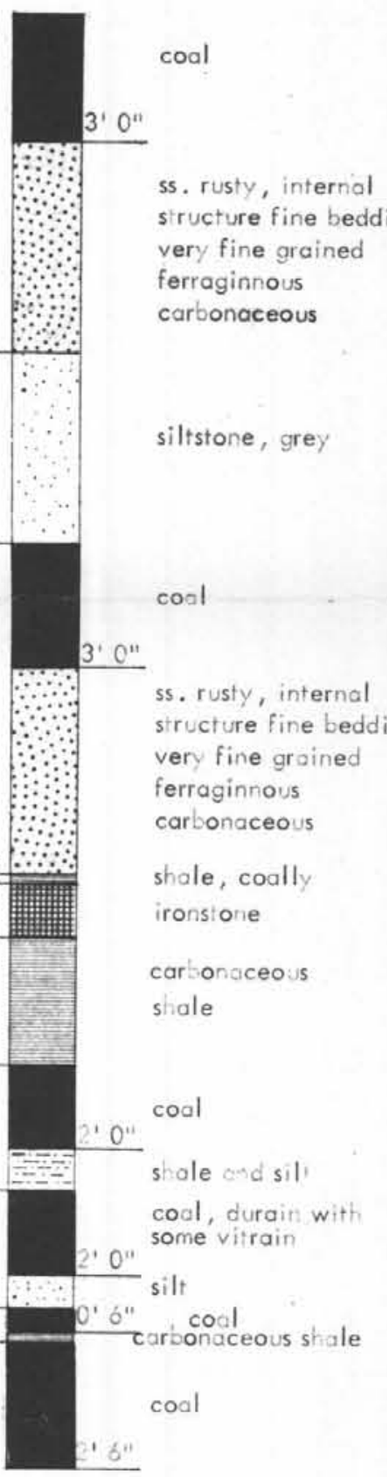
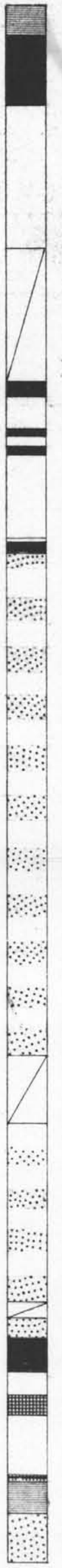


PLATE 3B
Coal Sections
Alexander Creek
Scale -- 1" = 4'

409

K-SHELL-LINE CREEK.
HORSESHOE RIDGE G7(5)A.

II. Horse Shoe Ridge



I. Line Creek, East

III. Horse Shoe Ridge

IV. Horse Shoe Ridge

LEGEND

- Sandstone
- Siltstone
- Mudstone
- Argillaceous siltstone
- Carbonaceous shale
- Coal
- Ironstone
- Covered

PLATE 4
Stratigraphic Sections
Scale -- 1" = 30'

409

K-SHELL-LINE CREEK-
HORSESHOE RIDGE 67(5)A