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PR-MONKMAN-BELLCOURT 73(1)A

GEOLOGICAL REPORT  
ON  
MONKMAN PASS COAL LICENCES  
BY  
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McINTYRE PORCUPINE MINES LTD.

Field Work - September, October, 1970.  
- July 1 - October 1, 1973.

Report Completed - November 26th, 1973.

GEOLOGICAL BRANCH  
ASSESSMENT REPORT

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## SUMMARY

McIntyre Porcupine Mines Limited holds one hundred and three (103) coal licences in the Monkman Pass area of northeastern British Columbia.

Exploration work during 1970 and 1973 has consisted of geological reconnaissance and bulldozer trenching. In total, thirty-two (32) trenches were excavated and the entire property covered by geological reconnaissance.

The programs have proven the existence of large reserves of coal, although definite mining areas have not been outlined nor has the coal quality been thoroughly tested.

Of several coal seams encountered, one, a fourteen-foot seam, correlates well, stratigraphically, with the mineable No. 4 Seam at Smoky River.

The most favourable areas for future exploration work have been indicated.

Further work is necessary before the coal quality can be determined, and, before definite mining areas can be outlined.

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## INTRODUCTION

The Monkman Pass coal Licences were staked between July 30th, and August 19th, 1970, following Order in Council No. 2105, dated June 22nd, 1970 which cancelled a portion of the British Columbia Coal Reservation created in 1943. In total, one hundred and thirty-four licences were obtained but thirty-one of these were not renewed on the first anniversary date. The remaining one hundred and three are still held and have been renewed annually at a yearly cost of \$35,321.00.

In order to cancel the coal reservation McIntyre agreed to post a \$50,000 Performance Bond which is to be returned upon satisfaction that \$150,000 has been spent on the property before the third anniversary date, October 7th, 1973. This money has been spent on geological reconnaissance and bulldozer trenching, and this report describes the execution and results of that work. Appendices attached to the report include the results of coal quality analyses which were performed at McIntyre's Smoky River laboratory on representative samples taken from the trenches.

The exploration efforts were conducted after acquisition of the licences in 1970 and in the period between June 15 and October 1st, 1973. Lists of the personnel involved, their periods of involvement and total

expenditures are also included in the appendices.

In addition to the geological work considerable effort was expended in protecting the environment and in reclaiming the areas disturbed by road construction and trenching during the program. The assistance of the British Columbia Forest Service and the Reclamation Division of the Department of Mines and Petroleum Resources is gratefully acknowledged.

## LOCATION & ACCESS

The described coal licences are located within the Foothills Belt of the Rocky Mountains in northeastern British Columbia. The area containing the licences extends for fifty (50) miles along the northwest-southeast trending Foothills between  $121^{\circ}00'W$ ,  $54^{\circ}50'N$ , in the northwest corner and  $120^{\circ}15'W$ ,  $54^{\circ}15'N$  in the southeast corner. The property is bounded on the north by licences held by Quintette Coal Limited, on the east by Belcourt Coal Limited and on the southeast by Saxon Coal Limited, all subsidiaries of Denison Mines Limited.

Access to the area is obtained in part by secondary roads and exploration trails but most of the licences can only be reached on foot or by helicopter. The Red Willow-Kinuseo Forest Road which crosses the northern licences and connecting routes within Alberta give access to Beaverlodge, Alberta, and Dawson Creek, British Columbia. Camp supplies and miscellaneous services were provided from Beaver lodge. Road access to the central part of the property could be restored with the reconstruction of a bridge across the Wapiti River and the use of existing petroleum exploration roads.

For transportation during prospecting and geological reconnaissance a helicopter was based at the camp established along the Red Willow-Kinuseo road.

## PHYSIOGRAPHY

Located entirely within the Rocky Mountain Foothills the licence area is topographically typical of the belt. In the northern part the features are low rounded hills, with less than 1,000 feet of relief, and broad swampy valleys. To the south the topography becomes more rugged with some sharp mountain peaks and steep glacial and fluvial valleys. Belcourt and Secus Mountains are the highest peaks, both being over 7,000 feet. The lowest elevations are found in the northeast corner which is at 3,250 feet.

The amount of forest cover changes throughout the property with complete cover in the northwest and essentially none in the south. The tree-line is around the 6,000 foot elevation.

The underlying structures, i. e. the northwest-southeast trending folds and thrust faults are expressed in the surface features with ridges formed by the more resistant rocks such as the conglomerates of the Cadomin Formation. Cross-cutting valleys are primarily glacial with some directional influence due to subsidiary faulting. Evidence of regional glaciation is found as high as 5,000 feet.

Tributaries of the Peace River are responsible for drainage of the area. The Narraway and Wapiti Rivers drain most of the area with Kinuseo Creek draining the northern licences.

## EXPLORATION TECHNIQUES

Two principal methods were used to study the geology and coal occurrences of the Monkman Pass licences. The more detailed work was the bulldozer trenching on the northeastern licences which were accessible by road. Over the rest of the property geological reconnaissance and prospecting were conducted using helicopter transportation.

### a. Bulldozer Trenching:

With previously published geological data and the results of surface investigation as guides a total of 32 trenches were cut which exposed known coal seams and /or explored favourable stratigraphic horizons. Bulldozers were used because of the heavy overburden cover and the necessity of using heavier equipment for road construction. In 1970 one Caterpillar D7E tractor, and, in 1973 two Caterpillar D8 46A tractors, one equipped with a ripper and the other with a winch, were used. This equipment was supplied, operated and maintained by a contractor. After a coal seam had been exposed the trench was logged and in most cases a channel sample was taken and sent to the Smoky River laboratory for analysis. Five (5) of the twenty-three trenches excavated in 1973 were not logged because of their failure to encounter either bed rock or in-place coal.

After logging and sampling the trench was filled, the ground contoured to as near the original surface as possible and the entire area seeded.

The trenching was somewhat hampered and it's effectiveness

reduced by overburden thickness, swampy conditions and persistent rains.

b. Geological Reconnaissance:

The areas not accessible by road during the field season were covered by geological reconnaissance and prospecting. Two 2-man field parties were transported by helicopter to traverse locations where they mapped the rock types and attitudes of any rock exposures, paying particular attention to the 1,500 foot stratigraphic interval above the Cadomin Formation. Often the conglomerate of the Cadomin was found to be the only unit exposed, especially in the heavily timbered areas. Areal photographs provided the ground control for the reconnaissance work.

## GEOLOGY

a. Stratigraphy:

The correlation of the various formations and rock units which exist on the licences is shown in the following table. All units are Lower Cretaceous in age:

TABLE OF FORMATIONS

<u>Group</u>	<u>Formation</u>	<u>Member</u>	<u>Thickness (Feet)</u>
		Boulder Creek	240 - 560
Fort St. John	Commotion	Hullcross	0 - 450
		Gates	220 - 900
	Moosebar		100 - 1000
Bullhead	Gething		75 - 1000
	Cadomin		45 - 600

## Minnes

Where observed the Minnes Group rocks consist of dark fissile shales and interbedded silty shales. Only a few exposures were examined because of the emphasis placed on the units above the Cadomin.

The Cadomin Formation, the lower unit of the Bullhead Group, is comprised of thick conglomerate beds with some sandstones, minor shale, and thin coal seams. Throughout the coal licences the formation is quite uniform, lithologically, with well-rounded pebbles, cobbles and boulders of chert, quartzite and quartz. Its thickness varies from 200 feet at the north end of the property to over 600 feet south of Belcourt Mountain. A measured section on Belcourt Mountain gave 594 feet of Cadomin. One of the important features of the formation is its extreme resistance to erosion, and, as a result, most of the ridges are capped by coarse conglomerate. It forms a near-perfect marker

horizon since the large coal seams are located within several hundred feet of its top.

The younger Bullhead Group member is the Gething Formation which is primarily a siltstone, shale, mudstone and sandstone unit with interbedded coal. This formation in the Smoky River coal field is the lower part of the Luscar Formation which is topped by the marine shale horizon known locally as the 'clam' zone. On the Monkman Pass licences its thickness is variable within a range of 160 feet to 600 feet. Isolated within the Gething, and, in particular the thicker sections, are scattered, ridge-forming conglomerate beds which are often mistaken for Cadomin conglomerate in air photographs. These occurrences are seldom more than a few hundred yards in length and upon field examination contain smaller pebbles. Carbonaceous horizons within the Gething are generally recessive and are exposed only in steep creek canyons or in thrust fault blocks. They are made up of shales and mudstones and often are associated with coal seams.

The Fort St. John Group contains three (3) formations, the Moosebar, the Commotion and the Shaftesbury. Only the Moosebar and part of the Commotion were investigated.

The Moosebar Formation is a recessive partly-marine sedimentary series which decreases in thickness from northwest to southeast. It is 350' thick at the northend of the property and 150' at the southeast end. In the Smoky River area the Luscar equivalent is less than 40 feet thick.

A detailed description of the Moosebar in the Belcourt Mountain area is included in the stratigraphic section in the attached appendices. Along the foothills the lithology of the Moosebar varies according to the relative percentages of arenaceous and silicious materials. The carbonaceous mudstones and fissile marine shales of the Smoky River area grade into a thicker sequence of shale, mudstone and sandstone near Belcourt, and, into mudstone and sandstones in the Kinuseo Creek area. During the field program the location of the Moosebar predicated the position of trenching in some instances since the largest, most consistent seam was located just above it's top.

The Commotion Formation, and in particular the Gates Member, was the main target for much of the exploration work because of the occurrence of mineable coal seams within it at other locations. Smoky River production currently comes from the Luscar equivalent and the main seams of the Denison properties are found within the Gates. The main lithological unit of the member is a fine-grained, well sorted sandstone with lesser amounts of siltstone, mudstone, carbonaceous shale and coal. Lateral facies changes between sandstone and shales are common, and, coupled with gradual vertical changes from sandstone to shale, they make correlation difficult, particularly in the upper part of the formation. The contact between the Gates and the underlying Moosebar is not always straightforward and is easily misplaced. Thicknesses of the Gates vary between

200 and 800 feet with the thickest sections in the Belcourt area.

Where uncovered in trenches the formation is usually a well-banded, grey-brown sandstone with frequent limonitic beds. It is generally thick bedded but platy interbeds are common.

The Hulcross Member of the Commotion is separated by a bed of coarse-grained sandstone containing a variety of small, well-rounded chert pebbles. This contact and the Hulcross shales are exposed on the ridge just northeast of the peak of Duke Mountain. No coal was observed in the Hulcross which is made up almost entirely of silty, dark grey shales.

b. Structure:

The portion of the Rocky Mountain Foothills described in this report is part of the large anticlinorium that forms the eastern part of the Foothills physiographic unit in British Columbia. It is comprised of northwesterly folds which are paralleled and cut by southwest dipping thrust faults. The folds are en echelon with the northwest ends of the anticlines terminated by faults and/or simple folds and the southern ends terminate in more structurally complex situations, usually an abundance of small folds. Thrust faults with large displacements push the eastern flanks of the anticlines over the adjoining synclines. The amount of deformation decreases to the east and the relatively flat eastern part of the Foothills is an unfaulted synclinorium. The greater part of the Monkman coal licences lies in the thrust faulted anticlinorium.

Of the several singular structural features on the licences the Onion Anticline is the largest and most consistent. It can be traced from the northwest at Five Cabin Creek to the Narraway River in the southeast, a distance of 50 miles. For most of its length only the southwest limb is still remaining due to thrusting and subsequent erosion of the northeast limb. The Onion Syncline is exposed in the northwest corner of the property but is lost by faulting and erosion south of Onion Creek. Other major folds are the Quintette syncline and anticline, and, the Dokkensyncline and anticline which are in the northeast part of the property. The axes of all folds trend  $N60^{\circ}W$ .

Several large thrust faults and a multitude of smaller associated faults occur. They can be divided into two (2) general zones, the east zone and the west zone. The east fault zone includes the Quintette folds and pushes the Gething-Commotion rocks over the younger Shaftesbury Formation to the east. The west fault zone is a series of smaller thrusts of limited displacements in the northwest and Belcourt Mountain area.

## COAL OCCURRENCES

Of the many individual seams found on the property, both in 1970 and 1973, only one could be correlated over more than a few hundred feet. This seam, which averaged more than fourteen (14) feet in true thickness, was found in eleven (11) of the 1973 bulldozer trenches and in six (6) of the 1970 trenches. It occurs just above the Moosebar Formation in the Gates Member of the Commotion Formation, and, thus, correlates well with the No. 4 Seam at Smoky River and the main seams of the Five Cabin and Babcock properties of Denison Mines. The seam is also found on surface in the Onion Syncline between Cabin Creek and Fearless Creek and in the Belcourt area.

A brief description of the coal occurrences and structure for each of eight (8) geological and geographical subdivisions of the licence area follows:

a. ONION SYNCLINE - Cabin Creek to Fearless Creek

The syncline is a symmetrical structure on which the dips of the flanks increase markedly to the southeast. At the northwest limits they vary between  $15^{\circ}$  and  $41^{\circ}$  and to the southeast, between  $38^{\circ}$  and  $75^{\circ}$ . The fold axes is clearly defined at several places along the Onion Creek canyon. Three (3) seams, of 4', 8' and 15' average true thickness, are fairly consistent along the syncline, with the eight-foot seam the lower of the three, and the four-foot seam the upper one. They occur within a stratigraphic interval of 220 feet.

b. ONION ANTICLINE - Fellers Creek to Wapiti River

Within the Onion Anticline between Fellers Creek and the Wapiti River several small seams were found which varied in thickness between 1.8 and 5.8 feet. In addition, one exposure of an 11.0 foot seam was found. Only the southwest limb of the anticline occurs south of Onion Creek and the dips along this flank are fairly consistently in the range of  $30^{\circ}$  to  $45^{\circ}$  southwest. The coal seams are located within 1,200' of the top of the Cadomin and appear to be entirely within the Commotion although definite stratigraphic placement is not possible due to a lack of rock exposure.

c. DOKKEN ANTICLINE - Dokken Creek to Wapiti River

Both the Dokken Anticline and its associated syncline are very tight folds with all dips averaging  $70^{\circ}$ . A large part of the limbs of both folds are eroded and covered with glacial till. The only coal found was in a possible slump block which contained two seams of less than 2.5 feet in thickness.

d. DOKKEN ANTICLINE - Fearless Creek to Dokken Creek

This area is heavily overburdened, and, from the few creek-bed rock exposures found, no definite structural interpretation could be made. The limited outcrop evidence points to a highly disturbed, geologically complex area. No coal was observed.

## e. ONION ANTICLINE - Wapiti River to Red Deer Creek

Only the conglomerates of the Cadomin Formation are exposed in this area. The dip of the unit varies between  $33^{\circ}$  and  $39^{\circ}$ .

## f. ONION ANTICLINE - Red Deer Creek to Belcourt Creek

Excellent exposures of Gething, Moosebar and Commotion Formations occur along the Onion Anticline between Red Deer Creek and Belcourt Creek. On the south side of Belcourt Mountain a 2188 foot stratigraphic section was measured and logged. The section is included in this report as Appendix V. The section contains four significant coal seams, the largest of which is 20.0 feet thick and lies 763 feet above the Cadomin. A 12.3 foot seam, 318 feet above the Cadomin, and two 5.0 foot seams were also measured.

In the Belcourt Mountain area a 45.0 foot seam was examined. This seam is remarkably clean with only minor shaley partings. The seam thickness has been greatly exaggerated by thrust faulting and due to snow and talus cover its areal extent could not be determined nor could its exact stratigraphic location. To the north the seam appears to split into three (3) seams with thicknesses of 7.6', 2.9' and 4.2'. However, the thrust faulting between and within the seams makes it difficult to determine if these are separate seams or the thrust remnants of a thicker seam. The enclosing sandstones are likely lower Commotion Formation, Gates Member.

g. ONION ANTICLINE - Belcourt Creek to Narraway River

The southwest limb of the Onion Anticline between Belcourt Creek and the Narraway River dips at an average of  $25^{\circ}$  southwest. The Cadomin caps the ridges and the only other exposed rock units are of the underlying Minnes Group which is exposed at the base of the steep eastern slopes of the ridges. On the more gently western slopes heavy overburden masks the underlying rocks and no coal was observed above the Cadomin. However, in the portion of the area where the favourable horizon (400 to 1100 feet above the Cadomin) may occur on the west slopes an excellent possibility for dip-slope coal does exist.

East of the Onion Anticline and southeast of Belcourt Lake, three (3) licences, CL 1256, CL 1257, and CL 1258, are underlain by a broad slightly asymmetrical syncline which is outlined by ridges of Cadomin conglomerate. No other rocks are exposed and although the occurrence of coal within the syncline has not been established, the configuration does suggest that the favourable horizon will exist in the central part of the structure.

h. NORTHEAST LICENCES - Trenched Area.

The area in which all the trenching was done contains part of the Quintette Syncline and the structurally complex region centered around Duke Mountain. In total thirty-two cross-cutting trenches were completed of which twenty-seven encountered coal or coal bloom. The logs of the trenches are contained in this report as Appendix II. One trench,

TR-12, was planned to give a complete stratigraphic section from the Cadomin into the Commotion and 975 feet of lithology was intersected with a total of 200 feet of this interval covered. Recessive rock units, often overlain by swamps, make complete section exposure impossible by bulldozer.

Many individual coal seams were exposed with the 14 foot seam, previously described, the most important. Other seams vary from a few inches to 11.0 feet but definite correlation cannot be established from trench to trench over more than a few hundred feet by either stratigraphy or seam characteristics.

Fifteen (15) channel samples were taken from the trenches dug in 1973 and sent to the Smoky River laboratory for analysis.

#### COAL QUALITY

The results of all analyses performed on the trench samples from the Monkman Pass coal licences are contained in this report as Appendix IV. Also included is a report by J. Hinds, laboratory supervisor for McIntyre Porcupine Mines Limited, Coal Division.

Although the samples were oxidized to variable degrees and it was not expected that coking tests would be successful, two samples did give Free Swelling Indices. This indicates that since both samples came from the 14-foot seam at least this seam may be of coking quality. Other tests tend to place the coal in the medium to high volatile range. No definite rank classification can be made until larger samples from deeper seams can be analysed.

## CONCLUSIONS

The results of the exploration programs conducted in 1970 and 1973 on the 103 licences of the Monkman Pass group have proven the existence of large reserves of coal, and, have provided a greater amount of data than was previously known about the area. The amount of effort expended to date has not been sufficient to outline mineable deposits nor to determine more definitively the exact rank of the existing coal. However, the more favourable areas for both surface and underground mining potential have been indicated, and, coal quality analysis suggests that at least one of the many seams may be a coking coal.

Bulldozer trenching, because of the areal extent of the licences, the limited accessibility and the heavy overburden and vegetative cover, is of restricted effectiveness and only a small part of the total property could be adequately covered by seam exposure techniques. Where it could be used the method was successful in uncovering and correlating coal seams but could not reach sufficient depths to guarantee a lack of oxidation of the coal.

Interpretative geology throughout the property was possible because of the presence of the resistant Cadomin Formation conglomerate which could be traced in heavily overburdened areas where less resistant units were completely obscured.

The stratigraphic interval of major importance lies between 400 and 1100 feet of the top of the Cadomin Formation. This interval contains the more favourable upper Gething and Lower Commotion rocks

along with the unproductive Moosebar Formation. Although the thicknesses of individual formations vary considerably along the length of the property the only large coal seams encountered are located within that 700 foot interval. The most significant seam, one which averages 14.0 feet in true thickness, lies in the Commotion Formation above the Moosebar Formation. This stratigraphic placement correlates with No. 4 Seam at Smoky River where the Luscar Formation equivalent of the Moosebar is the 'clam' zone, a marine shale unit found below No. 4 Seam.

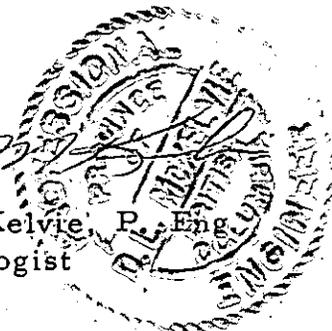
Two of the most promising areas for future exploration are outlined below:

- a. The Onion Anticline between Belcourt Creek and the Narraway River contains the best chance for dip-slope coal. Diamond drilling would be required to probe the south west flank of the anticline in localities where the most favourable horizon exists on the south west slopes.
- b. Licences 1256, 1257, 1258 cover an asymmetrical syncline south east of Belcourt Lake and the fold configuration suggests the possibility of flat-lying underground reserves. Since only the Cadomin is exposed a diamond drill program would be necessary to more thoroughly study the structure and test for the presence of coal.

Other areas such as the Onion Syncline and the Duke Mountain region contain potential for steep pitch underground mining situations but much more detailed work would be necessary to fully assess them.

November 26th, 1973.

  
D. L. McKelvie, P. Eng.  
Chief Geologist



APPENDIX I

LIST OF LICENCES

<u>Licence No.</u>	<u>Acreage</u>	<u>Licence No.</u>	<u>Acreage</u>
1158	640	1213	648
1159	640	1214	640
1160	640	1215	640
1161	640	1216	440
1162	640	1217	640
1165	640	1218	640
1166	640	1219	640
1167 -	640	1220	640
1168 -	640	1221	640
1169 -	640	1222	640
1170 -	640	1223	640
1171	640	1224	640
1172	640	1225	640
1173	640	1226	640
1174	640	1227	640
1175	640	1228	640
1176	640	1229	640
1177 -	640	1230	640
1178 -	640	1231	640
1179 -	640	1232	640
1180 -	640	1233	640
1181 -	640	1234	612
1182	640	1235	640
1183 -	640	1236	640
1184	640	1237	640
1185	640	1238	640
1186	640	1239	640
1187	640	1240	640
1188	640	1241	640
1189	640	1242	640
1190	640	1243	640
1191	640	1244	640
1192	640	1245	640
1193	640	1246	640
1194	640	1247	640
1195	600	1248	640
1197	640	1249	640
1198	640	1250	640
1200	640	1251	640
1201	640	1252	480
1202	640	1253	640
1203	640	1254	640
1204	640	1255	640
1205	640	1256	640

List of Licences (continued)

<u>Licence No.</u>	<u>Acreage</u>	<u>Licence No.</u>	<u>Acreage</u>
1206	640	1257	640
1207	640	1258	640
1208	640	1259	640
1209	640	1261	640
1210	640	1262	640
1211	640	1272	640
1212	640	1286-	640
		1267	640

Total :103 licences      65,492 acres

APPENDIX I

LICENCE GROUPING

GROUP I

CL	1167
CL	1168
CL	1169
CL	1170

GROUP II

CL	1177
CL	1178
CL	1179
CL	1180
CL	1181
CL	1286
CL	1183

RECLAMATION OUTLINE FOR MCINTYRE'S MONKMAN  
PASS COAL LEASES 1973 SUMMER PROJECT

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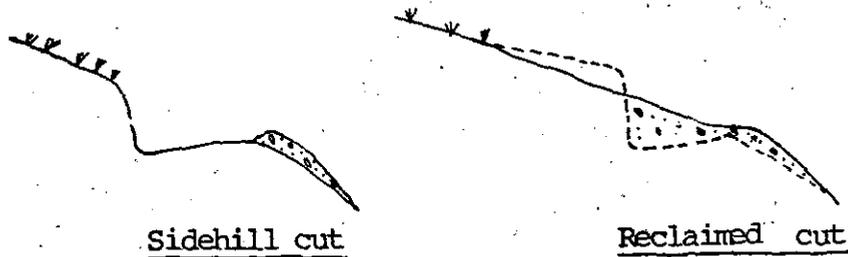
The following outline was prepared and presented to the men (catskinners & slashers) that were employed by the contractor (Wagro Construction) to carry out the reclamation work at the end of McIntyre's 1973 Exploration Project on the Monkman Pass coal leases.

OUTLINE

Reclamation: Is the reclaiming or repairing of land, upon which trails have been cut, trenching and destruction of timber has taken place, in order to maintain EROSION CONTROL.

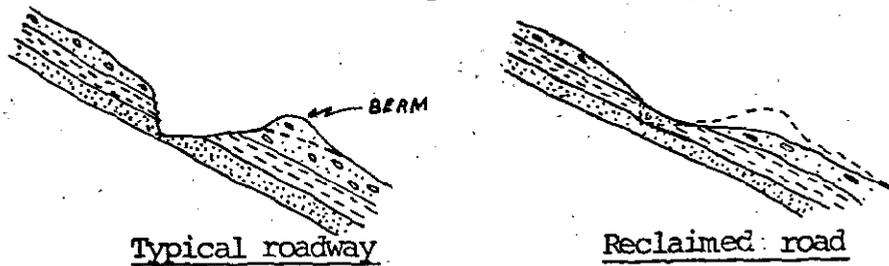
Reclaiming: Is to be carried out by the following steps wherever reasonably possible.

1. Backsloping of sidehill cuts



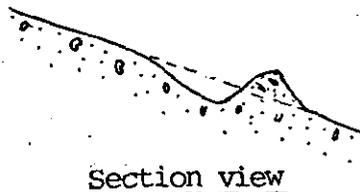
Section view

2. Sloping of roadway to outside edge and removing any berm left from building and maintaining.



Section view

3. Cross ditching of steeply inclined roads to prevent washing.



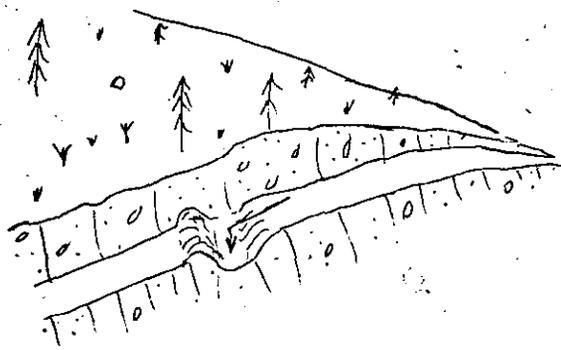
Section view

4. Proper disposal of disturbed timber along road right-of-way.



RECLAMATION STANDARDS REQUIRED

1. Slopes:
  - a) where soil is relatively unstable (dirt, gravel, clay, sand) an adequate backslope is required along cuts to prevent sliding and slumping.
  - b) where cut is in solid rock, original material pushed out should be brought back into cut wherever possible, otherwise very little can be done.
2. Crossditching
  - a) on very steep grades crossditching should be done every 150 - 200 feet.
    - b) crossditches must be built in order to divert runoff over the side of the road preferably into timber, where water will not erode the soil.
      - 1) crossditches should be cut 1 - 2 feet into the hard roadbed.
      - 2) the downhill side should have a berm or dyke piled behind the ditch stretching from the inside bank to to the outside edge of the road.
      - 3) this ditch and dyke should be angled across the road so that the outside is lower than the inside - this means angling the dozer blade the same way.
      - 4) the mouth of the ditch must be clear of debris in order to prevent water pools from collecting and washing over the dyke.



Crossditch

c) on shallow grades the crossditches do not have to be as close together.

1) the best locations, natural low spots, can be seen if one sizes up the road.

NOTE: Seeding will be carried out at the same time when the crossditching is done.

3. Brush Piling a) Cats must pull as much of knocked down timber out of bush (leaners and poorly stacked piles) as is possible, destroying as little as necessary of the standing timber.

b) these brush piles should be kept three to four feet away from standing timber.

c) the piles must be flattened and windrowed with gaps left in windrows every quarter mile.

d) 1) Slashers are responsible for limbing, cutting into short lengths (4 - 5 feet), and cutting off the root bowls of the timber in these windrows so that all pieces are lying flat on the ground.

NOTE: Root bowls should be cut as close to roots as possible.

2) the Slashers are also responsible for cutting down any "leaners" that are either hanging over the road or those leaning into timber that are impossible for the cats to get out.

e) where there are trenches available, all brush may be

pushed in and properly buried.

4. Seeding:
- a) Slashers will be seeding all cleared areas and those open areas disturbed by cats after cats have completed reclamation.
  - b) crossditching and seeding should be done together in order that slashers have access to area.
  - c) 15 lb. of seed mixture are to be applied to each acre or each quarter mile of road.

NOTE: A different grass mixture is used for non-forested areas.

5. Reclaiming Campsite and Along Main Road:

B. C. Forestry requires that 100% disposal be carried out on all work areas for 1/4 mile from main road.

- All brush may be buried in existing trenches.
- New trenches may be necessary for complete disposal.
- Seeding must be also carried out along this area.

It is necessary that these standards be strictly followed wherever possible and reasonable. Most of this work can be done by common sense and good judgement. Whenever there is any question ask either the geologist or your foreman. If we don't know, we'll consult the forestry officer. Any experience we gain from this program can be valuable as far as future work in this field is concerned. Every year the demand for better reclamation standards increase - likewise the demand for people with this experience also increases - therefore let's do a good job.

G. Lawrence.

APPENDIX VI  
LIST OF PERSONNEL

1970 Program - September, October 1970.

- a. McIntyre Porcupine Mines Limited, R.1003 409 Granville St.  
Vancouver, British Columbia.

J. W. MacLeod, P. Eng.  
W. D. Lidgett, Geologist  
R. D. Martin, Prospector  
A. E. Angus, Prospector  
P. Therrien, Student  
R. S. Ambery, Student  
G. Hawkins, Student  
N. Clyburn, Student  
G. Kaiway, Student

- b. Contractor - L. I. Adams Contractors Limited, Grande Prairie, Alberta.

L. I. Adams

1973 Program - July 1, 1973 - October 1, 1973.

- a. McIntyre Porcupine Mines Limited, P. O. Box 2000, Grande Cache, Alberta.

D. L. McKelvie, P. Eng.  
R. Rippon, Geotechnician  
G. Lawrence, Geotechnician  
W. Kilby, Student  
P. Lawson, Student  
R. Melin, Student

- b. Contractor - Wagro Construction Ltd., Edson, Alberta.

F. Wassing, Foreman  
D. Wassing, Cook  
G. Love, Cook  
E. Roy, Tractor Operator  
T. Marshall, Tractor Operator  
E. Bloom, Tractor Operator  
N. Beaulieu, Tractor Operator  
G. Budell, Chain Saw Operator  
J. Moyan, Chain Saw Operator  
J. Houle, Sr., Chain Saw Operator  
J. Houle, Jr., Chain Saw Operator  
R. Paul, Chain Saw Operator  
S. Desjarlais, Chain Saw Operator  
F. Belcourt, Chain Saw Operator

List of Personnel-Continued

Contractor - Alpine Helicopters, Kelowna, British Columbia.

S. Koster, Pilot

W. Dixon, Engineer



**MCINTYRE**  
PORCUPINE MINES LIMITED

TORONTO, ONTARIO  
MSL ICI

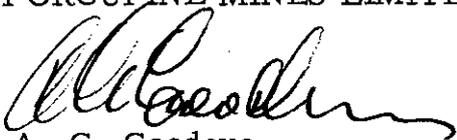
EXECUTIVE OFFICES  
P. O. BOX 51  
COMMERCE COURT WEST  
TELEPHONE 362-4751-TELEX 02-29079

McINTYRE PORCUPINE MINES LIMITED  
EXPENDITURES  
103 MONKMAN PASS COAL LICENCES  
1158 ET AL  
OCTOBER 1970 TO OCTOBER 1973

<u>Account</u>	<u>Amount</u>
Rent and Services	\$ 3,927.00
General Field Work	14,456.00
Camp Supplies and Food	12,691.00
Geology	6,407.00
Reconnaissance	29,825.00
Trenching	45,142.00
Transportation	36,583.00
Salaries	52,891.00
Administration	<u>20,192.00</u>
Total:	<u>\$222,114.00</u>

Certified Correct,

McINTYRE PORCUPINE MINES LIMITED,

  
A. G. Goodeve,  
Treasurer.



APPENDIX VII

LIST OF EXPENDITURES - JULY 1 to OCTOBER 1/73.

	<u>Total</u>	<u>Group I</u>	<u>Group II</u>
Rent & Services	60.00	--	--
General Fieldwork	13,968.00	--	--
Camp Supplies & Food	6,889.00	496.00	882.00
Geology, Detailed	1,800.00	648.00	1,152.00
Geology, Reconnaissance	29,825.00	--	--
Trenching	45,142.00	16,251.00	28,891.00
Transportation	29,536.00	918.00	1,632.00
Salaries	17,744.00 <sup>x</sup>	1,064.00	1,893.00
Administration	14,496.00	1,044.00	1,455.00
	<hr/>	<hr/>	<hr/>
	\$ 159,460.00	\$ 20,421.00	\$35,905.00



~~CONFIDENTIAL~~  
APPENDIX 211

"A" SECTION

- 00 - 65 -- On a bearing of 45°. On road.  
No outcrop / pebbly sandstone.
- 65 - 80 -- 15.0' coal. A1 Strike 95°. True dip 65°W.
- 80 - 84.5 - 4.5' grey shale.
- 84.5-84.7 - 0.2' coal.
- 84.7-89.6 - 4.9' grey shale.
- 89.6-90.5 - 0.9' coal shale.
- 90.5-91.8 - 1.3' grey shale.
- 91.8-92.4 - 0.6' coal shale.
- 92.4 - 95 - 2.6' coal A2 Strike 98°. Ap. dip 68°W. (True 75°).
- 95 - 100 - Grey shale
- 100 - 200 - No outcrop - grey shale.
- 200 - 202.6- On a bearing of 25°. 2.6 Sandstone.
- 202.6 - 205.2- 2.6 coal shale.
- 205.2 - 208.2- 3.0 coal. A3
- 208.2 - 208.6- 0.4 grey shale
- 208.6 - 208.8- 0.2 coal.
- 208.8 - 450 (approx.) - On a bearing of 35°. Grey shale - no outcrop & swamp.
- 450 (approx.) - Cadomin conglomerate.

-----

"B" SECTION

- 00 - On western edge of Cadomin Conglomerate dipping steeply W.
- 00 - 75 - On a bearing of  $60^{\circ}$   
Conglomerate - coarse - 'cobble'
- 75 - 150 - On a bearing of  $93^{\circ}$   
Conglomerate - coarse - 'cobble'
- 150 - 225 - No outcrop
- 225 - 641.6 - On a bearing of  $100^{\circ}$   
No outcrop - grey shale
- 641.6 - 649 - 7.4' coal. B1 Strike  $135^{\circ}$ . Dip  $87^{\circ}$
- 649.0 - 650 - 1.0' coal shale
- 650 - 750 - Fine sandstone / shales (Minor)
- 750 - 895.4 - On a bearing of  $106^{\circ}$   
Fine sandstone / grey shales  
(At 780 Strike  $135^{\circ}$  True dip  $70^{\circ}$  E)
- 895.4 - 898.2 - 2.8 Coal B2 Strike  $135^{\circ}$  Dip (?) (Section  $123^{\circ}$ )
- 898.2 - 907 - 8.8 Grey shale
- 907 - 914 - 7.0 Coal shale
- 914 - 920.8 - 6.8 Grey shale
- 920.8 - 947 - 26.2 Coal B3 Strike  $132^{\circ}$  True dip  $86^{\circ}$  E
- 947 - 948 - 1.0' grey shale
- 948 - 950.8 - 2.8 coal B3
- 950.8 - 951 - 0.2 grey shale
- 951 - 959.9 - 8.9 shale
- 959.9 - 962.3 - 2.4 grey shale
- 962.3 - 967.8 - 5.5 Coal B4 Strike  $140^{\circ}$  True dip  $85^{\circ}$  E
- 967.8 - 968 - 0.2 grey shale

"B" SECTION

Page 2

- 968 - 986 - 18.0 shale
- 986 - 991 - 5.0 sandstone
- 991 - 998 - On a bearing of  $98^{\circ}$   
7.0 shale
- 998 - 1006.1 - 8.1 grey shale
- 1006.1-1007.3- 1.2 coal shale
- 1007.3 - 1017.5 - (10.2) coal B5 Strike  $130^{\circ}$  Dip  $88^{\circ}$
- 1017.5 - 1020 - 2.5 grey shale / no outcrop
- 1020 - 1030 - 10' small pebble conglomerate
- 1030 - 1075 - 45' sandstone
- 1075 - 1130 - 55' Pebble conglomerate
- 1130 - 1170 - 40' . No outcrop
- 1170 - 1200 - 30' grey shale - porous wet friable grey shale - (Moosebar)
- 1200 - - No outcrop. On a bearing of  $85^{\circ}$ .
-

"C" SECTION

- 00 - 90 - On a bearing of  $280^{\circ}$   
No outcrop. (grey shale)
- 90 - 90.3 - 0.3 coal. Strike  $160^{\circ}$ . C1 True thickness 0.2',
- 90.3 - 93 - Coal shale
- 93 - grey shale
- 
- 00 - 60 - On a bearing of  $70^{\circ}$   
Shale with minor sandstone
- 60 - 60.5 - 0.5 Coal (to coal shale) C2 Strike  $155^{\circ}$  Ap. dip (?)  $60^{\circ}$ W  
True thickness 0.4'
- 60.5-60.9 - grey shale
- 60.9-61.4 - 0.5 coal. True thickness 0.4.
- 61.4 - 135 - grey shale / shales & sandstones
- 135 - 137.3- On a bearing of  $100^{\circ}$   
2.3' coal C3 Strike  $170^{\circ}$  Ap. dip  $50^{\circ}$ W. True thickness 2.0
- 137.3 - 139.1- 1.8 grey shale
- 139.1 - 141.7- 2.6 brown sandstone
- 141.7 - 143.9- 2.2 chocolate to grey shale
- 143.9 - 144.4- 0.5 coal shale
- 144.4 - 144.6- 0.2 grey shale
- 144.6 - 145.6- 1.0 coal C4 Strike  $150^{\circ}$  Ap. dip  $55^{\circ}$ W True thickness 0.8'
- 145.6 - 147.6- 2.0 grey shale
- 147.6 - 150.2- 2.6 coal C5 Strike  $150^{\circ}$  Ap. dip  $57^{\circ}$ W True thickness 2.3'
- 150.2 - 245 - grey shale/no outcrop/shale & sandstone
- 245 - 315 - On a bearing of  $84^{\circ}$   
70' grey shale/no outcrop/shale & sandstone

"C" SECTION

Page 2

- 315 - 317 - 1.5 coal C6 True thickness 1.3  
0.5 grey shale to coal shale  
0.5 coal shale to coal
- 317 - 320 - 3' grey shale
- 320 - 350 - 30' no outcrop
- 350 - 375 - 25' grey shale
- 375 - 377.2- 1.6 coal C7 True thickness 1.3  
0.6 coal shale
- 377.2 - 400- 22.8 grey shales; sandstones & shales
- 400 - 403.7 - 0.6 coal C8 True thickness 0.4'  
0.6 coal to coal shale  
1.6 grey shale  
0.3 coal True thickness 0.2'  
0.6 coal shale to coal. Strike 155° Ap. dip 77°W
- 403.7 - 412.2- 8.5 brown shale
- 412.2 - 4.8.5- 0.9 grey shale to coal shale  
1.0 coal C9 True thickness 0.8  
0.4 coal shale  
2.0 grey shale  
0.3 coal Strike 155° Ap. dip 82°W True thickness 0.2  
1.0 grey shale  
0.7 coal C10 True thickness 0.6'
- 418.5 - 420 - grey shale
- 420 - 500 - no outcrop
- 

490 ft. on a bearing of 280° to the 1800 ft. mark on the 'E' Section.

"D" SECTION

Page 2

- 00 - From branch at sub datum X
- 00 - On a bearing of  $90^{\circ}$   
No outcrop
- 125 - 155 - Shale
- 155 - 170 - Sandstone
- 170 - 200 - Siltstone/shale. Strike  $318^{\circ}$ . Tr. dip  $45^{\circ}$
- 200 - 300 - On a bearing of  $110^{\circ}$   
Siltstone/shale  
Very minor coal shale in shale @ 275
- 300 - 375 - No outcrop
- 375 - 390 - On a bearing of  $90^{\circ}$   
No outcrop
- 390 - 500 - Sandstone/shale
- 500 - 575 -  $D6^B$  - 5 feet of good coal bloom - no observable seam  
No outcrop - sandstone & shales
- 575 - 645 - On a bearing of  $95^{\circ}$   
Sandstone/shale  
Strike  $300^{\circ}$ ; dip  $35^{\circ}$  (?) @ 575
- 645 - 683 - 2.0 coal shale  
30.0 coal  $D6$   
2.0 coal shale  
4.0 coal Strike  $305^{\circ}$  Ap. dip  $13^{\circ}$  True dip  $43^{\circ}$   
Calc. true dip  $23^{\circ}$
- 683 - 700 - On a bearing of  $95^{\circ}$   
Shale
- 700 - 705 - 1.5' coal shale  
0.2' coal  
shale
- 705 - 761.4 - No outcrop - sandstone ( good sandstone)
- 761.4 - 775 - 0.4' fine conglomerate - pebble  
11.5' coal  $D7$   
1.7' Coal shale Strike  $312^{\circ}$  Dip  $53^{\circ}$   
The pebble conglom is displaced by a sharp fold

continued....

or most probably a micro fault - 4' along section

D7

No apparent displacement in the basal sandstone, which is a competent hard white sandstone.

- 775 - 795 - Sandstone - with coaly shale planes on joints (?)
  - 795 - 840 - Siltstone/shale with bands of coal shale and coal. There are more than 16 bands giving a true cumulative width of greater than 2 feet over the 45' of section.
  - 840 - 1000- No outcrop - minor sandstone
-

"E" SECTION

(Cut along the old road)

- 00 - 95 - On a bearing of  $110^{\circ}$   
No outcrop - shale & sandstone
- 95 - 98 - Chocolate shale
- 98 - 140 - On a bearing of  $133^{\circ}$   
No outcrop. (Almost parallel to strike)
- 140 - 142 - Shale
- 142 - 150 - Sandstone
- 150 - 175 - Shale
- 175 - 225 - 17.3 Coal E1 Strike  $145^{\circ}$  Dip(?) True width 2.9'  
Shale
- 225 - 235.5(+)- 10.5 Coal (+) E2 True width approx. 2'
- 235.5(+)-250 - No outcrop
- 250 - 255 - Shale
- 255 - 288 - Coal shale & grey shale
- 288 - 315.9- 2.4 Coal E3 True width 0.4'  
0.7 grey shale  
24.8 coal E3 Strike  $145^{\circ}$  Dip (?) True width 4.5'
- 315.9 -406 - Shale & sandstone @ 400 Strike  $158^{\circ}$  Dip  $65^{\circ}$   
Chocolate shale
- 406 - 408 - Coal shale
- 408 - 422 - Grey shale
- 422 - 423 - 1.0 Coal E4 True width 0.4'
- 423 - 427.7 - Grey shale
- 427.7 - 428.3 - Grey shale and good plant fossils
- 428.3 - 429.4 - 1.1 Coal E5 True width 0.4'

continued.....

429.4 - 433 -	Grey and chocolate shale
433 - 450 -	CROSS-CUT TRENCH Sec trench section at the end of this section Bearing 45°
450 - 500 -	Grey shale
500 - 675 -	No outcrop
675 - 780 -	At a bearing of 100° No outcrop
780 - 790 -	Shale
790 - 791.3 -	1.3 Coal <u>E6a</u> Strike 140° True width <u>0.6'</u>
791.3 - 800 -	Shale
800 - 800.1 -	0.1' Coal True width 0.1
800.1 - 825 -	Sandstone & shale
825 - 828 -	Grey shale & coal shale
828 - 830 -	Shale
830 - 850 -	No outcrop - grey shale
850 - 860 -	0.2 Coal True width 0.1' 9.8 Grey and brown shales
860 - 950 -	No outcrop . Sandstone & shale
950 - 967.7 -	Brown grey shale. Strike 142° Dip 64° (Calc. Tr. dip 72°)
967.7 - 968.2 -	Grey shale
968.2 - 970 -	Brown shale
970 - 970.7 -	Coal shale
970.7 - 974.6 -	Light grey shale
974.6 - 974.7 -	Coal shale

continued.....

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974.7 - 978 - Light grey shale  
978 - 978.4 - Coal shale  
978.4 - 979.8- 1.4 Coal E6 Strike 140° Dip 75°  
979.8 - 979.9 - Grey shale  
979.9 - 980.1 - 0.2 Coal True width 0.1'  
980.1 - 985.6 - Grey shale - plant fossils  
985.6 - 990 - Grey shale & coal shale bands  
990 - 995 - Grey shale  
995 - 995.1 - Coal shale  
995.1 - 996.2 - Grey shale  
996.2 - 996.4 - 0.2 Coal True width 0.1'  
996.4 - 1000.9 - Grey shale  
1000.9 - 1000.1.2 - 0.3 Coal True width 0.1'  
1001.2 - 1001.4 - Grey shale  
1001.4 - 1002.9 - 1.5' Coal E7 Strike 135° Dip 65° True width 0.7'  
1002.9 - 1007 - Grey shale  
1007 - 1014.7 - Chocolate & brown shale  
1014.7 - 1015 - Coal shale  
1015 - 1039.3 - Shale  
1039.3 - 1040.9 - 1.6 Coal E8 Strike 150° T. dip 60° True width 0.9'  
1040.9 - 1043.6 - Brown shale & sandstone  
1046.6 - 1047.2 - Grey shale  
1047.2 - 1049.2 - Grey shale & coal shale bands

continued .....

"E" SECTION

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Page 4

1049.2 - 1053.8	-	Grey shale
1053.8 - 1054.0	-	Coal shale
1054.0 - 1054.3	-	Grey shale
1054.3 - 1054.4	-	Coal shale
1054.4 - 1055.8	-	Coal shale & grey shale bands
1055.8 - 1058.0	-	Grey shale
1058.0 - 1058.4	-	Coal shale
1058.4 - 1060.8	-	Grey shale
1060.8 - 1066.6	-	Chocolate shale
1066.6 - 1067.0	-	0.4 Coal True width 0.2'
1067.0 - 1074.6	-	Chocolate shale
1074.6 - 1075	-	0.4 Coal to coal shale True width 0.2'
1075 - 1075.7	-	Grey shale
1075.7 - 1105	-	Shale & sandstone
1105 - 1115	-	Sandstone
1115 - 1119.6	-	Shale
1119.6 - 1119.9	-	0.3 Coal True width 0.2'
1119.9 - 11123	-	Grey shale & coal shale bands with plant fossils
11123 - 1130.6	-	Brown shale
1130.6 - 1132.2	-	Grey shale & coal shale bands
1132.2 - 1135.2	-	Chocolate shale
1135.2 - 1135.4	-	Coal shale
1135.4 - 1137.5	-	Grey shale
1137.5 - 1139.4	-	Coal shale

continued.....

1139.4 - 1140.2	-	0.8 Coal <u>E9</u>	Strike 155°	Tr. dip 62°	True width 0.6'
1140.2 - 1143	-	Grey shale			
1143 - 1144.4	-	Brown shale			
1144.4 - 1145	-	Coal shale & grey shale bands			
1147 - 1151.6	-	Chocolate & brown shale			
1151.6 - 1151.9	-	Coal shale			
1151.9 - 1152.6	-	Grey shale			
1152.6 - 1166	-	Brown shale with sandstone			
1166 - 1171	-	5.0 Coal <u>E10</u>	Strike 162°	Tr. dips 65° & 70°	True width 3.9'
1171 - 1176.4	-	Grey shale			
1176.4 - 1178.9	-	Brown shale with grey shale bands			
1178.9 - 1179	-	0.1 Coal	True width 0.1'		
1179 - 1179.7	-	Grey shale			
1179.7 - 1184.6	-	4.9 Coal <u>E11</u>	Strike 160°	dip 70°	True width 3.9'
1184.6 - 1186.0	-	Grey shale			
1186.0 - 1208.3	-	Shale			
1208.3 - 1208.4	-	0.1 Coal	True width 0.1'		
1208.4 - 1214	-	Shale			
1214 - 1215	-	Grey shale with minor coal shale			
1215 - 1225	-	Shale			
1225 - 1225.6	-	0.6 Grey shale with coal partings	True width 0.4'		
1225.6 - 1226.4	-	0.8 Coal <u>E12</u>	True width 0.5'		
1226.4 - 1227	-	Grey shale			

continued.....

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1227 - 1266.3	-	Shale
1266.3 - 1267.6	-	1.3 Coal <u>E13</u> Ap. dip 83° (Calc. tr. dip) True width <u>1.1'</u>
1267.6 - 1267.9	-	0.3 No outcrop
1267.9 - 1268.2	-	0.3 Coal ( <u>E13</u> ) Probably one seam of <u>1.9</u> feet section length. True width 0.2'
1268.2 - 1269.6	-	Coal shale & grey shale
1269.6 - 1278	-	Grey shale
1278 - 1279.5	-	Coal shale
1279.5 - 1281.2	-	Grey shale
1281.2 - 1281.6	-	Coal shale
1281.6 - 1290	-	Shale
1290 - 1210	-	No outcrop. (Minor shale to 1350)
1410 - 1413.4	-	Shale
1413.4 - 1413.6	-	Coal shale
1413.6 - 1417	-	Grey shale
1417 - 1418.3	-	1.3 Coal <u>E14</u> True width <u>1.3'</u>
1418.3 - 1421.3	-	Grey shale
1421.3 - 1423	-	Bands of coal; coal shale & grey shale
1423 - 1423.1	-	0.1 Coal True width 0.1'
1423.1 - 1423.5	-	Bands of coal; coal shale & grey shale
1423.5 - 1426.5	-	Grey shale with minor coal shale
1426.5 - 1426.7	-	Coal shale
1426.7 - 1427.5	-	Grey shale
1427.5 - 1427.6	-	Coal shale

continued.....

1427.6 - 1433	-	Grey shale
1433 - 1433.3	-	Coal shale
1433.3 - 1433.5	-	Grey shale
1433.5 - 1434.9	-	1.4 Coal <u>E15</u> True width <u>1.1'</u>
1434.9 - 1440	-	Grey shale
1440 - 1450	-	No outcrop
1450 - 1455	-	Shale
1455 - 1457.7	-	2.7 Coal <u>E16</u> True width <u>2.3'</u>
1457.7 - 1462	-	Grey shale
1462 - 1464.4	-	Coal shale with grey shale bands
1464.4 - 1465.8	-	Grey shale
1465.8 - 1467	-	Coal shale & grey shale
1467 - 1475	-	Grey shale
1475 - 1485	-	No outcrop
1485 - 1485.7	-	Chocolate shale
1485.7 - 1487.3	-	1.6' coal <u>E17</u>
1487.3 - 1488	-	Grey shale
1488 - 1800	-	No outcrop - grey shale
1800 - 1801.1	-	On a bearing of $105^{\circ}$ 1.1 Coal <u>E18</u> Strike $132$ Ap. dip $54^{\circ}$ (Calc. tr. dip $72^{\circ}$ ) True width <u>0.5'</u>
1801.1 - 1804.7	-	Coal shale
1804.7 - 1890	-	Grey shale - No outcrop
1890	-	Main road

continued.....

TRENCH SECTION "T"

00 - 10 -	On a bearing of 45° Shale
10 - 11 -	Coal shale. Strike 170° Dip 48°W (Calc. tr. dip 54°)
11 - 17 -	Shale
17 - 18 -	Coal shale
18 - 24 -	Shale (siltstone)
24 - 26 -	Grey shale
26 - 26.4 -	0.4 Coal True width <u>0.3</u>
26.4 - 26.7 -	Grey shale
26.7 - 27.2 -	0.5 Coal True width <u>0.4</u>
27.2 - 28.2 -	Grey shale
28.2 - 28.4 -	Coal shale
28.4 - 28.5 -	0.1 Coal True width <u>0.1</u>
28.5 - 28.8 -	Grey shale
28.8 - 29.0 -	Coal shale
29.0 - 39.0 -	Grey shale
30.0 - 30.1 -	0.1 Coal True width <u>0.1</u>
30.1 - 30.6 -	Grey shale
30.6 = 31.4 -	Coal shale
31.4 - 33.9 -	2.5' Coal <u>T1</u> Strike 160° Ap. dip 55° (Calc. tr. 58°) True width 1.9'
33.9 - 34.0 -	Grey shale
34.0 - 34.1 -	0.1 Coal

continued.....

"E" SECTION

Page 9

TRENCH SECTION "T"

34.1 - 37	-	Grey shale
37 - 37.8	-	Coal shale & grey shale
37.8 - 40.5	-	Brown shale
40.5 - 42.0	-	Grey shale with coal shale bands
42.0 - 44.0	-	Brown shale
44.0 - 49	-	Sandstone
49 - 52	-	Grey shale & coal shale
52 - 60	-	Shale & sandstone
60 - 63.5	-	On a bearing of $67^{\circ}$ Grey shale & chocolate shale
63.5 - 72	-	Sandstone
72 - 73	-	Grey shale
73 - 74	-	Coal shale
74 - 75.6	-	N.B. cross the 'E' Section Line Brown sandstone Strike $150^{\circ}$ Dip $55^{\circ}$
75.6 - 76	-	Grey shale
76 - 76.5	-	Brown shale
76.5 - 79	-	Grey shale
79 - 80.7	-	Brown shale
80.7 - 81.5	-	Grey shale with plant fossils
81.5 - 82.6	-	Coal shale Ap. Dip $53^{\circ}$
82.6 - 82.8	-	Grey shale
82.8 - 82.9	-	Coal shale
82.9 - 84.3	-	Grey shale with plant fossils in the first 0.2'

continued.....

"E" SECTION

Page 10

TRENCH SECTION "T"

84.3 - 85	-	0.7 Shaly coal with coal bands <u>T2</u> True width 0.5'
85 - 86.5	-	Grey shale
86.5 - 87.7	-	Chocolate shale
87.7 - 88.4	-	Grey shale
88.4 - 90	-	Chocolate shale/siltstone with plant fossils

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"F" SECTION

00	-	On the edge of the dip-slope unit at the centre of the syncline.
00 - 50	-	On a bearing of $87^{\circ}$ Shale. Strike $320^{\circ}$ . Dip $45^{\circ}$
50 - 225	-	No outcrop
225 - 250	-	Sandstone
250 - 300	-	Fine banded sandstone with shale Strike $325^{\circ}$ ; dip $40^{\circ}$
300 - 350	-	No outcrop
350 - 400	-	Sandstone. Strike $315^{\circ}$ Dip $45^{\circ}$
400 - 420	-	15.0 Coal <u>F1</u> Strike $310^{\circ}$ Ap. dip $32^{\circ}$ (Calc. dip $40^{\circ}$ ) 1.0 Shale 4.0 Coal
420 - 435	-	Shale
435 - 440	-	Coal Shale
440 - 450	-	Shale
450 - 460	-	Sandstone
460 - 580	-	No outcrop - sandstone & shale
580 - 589	-	9.0 Coal <u>F2</u> Strike $325^{\circ}$ Ap. dip $32^{\circ}$ (Calc. tr. dip $40^{\circ}$ )
589 - 595	-	Shale
595 - 660	-	Sandstone and shale
660 - 671	-	8.5 Coal <u>F3</u> Strike $315^{\circ}$ Section $80^{\circ}$ 2.5 Coal Shale True Dip $45^{\circ}$
671 - 700	-	Shale & Sandstone @ 700 Strike $315^{\circ}$ Dip $45^{\circ}$
700 - 745	-	At a bearing of $90^{\circ}$ Shale & Sandstone
745 - 755	-	Shale with coal shale bands and coal bands up to continued...

- 2" in width. Highly contorted.
- 755 - 775 - Sandstone & Shale
  - 775 - 780 - Shale & Sandstone with coal and coal shale bands
  - 780 - 781.5 - 1.0 Coal shale  
0.5 Coal (Strike 320° Dip 54°)
  - 781.5 - 785 - Shale & Sandstone with coal & coal shale bands
  - 785 - 795 - Sandstone & shale
  - 795 - 805 - 4.0' Coal F4 Strike 315° Ap. dip 30°  
6.0 Coal shale (shaly coal) (calc. Tr. dip 40°)
  - 805 - 850 - Shale with minor sandstone
  - 850 - 900 - On a bearing of 40°  
As above increase in sandstone content along section
  - 900 - 1025 - Sandstone & shale with shale decreasing along section  
@ 975 Strike 320° T. dip 60°
  - 1025 - 1047 - 23.0' coal F5 Section 100° Strike 310°  
Ap. dip 40° (Calc. Tr. dip 56°)
  - 1047 - 1100 - No outcrop - minor sandstone
  - 1100 - 1160 - Swamp
  - 1160 - 1200 - Sandstone Strike 310° T. dip 45°
  - 1200 - 1300 - No outcrop - sandstone
  - 1300 - 1305 - 1.5 Coal shale  
0.1 Coal  
Shale
  - 1305 - 1320 - Sandstone (at base - Strike 310° Tr. dip 45°)
  - 1320 - 1342 - 4.0 Coal F6  
3.0 Shale  
11.0 Coal F6  
1.5 Shale  
2.5 Coal F6
  - 1342 - 1700 - Sandstone with very minor shale and no outcrop zones.

continued.....

"F" SECTION

Page 3

- 1700 - 2400     •     No outcrop and sandstone at 2400  
                           Strike 310 Tr. Dip 45° in sandstone
- 2400             •     No outcrop

-----



"H" SECTION

Along a switchback section on the road down  
th syncline.

- 00 - At the edge of the 1st coal seam.
- 00 - 26 - On a bearing of  $75^{\circ}$   
26.0' coal H1 Strike  $300^{\circ}$  Ap. dip  $32^{\circ}$   
(Calc. Tr. dip  $39^{\circ}$ )
- 26 - 126 - On a bearing of  $55^{\circ}$
- 126 - 140 - On a bearing of  $95^{\circ}$   
6.5 Coal Strike  $130^{\circ}$  Ap. dip  $45^{\circ}$  (?)  
(Calc. tr. dip  $60^{\circ}$ ) H2  
3.5 Shale H2  
4.0 Coal H2
- 140 - 240 - On a bearing of  $65^{\circ}$
- 240 - On a bearing of  $80^{\circ}$   
7.0 Coal? Strike  $130^{\circ}$  (?) Ap. dip  $(35^{\circ})$

Hanging wall - Sandstone with conglomerate (pebble)  
bands - one band on contact footwall - shale  
(calc. true dip  $45^{\circ}$ )

-----

"J" SECTION

Swamp

- 00 - 50 - On a bearing of  $175^{\circ}$   
No outcrop
- 50 - 125 - No outcrop - ripped sandstone beneath the overburden
- 125 - 135 - Shale
- 135 - 180 - 1.0 Coal shale  
1.0 Grey shale  
3.5 Coal shale  
4.0 Grey shale  
2.5 Coal shale  
1.0 Coal shale and shale  
23.0 Grey shale  
1.7 Coal J1  
0.8 Grey shale  
0.5 Coal J1  
1.3 Shale  
0.1 Coal shale  
0.9 Shale  
1.1 Coal shale  
0.7 Shale  
0.2 Coal shale  
9.7 Shale Strike  $128^{\circ}$  Ap. dip  $34^{\circ}/27^{\circ}$   
(Calc. Tr. dip  $42^{\circ}/36^{\circ}$ )
- 180 - 280 - Sandstone - no outcrop dip slope
- 280 - 300 - Sandstone. Strike  $115^{\circ}$ , T. dip  $34^{\circ}$
- 300 - 310 - On a bearing of  $25^{\circ}$   
Sandstone
- 310 - 350 - No outcrop
- 350 - 450 - On a bearing of  $115^{\circ}$   
No outcrop
- 450 - 5000 - Red sandstone. Strike  $115^{\circ}$ . True dip  $26^{\circ}$
- 500 - 550 - No outcrop
- 550 - 660 - Red sandstone @ 550. Strike  $105^{\circ}$  Dip  $55^{\circ}$ ; @ 600  
Dip  $38^{\circ}$  Strike  $105^{\circ}$  @ 650 Strike  $110^{\circ}$  Dip  $33^{\circ}$ ;  
@ 650 Strike  $125^{\circ}$  Dip  $37^{\circ}$  continued.....

"J" SECTION

Page 2

- 660 - 950 - - No outcrop - sandstone
- 950 - 1000 - - On a bearing of 105°  
No outcrop
- 1000 - 1100 - - Red and grey sandstone  
@ 1000 Strike 130° Dip 35°  
@ 1050 Strike 105° Dip 35°
- 1100 - 1350 - - On a bearing of 90°  
Sandstone  
@ 1100 Strike 115° Dip 30°  
@ 1250 Strike 123° Dip 30°
- 1350 - 1400 - - On a bearing of 105°  
Sandstone - at 1350 a 1.0 foot thick shale band.  
Strike 123° Dip 29°
- 1400 - 1500 - - On a bearing of 90°  
Sandstone
- 1500 - 1600 - - No outcrop. No visible bloom
- 1600 - 1725 - - On a bearing of 60°  
No outcrop. No visible bloom
- 1725 - 1875 - - On a bearing of 50°  
No outcrop
- 1875 - 1900 - - On a bearing of 335°  
No outcrop
- 1900 - 1975 - - Swamp
- 1975 - 1980 - - Conglomerate - pebble
- 1980 - 2125 - - No outcrop
- 2125 - 2150 - - On a bearing of 80°  
No outcrop
- 2150 - 2160 - - Sandstone - white, hard and contains carbonaceous  
shears
- 2160 - 2200 - - Shale
- 2200 - 2236.2 - - On a bearing of 85°

continued.....

0.1 Coal J2 Strike  $131^{\circ}$  Ap. Dip  $22^{\circ}(?)$   
(Calc. True  $24^{\circ}$ )

2.3 Shale

1.1 Coal - J2 - irregular thickness but true width  
is always greater than 0.3

8.5 Coal shale

0.7 Banded sandstone and shale

2.2 Coal shale

2.1 Red sandstone

7.4 Coal shale

2.6 White sandstone

0.0 White shale/siltstone

2.0 Grey shale

1.2 Coal shale

2236.2 - 2240	-	On a bearing of $80^{\circ}$ Shale
2240 - 2290	-	No outcrop
2290 - 2300	-	Grey shale with 1" coal shale
2300 - 2305	-	Sandstone. Strike $128^{\circ}$ Dip $45^{\circ}$
2305 - 2320	-	Shale
2320 - 2321	-	Coal shale
2321 - 2325	-	Shale
2325 - 2400	-	No outcrop
2400 - 2410	-	Conglomerate - small pebble
2410 - 2430	-	No outcrop - (shale?)
2430 - 2500	-	On a bearing of $180^{\circ}$ No outcrop
2500 - 2600	-	On a bearing of $25^{\circ}$ No outcrop
2600 - 2670	-	Shale
2670 - 2700	-	No outcrop

continued....

- 2700 - 2850 - On a bearing of  $65^{\circ}$   
Fork to creek on a bearing of  $350^{\circ}$   
No outcrop
- 2850 - 2900 - Shale
- 2900 - 2910 - On a bearing of  $80^{\circ}$   
Shale
- 2910 - 2912 - Coal shale
- 2912 - 2925 - Shale
- 2925 - 2927 - Coal shale
- 2927 - 2930 - Shale
- 2930 - 3000 - No outcrop
- 3000 - 3175 - On a bearing of  $124^{\circ}$   
No outcrop
- 3175 - 3280 - On a bearing of  $92^{\circ}$   
No outcrop
- 3280 - 3325 - Conglomerate (flat lying?)
- 3325 - 3350 - No outcrop
- 3350 - 3400 - On a bearing of  $358^{\circ}$   
No outcrop
- 3400 - 3500 - Conglomerate Strike approx.  $150^{\circ}$
- 3500 - 3600 - No outcrop - conglomerate (?)
- 3600 - 3625 - On a bearing of  $55^{\circ}$   
Conglomerate
- 3625 - 3670 - No outcrop
- 3670 - 3675 - Sandstone Strike  $190^{\circ}$  Dip  $35^{\circ}$ E
- 3675 - 3725 - No outcrop
- 3725 - 3900 - On a bearing of  $125^{\circ}$  No outcrop

continued.....

"J" SECTION

- 3900 - 4190     •     On a bearing of  $170^{\circ}$   
Creek. Swamp - no outcrop
  
- 4190             •     On a bearing of  $115^{\circ}$

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MCINTYRE PORCUPINE MINES LTD.

MONKMAN PASS COAL LEASES  
(KINUSEO CREEK AREA)

TRENCH LOG

TRENCH: T-1  
TRENCH AZIMUTH: 210°  
SEAM AZIMUTH: 300°  
SEAM DIP: 65° S.W.  
TRUE THICKNESS OF SEAM: 13.9 ft.

LOCATION DESCRIPTION: On Texaco Seismic line  
on south side of Kinuseo Falls road.

FROM            TO                            DESCRIPTION

No measurements taken other than coal seam.	Roof: Silty sandstone in contact with coal. Some yellow staining. Coal Floor: Light-grey mudstone grading into light-grey silty sandstone
---------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------

Logged by: R. Rippon

MONKMAN PASS COAL LEASES  
(KINUSEO CREEK AREA)

TRENCH LOG

TRENCH: T - 2  
TRENCH AZIMUTH: 208°  
SEAM AZIMUTH: 298°  
SEAM DIP: 66° S.W.  
TRUE THICKNESS OF SEAM: 13.8'

LOCATION DESCRIPTION: Along north side of Kinuseo Falls Road approximately 1 1/2 miles West of 1973 McIntyre Exploration Camp.

<u>FROM</u>	<u>TO</u>		<u>DESCRIPTION</u>
0.0'	2.2'	Roof:	Medium grain, limonitic sandstone
2.2'	4.1'		Chert pebbles conglomerate. Pebbles not larger than 1/2"
4.1'	9.0'		Contorted limonitic sandstone with interbedded coal. Small tree fossils imprinted in rock.
9.0'	9.9'		Buff colored silty mudstone
9.9'	24.0'	Coal. (14.1')	
24.0'	31.0'	Floor:	Interbedded light gray silt and mudstone.
31.0'	34.0'		Light grey mudstone

LOGGED BY: R. Rippon





MONKMAN PASS COAL LEASES  
(KINUSEO CREEK AREA)

TRENCH LOG

TRENCH: T-5  
TRENCH AZIMUTH:  
SEAM AZIMUTH:  
SEAM DIP:  
TRUE THICKNESS OF SEAM:

LOCATION DESCRIPTION: On the Texaco  
Seismic Line North of Kinuseo Falls Road.  
N.E. Limb of Quintette Anticline

FROM      TO      DESCRIPTION

No measurements taken

This seam is too eroded to obtain a measurement and descriptive logs of the roof and floor.

Logged by: R. Rippon

MONKMAN PASS COAL LEASES  
(KINUSEO CREEK AREA)

TRENCH LOG

TRENCH: T - 6  
 TRENCH AZIMUTH: 222°  
 SEAM AZIMUTH: 312°  
 SEAM DIP: 85° N.E.  
 TRUE THICKNESS OF SEAM: 14.2'

LOCATION DESCRIPTION: South side of  
 Kinuseo Falls Road - 2 1/2 miles West  
 of 1973 McIntyre Exploration camp.  
 Southeast limb of Quintette Anticline.

<u>FROM</u>	<u>TO</u>		<u>DESCRIPTION</u>
0.0'	4.1'	Roof:	Buff colored, fine grain siltstone
4.1'	19.0'	Coal	
19.0'	21.9'	Floor:	Dark grey, medium grain, silty sandstone.
21.9'	27.8'		Light grey, fine grain siltstone (contorted)
27.8'	33.0'		Light grey, medium grain, silty sandstone
33.0'	34.1'		Interbedded mudstone and coaly shale.
34.1'	41.0'		Gray, medium grained, silty sandstone
41.0'	50.0'		Limonitic, medium grained sandstone.

NOTE: T - 6 is probably Gething Coal.

LOGGED BY: R. Rippon

MCINTYRE PORCUPINE MINES LTD.

MONKMAN PASS COAL LEASES  
(KINUSEO CREEK AREA)

TRENCH LOG

TRENCH: T-7 LOCATION DESCRIPTION: South side of Kinuseo  
 TRENCH AZIMUTH: 230° Falls Road - 2 1/2 miles west of 1973 McIntyre  
 SEAM AZIMUTH: 320° Exploration Camp. (Same location as T-6)  
 SEAM DIP: 80° N.E. Southeast limb of Quintette Anticline.  
 TRUE THICKNESS OF SEAM: 14.4'

FROM      TO      DESCRIPTION

0.0'	2.1'	Roof: Medium grain, limonitic sandstone. Weathered-rust colored; fresh med grey
2.1'	2.3'	Siltstone, medium grey
2.3'	4.6'	Coal
4.6'	4.9'	Dark grey, carbonaceous mudstone
4.9'	5.4'	Medium grey siltstone
5.4'	7.9'	Fine grain, limonitic sandstone Weathered-rust colored; fresh-med. grey
7.9'	9.3'	Muddy siltstone. Weathered - rusty; fresh grey
9.3'	23.9'	Coal Seam
23.9'	26.9'	Floor: Dark grey carbonaceous siltstone
26.9'	32.3'	Highly carbonaceous, dark grey mudstone
32.3'	37.7'	Medium grey siltstone
37.7'	39.4'	Black carbonaceous mudstone
39.4'	41.4'	Silty sandstone
NOTE: Same seam as T-6		

Logged by: R. Rippon

MCINTYRE PORCUPINE MINES LTD.

MONKMAN PASS COAL LEASES  
(KINUSEO CREEK AREA)

TRENCH LOG

TRENCH: T-8 LOCATION DESCRIPTION: 5 miles up old  
 TRENCH AZIMUTH: 217° exploration trail on Duke Mt. from Kinuseo  
 SEAM AZIMUTH: 307° Falls Road  
 SEAM DIP: 45° S.W.  
 TRUE THICKNESS OF SEAM: 3.4'

FROM	TO	DESCRIPTION
0.0'	2.5'	Roof: Massive, medium grain silty sandstone weathered-buff; fresh-dark grey
2.5'	4.3'	Mudstone, weathered buff
4.3'	5.0'	Black carbonaceous shale.
5.0'	5.9'	Carbonaceous shale (fossiliferous-large plants)
5.9'	6.0'	Grey clay band
6.0'	6.5'	Shaly coal
6.5'	6.9'	Carbonaceous, fossiliferous, muddy siltstone
6.9'	8.7'	Coal
8.7'	9.8'	Mudstone
9.8'	13.2'	Coal Seam with a few fine shale bands
13.2'	14.0'	Floor: Shale
14.0'	16.0'	Black coaly shale
16.0'	17.0'	Fine grain, carbonaceous, fossiliferous, silty sandstone
17.0'	18.3'	Black carbonaceous shale
18.3'	19.7'	Muddy siltstone carbonaceous
19.7'	19.8'	Coal
19.8'	---	Medium grain, light grey, limonitic sandstone.

Logged by: R. Rippon

MCINTYRE PORCUPINE MINES LTD.

MONKMAN PASS COAL LEASES  
(KINUSEO CREEK AREA)

TRENCH LOG

TRENCH: T - 9      LOCATION DESCRIPTION: Top of Duke Mt.  
TRENCH AZIMUTH: 195°  
SEAM AZIMUTH: 285°  
SEAM DIP: 88° S.W.  
TRUE THICKNESS OF SEAM: 8.0'

FROM	TO	DESCRIPTION
0.0'	10.6'	Roof: Grey, slightly fractured mudstone
10.6'	18.6'	Coal Seam:
18.6'	19.5'	Floor:      Grey mudstone
19.5'	20.0'	Coal
20.0'	20.8'	Mudstone
20.8'	21.7'	Coal
21.7'	35.0'	Silty sandstone

Logged by: R. Rippon

MCINTYRE PORCUPINE MINES LTD.

MONKMAN PASS COAL LEASES  
(KINUSEO CREEK AREA)

TRENCH LOG

TRENCH: T-10 LOCATION DESCRIPTION: Top of Duke Mt.  
 TRENCH AZIMUTH: 195°  
 SEAM AZIMUTH: 285°  
 SEAM DIP: 51° N.E.  
 TRUE THICKNESS OF SEAM: 14.0'

FROM	TO		DESCRIPTION
0.0'	6.6'	Roof:	Medium grey siltstone, laminated, weathered buff
6.6'	7.3'		Laminated mudstone, light-dark grey
7.3'	7.8'		Shaly coal
7.8'	8.2'		Mudstone
8.2'	9.0'		Coal - Shaly
9.0'	11.8'		Carbonaceous mudstone
11.8'	12.8'		Mudstone with coal stringers
12.8'	15.7'		Grey siltstone
15.7'	16.6'		Mudstone with coal stringers
16.6'	18.8'		Coal - not shaly
18.8'	19.5'		Mudstone light grey with coal stringers
19.5'	24.2'		Muddy siltstone - laminated. Med. grey; weathered buff
24.2'	24.6'		Carbonaceous mudstone
24.6'	24.8'		Shaly coal
24.8'	26.3'		Buff-light grey laminated mudstone
26.3'	28.6'		Coal (not shaly)
28.6'	35.9'		Light grey muddy siltstone, slightly carbonaceous
35.9'	36.1'		Muddy coal
36.1'	38.1'		Mudstone
38.1'	83.1'		Covered
83.1'	85.1'		Mudstone
85.1'	85.4'		Carbonaceous mudstone
85.4'	88.6'		Buff colored mudstone
88.6'	90.0'		Carbonaceous mudstone
90.0'	104.0'	Coal Seam	
104.0'	106.3'	Floor:	Dark grey mudstone

DESCRIPTION

FROM	TO
106.3'	107.5'
107.5'	108.5'
108.5'	110.2'
110.2'	110.8'
110.8'	111.4'
111.4'	112.0'
112.0'	112.5'
112.5'	116.7'

Carbonaceous mudstone  
 Coal  
 Dark grey silty mudstone  
 Muddy coal  
 Black mudstone  
 Muddy coal  
 Carbonaceous mudstone  
 Sandy siltstone

Logged by: R. Rippon

MCINTYRE PORCUPINE MINES LTD.

MONKMAN PASS COAL LEASES  
(KINUSEO CREEK AREA)

TRENCH LOG

TRENCH: T-11 LOCATION DESCRIPTION: Top of Duke Mt.  
 TRENCH AZIMUTH: 190°  
 SEAM AZIMUTH: Note: Strike & dips taken  
 SEAM DIP: along trench as logged  
 TRUE THICKNESS OF SEAM:  
 Logged August, 1973.

FROM	TO	DESCRIPTION
		Note: Logging commenced at end of trench in what is believed to be the Upper Gates formation & proceeded up section to terminate in what is believed to be the Hulcross shale.
0.0'	3.1'	Carbonaceous, light grey shale
3.1'	8.3'	Shaly coal
8.3'	13.0'	Dark grey mudstone
13.0'	15.9'	Light and dark grey, laminated, med. grain, silty sandstone strike 275°; dip 50° N.E.
15.9'	23.0'	Light grey mudstone
23.0'	26.2'	Light & dark grey, laminated, med. grain silty sandstone
26.2'	29.3'	Light grey mudstone
29.3'	30.5'	Carbonaceous siltstone
30.5'	32.5'	Light grey mudstone
32.5'	35.6'	Light & dark grey laminated silty sandstone
35.6'	40.8'	Carbonaceous mudstone
40.8'	45.4'	Shaly coal
45.4'	48.2'	Light grey mudstone
48.2'	51.3'	Light grey siltstone
51.3'	56.3'	Light grey mudstone
56.3'	63.0'	Medium grain limonitic sandstone
63.0'	64.5'	Thinly bedded, fine grained, silty sandstone
64.5'	67.5'	Light & dark grey laminated, medium grain, silty sandstone.
67.5'	77.7'	Light grey mudstone
77.7'	78.6'	Shaly coal
78.6'	80.1'	Light grey mudstone.

FROM	TO	DESCRIPTION
80.1'	80.6'	Shaly coal
80.6'	81.6'	Buff colored mudstone with iron nodules
81.6'	82.0'	Shaly coal
82.0'	83.0'	Buff colored mudstone
83.0'	86.1'	Buff colored, fine grained, silty sandstone
86.1'	86.9'	Light grey mudstone
86.9'	87.4'	Shaly coal
87.4'	91.9'	Light grey mudstone
91.9'	92.8'	Medium grain, limonitic sandstone
92.8'	93.7'	Light grey mudstone
91.9'	92.8'	Medium grain, limonitic sandstone
92.8'	93.7'	Light grey mudstone
		Strike: 285° Dip 52° N.E.
93.7'	100.8'	Buff colored, medium grained, limonitic sandstone
100.8'	102.1'	Light grey mudstone
102.1'	105.0'	Buff colored, carbonaceous mudstone with iron nodules
105.0'	110.5'	Light grey mudstone with shaly partings
110.5'	112.7'	Shaly coal
112.7'	123.2'	Light grey mudstone
123.2'	125.6'	Buff colored, medium grained sandstone
125.6'	141.5'	Buff colored mudstone
141.5'	141.8'	Coaly shale
141.8'	146.6'	Dark grey mudstone
146.6'	148.6'	Coaly shale
148.6'	154.4'	Medium grain sandstone, buff colored
154.4'	157.9'	Dark grey and buff colored mudstone
157.9'	159.4'	Buff colored, fine grained, limonitic sandstone
159.4'	161.9'	Light grey, carbonaceous mudstone
161.9'	163.9'	Shaly coal
163.9'	164.0'	Buff colored mudstone
164.0'	184.5'	Buff colored, finely bedded, medium grained limonitic sandstone
184.5'	187.7'	Light grey mudstone
187.7'	202.0'	Buff colored, thinly bedded, medium grained limonitic sandstone
202.0'	204.4'	Light grey mudstone
204.4'	210.6'	Buff colored, thinly bedded, medium grained, limonitic sandstone
210.6'	215.2'	Light grey mudstone
215.2'	219.0'	Dark grey & buff colored, laminated, medium grained limonitic sandstone

FROM	TO	DESCRIPTION
219.0'	221.6'	Light grey mudstone
221.6'	223.9'	Limonitic sandstone with mudstone partings
223.9'	266.5'	Dark grey mudstone. Strike 285°; Dip 63° N.E.
266.5'	476.0'	Very thinly bedded, highly broken dark grey & buff colored, laminated, muddy siltstone.

Logged by: R. Rippon

MCINTYRE PORCUPINE MINES LTD.

MONKMAN PASS COAL LEASES  
(KINUSEO CREEK AREA)

TRENCH LOG

TRENCH: T -12

LOCATION DESCRIPTION: Top of Duke Mt.

TRENCH AZIMUTH: 206°

SEAM AZIMUTH: strike & dips taken

SEAM DIP: along trench as logged

TRUE THICKNESS OF SEAM:

Logged August, 1973.

FROM	TO	DESCRIPTION
------	----	-------------

NOTE: Logging commenced at the Cadomin Conglomerate Formation and proceeded up section.

0.0'	85.0'	Covered
85.0'	105.0'	Grey, fine grain, silty mudstone with some shaly partings
105.0'	109.5'	Fine grain, limonitic sandstone. Fossiliferous
109.5'	110.0'	Coaly shale
110.0'	112.0'	Muddy siltstone
112.0'	116.0'	Shaly coal with mudstone partings
116.0'	122.0'	Buff colored, fine grain siltstone. Strike: 284°; Dip 70° N.E.
122.0'	127.5'	Light grey mudstone
127.5'	129.5'	Dark grey, fine grain, silty mudstone
129.5'	135.0'	Grey, fine grain, silty mudstone
135.0'	135.5'	Coaly shale
135.5'	137.0'	Dark grey, silty mudstone
137.0'	137.5'	Coaly shale
137.5'	140.0'	Buff colored, muddy siltstone
140.0'	146.5'	Medium grain, limonitic sandstone laminated with coal.
146.5'	197.5'	Covered. Mostly small chert pebble conglomerate - up 1/2" pebbles
197.5'	279.0'	Medium grain limonitic sandstone
279.0'	283.5'	Fine grained limonitic sandstone with calcite traces.
283.5'	286.0'	Buff colored muddy siltstone with coal partings.
286.0'	287.0'	Medium grey mudstone
287.0'	298.5'	Small fold of carbonaceous muddy siltstone with coal partings.

FROM TO

DESCRIPTION

298.5'	300.5'	Buff colored muddy siltstone
300.5'	310.5'	Medium gray siltstone
310.5'	311.5'	Pebble conglomerate
311.5'	312.5'	Medium grey mudstone
312.5'	316.0'	Limonitic fine grained sandstone
316.0'	369.0'	Medium grained, limonitic sandstone
369.0'	384.5'	Light grey, medium grained sandstone (similar to salt & pepper)
384.5'	389.5'	Dark grey, medium grain, carbonaceous sandstone
389.5'	394.0'	Buff colored, fine grain sandstone
394.0'	399.0'	Mudstone
399.0'	410.0'	Fine grain, dark grey siltstone
		Roof of coal seam (detailed logging begins)
410.0'	411.7'	Shaly coal
411.7'	413.8'	Grey, fine grain, muddy siltstone with coal partings
413.8'	414.7'	Shaly coal
414.7'	417.1'	Light grey, fossiliferous, muddy siltstone
417.1'	430.0'	Coal Seam. True Thickness = 13.8 (clean coal)
		Strike = 296°
		Dip = 59° N.E.
430.9'	431.6'	Floor: Gray carbonaceous mudstone with some coal partings
431.6'	433.8'	Buff colored muddy siltstone
433.8'	437.4'	Buff colored muddy siltstone with iron nodules
437.4'	437.7'	Shaly coal
437.7'	438.9'	Buff colored mudstone
438.9'	439.1'	Shaly coal
439.1'	440.0'	Buff colored mudstone
440.0'	442.9'	Buff mudstone with small partings of shaly coal
442.9'	444.7'	Light grey mudstone
444.7'	446.4'	Buff colored, fine grained siltstone
446.4'	449.9'	Light grey mudstone with shaly coal partings
449.9'	451.0'	Buff colored muddy siltstone
451.0'	451.4'	Shaly mudstone
451.4'	458.6'	Buff colored siltstone
458.6'	460.0'	Grey siltstone
460.0'	461.8'	Buff colored siltstone
461.8'	473.1'	Grey fine grain, silty sandstone
473.1'	475.6'	Light grey mudstone

475.6	484.9	Buff colored muddy siltstone
484.9	486.0	Grey mudstone
486.0	488.3	Shaly coal
488.3	490.3	Light grey mudstone
490.3	495.3	Buff colored slightly sandy siltstone
495.3	495.9	Dark grey mudstone
495.9	499.2	Dary grey-buff colored mudstone
499.2	500.8	Shaly coal
500.8	505.8	Muddy siltstone
505.8	600.0	Chert pebble conglomerate (pebbles 1/2" in diameter) very resistant
600.0	743.0	Covered.
743.0	847.0	Dark grey siltstone
847.0	903.0	Medium grey, medium grain silty sandstone. At 867.0': Strike = 302°; Dip 48° N.E.
903.0	926.0	Grey siltstone
926.0	933.5	Slightly carbonaceous, buff colored, mudstone with some shaly coal stringers
933.5	937.1	Shaly coal with mudstone partings
937.1	942.3	Buff colored mudstone
942.3	944.4	Shaly coal
944.4	946.5	Dark grey, carbonaceous mudstone
946.5	948.0	Shaly coal
948.0	950.1	Grey mudstone - fossiliferous
950.1	951.6	Shaly coal. Dip = 25° N.E.
951.6	953.0	Grey mudstone
953.0	954.4	Shaly coal
954.4	956.5	Dark grey fossiliferous mudstone
956.5	960.9	Shaly coal
960.9	975.0	Buff colored, medium grain sandstone

Logged by: R. Rippon

MCINTYRE PORCUPINE MINES LTD.

MONKMAN PASS COAL LEASES  
(KINUSEO CREEK AREA)

TRENCH LOG

TRENCH: T - 13 LOCATION DESCRIPTION: Top of Duke Mt.  
 TRENCH AZIMUTH: 205°  
 SEAM AZIMUTH: App. 295°  
 SEAM DIP: 17° N.E.  
 TRUE THICKNESS OF SEAM: 14.3'  
 Logged August, 1973.

FROM	TO	DESCRIPTION
0.0'	1.7'	Roof: Buff colored, fine grain, sandy siltstone
1.7'	4.8'	Buff colored siltstone with iron nodules & shaly partings.
4.8'	5.7'	Buff to dark silty mudstone.
5.7'	5.9'	Coal
5.9'	6.8'	Buff colored mudstone
6.8'	19.1'	Coal Seam (oxidized)
19.1'	21.0'	Floor: Dark grey medium grey sandstone.
21.0'	21.4'	Dark grey, fine grain, silty sandstone
21.4'	21.7'	Dark grey mudstone
21.7'	24.2'	Shaly coal
24.2'	25.3'	Dark grey mudstone
25.3'	25.9'	Shaly coal
25.9'	26.4'	Dark grey mudstone
26.4'	28.4'	Dark grey silty sandstone

Logged by: R. Rippon

MCINTYRE PORCUPINE MINES LTD.

MONKMAN PASS COAL LEASES  
(KINUSEO CREEK AREA)

TRENCH LOG

TRENCH: T - 14 LOCATION DESCRIPTION: Top of Duke Mt.  
TRENCH AZIMUTH: 210°  
SEAM AZIMUTH: Approx. 300°  
SEAM DIP: 22° N.E.

TRUE THICKNESS OF SEAM:

Logged August, 1973.

FROM	TO	DESCRIPTION
		Seam was badly eroded, therefore, impossible to log properly or obtain true seam thickness.
		Same seam as T - 13.

R. Rippon

MONKMAN PASS COAL LEASES  
(KINUSEO CREEK AREA)

TRENCH LOG

TRENCH: T - 15 LOCATION DESCRIPTION: Top of Duke Mt.  
 TRENCH AZIMUTH: 230°  
 SEAM AZIMUTH: 320°  
 SEAM DIP: 65° N.E.

TRUE THICKNESS OF SEAM: 6.5'

Logged September, 1973.

<u>FROM</u>	<u>TO</u>		<u>DESCRIPTION</u>
0.0'	2.0'	Roof:	Dark brown, carbonaceous mudstone with bands of coal.
2.0'	4.0'		Medium grey, carbonaceous siltstone
4.0'	5.0'		Black coaly shale
5.0'	5.9'		Light grey limonitic mudstone
5.9'	6.1'		Coal
6.1'	8.7'		Dark grey, massive, fine grain sandstone
8.7'	12.8'		Dark grey, carbonaceous mudstone with a 1" band of black carbonaceous shale @ 10.8'
12.8'	19.3'	Coal Seam:	4" grey mudstone band @ 15.3' 4" black carbonaceous shale band @ 18.9'
19.3'	22.7'	Floor:	Dark grey, finely laminated, carbonaceous muddy siltstone

NOTE: This seam is approximately 200 ft. up section from the cadomin Conglomerate.

LOGGED BY: G. Lawrence.

MCINTYRE PORCUPINE MINES LTD.

MONKMAN PASS COAL LEASES  
(KINUSEO CREEK AREA)

TRENCH LOG

TRENCH: T-16

LOCATION DESCRIPTION: Top of Duke Mt.

TRENCH AZIMUTH: 215°

SEAM AZIMUTH: 305°

SEAM DIP: 45°

TRUE THICKNESS OF SEAM: 13.0'

Logged September, 1973.

FROM	TO	DESCRIPTION
0.0'	14.2'	Roof: Limonitic bands of mudstone nodules
14.2'	27.2'	Coal Seam. Band of mudstone nodules @ 24.2' - 24.6'
27.2'	34.7'	Floor: Medium - dark grey, carbonaceous, muddy siltstone with coaly rootlets throughout
34.7'	35.5'	Coal (clean)
35.5'	35.7'	Black carbonaceous shale
35.7'	36.5'	Coal (clean)
36.5'	→	Approx. 4' - 5' of light grey, fossiliferous mudstone followed by a medium grey band of clean siltstone resting upon medium grey, fine grain, massive very clean sandstone.

Logged by: G. Lawrence.



MONKMAN PASS COAL LEASES  
(KINUSEO CREEK AREA)

TRENCH LOG

TRENCH: T.- 18 LOCATION DESCRIPTION: Top of Duke Mt.  
 TRENCH AZIMUTH: 195°  
 SEAM AZIMUTH: 285°  
 SEAM DIP: 42° S.W.  
 TRUE THICKNESS OF SEAM: 14.75' Logged September, 1973.

<u>FROM</u>	<u>TO</u>		<u>DESCRIPTION</u>
0.0'	3.3'	Roof:	Bands of rust stained, light-medium grey mudstone nodules with coal stringers.
3.3'	3.9'		Light grey, massive, carbonaceous siltstone
3.9'	4.3'		Light grey mudstone nodules
4.3'	4.6'		Black coaly shale
4.6'	4.8'		Fine laminations of limonitic shale
4.8'	5.2'		Black coaly shale
5.2'	5.7'		Limonitic mudstone nodules
5.7'	6.4'		Black coaly shale
6.4'	7.3'		Limonitic mudstone
7.3'	8.0'		Medium grey carbonaceous mudstone
8.0'	22.75'	Coal Seam:	Mudstone and shale band at 15.2' - 16.8' coal very friable and dull above this band. coal very hard and competent below this band with considerable vitrain present.
22.75'	27.0'	Floor:	Light grey, carbonaceous mudstone with coal stringers.
27.0'	28.5'		Coal (clean)
28.5'	33.0'		Light grey, carbonaceous siltstone with coaly rootlets
33.0'	---		Light grey (oxidized to buff), fine grain laminated carbonaceous sandstone. Strike: 295°; Dip: 40° S.W.

NOTE: Horizontal Distance between seam in T-16 & seam in T - 18 is approximately 170'.

Logged by: G. Lawrence.

BELCOURT MOUNTAIN - SECTION MEASUREMENT

TOTAL MEASURED HEIGHT ABOVE BASE	2188.00'
<u>CADOMIN FORMATION</u>	0.0' - 594.00'
<u>GETHING FORMATION</u>	594.00' - 755.75'
<u>MOOSEBAR FORMATION</u>	755.75' - 1077.25'
<u>COMMOTION FORMATION</u>	1077.25' - 2188.00'
Section above cadomin	1594.00'

<u>UNIT NUMBER</u>	<u>LITHOLOGY</u>	<u>THICKNESS</u> <u>(FEET)</u>	<u>HEIGHT ABOVE</u> <u>BASE</u>
142	Sandstone - Medium Grain Fresh - Medium Grey	----- Rock Type Above Section Measurement.	
141	Brown Muddy Shale	4.0'	2188.00'
140	Shale - Black	7.5'	2184.00'
139	Shale - Light Grey Ironstone Nodules	3.0'	2176.50'
138	Shale - Dark Brown	2.7'	2173.50'
137	Black Shale	14.0'	2170.80'
136	Coal	2.0'	2156.80'
135	Shale - Brown, Dirty	5.0'	2154.80'
134	Mostly covered - Probably Black & Light Brown Shale	9.0'	2149.80'
133	Sandstone - Coarse Grain Mixed with Conglomeratic SS	20.0'	2140.80'
132	Covered - Probably Light grey, med. grain S.S. with massive weathered plating.	25.0'	2120.80'
131	Sandstone - Conglomeratic	1.0'	2095.80'
130	Sandstone - Med. grain, light grey - Massive weathered plating. Strike 315° - 36° S.W.	35.0'	2094.80'
129	Sandstone - Fine - Med. grain Fresh Light Grey Slightly limonitic	14.0'	2059.80'
128	Sandstone - fine grain. Fresh - steel grey	20.0'	2045.80'
127	Siltstone - Sandy. Fresh - Medium Grey Limonitic	3.0'	2025.80'

126	Covered	5.0'	2022.80'
125	Sandstone - fine grain. Fresh - Steel - Med. Grey (Rippled)	10.0'	2017.80'
124	Covered	25.0'	2007.80'
123	Shaly coal	6.8'	1982.80'
122	Sandstone - fine grain. Fresh - light grey laminated light & dark bands.	7.0'	1976.00'
121	Sandstone - medium grain. Fresh - light grey. Massive - slightly limonitic	29.0'	1969.00'
120	Sandstone - fine grain. Fresh - light grey. Slightly limonitic	5.0'	1940.00'
119	Covered	6.5'	1935.00'
118	Sandstone - Silty. Fresh - light grey	1.0'	1928.50'
117	Sandstone - fine grain. Slightly limonitic & slightly carbonaceous. Med. grey with streaks of red quartz	4.0'	1927.50'
116	Covered	10.0'	1923.50'
115	Siltstone - Sandy. Fresh - medium grey. Limonitic	4.0'	1913.50'
114	Covered	11.0'	1908.50'
113	Sandstone - medium grain. Fresh - light grey	7.0'	1897.50'
112	Sandstone - medium grain. Fresh - med. grey. Small ironstone nodules	1.5'	1890.50'
111	Sandstone - med. fine grain. Fresh - medium grey. Slightly limonitic. Highly crossbedded.	20.0'	1889.00'
110	Covered	17.0'	1869.00'
109	Siltstone - dark grey. Slightly limonitic	5.0'	1852.00'
108	Covered	10.0'	1847.40'
107	Small alternating bands coal - shale - coaly shale.	5.0'	1837.40'

106	Siltstone - limonitic. Ironstone nodules	1.0'	1832.40'
105	Sandstone - medium grain. Fresh- steel grey. Slightly limonitic	21.0'	1831.40'
104	Covered	23.0'	1810.40'
103	Shaly coal	4.2'	1787.40'
102	Shale - light grey	7.0'	1783.20'
101	Siltstone - Sandy, limonitic. Slightly carbonaceous	5.0'	1776.20'
99	Covered	15.0'	1755.40'
98	Siltstone. Fresh-medium grey	5.0'	1740.40'
97	Coaly shale	3.1'	1735.40'
96	Shale - medium grey	3.7'	1732.30'
95	Siltstone - sandy, light grey. Slightly limonitic	2.8'	1728.60'
94	Covered - probably fine grain S.S. or Silty S.S.	25.0'	1725.80'
93	Coaly shale - black	4.1'	1700.80'
92	Shale - light grey	3.5'	1696.70'
91	Sandstone - silty. Fresh - medium grey. Slightly limonitic	37.0'	1693.20'
90	Sandstone - silty. Fresh - medium - steel grey. Ironstone nodules.	11.0'	1656.20'
89	Sandstone - medium grain. Slightly conglomeratic. Fresh - Medium grey	9.2'	1645.20'
88	Sandstone - Coarse Grain	10.0'	1636.00'
87	Conglomerate - Average Size Pebble 1.5 CM	11.0'	1626.00'
86	Shale - Light & Dark Grey	15.0'	1615.00'
85	Covered - Probably Light & Dark Grey shale.	13.5'	1600.00'

84	Shale - Light & Dark Grey	20.0'	1586.50'
83	Siltstone - Light Grey - Slightly Limonitic.	3.1'	1566.50'
82	Shale - Black Carbonaceous	4.5'	1563.40'
81	Siltstone - Sandy. Fresh - Light Grey. Slightly limonitic.	2.9'	1558.90'
80	Covered	5.0'	1556.00'
79	Shale - Dark Grey	2.1'	1551.00'
78	<u>Coal</u>	4.2'	1548.90'
77	Siltstone - Iron Grey	2.9'	1544.70'
76	Sandstone - Silty. Fresh - Medium Grey. Limonitic.	27.0'	1541.80'
75	Covered	8.25'	1514.80'
74	Shale - Light Grey	3.5'	1506.55'
73	Coaly Shale	3.5'	1503.05'
72	Shale - Light Grey	5.0'	1499.55'
71	Sandstone - Medium Grain. Fresh - Medium Grey. Small Band Highly Limonitic. Ironstone Nodules.	23.5'	1484.55'
70	Sandstone - Medium Fine Grain. Oxidized, Iron Grey. Slightly Limonitic.	15.0'	1461.05'
69	Sandstone - Medium Grain. Fresh - Medium Grey.	10.5'	1446.05'
68	Soil	6.0'	1435.55'
67	Siltstone - Sandy. Medium - Light Grey. Limonitic.	37.0'	1429.55'
66	Covered.	5.0'	1392.55'
65	<u>Coal</u> - 763' Above Cadomin	<u>20.0'</u>	1387.55'

64	Silty Shale - Medium Grey. Slightly Limonitic	7.8'	1367.55'
63	Shale - Dark Grey. Occasional 1" Bands of coal Close to Top.	4.0'	1359.75'
62	Coal - Shaly	5.0'	1355.75'
61	Siltstone - Medium Grey. Limonitic. Strike 315° Dip 36° S.W.	10.0'	1350.75'
60	Shale - Medium Grey to Black	5.0'	1340.75'
59	Siltstone - Sandy. Fresh - Medium Grey.	8.0'	1335.75'
58	Siltstone - Sandy. Medium Grey. Limonitic.	2.0'	1327.75'
57	Shale - Black	4.0'	1325.75'
56	Sandstone - Fine Grain. Fresh - Medium Grey.	26.5'	1321.75'
55	Conglomerate - Small Pebbles, average Size 1/2 C.M.	12.0'	1295.25'
54	<u>Coal</u>	5.0'	1283.25'
53	Covered - Probably Conglomerate with Small Pebbles. <u>Concretion Formation</u>	6.0'	1278.25'
52	Covered	14.0'	1272.25'
51	Siltstone - Medium Grey. Limonitic	25.0'	1258.25'
50	Shale - Black	10.0'	1233.25'
49	Siltstone - Sandy. Fresh - Medium Grey	5.0'	1223.25'
48	Covered	3.5'	1218.25'
47	Sandstone - Medium - Fine Grain. Fresh - Medium Grey.	15.0'	1214.75'
46	Sandstone - Fine Grain. Limonitic	2.0'	1199.75'
45	Sandstone - Medium - Fine Grain. Fresh - Medium Grey.	10.0'	1197.75'
44	Covered Probably 40' - 45' Black Shale	55.0'	1187.75'

43	Sandstone - Fine Grain, Slightly Limonitic.	5.0'	1132.75'
42	Sandstone - Medium Grey. Oxidized	2.0'	1127.75'
41	Shale - Black	2.0'	1125.75'
40	Sandstone - Silty	5.0'	1123.75'
39	Clay	5.0'	1118.75'
38	Shale - Black	3.25'	1113.75'
37	<u>Coal</u> - Shaly	1.5'	1110.5'
36	Shale - Grey. Strike 310°, Dip 35° S.W.	10.0'	1109.0'
35	Sandstone - Steel Grey	7.75'	1099.0'
34	Covered - Probably - Sandstone - Steel Grey	12.0'	1091.25'
33	Siltstone - Limonitic	2.0'	1079.25'
	<u>Moosebar Formation</u>		
32	Conglomerate - Similar to Cadomin	37.5'	1077.25'
31	Sandstone - Medium Grain Fresh - Medium Grey. Slightly Limonitic	23.0'	1030.75'
30	Shale - Silty, Limonitic Ironstone Nodules	5.5'	1007.75'
29	Conglomerate - Large Cobbles	3.75'	1002.25'
28	Sandstone - Fine Grain. Fresh - Medium Grey	19.5'	998.5'
27	Covered - Probably Light Grey Silty Shale	18.0'	979.0'
26	Shale - Coaly	4.5'	961.0'
25	Mud	0.25'	956.50'
24	<u>Coal</u>	3.75'	956.25'
23	Shale - Silty - Dark Grey. Slightly Carbonaceous.	1.75'	952.5'
22	<u>Coal</u>	5.0'	950.75'
21	Shale - Black, Slightly Carbonaceous	15.75'	945.75'

20	<u>Coal</u> - 318 ft. Above Cadomin	12.25'	930.0'
19	Shale - Light Grey (Weathered) Fresh - Dark Grey. Strike - 320°, Dip 36° S.W.	5.0'	917.75'
18	Sandstone - Medium - Fine Grain. Fresh - Light Grey. Black Lichen Forms Dark Band on Photo - Ironstone Nodules.	19.0'	912.75'
17	Sandstone - Fine Grain. Fresh - Light Grey. Slightly limonitic	98.0'	893.75'
16	Sandstone - Fine Grain. Fresh - Steel Grey weathered - rust color.	40.0'	795.75'
15	Covered - Probably Fine Grain SS - Steel Grey	125.0'	755.75'
14	Siltstone - Fresh - Steel grey weathered limonitic.	5.0'	630.75'
13	Sandstone - Silty Fine Grain	10.5'	625.75'
12	Siltstone - Dark Grey	2.75'	615.25'
11	Sandstone - Silty Fine Grain. Platy, Weathered - Buff. Strike 320°, Dip 49° SW.	3.5'	612.5'
10	Sandstone - Medium Grain. Fresh - Light Grey.	15.0'	609.0'
<u>†Gething Formation</u>			
9	Conglomerate	49.5	594.0'
8	Sandstone - Medium Grain, Medium Grey - Weathered Rust or Buff. Strike 315° Dip 41° S.W.	13.5'	544.5'
7	Conglomerate - Large Cobbles. Typical Cadomin	235.0'	531.0'
6	Conglomerate - 2CM Diameter. Occasional Cobble. Coarse S.S. Matrix.	200.0'	296.0'

5	Sandstone - Medium Grain. Fresh - Light Grey.	1.0'	96.0'
4	Conglomerate - Pebbles 2 CM Diam. Matrix - Very Coarse Sandstone	17.0'	95.0'
3	Conglomerate - Occasional Cobble. Strike 325°, Dip 36° S.W. Pebbles Diminish to Size Toward Top.	60.0'	78.0'
2	Conglomerate - Pebbles 1 - 2 CM Diam. Matrix - Very Coarse Sandstone	18.0'	18.0'
1	Sandstone: Coarse Grain. Fresh Medium Grey. Strike 325°, Dip 38° S.W.		0.0'
	<u>Cadomin Formation</u>		