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PR- FALLS MOUNTAIN 75(1)A

OPEN FILE

FALLS MOUNTAIN COAL PROJECT

NORTHEAST BRITISH COLUMBIA

1975 PROGRAM

C.C. NOS. 3265 - 3278

55°33' 122°15'

Prepared for: McIntyre Mines Ltd.
Vancouver, B.C.

by: Paul Dyson Consultants
Calgary, Alberta

October 1975

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ILLUSTRATIONS

ABSTRACT

The coal licences of McIntyre in the Falls Mountain area of northeast British Columbia cover an apparently geologically undisturbed area underlain by prospective Gething formation coal measures. Additionally, the potential reserve block is situated on the railway close to the town of Chetwynd.

Surface mapping and drilling indicate the reserves of coal to be deeply buried and probably much more geologically disturbed than initially believed. No good prospect for mineable coal reserves exists.

It is recommended that the licences be relinquished.

I. INTRODUCTION

This report describes work carried out in 1975 by McIntyre Mines Ltd. in an attempt to locate an economically viable coal deposit of metallurgical grade coking coal on coal licences in the Falls Mountain area of northeast British Columbia. The area explored lies immediately south of the Pine Pass in the Foothills belt west of Dawon Creek (Fig. 1).

The report is divided into several main sections: the introduction, the prospect, the exploration program and the conclusions. Maps, figures and table accompany the report which is designed to present a comprehensive picture of the project.

(a) Regional Setting

The area under consideration lies within the Rocky Mountain Foothills between the Sukunka and Pine Rivers in northeastern British Columbia. The area is underlain by Lower Cretaceous sediments which contain the potential coal measures under investigation. Specifically, the Gething formation and the Gates formation of Lower Cretaceous age were explored for viable coal seams.

The Cretaceous sequence was folded during the Laramide orogeny being deformed into elongate plunging anticlines and

(a) Regional Setting (Cont'd.)

synclines with associated faulting. This series of en echelon folds and faults has a northwesterly trend. In this area of the Foothills most of the Cretaceous rock exposures occur in creeks as almost the whole area is covered by vegetation.

The "Foothills" of this region have considerable relief with elevations within the area under consideration varying from lows of approximately 2500 feet above sea level to slightly over 4500 feet above sea level. As the tree line at this latitude is at approximately 5500 feet above sea level, most of the hills are totally covered with a dense vegetation.

(b) Access

The Hart Highway provides excellent access along the northern side of the area (see Fig. 2). It is an all weather paved highway.

A road useable by 4WD vehicles passes up the east side of Willow Creek immediately to the east of Falls Mountain. A bridge is needed over to the Pine River to make this road accessible.

(c) Acknowledgements

The completion of the program would have been impossible without the help and co-operation of the technical personnel and contractors.

The drilling program was carried out by Canadian Longyear Ltd. of Vancouver. The foreman, Mr. Elmer Russel, made every effort to maintain an efficient drilling program despite an initial series of mechanical problems

The helicopter services were provided by Canwest Aviation Ltd. of Calgary. The helicopter was piloted by Mr. John Pridie who provided efficient and safe service.

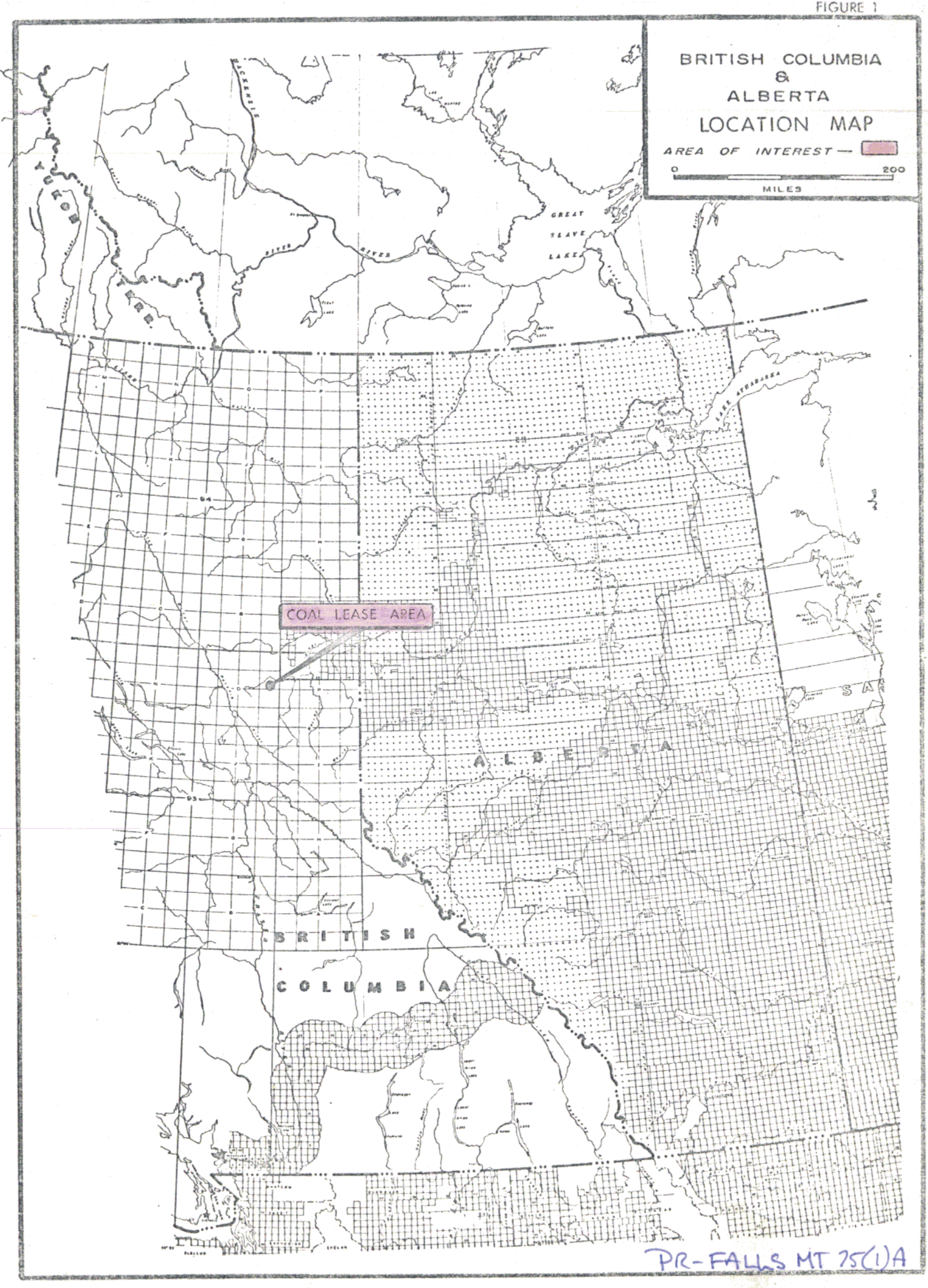
Logging of the drill holes was conducted by Roke Oil Enterprises Ltd. of Calgary. Mr. Lance Rainey, the field engineer, carried out his duties most efficiently. Additionally, his general help with the program was greatly appreciated.

The camp was based at Willow Flats on the Hart Highway west of Chetwynd. Mrs. Alice Tricker provided excellent food for all the crew.

The reclamation program was carried out by Mr. Jim Smith of Chetwynd. He did an excellent job to the satisfaction of the B.C. Forestry officials.

The geological crew consisted of geologists, Mr. Rory Hankel and Dr. Ali Chowdry. Overall supervision was provided by Mr. Paul Dyson.

FIGURE 1



PR-FALLS MT 75(1)A

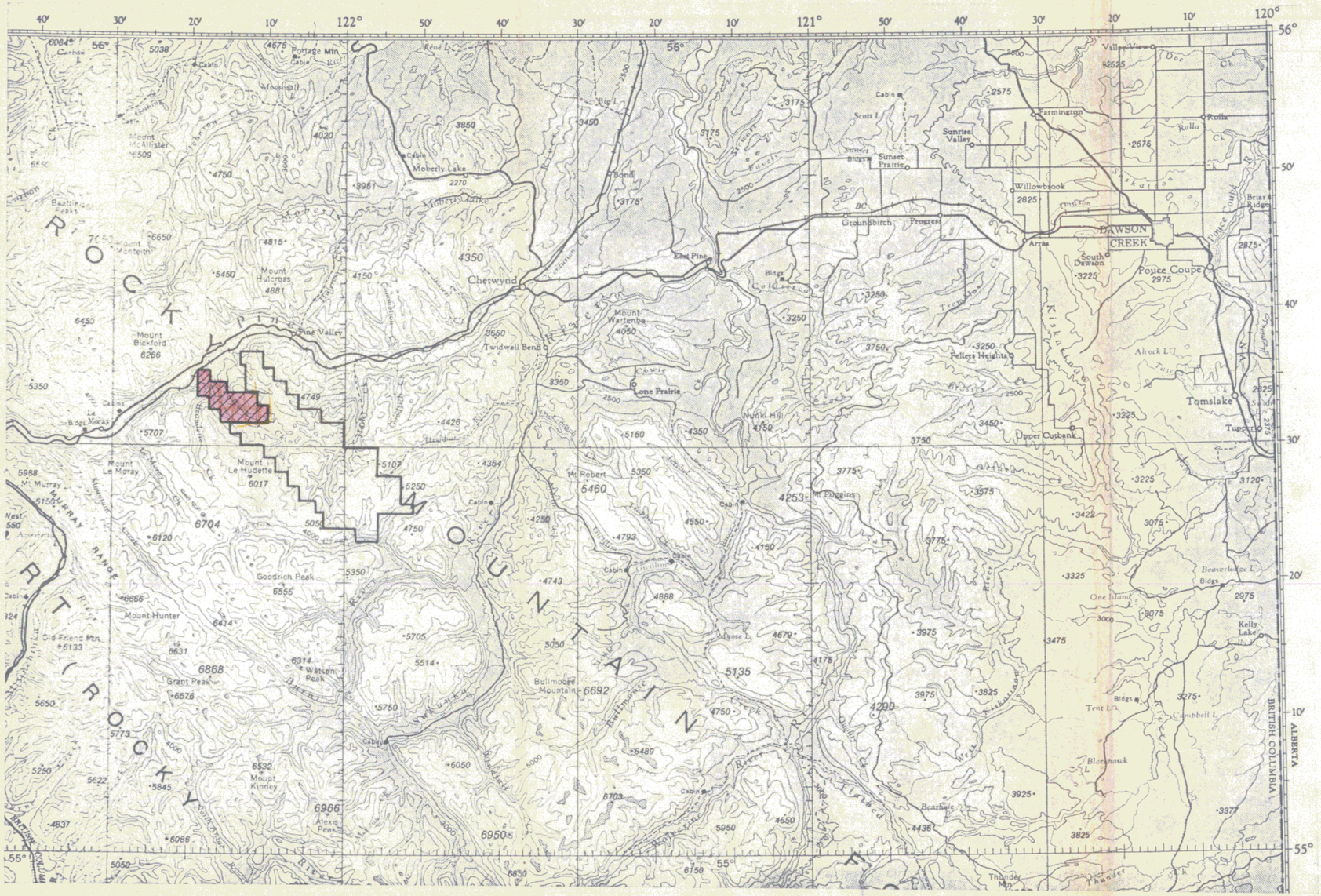


Figure 2

PR- FALLS MT. 75(1)A

McINTYRE MINES LTD.

FALLING CK.- FALLS MTN.
BRITISH COLUMBIA

COAL LICENCE LOCATIONS

SCALE : 1 INCH = 8 MILES

PAUL DYSON CONSULTANTS

II. PROSPECT

The exploration program was designed to evaluate coal rights acquired from the British Columbia government and held as Coal Licences 3265 to 3278. This section of the report explains the development of the prospect.

Details of the prospect are outlined both from a strictly geological point of view and from an economic point of view.

(a) Regional Geology

As stated in the Introduction the area under consideration lies within the Foothills belt of northeastern British Columbia. The geology of the area has been mapped at a scale of 1" = 4 miles by Muller (1961) and Stott (1961). These two maps are of a reconnaissance nature only.

Regional stratigraphic studies have been made by the Geological Survey of Canada and published as Stott (1968a) and Stott (1971). In addition to this Stott has from time to time given various unpublished papers at several conferences over the past two or three years.

Several localized stratigraphic and mapping projects have been completed within the area - both by the Geological Survey of Canada and by the British Columbia Department of Mines. These are referred to in the Selected References as Hughes (1964), Hughes (1967), McLearn and Kindle (1950), McKechnie (1955) and Spivak (1944).

(i) Stratigraphy

The rocks exposed in the area of the McIntyre licences are Lower Cretaceous. While the Fernie group of Jurassic age does not directly underlie the coal licences, it is shown on the "Table of Formations" (Table 1) as it marks the first major lithologic break below the coal measures of the Gething formation.

The Minnes group is not discussed in this report other than to record its presence underlying the Cadomin formation which marks the base of the Bullhead group.

The Bullhead group contains two formations - the coal bearing Gething formation, and its basal conglomeratic unit - the Cadomin formation.

The Gething formation is overlain by the basal formation of the Fort St. John group - the Moosebar formation. This is an excellent lithologic break from the sandy sequence of the Gething formation to the predominantly shale sequence of the Moosebar formation.

(Full details of the complex and somewhat controversial stratigraphy of the Minnes and Bullhead groups of this area are contained in the literature - Stott (1963) and Hughes (1964).

The shales of the Moosebar formation pass imperceptibly and gradationally into the massive basal sands of the overlying Gates formation. The Gates formation is substantially a non-marine sequence of fine grained sandstones, black shales and thin coals with only intermittent and thin marine shales.

TABLE 1

TABLE OF FORMATIONS

Formation or Group			Thickness (feet)	Lithology
	Fort St. John Group (includes Moosebar fm. and Gates fm.)		3,000 - 5,000	Dark grey, marine shale with fine grained sandstone. Occasional coaly zones in Gates fm.
Lower Cretaceous	Bullhead Group 0-2,500	Gething formation	1,000 - 3,000 (?)	Fine-grained, cherty to quartzose sandstone; rusty weathering shales; carbonaceous mudstone and coal seams; minor conglomerate.
		Cadomin Formation	100 - 500	Massive chert conglomerate and coarse-grained sandstone; carbonaceous shale, minor coal.
	Regional erosional unconformity; bevels rocks of succeedingly older age northward and eastward.			
	Minnes Group		0 - 6,000	Massive quartzose sandstone; alternating units of fine-grained sandstone and mudstone; minor carbonaceous sediments.
Jurassic	Fernie Formation		500 - 1,000	Calcareous and phosphatic shales; rusty weathering shales; glauconitic siltstone; sideritic shales; thinly interbedded sandstone, shale, and siltstone.

(ii) Structure

The mapping of the area by Stott (1961) and Muller (1961) is the only complete structural interpretation of the area. As can be seen from these maps, the structure consists of a series of sub-parallel folds and faults generally trending northwest-southeast. It appears from these maps that folding is the predominant feature, however, this may not be so.

The detailed mapping by McKechnie (1955) and Spivak (1944) has indicated many more faults than are shown on the maps of Stott and Muller. This more likely reflects the scale of mapping rather than a basic difference in interpretation.

(b) Coal Potential

The "coal potential", or to put it more explicitly, the potential of the area for the discovery of a viable coal deposit was dependent on three major criteria:

(i) the probable coal seam distribution and likely coal seam thicknesses,

(ii) the probable coal quality,

(iii) the mining potential.

These three factors were considered separately.

(i) Probable Coal Seams

The area under considation lies between Falling Creek and Willow Creek. In general, it was an area of only reconnaissance mapping although some detail was available along the Pine Pass (McKechnie 1955 and Hughes 1967) and in the Hasler Creek area (Spivak 1944). These detailed mapping projects, previously aimed at acquiring knowledge regarding the coals of the area are most valuable in this respect.

The data in the Spivak (1944) report describes the coals of the Gething formation as they were known at that time adjacent to the Hasler Mine some eight miles to the southeast with some references to coals along Willow Creek. Spivak makes reference to the 8 foot 8 inch seam at the Hasler mine and to seams apparently up to at least 15 feet thick in the vicinity. Seams exceeding 7 feet were reported on Johnson Creek four miles to the southeast and up to 5 feet in the Willow Creek drainage.

McKechnie (1955) wrote a comprehensive report describing a drilling program carried out in Willow, Johnson and Hasler Creek drainages. In total almost 50,000 feet of diamond drilling was carried out between 1946 and 1951 by the Coal Division of the Department of Lands and Forests of the Province of British Columbia. The results of this program were inconclusive but several coal seam intersections thicker than 10 feet were recognized in the drilling.

(i) Probable Coal Seams (Cont'd.)

In 1969 and 1970, Brameda Resources Ltd. and Pine Pass Coal Co. carried out some exploration along the Pine Pass immediately north of the highway. This exploration consisted of surface mapping, a drilling program and an adit. Once again, the existence of coal seams in the Gething formation with thicknesses greater than 10 feet was indicated.

From this information it was concluded that coal seams at least 10 feet thick and possibly close to 20 feet thick do exist in the Gething formation in the Pine Pass area.

(ii) Probable Coal Quality

Coal quality was poorly defined as the old analyses in the Willow Creek and Hasler areas were not primarily designed to make preliminary assessments of the suitability of the coal for the metallurgical market. Nevertheless, some indication of coal quality was obtained from these old analyses and from regional considerations.

The best data in the immediate area was from the Pine Pass Coal Co. project which included the driving of an adit to obtain bulk samples of coal from 16 foot seam. This coal is of good coking quality (FSI 7+) and it further appears to be amenable to simple washing to reduce the ash below 6%.

(ii) Probable Coal Quality (Cont'd.)

Samples from the old Hasler Mine were similarly encouraging as to low ash content and probable coking quality.

Exploration by Brameda Resources Ltd. to the south in the Sukunka area had similarly found a low ash good quality coking coal.

Other parameters such as volatile matter content and sulphur content were similarly satisfactory. Volatile content was generally recorded at the low end of the medium volatile range and sulphur content was below 0.65%.

The analyses from the drilling report by McKechnie (1955) generally fall within these same parameters, although once again no quantitative coking information was recorded.

It was concluded that the coal of the Gething formation in the Pine Pass area was probably of medium volatile, low sulphur, low ash coking coal which furthermore would be readily amenable to a relatively simple washing process.

(iii) Mining Potential

The mining potential of an area is affected by three main factors:

(a) a suitable mining method,

(b) sufficient recoverable reserves to support a mine, and

(c) an adequate transportation system.

(iii) Mining Potential (Cont'd.)

The possibility of mining large volumes of coal in the area by some form of open pit was believed to be limited. This conclusion was reached as maximum seam thicknesses, in general, were expected to be less than 15 feet. Such thicknesses do not permit the removal of large amounts of overburden especially when the coal at shallower levels is probably oxidized. Although a possibility existed for a unique relationship of topography to coal seam and/or tectonic thickening of the seam, this was largely discounted. Primary consideration was given to possibilities for underground mining methods.

The most significant factor required was an area of relative structural simplicity containing a seam of a thickness suited to the optimum operation of modern mechanized equipment. In general, increases in dip above 15^{0} to 20^{0} cause a rapid decrease in the efficiency of conventional machanized equipment. Seams of 6 to 10 feet are probably preferred.

The probability of a seam in the above thickness range was established but little information was available on the detailed structure of the area as the only available mapping for most of the area was of a reconnaissance nature only.

However, as reserves in the order of ten million tons of recoverable clean coal were believed to be a reasonable

(iii) Mining Potential (Cont'd.)

minimum objective, an area of two to three square miles underlain by a 5 foot seam at suitable inclinations would be adequate. An area with low dip such as Falls Mountain that would permit mining on this scale was well within the probability of the structure of the area.

One of the main advantages of the area was the proximity of the railway, the paved highway and the town of Chetwynd. Most of the prospective area lies less than five miles from the railway. This is a distinct advantage for any coal property as one of the major problems common to many is the need of many miles of new railway. A new mine in the area would be within economic trucking distance of the existing rail.

Similarly the town of Chetwynd connected to the area by all weather paved highway could be used as a townsite for persons working at any mine in the area (Fig. 2).

III. EXPLORATION

(a) Objectives

The 1975 exploration program for the licences held by McIntyre had the following objectives in mind:

(a) A geological understanding of the distribution of the coal bearing rocks in the area of the licences.

(b) The confirmation of the presence of coal on the licences.

(c) The preliminary delineation of both seam thickness and seam distribution within the coal bearing formation.

(d) The establishment of some initial data regarding coal quality.

(e) An initial assessment of the mining possibilities for the properties.

These objectives were met by the following exploration program. All the available geological data for the area was reassessed to ensure the best possible understanding of the Gething formation.

Following this, a field mapping program was carried out. The objectives of this program were to confirm the reported geological structure; to locate coal seams at outcrop if possible; to carry out hand trenching of seams located in order to determine seam thicknesses; and to check access to possible drill sites.

(a) Objectives (Cont'd.)

The above field program was followed by the drilling of one hole in the area. The objectives of this drilling program were to test the Gething formation for the presence of possible viable coal seams obtaining, at the same time, unweathered, uncontaminated samples from any such seams for analysis. The drilling would also yield additional structural data.

This report treats the field work stage and the drilling stage of the program as two separate sections.

(b) Field Work

The field work was carried out from Willow Flats. The crew consisted of two geologists and two assistants utilizing a Gazelle 2 helicopter. The field work was carried out during part of June and July 1975. Field data was plotted on to a new "form line" uncontrolled topographic map at a scale of 1" - 500 feet (Fig. 3.) 1:6000

It quickly became apparent that there is a general lack of outcrop in the area and that the interpretation of the detailed geology would be time consuming if not impossible from surface mapping. Traversing was essentially limited to areas of readily apparent outcrop. All the data that was recorded has been plotted onto a base map (Fig. 3). As can be seen, the overall interpretation of the geology does not differ from that already published.

(b) Field Work (Cont'd.)

Traverses of Falling Creek were most unproductive as outcrop in the licence area was totally within the Moosebar formation.

The structure was confirmed to be essentially a gently west dipping monocline with dips generally in the 5^0 to 30^0 range. A syncline appears to exist with its axis through Falls Mountain but the west flank is very poorly developed. The monoclinal interpretation gives a more realistic impression of the structure.

Furthermore, no outcrops of Gething formation were found within the boundaries of the licence block. Outcrops mapped by Hughes (1954-58) as Gething formation on the north side of Falls Mountain were found in fact to be resistive members within the Moosebar formation.

While the field work did not produce the definitive results hoped for, sufficient data was obtained to plan a valid drill hole.

(c) Drilling Program

i) Planning

The objectives of the drilling program were to test the Gething formation for viable coal seams, to obtain unweathered samples of coal for quality control; and to aid in the structural interpretation of the coal licences.

i) Planning (Cont'd.)

The choice of a location for this initial drilling program was based on the following criteria:

(a) An area where the structural dip was below 30^{o}. Such an area might well lend itself to an initial limited mining program should viable coal seams be present.

(b) An area with suspected coal occurrences.

(c) The need to stay within the licence block.

Bearing these parameters in mind an area on the northeastern corner of the property was chosen. Field work had confirmed the structural dip to be essentially less than 30^{o} and no major faulting or folding had been recognized. From a structural point of view, it was a suitable area. Stratigraphically, the beds exposed nearby were in Moosebar formation but it was believed that a 500 foot drill hole would reach the Gething formation. A well, Texas Gulf Sulphur Sun Falls a-64-B, drilled in 1966, indicated several coal seams in the upper portion of the Gething formation. In fact, the Sonic Log indicates two coal seams thicker than 10 feet in the upper 1200 feet of Gething formation.

ii) Drillhole Summary

The drillhole was drilled using a Longyear 38 wireline diamond drill moved and serviced by helicopter. This avoided the need to make new access roads and kept reclamation to a minimum.

ii) Drillhole Summary (Cont'd.)

The rig was set up to drill at right angles to the bedding. The hole was completed at a depth of 651 feet while still in the Moosebar formation having failed to reach the Gething formation.

While it is difficult to predict the depth of hole that would be required to reach the Gething formation, it appears that the lithologies encountered are not basal Moosebar formation. Probably more than 100 feet of section remained to be penetrated.

(d) Conclusions

An examination of the Geological Map (Fig. 3) and the Cross-section (Fig. 4) indicates that the Gething formation is for the most part at depths with more than 1500 feet of cover.

Furthermore, nowhere does the Gething formation outcrop on the coal licences held by McIntyre. Access to any limited coal reserves which might be found at mineable depths would be very difficult.

Furthermore, the structure both along Willow Creek and Falling Creek is most complex in detail and no large areas of undisturbed coal measures would be expected.

(e) Recommendations

It is recommended that McIntyre relinquish all the coal licences they hold in the Falls Mountain area. Despite the superficially attractive geological structure and the proximity of the railway, there is not believed to be any prospect for readily mineable coal.

I. P. Dyson, P. Geol.

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N.E.B.C. Pipe Lines
FALLING CREEK
GEOLOGY
Paul Dyson Consultants

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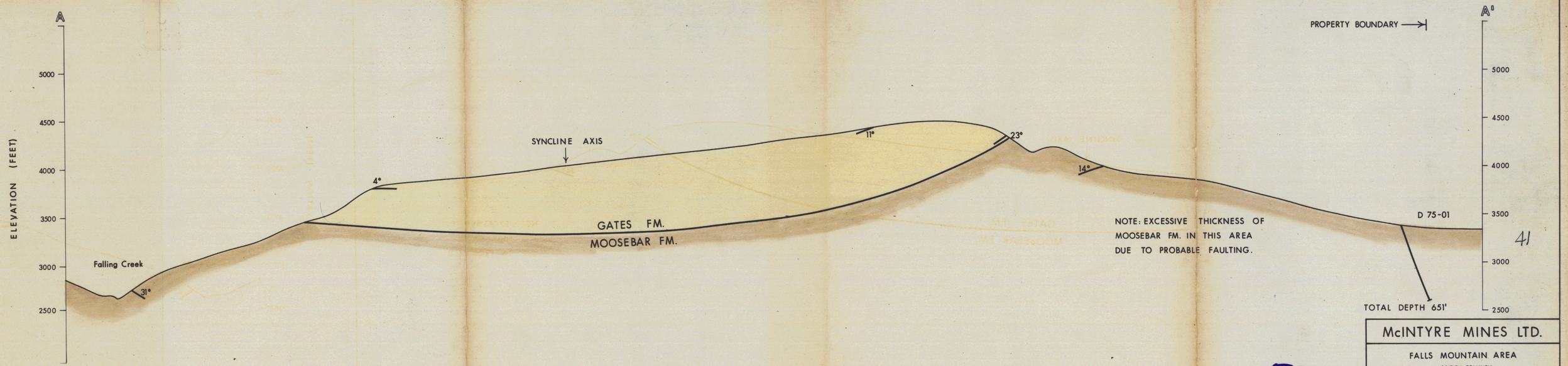
McINTYRE MINES LTD.
FALLING CREEK - FALLS MOUNTAIN
BRITISH COLUMBIA
GEOLOGICAL MAP
SCALE: 1" = 500' 1
CONTOUR INTERVAL: 25' - 50'
PAUL DYSON CONSULTANTS

Figure 3



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Re-Falls Mt. 15(0)A

McINTYRE MINES LTD.

FALLS MOUNTAIN AREA

BRITISH COLUMBIA

STRUCTURAL CROSS SECTION

A-A'

0 500 1000 1500

(FEET)

DATE: OCT. /75

PAUL DYSON CONSULTANTS

Figure 4

ROKE

GAMMA RAY NEUTRON LOG

41 OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO.	
LSD	COMPANY MCINTYRE MINES LIMITED
SEC	WELL 75-01 526
TWP	LOCATION FALLS MOUNTAIN
RGE	FIELD PINE PASS
W_____M	PROVINCE BRITISH COLUMBIA

Other Services: NIL

Permanent Datum GROUND LEVEL Elev. ____ K.B. ____
Log Measured from RIG FLOOR 3 Ft. Above Perm. Datum CSG ____
Well Depths Measured from RIG FLOOR G.L. ____

Run. No.	ONE		
Date	14 JULY 1975		
First Reading	648		
Last Reading	00		
Footage Logged	648		
Depth Reached	650		
Depth Driller	651		
Casing Roke	32		
Casing Driller	32		
Fluid Type	WATER		
Liquid Level	00		
Min. Diam.	2.375 (NQ)		
Rm @ °F			
Operating Time	2 HOURS		
Truck No.	SU-5		

Recorded By RAINEY Witnessed By DYSON

EQUIPMENT DATA

GAMMA RAY		NEUTRON	
RUN NO.	ONE	RUN NO.	ONE
TOOL MODEL NO.		LOG TYPE	NEUTRON/NEUTRON
DIAMETER	$1\frac{11}{16}$	TOOL MODEL NO.	
DETECTOR MODEL NO.		DIAMETER	$1\frac{11}{16}$
TYPE	SCINTILLATION	DETECTOR MODEL NO.	
LENGTH	18 INCH	TYPE	PROPORTIONAL
DISTANCE TO N. SOURCE	6 FT.	LENGTH	6 INCH
		SOURCE MODEL NO.	MRC-N-SS-W
GENERAL		SERIAL NO.	71
HOIST TRUCK NO.		SPACING	17
INSTRUMENT TRUCK NO.	SU-5	TYPE	AmBe
TOOL SERIAL NO.	340	STRENGTH	3 CURIES

LOGGING DATA

GENERAL				GAMMA RAY				NEUTRON			
RUN NO.	DEPTHS FROM	DEPTHS TO	SPEED FT/MIN	T.C. SEC.	SENS SETTINGS	ZERO DIV. L OR R	API G. R. UNITS PER LOG DIV.	T. C. SEC.	SENS SETTINGS	ZERO DIV. L OR R	API N. UNITS PER LOG DIV.
1	00	648	12	5	100	0L	14 API	3	500	0L	250 API

REMARKS LOGGED THROUGH NQ DRILL ROD
70 DEGREE ANGLE HOLE

GAMMA RAY	DEPTHS	NEUTRON
GAMMA RAY INCREASES → API 14 — 0 … 140		NEUTRON INCREASES → API 250 — 0 … 2500 … 5000

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STRATIGRAPHIC LOG

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DRILL HOLE D 75-01 AREA Falls Mountain

COMPANY McIntyre Mines Ltd.

COORDINATES 55° 34' 54" N , 122° 12' 50" W (unsurveyed)

GROUND ELEVATION 3440' TOTAL DEPTH 651'

MECHANICAL LOGS RUN Gamma Ray/Neutron

DRILLING METHOD Diamond, Wireline

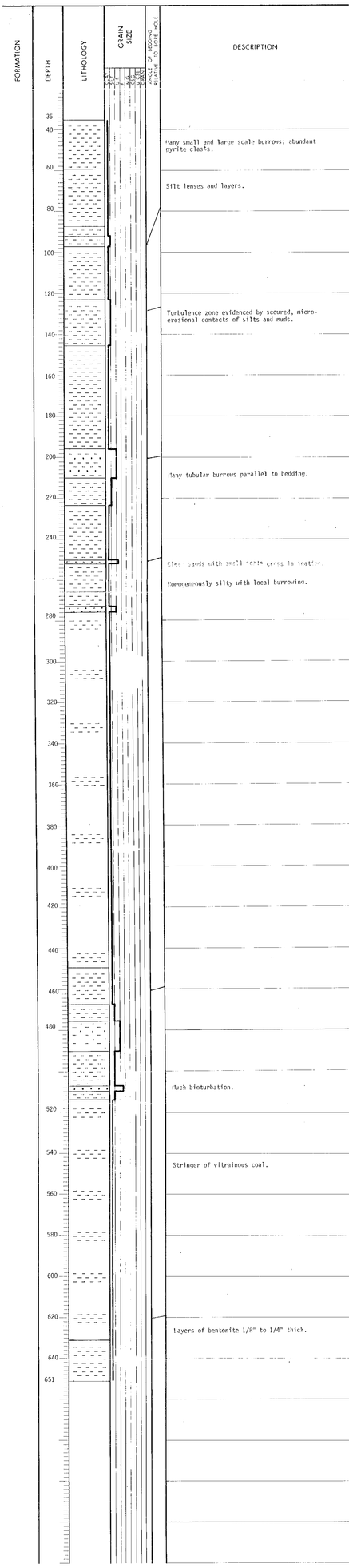
HOLE SIZE NQ DATE OF COMPLETION July 14, 1975

LOGGED BY A. Chowdry, R. Hankel

REMARKS Entirely within Moosebar formation.
Hole drilled at 70° on azimuth of 40°.

LITHOLOGIC SYMBOLS

Breccia | Conglomerate | Sandstone | Calcareous sandstone | Coal | Sandstone beds with shale partings | Siltstone | Mudstone or massive claystone | Shale



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