PR- FARRELL-CREEK 71(1)A.

AMAX COAL COMPANY, INC.

FARRELL PROPERTY

(Peace River Project)

56°10' 122°15'

ANNUAL REPORT 1971 - 72

J. E. HUGHES

CONSULTING GEOLOGIST

CONTENTS

REFER TO:
PR- FARREL CREEK
71(A)A
CONFIDENTIAL
ANALYSIS FILE

FIGURES

TELEPHONE
477-4228

4155 LONG VIEW DRIVE
VICTORIA, BRITISH COLUMBIA

J. E. HUGHES
CONSULTING GEOLOGIST

October 21, 1972.

The Honourable Mr. Leo Nimsick,
Minister of Mines and Petroleum Resources,
Department of Mines and Petroleum Resources,
VICTORIA, British Columbia.

Dear Sir:

re: Amax Coal Company, Inc.
Coal Licences

I include the Annual Report 1971 - 1972 for Coal Licences 2519 to 2606 inclusive, held by Amax Coal Company, Inc.

I ask that the Report be kept confidential, and that the contents not to be released without the permission of the company.

Yours sincerely,

J. E. Hughes

J. E. Hughes.

JEH/emh

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
J. E. HUGHES

PART I

Part I

INTRODUCTION

In 1971 Amax Coal Company, Inc. staked and obtained coal licences, described as the Farrell property, on the north and outlying parts of the East Portage prospect, and carried out a programme of exploration and drilling thereon. This work represented the major effort of the company's Peace River Project, 1971.

The Farrell property lies along the border of the Rocky Mountain Foothills and Plains between Latitude 56° 00' and 56° 20' - where coals of the Gething Formation are accessible to mining at surface and underground. The Gething coals are of low to medium volatile bituminous rank, with high calorific values, low sulphur and low to moderate ash: a number of the Gething seams have good coking characteristics.

LOCATION AND ACCESS

The location of the Farrell property is illustrated by Figure A1 and Figure A2 (Map, "Peace River", Department of Lands, Forests and Water Resources, B.C. 1965, showing transport, routes, and settlements, and towns). The Peace River District has two railways: the British Columbia Railway which connects with the Pacific Coast at Squamish; and the Northern Alberta Railway to Grande Prairie, which connects with the Canadian National Railway providing routes to the Pacific Coast, Edmonton and eastwards. The Farrell property lies within a range of 35 to 50 miles, direct distance, of the Pacific Great Eastern branch from Fort St. John to Chetwynd.

Access to the property itself is from Hudson Hope: 5 miles west of the town on the road to the W. A. C. Bennett Dam: then 12.5 miles northwards on the new gravel road to Mackie Creek, to the junction with the old trail and winter road to the Halfway River at the boundary of Lots 1254 and 1255. The property is entered by the trail and winter road - a distance of 6.5 miles to a nodal location about the confluence of Farrell and Ruddy Creeks. The trail is unsuitable and parts of it impassable for wheeled traffic in spring and throughout much of the summer and fall.

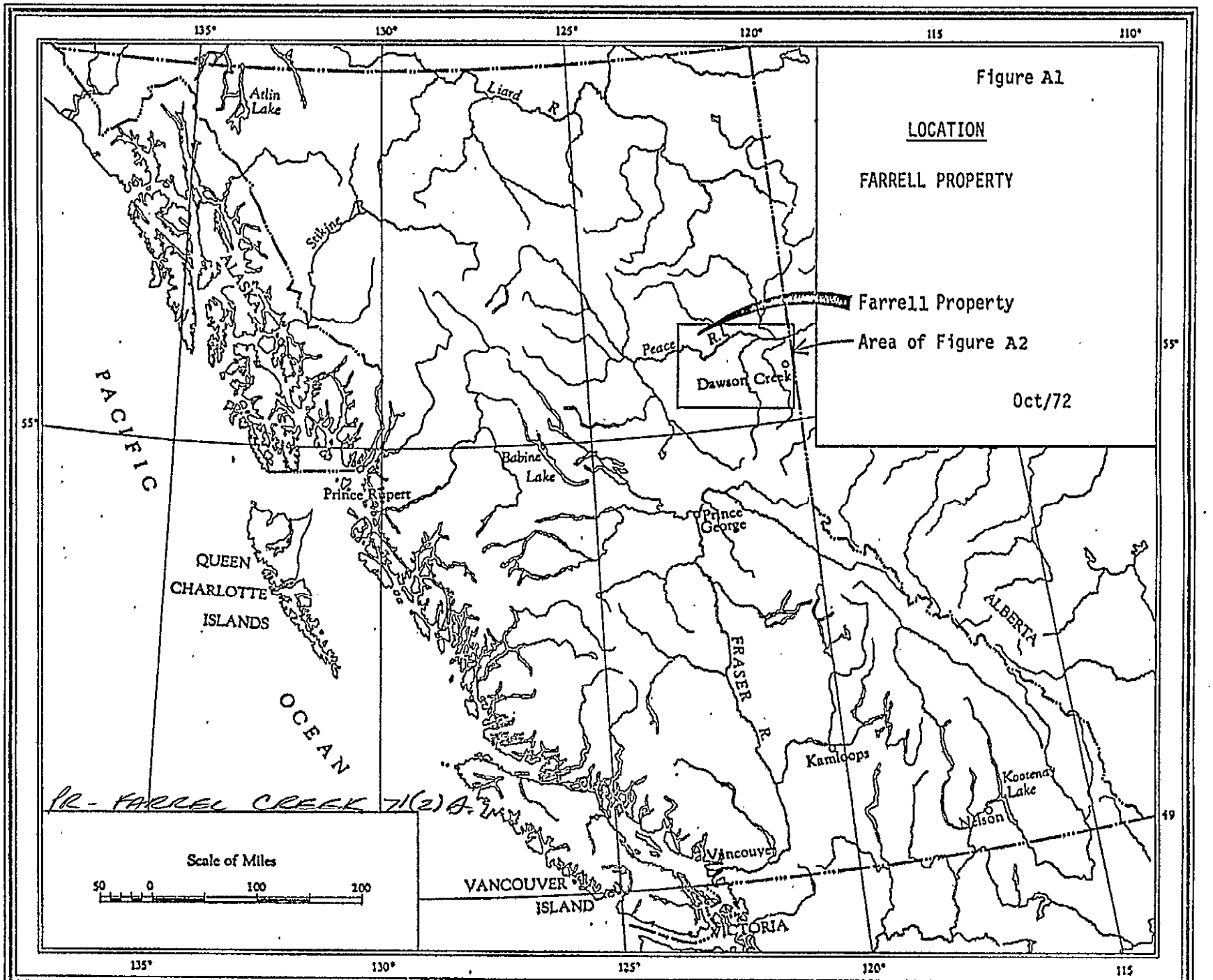
Figure A1
LOCATION
FARRELL PROPERTY
Farrell Property
Area of Figure A2
Oct/72
135°
130°
125°
120°
115
110°
55°
49
Atlin Lake
Liard R.
Stikine
ALASKA
PACIFIC
OCEAN
Peace R.
Dawson Creek
Babine Lake
Prince Rupert
Prince George
QUEEN CHARLOTTE ISLANDS
FRASER R.
ALBERTA
Kamloops
Kootenay Lake
Nelson
Vancouver
VANCOUVER ISLAND
VICTORIA
Scale of Miles
50 0 100 200
PR - FARREL CREEK 71(2) A.

COAL LICENCES

The Department of Mines and Petroleum Resources, British Columbia, administers the grant, issue and tenure of coal titles, exploration, development and mining under the Coal Act.

Amax Coal Company, Inc. (formerly under the name Ayrshire Coal Company, Inc.) applied for release of reservation to the Crown on the East Portage prospect March 9, 1971; and deposited a performance bond of $50,000 in support of application, required according to the Coal Act, and Order in Council 2085.

The release of the Crown reservation was made effective for the period July 12 - August 10, 1971, Order in Council 2085. The company staked the East Portage prospect by contract of McElhanney Engineering & Surveys Ltd; and the company's agent J. Kozak filed application for the coal licences, August 2, 1971. The coal licences were issued to Amax Coal Company, Inc. (formerly under the name Ayrshire Coal Company, Inc.) on September 21, 1971.

These coal licences, Numbers 2543 to 2606 inclusive and collectively termed the Farrell property, amount to 35,166 acres. They cover parts of the East Portage prospect, which remained open and available for claiming at the time of release of the Crown reservation.

The change of name from Ayrshire Coal Company, Inc. to Amax Coal Company, Inc. January 1, 1972 was applied to the coal licences of the Peace River project, both the Farrell and Gaylard properties, effective February 18, 1972.

Directions and advice on claiming coal licences are set out in notes, memoranda, and current reports to the company, March to September, 1971.

The phases and procedures to the issue of the coal licences, - the reservations, claims, and issue of licences, were advertised by public notice in local newspapers, and in the B. C. Gazette. (See Appendix E).

EXPLORATION: WORK DONE 1971 TO 1972

Most of the work on the Farrell property was done in 1971, and consisted of: reconnaissance to check and define the prospect; staking and application for coal licences; geological mapping and prospecting; improving and making access roads; drilling and evaluation. Field work was started on June 22, 1971. Improvements on the existing access to the property, the winter road along Farrell Creek, commenced on September 9, 1971.

Work undertaken after the issue of the coal licences September 21, 1971, contributes to the return of the performance bond, and to rebate on annual rentals in appropriate groups of coal licences. Work on the Farrell property from September 21, 1971 to November 22, 1971, when the property was vacated, is summarised as follows.

(1) Improving access (work continuing from September 9) and constructing new access roads to drill sites.

(2) Geological work, viz. - assembling the results of earlier mapping: supplementary traverses and observations: planning the drill programme: locating and checking drill sites.

(3) Setting up trailer camp to accomodate field crews.

(4) Drilling: four holes were drilled by rotary tools, for total footage of 4,488 feet, October 22 to November 18, 1971. The drill programme included: sampling cuttings, and coal seams: field tests and analyses of coal quality: logging by Gamma, Neutron and Density sensors.

(5) Drawing base-map of the property.

(6) Clean-up, slash disposal and reclamation on access roads, drill sites and camp site.

(7) Evaluating the results of drilling: report.

Amax staff carried out field operations and supervised the drilling from October 15 to November 22, 1971 when the property was vacated: Appendix A, by P. Graham, Amax Coal Company, Inc. gives a summary record of these field operations and drilling.

The following companies and contractors serviced the exploration and developments on the Farrell property:

Fortier & Associates	-	Dawson Creek (camp)
Garritty & Baker Drilling Company	-	Edmonton (drilling)

Hirtz Bros. Construction Ltd.	-	Ft. St. John (cat work)
D. Kyllo	-	Hudson Hope (packing and transport)
Loring Laboratories Limited	-	Calgary (analyses)
McElhanney Associates	-	Vancouver (staking, air photomosaics, base-map)
Okanagan Helicopters	-	Ft. St. John (air transport)
Peter & Paul Demeulemeester Ltd.	-	Chetwynd (cat work, slashing)
Roke Oil Enterprises Ltd.	-	Calgary (petrophysical logging)

Notice and proposals for entry and work on the property October 6, 7 & 14, 1971; and a report to describe its nature and environment, the effects of exploration, and measures to ensure conservation and reclamation October 6, 1971 (Appendix B), were submitted to the Department of Mines and Resources, Inspection Branch - Reclamation, and advertised (B.C. Gazette November 4, 1971, Issue No. 44). Approval for the work was received, and confirmed December 9, 1971, under Permit 58, and Order in Council No. 4467. The company (under former name of Ayrshire) posted bond of $2,500. for surety to reclamation.

Field inspections, by the District Inspector of Mines and the Forest Service, Prince George District, proved the work, conservation and reclamation to meet satisfactory standards.

EXPENDITURES

Expenditures on the Peace River Project for 1971 to 1972, amount to the order of $178,000, - the sum including costs to 1) staking and acquiring both Farrell and Gaylard properties, 2) annual fees and rentals for both properties, 3) geological mapping, 4) exploration, drilling and development work on the Farrell property from September 21, 1972.

Detailed accounting is available for the latter phase of work.

Summary of Expenditures
September 21, 1971 to September 20, 1972

Drilling	$ 37,826.59
Road Construction	18,317.97
Field Accommodation and Living Expenses	14,224.00
Staff Salaries, Benefits and Overhead	7,987.06
Consultant Fees and Expenses	5,743.41
Logging	3,583.36
Maps	3,255.86
Temporary Salaries	3,159.62
Rental of Field Vehicles	3,028.78
Restoration	1,655.46
1972 Property Tax	1,385.87
Miscellaneous Items	4,449.32
Total Expenditures 9/20/71 - 9/20/72	$ 104,617.30

(from record of the Accounting Department, Amax Coal Company, Inc., Indianapolis)

Additional outlays to the Peace River Project 1971, are redeemable:

a) Deposit of Performance bond, $50,000.
b) Deposit of bond, $2,500., for reclamation and conservation.

The work and expenditures on the Farrell property, qualify for the return of the performance bond of $50,000. Also, they earn rebate on rentals for the year 1972 - 73 amounting to $6,974. Return of the bond for $2,500 depends on satisfactory standards of reclamation and acceptance of a completion report.

PART II

ENVIRONMENT: CONSERVATION AND RECLAMATION

The Farrell property covers farmlands in the south, and primitive terrain north of Chinaman Lake.

Farms and land under clearing extend along the road to Mackie Creek. A residential development near the old settlement of Beryl Prairie was started in 1970. Several land lots and two reservations for public recreation occupy part of the waterfront of Chinaman Lake, though there is no permanent habitation. A gas pipe-line of Westcoast Transmission Company Ltd. follows the road to Mackie Creek. In the south and east parts of the property, coal measures of the Gething Formation underlie the surface at depths to 1,500 feet (reference datum = top of Gething Formation).

The primitive terrain north of Chinaman Lake consists of four natural divisions: (1) the Butler Ridge at elevations about 5,000 feet: (2) the east flank of the Ridge at elevations 4,250 to 3,250 feet - hillsides, with moderate slopes and relief, dissected by streams, and covered by scrub, with poplar in the lower parts: (3) the lowlands in the drainage of Ruddy and Farrell Creeks, at elevations 3,250 to 2,750 feet - low hills and slopes covered by open poplar and belts of pine on sandy ridges, and in places swampy ground bordered by spruce:

(4) the lowlands of Kobes Valley - low slopes and undulating ground with large areas of muskeg and poorly drained flats, where low spruce forms the most common growth. The Gething coal measures are absent from the Butler Ridge (division 1): they outcrop in the hill slopes on its east flank (division 2): and underlie the lowlands of Ruddy, Farrell, and Kobes Creeks (divisions 3 and 4) from surface to depths about 1,500 feet (reference datum = top of Gething Formation). Cut lines in the Farrell property remain from seismic exploration in the period 1950 to 1970. The Government of British Columbia drilled 5 holes in the area around the confluence of Farrell and Ruddy Creeks in 1921 and 1922. cored holes

The Report for Directive - "Exploration of Coal Properties, October 16, 1971, describes the north part of the property; its nature, terrain, land use, and resources, and states measures and work for conservation and reclamation in the 1971 drill programme. Reclamation started at the time of drilling, and was completed to standards of inspection by the Department of Lands, Forests, and Water Resources, by the end of November, 1971. A completion report (October 16, 1972) describes work, and reclamation done on the property.

Appendix B includes both reports for reference.

The company's staff gave care and effort to conservation and reclamation, and undertook observations and planning to these ends before entry to the property. Terms and conditions for Permit 58, Authorizing Surface Work, December 9, 1971 noted "the Butler Ridge area is reportedly a prime wildlife area, in particular Stone Sheep", and stressed the care for wildlife. The observation was correct, and the company's staff supported the instruction, item (11) of the terms and conditions of the Permit. However, there was a very great increase in hunting on the primitive terrain of the Farrell property, by hunters using the new and improved access made for drilling, and by hunters brought in by registered guides. For much of the drill programme traffic by hunters along the road to camp and drill sites exceeded traffic due to the company's work. Restraint and balance of hunting to conserve game and wildlife rests on the authority of the Minister and Department of Recreation and Conservation - this is a matter of the public and government and is outside the role and responsibility of mining companies and their staffs.

The effect of new and improved access to the Butler Ridge area was foreseen and drawn to the attention of the Departments of Recreation and Conservation, and of Mines and Petroleum Resources in September and October, 1971. (See Appendix B: Report for Directive - "Exploration of Coal Properties", October 16, 1971)

EXPLORATION 1971: COMMENTARY

The Gething coals form the main target for exploration in northeastern British Columbia. The distribution, thickness, and quality of the seams are not well known, excepting at few localities in the Peace, Pine, and Sukunka Valleys. A staking rush on the Gething outcrop started in 1970, and coal licences were acquired as a form of permit to explore. At the end of February, 1971 about 90% of the Gething outcrop was held by coal licences and applied for. The north and outlying parts of the East Portage outcrop remained open.

Coal prospects were reviewed in the studies to February, 1971. East Portage looked promising. Its location allowed marketing of coking coals to be feasible. Its terrain, low to moderate relief, and access made for relatively low costs in exploration and development. The relation of the prospect to Gething sedimentation was favourable, or in the lowest measure not unfavourable to coal deposits. Definite potential for coals with good coking characteristics was inferred. Prior application and claims covered the major part of the Gething outcrop in south half of the prospect.

Equal or greater promise remained in the north, in the subcrop, for reasons of its potential for large reserves and suitability for underground mining. These factors formed the basis for acquiring the exploring the Farrell property.

PR-FARRELL-CR. 71 (1)A

Part II

STRATIGRAPHY

Strata in the mapped area, Ruddy and Farrell Creek westward to the Butler Ridge, are of Lower Cretaceous age. They are divisible in units of the succession listed:-

TABLE OF FORMATIONS

Fort St. John Group (part)	Thickness
Sikanni Formation.	+ 175 feet
Hasler Formation	2,050 feet
Gates Formation.	240 to 250 feet
Moosebar Formation	625 to 650 feet
Crassier Group (= Non-Marine Bullhead) (part)	
Gething Formation.	930 feet
Dresser Formation (part) . . .	+ 170 feet
Fault separation	
Beaudette Group (Marine Bullhead) (part) .	+ 1,000 feet

Crassier Group (Non-Marine Bullhead)

The group term refers to a coal measure sequence, in the stratigraphic interval between the Beaudette (Marine Bullhead) and Fort St. John strata, and dated within the range late Valanginian to early Albian.

The coal measures are divisible into formations on the basis of: shale/sandstone ratio; the frequency, and characteristics of sandstones, and occurrences of conglomerate; the nature of cyclothems; and the distribution of coal seams. The division is useful, but tends to be arbitrary as formations intergrade in transitions; in places, the division becomes obscure or untenable.

The Crassier coal measures drilled in BR, 1, 3, 4, and 5, amount to about 1,100 feet. They show little overall distinction of formational rank. The drilled sections of the coal measures are properly assigned to the undivided Crassier Group (See: correlation diagrams C1, C2). However, a division into Gething and Dresser Formations may be made in comparison with the section of the Peace River Canyon - this serves a convenience in description, and accords with the division used for mapping. Its merits can be qualified by deeper drilled sections, and stratigraphic studies.

Dresser Formation: The term defines an assemblage of lean coal measures and thick sandstones, of medium to very coarse grain, with or without conglomerates; the coarser clastics form about 50% or more of the unit. In BR-1, and 5 the lowest 160, and 170 feet of the respective sections, are assigned to the formation (estimates of stratigraphic thickness).

Gething Formation: BR-1 shows a complete section. The formation consists of interbedded shales, silty shales, siltstones, sandstones, and coals; shales are thin and restricted; sandstones in thick and thin beds are predominant: cyclothems and coal seams are frequent - this feature is characteristic of the Gething in its deltaic facies. In the drilled sections the dominance of sandstones is less characteristic of the Gething and obscures its distinction from the Dresser Formation.

In the uppermost 100 feet of the Gething, sandstones form a distinct mappable unit, here named the Ruddy member. Sandstones in the upper part of this member are light coloured, clean, and subquarzitic; the underlying sandstones, darker, and fine to coarse grained, contain abundant chert grains, and have thin conglomerates, in few scattered lenses.

Fort St. John Group

The division of Fort St. John beds follows a classification well known from the Peace River Canyon. Mapping (1971) showed the Gates sandstones to continue northward to Lat. 56° 18'. The Gates allows separation of the Moosebar and Hasler shales. The term Hasler then incorporates possible equivalents or extensions of parts of the Commotion Formation of its type locality in the Pine Valley. Most of the Fort St. John Group belongs to the Albian stage. Beds above the Sikanni Formation are referred to the Upper Cretaceous (Cenomanian), and lie outside the mapped area.

Moosebar Formation: The unit consists of dark grey shales and mudstones. A conglomerate 20 to 50 feet thick marks the base of the formation, and overlies the top sandstones of the Gething with sharp, planar contact. The conglomerate is made of rounded pebbles, 1/8 to 1/4 inch, average diameter: chert, dark coloured, or black, forms the majority of the clasts: locally, thick shelled pelcypods (? Dicranodonta) occurs in the upper part.

Gates Formation: The upper part of the formation is exposed around the junction of Farrell and Ruddy Creeks; its lower part is concealed. A record of the formation can be inferred from outcrop and the description of cores taken in B. C. Government DDH's 1 and 2 (McLearn; Ms, 1922: Spivak; Ms, 1942), - as follows.

70 feet:	Sandstones, thin flaggy bedded, with minor shales: lower third, with thin interbedded shales, siltstones and sandstones, grading to -
150 feet:	Shales with lesser siltstones and sandstones in thin interbeds
20 to 30 feet:	Sandstones, argillaceous.

The Gates outcrops along the west limb, and the northern closure of the Ruddy anticline. In places here, it forms a low escarpment, but for the most part its trace is obscure. The lower part of the formation and its contact with the Moosebar is too indistinct for mapping.

Hasler Formation: The term refers to a thick sequence of shales and silty shales, and minor shales with thin interbedded and interlaminated siltstones and sandstones, in the interval between the Gates and the Sikanni Formations.

Sikanni Formation: The formation outcrops along the Farrell Scarp. It consists of very fine to medium grained sandstones in thick beds, with thin interbedded shales, siltstones and sandstones.

STRUCTURE

Four elements of structure define the prospect - from west to east (See: Figure M-2).

(1) A thrust fault and fault zone: along the east front of the Butler Ridge. Beaudette strata, are overthrust on the coal measures of the Crassier Group in thin fault wedge to the east.

(2) The Ruddy anticline: an angular fold, probably compound in form. The anticline plunges northwards. Its west limb is steep, dipping at 40° to 60°, and inclined under the fault zone (1). It is inferred that a syncline separates the unit structures (1) and (2) northward, and along the anticlinal plunge.

In the broad span of the east limb, beds dip 10° to 12°; an increase of dip to the order of 30° forms a sharp contraflexure with the Farrell syncline.

(3) The Farrell syncline: a broad syncline of low fold amplitude, with dips of the order 4° to 6° across a span of two miles in the middle part. The Gething/Moosebar contact underlies 1,250 feet of cover along the synclinal axis in the valley of Ruddy Creek.

(4) The Farrell anticline: a narrow structure of concentric form and low fold amplitude. The Gates Formation is exposed in its core. A thrust fault cuts the east flank of the anticline. On the east, folding and faulting combined depress the Gates Formation 1,500 to 2,000 feet relative to the Farrell syncline.

The structures trend north northwest; component fold axes are separated 10° to 20°.

The structure of the prospect is simple and uncomplicated.

NATURE OF THE PROSPECT

Gething and older coal measures outcrop in the Ruddy anticline, and in the thrust wedge along the east front of the Butler Ridge.

The Ruddy anticline provides the major outcrop in its broad, east limb. Here, the upper beds of the Gething form a dip slope of about 10°: the slope is incised by transverse valleys with relief to about 450 feet. The west limb of the anticline is mostly concealed, and has narrow outcrop.

The thrust wedge represents a secondary prospect. Gething and older coal measures dip 55° to 65° west, under the overthrust. They are covered by thick patches and spreads of till and periglacial waste. Exploration here requires detailed mapping and close support by drilling and trenching.

The underground prospect, in the valleys of Brenot, Farrell, Ruddy, and Kobes Creek is extensive. A mid-section of the prospect along Ruddy Creek shows working depths from surface to 1,300 feet for the top of the Gething beds. Mining conditions, dip and structure of beds, nature and depth of cover, promise to be satisfactory, perhaps among the most promising in the region. Exploration is handicapped by the lack of exposures outside Ruddy Creek.

DRILLING

The drilling, 1971 programme, was assigned by Ayrshire Coal Company, Inc. to a contract for 4,000 feet (rotary drilling).

The drilling plan was designed as follows:-

(i) a primary, stratigraphic test of the Gething Formation, 1,000 to 1,200 feet depth, at locality A, to assess the potential for surface and underground mining.

(ii) supplementary drilling, five drill holes in the range 400 to 700 feet depth, at localities B, C, D, E, F, - to support (i), and to assess the potential for surface mining at outcrop.- (See: Reports - September 28, October 7, October 16, 1971).

The company's staff directed and supervised the drilling, October and November, 1971; and tested the Gething and underlying coal measures in four drill holes:

BR 1:	Depth, 1168 feet:	Locality A
BR 2:	Not drilled	
BR 3:	Depth, 1,207 "	New Locality
BR 4:	Depth, 913 "	New Locality
BR 5:	Depth, 1,200 "	New Locality

The drilling operations are summarised in Appendix A.

Locations of drill holes are not surveyed.

Data obtained from drilling was processed in the forms:

1) drill cuttings, collected at 5 feet intervals

2) coal seams, sampled in drill cuttings

3) field tests for free swelling index (Amax Staff): analyses of coal samples, for volatile matter, fixed carbon, ash, and free swelling index (Loring Laboratories Ltd.)

4) gamma ray, neutron, and density logs, to total depths (Roke Oil Enterprises Ltd.)

5) graphic lithological logs

The distribution of coal seams is set out in correlated form, as determined from the petrophysical logs - (See: Figures C1, C2, C3).

COAL SEAMS

Coal seams in the drilled sections tend to be thin and numerous.

Seams of relatively greater, overall thickness are correlated in a numbered sequence, (Figures C-1, and C-2, A, B, and C and Table I). Their coal intersections range from 1 to 4 feet, and are dispersed at intervals of 50 to 150 feet.[1] The closest grouping of seams is: 8 feet (coal and waste) - in seam No. 5, about 460 feet, stratigraphic interval, from the top of the Gething.

Coals of the drilled section have f.s.i. in the range 1 to 8 (field tests and analyses) - indicating a potential for coking coals. Fifteen analyses are available November 26, 1971: these lack tests for sulphur and calorific values. Proposals have been made to analyse more coal intersections. Field tests of f.s.i., cover some of the numbered coal seams, and other seams outside the numbered sequence (the latter are thin, most less than 2.0 feet). A complete record of field tests, and analyses todate is set out in Appendix C.

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[1]Measurements of coal intersections are taken from gamma and density logs and involve some factor of interpretation. There is no workable calibration from drilling data, and no information from core: there are no measurements of dip, downhole.

Thickness of coal seams is left uncalculated for this report. Thickness of seams approximate to the measured intersections for drill holes, BR-1, BR-3, and BR-5, where beds at the surface dip at 8 to 25 degrees.

TABLE I

COAL SEAMS, BR-1, 3, 4, and 5

	BR-1			BR-3			BR-4			BR-5		
Seam	Depth	Vl	C	Depth	Vl	C	Depth	Vl	C	Depth	Vl	C
1	166	4.0		127	2.0		nd			151	2.2	2
2	228	1.8		200	2.6 p		92	4.0	1	227	2.4 p	
3	281	2.2		261	2.2		162	2.0 p		276	2.0 p	
4	418	1.5		407	1.5		349	1.3		427	1.8	
5a	506	p		496	1.0		461	1.3		p		
5b	511	1.8		501	1.8		467	1.7		520	2.0	
5c	522	3.5	6/1	512	2.6		481	3.7	½	542	2.0	3
5d	529	2.8	½/1½	521	2.4		491	2.2 p		550	2.0	
6	626	1.0		625	2.0		625	3.8		726	2.0	
7	833	1.6		852	2.2		871 886	2.8 2.1		838	2.0	
8	1,010	1.6	6	1,024 1,034	2.0 1.5		nd			1,000 1,012	2.0 2.0	

Vl = vertical intersection of seam: feet

(= approximate thickness of seam - except for BR-4, in which beds dip more than 40°)

C = free swelling index: determined by Loring Laboratories Ltd., Nov. 26/71

p = seam parting or split, adjacent (not measured or included)

Coal intersections from mid-ordinates of density log.

CORRELATIONS

The diagrams, Figures C1, C2-A, C2-B, C2-C, and C3, explain the correlations of coal measures intersected in the drill holes, BR-1, 3, 4, and 5.

They distinguish eight coal seams and group of seams in a numbered sequence for a stratigraphic interval of 1,100 feet in the Gething and underlying beds.

Controls for correlations are listed:

1) Geological mapping, fieldwork 1971.

The drill holes were spudded in the stratigraphic datums:-

BR-1: basal conglomerate of the Moosebar Formation; the Gething/Moosebar contact was cut at 55 feet.

BR-3: uppermost (Ruddy) member of the Gething Formation

BR-4: uppermost (Ruddy) member of the Gething

BR-5: uppermost (Ruddy) member of the Gething, about 25 feet below the contact with Moosebar Formation.

2) Characteristic, distribution, and continuity of coal seams and groups.

3) Nature and continuity of cyclothems.

In the drilled sections, cyclothems are frequent, variably thin and thick, incomplete or compound, and subject to laterial changes in sedimentation. The coal measures are mostly arenaceous, and shale beds tend to be thin.

These conditions allow possibilities of error, ar ambiguities in correlation, which are resolved by correlating cyclothems and component beds in detail to a system of closures. These indicate that any error of correlation is less than 25 feet, and that coal seams of the numbered sequence are correctly identified (Figure C1).

The drilled sections, BR-1, 3, and 5, are unfaulted and uncomplicated. Strata at the surface dip 8° to 10° at BR-1, 12° at BR-3, and 20° to 25° at BR-3 near the contraflexure of the Ruddy anticline and the Farrell syncline. The section BR-4, is expanded, indicating average dips about 40° to 50°. Its location, relative to the axis of the Ruddy anticline was not demonstrated. BR-4 can be presumed to cut the west limb of the anticline; the alternative interpretation, that it cuts a steep east limb in the footwall of a thrust fault, is tenable and consonant with the structural patterns for anticlines of angular fold forms, though there is no evidence for such fault at hand. The section BR-3, perhaps indicates flexure or increased dips adjacent to the axis of the Ruddy anticline. No structural data, dip meter surveys or core records are available from the drilling.

ACKNOWLEDGEMENTS

The help of Amax staff in compiling the Annual Report is appreciated and acknowledged.

J. E. Hughes

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
J. E. HUGHES

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J. E. Hughes
October 21, 1972

PART III – APPENDIX A

Part III

APPENDIX A

Record of Field Work: September 9 to November 22/71

Sept 9	-	Started cat work (Hirtz) on existing access roads.
Sept 9-Oct 11	-	Built diversions and repaired existing roads from main road to campsite.
Sept 20-21	-	Hauled and installed culverts in problem drainage areas.
Oct 7	-	Hired (2) slashers for corduroying parts of road.
Oct 11	-	Brought in second cat (Demeulemeester) to work on drillsite roads.
Oct 12	-	Build campsite and sewer pits.
Oct 15	-	Moved in trailers from road - 3 cats employed for move. Two Hirtz and one Demeulemeester. Released first Hirtz cat.
Oct 18	-	Released second Hirtz cat.
Oct 19	-	First set of slashers relieved. Two more slashers brought in.
Oct 22	-	First drill moved in and set up on BR-1.
Oct 24	-	Hit water in BR-1-drill shut down to cement casing.
Oct 28	-	Drilling resumed on BR-1.
Oct 30	-	Second rig moved in and set up on BR-3.
Nov 1	-	BR-1 shut down 6½ hours - pipe stuck in hole.
Nov 2	-	BR-1 shut down - broken triple line block.
Nov 3	-	Slashers completed work.

Nov 5	-	Broken sand line & pipe stuck in hole on BR-3.
Nov 6	-	Drilling resumed after repairs at BR-1. First forestry inspection.
Nov 7	-	BR-3 drilling resumed after repairs-broke down again with bent Kelly rod. Total depth reached on BR-1 at 1168' - hole logged.
Nov 8	-	Moved rig from BR-1 to BR-5 and set up.
Nov 9	-	BR-3 drilling resumed after repairs. Visit from District Inspector of Dept. of Mines & Petroleum Resources.
Nov 11	-	Total depth reached on BR-3 at 1207'. Hole logged and rig moved to BR-4 location.
Nov 12	-	Second visit of Dept. of Forestry.
Nov 14	-	BR-4 shut down - rock bit cones lost down hole. Resumed drilling after cones fished out.
Nov 16	-	Total depth reached on BR-5 at 1200'. Hole logged and rig moved out.
Nov 18	-	Total depth reached on BR-4 at 913'. Hole electro logged moved second rig out.
Nov 19	-	Camp moved out.
Nov 21	-	Demeulemeester cat cleaned up camp site and access road cross ditched and blocked.
Nov 22	-	Property evacuated.

P. S. Graham,
Amax Coal Company, Inc.
December, 1971

APPENDIX B

Ayrshire Coal Company Incorporated

Report for Directive, "Exploration of Coal Properties":

Farrell Property

Introduction and Terms of Reference

Ayrshire Coal Co. Inc. hold coal licences in the area Lat. 56°05', 56°20', and Long. 122°05', 122°20'; these are collectively termed the Farrell property.

Ayrshire's exploration, 1971, is directed to one sector of the property, - a sector of dimensions 8,000 x 24,000 feet, centred and located about Lat. 56°13; Long. 122°18; The company intends drilling 4,000 feet by rotary rig, in 6 holes. Drilling is to be completed in 30 days, and expected to end about Nov. 10/71. The exploratory drilling will allow the first evaluation of the property.

This report, item (3) of the Directive, "Exploration of Coal Properties" (see Order in Council 1390/71) is concerned with the exploratory drilling of the 1971 programme, the sector of the Farrell property to be drilled, and the access necessary for the drilling. No work or drilling is planned for other parts of the property at present time.

Previous notice of Ayrshire's work is set out by letter and plan of Oct 7/1971, and form "Notice of Opening Mine, or Quarry, or of work on a Mineral Property", of Oct 14/1971, submitted to the Inspector of Mines - Reclamation.

Nature and Present Use of Land, and its Environment

The sector to be drilled lies on the east flank of the Butler Ridge, between elevations 3,250, and 4,250 feet. Relief is moderate, and the slopes uniform, but dissected by several tributaries of Kobes and Ruddy Creeks. Hillslopes are covered by scrub, mostly alder with patches and spreads of scrub poplar and willow, and balsam with arctic dwarf, birch. Growth is poor and stunted and soils are thin and stony on the hill slopes. Poplar with small stands of spruce line watercourses, and cover parts of the lower ground.

The area remains in a primitive, natural state, and is uninhabitated. There is no farming or land use. Seismic exploration, 1950 to 1970, predates the entry of Ayrshire on this part of the property.

The environment of the sector to be explored and drilled can be summarised: (1) the Butler Ridge, at elevations about 5,000 feet, a steep east face, open, with arctic - alpine herbage, and grass: (2) the east flank of the Butler Ridge at elevations of 4,250 to 3,250 feet, of moderate slopes and relief, dissected by streams, and covered by scrub, and poplar in the lower parts: (3) the lowlands of Ruddy and Farrell Creeks, at elevations 3,250 to 2,750 feet, low hills and slopes covered by open poplar, and by belts of pine on sandy ridges, and in places swampy ground with borders of spruce: (4) the lowlands of Kobes Creek, undulating, with extensive areas of muskeg and poorly drained flats where low spruce forms the most common growth.

Livestock & Grazing: These are absent.

Wildlife: Exploration, drilling and occupation, are brief, and their effects on the wildlife, slight or nil, and only temporary.

However more serious, of greater concern, and here brought to the attention and responsibility of the public and Government, is the incidental effect of new access for mining - to introduce many hunters to the area. The game is vulnerable (for reason of previous isolation) - especially new, small herds of caribou and sheep along the Butler Ridge. These herds are liable to rapid extinction, by hunting. Preservation of game and wildlife is a concern of the public and their representatives in Government, and extends far beyond the responsibility of mining companies. Regrettably, mining access roads introduce means by which this area may be overhunted, and some species destroyed or lost. Access for hunters can well present a more serious and important threat to game and wildlife, which it is desireable to preserve, than exploration and mining per se. Restraint and balance of hunting to conserve wildlife, depends on the authority of the Minister, and Department of Recreation and Conservation, not on a mining company.

The affect of access on game and wildlife, outlined here, is a general matter, and applies to many other prospects. Useful solution, and sensible action by the public and their representatives in Government, would meet approval and support from most sections of the mining industry.

Watercourses: The effect of exploration is likely to minimal, and temporary, and no watercourses or streams are to diverted.

Timber: Effect of exploration, new access roads and improvements to existing trails, seismic lines, and winter road, on timber, is small. There is little, or probably no, merchantable timber, in the area of work.

Farms & Inhabited places: These are absent in the areas concerned with the terms of reference of this report.

Appearence: Effects of exploration will be very slight and local: new access roads are narrow; cleaned areas of drill sites are most in scrub. Access roads and drill sites can be aesthetic, and can harmonize with the landscape, when returned to growth.

Action to reduce disturbance of land,

environment, and ecology to minimum.

Livestock and grazing: These are absent from the area of the report.

Wildlife: See previous section, which draws public and official attention to the affect of new access roads.

Gaps in slash windrows are to be cleared for travel of game.

Otherwise no special measures against disturbing wildlife seem necessary or vital. Drilling and traffic is local and restricted. Normallly, game and wildlife tend to retain their habitats during exploration and drilling - unless molested or hunted.

Watercourses: Culverts have been laid for 3 road crossings: a fourth is bridged. Pre-existing crossings - the winter road at Farrell Creek, and the seismic line and trail at Ruddy Creek are left as fords, for reasonable economy, but more cogently because bridging or culverts will do more harm than good at the present density of traffic.

Drill sites are located away from stream courses; pits to collect waste drilling mud or fluid, are to be made (as usual practice, and by instruction).

Camp site is located 300 feet away from watercourse; and camp sewage is treated in a fenced lagoon, following recommendation of Health Dept.

Instructions have been set out to clean creek crossings after use, to clean and remove mud spoil, and to remove and clear slash from the banks.

Timber: Access roads and entry to the property have the following design: (1) make maximum use of pre-existing winter road and seismic lines: (2) least distance of new access roads: (3) road width 26 feet: (4) avoid stands of commercial timber.

These factors ensure least destruction of timber.

Slash disposal will be done as normal good practice, and according to the instructions and inspections of B.C. Forest Service.

Farms & Inhabitated Places: There are none in the sector to be explored, or on the access.

Appearance: No mining is planned at the present time. Roads to the drill sites are routed to avoid ridges and bare slopes: side hill cuts are reduced to minimum, and very few are necessary. Roads to drill sites are concealed in the brush.

Stripping, may not be required, but it has been advised to explore a few sections alongside the access roads to drill sites for the limited and specific purpose of identifying a stratigraphic datum. Stripping along creek beds has been contra-indicated. Random stripping should not be necessary.

Garbage disposal is arranged, for camp, and for drill sites, and instructions are to be implemented.

Clean up of drill sites, roads and creeks, and camp, and slash disposal to be done, and to begin with the start of drilling.

Potential Use of Land

The potential of the sector to be drilled, i.e. for human and economic use, is very small (or nil in some terms of valuation) - excepting: (a) coal which potential value is to be investigated by drilling: (b) petroleum and natural gas, not investigated. The hill slopes of the east flank of Butler Ridge have a scanty pasturage, which is open to the wild grazers and predators. At lower levels, a few stretches of open poplar growth can provide natural grazing.

Commentary

The 1971 exploration and drilling programme for Ayrshire is limited, and the planning has full regard to conserving environment, and ecology. Discussions with interested Government departments in the Peace River District look to effective and satisfactory results in conservation.

J. E. Hughes

Consulting Geologist

for Ayrshire Coal Co. Inc.

Oct. 16/71

submitted Oct. 20/71

See notes on reverse side before preparing this report.

DEPARTMENT OF MINES AND PETROLEUM RESOURCES

Report of Exploration Work on Coal Licences

(Pursuant to section 8, Coal Mines Regulation Act)

1. Name of property Farrell Property

   Location Lat. 56° 05' - 56° 20', Long. 122° 05' - 122° 20'

2. Coal licence numbers 2543 - 2606 Inclusive

3. Name and address of the Crown licensee:

   Amax Coal Company, Inc.,

   105 South Meridian St., Indianapolis, Indiana. 46225.

4. Name and address of the operator, if different from (3) above:

   Amax Coal Company, Inc.,

   710 - 550, 6th Ave. S.W., Calgary, Alberta. T2P 0S2

5. The exploration work (~~is now being~~ / was) done during the period from June 21, 1971 (Date) to November 22, 1971 (Date)

6. Type of equipment (to be) used in the exploration work D6 Caterpillar, D7E Caterpillar, Mayhew 1000 Truck-mounted Rig, Mayhew 1000 Nodwell-Mounted Rig, Gamma-Neutron Logger, Associated Service & Transport Vehicles

7. Number of men (~~now being~~) employed Three (Minimum) to Seventeen (Maximum)

8. Give details of the exploration work (~~now being~~) done:

   (*a*) Road construction—total length 59,530 feet, width of clearing 23 feet.

   (*b*) Line cutting—total length ____ feet, width ____ feet, method ____

   (*c*) Total area of drill-sites 26,000 square feet, number of sites 5 (One never drilled)

   (*d*) Total area of camp-sites 8,470 square feet, number of sites 1.

   (*e*) Total area of adits, refuse piles, stockpiles, etc. Nil square feet, number of adits ____.

   (*f*) Trenching and stripping—

   (i) Seam tracing—length Nil feet, width Nil feet, maximum depth Nil feet.

   (ii) Formation cross-cutting—length Nil feet, width Nil feet, maximum depth Nil feet.

   (iii) Test pits—total area Nil square feet, number of pits Nil maximum depth Nil feet.

   (iv) Stripping (other than above) for the purpose of Nil

   Total area ____ square feet, maximum depth ____ feet.

(*g*) List any other disturbances of the surface of the land not included above, and show the total areas and maximum depth of such disturbances_____

(*h*) Clearing—the total area of land to be cleared for items 8 (*a*) to (*g*) above is 32.2 acres.

NOTE—The *Forest Act* has regulations pertaining to the cutting of trees, including such cutting for coal-exploration purposes. Check with the Forest Ranger or District Forester before the clearing of a forested area is undertaken.

(*i*) Will any watercourse be disturbed? If yes, give the details. No

NOTE—If yes, a water licence must be applied for from the Water Rights Branch, Department of Lands, Forests, and Water Resources, Victoria.

(*Signature*) L. F. Martin

Name L. F. Martin (Print)

Position Administrative Assistant, Exploration

Date October 16, 1972

NOTES

1. This report is to be filed with the Minister of Mines and Petroleum Resources. It is to be submitted *annually* and *prior* to the start of the exploration work. At the conclusion of the work programme, or at the time of filing of the next annual report with the Minister, whichever is first, a follow-up report is to be submitted to the Chief Inspector of Mines (using this report form), listing the actual work which was done.

2. Each report is to be accompanied by a map at suitable scale of the licences held under the *Coal Act*. This map is to show the full extent of the exploration work as listed in (8) above. It should show lakes, streams, and inhabited places in the vicinity. It should show the topography and other physical features of the area. As a small-scale insert on this map, show the location of the property. (For administrative purposes, seven copies of this map are required.)

3. The filing of this report with the Minister does not relieve you of your responsibility to file a notice with the Chief Inspector of Mines, as required by section 7 (1) of the *Coal Mines Regulation Act*.

4. One copy of the report is to be forwarded to the District Inspector of Mines and one copy to the District Forest Ranger prior to the start of coal-exploration work on the coal licences.

NOTE—This replaces the use of the form *Notice of Opening of a Mine or Quarry, or of Work on a Mineral Property* for this purpose.

5. Subsection (2) of section 8 of the *Coal Mines Regulation Act* requires the filing of a reclamation report with the Minister. The information required in the reclamation report is outlined in subsection (3) of section 8 of the Act and in Item (3) of the Directive.

This reclamation report should be submitted with the initial report as per paragraph 1 above. If, for good reason it is not possible to do so, application should be made to the Minister for deferment, stating when the report will be submitted. The maximum deferment will not exceed six (6) months.

6. Reclamation of the surface of the land disturbed by the exploration work is to commence at the earliest possible date, commensurate with good operating practice. Prior to starting such reclamation work, the proposed reclamation programme is to be submitted to the Chief Inspector of Mines for approval. Upon completion of the reclama ion programme, or any part of it, such should be reported to the Chief Inspector of Mines. Upon the completed reclamation work being approved, a proportionate reduction in the security deposit will be made.

10M-372-243

PART III

for:

APPENDIX C -
Record of Sampling, Analyses, and Field Tests

APPENDIX D -
Analyses

Refer to:

PR - FARREL CREEK 71(4)A
CONFIDENTIAL ANALYSIS FILE

APPENDIX E

PR - FARREL CREEK 71(A)A

AMAX COAL COMPANY, INC.

FARRELL PROPERTY

(Peace River Project)

CONFIDENTIAL

ANNUAL REPORT 1971 - 72

J. E. HUGHES

CONSULTING GEOLOGIST

APPENDIX C

- data was taken from
PR - FARREL CREEK 71(1)A
OPEN FILE

APPENDIX C

Record of Sampling, Analyses and Field Tests

BR-1: Farrell Property

INTERVAL SAMPLED	BASE OF SEAM	SEAM THICKNESS DRILLING	SEAM THICKNESS LOGS	FSI FIELD	FSI LAB	INH H_2O	ANALYSIS %VM	ANALYSIS %ASH	ANALYSIS %F.C.	SEAM NUMBER
165-168	168	3.0	4.0-.5P	1						1
281-282.5	282.5	1.5	3.0	3						3
404-404.5	404.5	.5	.5	1						
506.5-507	507.0	.5	.5							
521.4-522.4	524.4	3.0	3.5		6	1.00	32.32	8.51	58.17	5
522.4-524.4	524.4	3.0	3.5	1	1	.98	25.10	3.68	70.24	5
528.6-529.7	530.0	1.4	3.0	1	½	.91	24.39	6.39	68.31	5
529.7-530.0	530.0	1.4	3.0		1½	.88	26.59	2.40	70.13	5
549.4-550.1	550.1	.7	.5							
589.5-591.0	591.0	1.5	1.5	5½						
627.0-628.5	628.5	1.5	.5							6
661.1-662.1	662.1	1.0	.5							
679.3-680.3	680.3	1.0	2.0							
698.5-699.2	699.2	.7	.5							
711.2-714.2	715.2	4.0	1.5	6½						
714.2-715.2	715.2	4.0	1.5							
835.0-836.2	836.2	1.2	1.5	2						7
877.3-877.7	877.7	.4	.5							
896.0-898.0	898.0	2.0	.5	8						
906.0-906.8	906.8	.8	.5							
908.0-909.0	909.0	1.0	.5							
946.6-948.1	948.1	1.5	1.5	6½						
996.0-996.6	996.6	.5	.5							
1001.8-1002.5	1002.5	.7	.5		4	.73	27.57	11.77	59.93	8
1003.8-1006.2	1006.2	2.4	.5	8	3	.80	27.48	5.01	66.71	8
1006.3-1007.0	1007.0	.7	.5	5½	7½	.93	27.67	6.30	65.10	8
1010.0-1013.0	1013.0	3.0	1.5	6½	6	.79	28.25	10.10	60.86	8
1023.0-1024.0	1024.0	1.0	.5	4						
1026.4-1027.0	1027.0	.6	.5							
1105.4-1106.7	1106.7	1.3	2.5	2						
1131.2-1137.0	1137.0	5.8	2.0	1						
1166.0-1166.6	1166.6	.6	.5							

BR-3: Farrell Property

INTERVAL SAMPLED	BASE OF SEAM	SEAM THICKNESS DRILLING	SEAM THICKNESS LOGS	FSI FIELD	FSI LAB	INH H_2O	ANALYSIS %VM	ANALYSIS %ASH	ANALYSIS %F.C.	SEAM NUMBER
126.5-127.3	127.3	1.3	2.0		1	.64	24.14	40.79	34.43	1
140.0			.5	4						
839.0-840.0	840.0	1.0	2.5	6						7
878			.5	2						
968-968.5	968.5	.5	1.5	4½						
998.2-998.6	998.6	.4	.5	6½						

BR-4: Farrell Property

INTERVAL SAMPLED	BASE OF SEAM	SEAM THICKNESS DRILLING	SEAM THICKNESS LOGS	FSI FIELD	FSI LAB	INH H_2O	ANALYSIS %VM	ANALYSIS %ASH	ANALYSIS %F.C.	SEAM NUMBER
89.0-92.7	92.7	3.7	4.5	1	1	1.10	28.73	3.34	66.83	2
160.3-165.8	165.8	5.3	4.5-.5P	3½						3
234.2-235.0	235.0	.8	1.0							
403.0-404.5	404.5	1.5	1.0	6						
464.0-464.9	464.9	.9	2.0							
469.5-471.0	471.0	1.5	2.5	1½						
481.8-485.0	485.0	3.2	5.0	1	½	.95	26.45	2.95	69.65	5
489.0-493.0	495.0	6.0	4.0-1.0P	1½	NA	.97	24.70	3.08	71.25	5
493.0-495.0	495.0	6.0	4.0-1.0P	1	NA	.91	25.23	2.06	71.80	5
628.0-632.0	632.0	4.0	5.0	1	NA					6
694.0-696.0	696.0	2.0	1.5	3½						

BR-5: Farrell Property

INTERVAL SAMPLED	BASE OF SEAM	SEAM THICKNESS DRILLING	SEAM THICKNESS LOGS	FSI FIELD	FSI LAB	INH H_2O	ANALYSIS %VM	ANALYSIS %ASH	ANALYSIS %F.C.	SEAM NUMBER
142.0-145.5	145.5	3.5	3.5	3½	2	.72	25.23	7.31	66.74	1
415.0-416.0	416.0	1.0	2.0	1						4
429.2-429.7	429.7	.5	.5							
457.4-457.9	457.9	.5	.5							
503.5-504.5	504.5	1.0	.5	1½						5
507.6-510.6	510.6	3.0	2.5	2½						5
536.4-540.6	540.6	4.2	3.0	1	3	.85	31.76	8.63	58.76	5
552.8-553.8	553.8	1.0	.5							
566.0-568.5	568.5	2.5	1.0	6½						
592.5-594.5	594.5	2.0	1.5	7½						
608.1-609.0	609.0	.9	.5							
612.5-614.5	614.5	2.0	.5	8						
622.0-625.0	627.0	5.0	4.5-.5P	1½	½					6
640.3-643.3	643.3	3.0	1.5	3						
669.0-669.4	669.4	.4	.5							
672.0-672.7	672.7	.7	1.0							
712.7-714.7	714.7	2.0	2.5	1						
715.6-716.8	716.8	1.2	.5							
751.5-752.7	752.7	1.2	.5	8						
779.0-780.0	780.0	1.0	.5							
821.6-821.9	821.9	.3	.5							
825.6-827.4	827.4	1.8	2.5	1						7
897.6-901.1	901.1	3.5	4.5-.5P	2	½	.83	24.13	3.11	71.93	
912.3-912.8	912.8	.5	.5							
946.5-948.0	948.0	1.5	1.5	4						
962.5-964.5	964.5	2.0	2.0	7½						
968.0-970.0	970.0	2.0	.5	3½						
978.5-979.1	979.1	.6	.5							
988.0-990.5	990.5	2.5	2.0	4	2½					8L
1000.0-1004.0	1004.0	4.0	2.5	2½	1					8m
1122.5-1123.5	1123.5	1.0	1.0							
1148.0-1149.0	1149.0	1.0	.5							
1153.6-1154.1	1154.1	.5	.5							

P. Graham
Amax Coal Company, I

APPENDIX D

To: MEADOWLARK FARMS INC.
1415 24A Street,
Calgary 4, Alta.

Attn: Mr. P. Graham

File No. 4808
Date Nov. 26, 1971
Samples Coal

Certificate of ASSAY of

LORING LABORATORIES LTD.

SAMPLE No.	INH. %H2O	% V.M.	% ASH	% F.C.	FSI
ANALYSIS OF FLOATS					
BR-1					
521.4-522.4'	1.00	32.32	8.51	58.17	6
522.4-524.4'	.98	25.10	3.68	70.24	1
528.6-~~530~~ 529.7	.91	24.39	6.39	68.31	½
529.7-530'	.88	26.59	2.40	70.13	1½
1001.8-1002.5'	.73	27.57	11.77	59.93	4
1003.8-1006.2'	.80	27.48	5.01	66.71	3
1006.3-1007'	.93	27.67	6.30	65.10	7½
1010-1013'	.79	28.25	10.10	60.86	6
BR-4					
89-92.7'	1.10	28.73	3.34	66.83	1
481.8-485'	.95	26.45	2.95	69.65	½
489-493'	.97	24.70	3.08	71.25	N.A.
493-495'	.91	25.23	2.06	71.80	N.A.
BR-5					
142-145.5'	.72	25.23	7.31	66.74	2
536.4-540'	.85	31.76	8.63	58.76	3
897.6-901.1'	83	24.13	3.11	71.93	½

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES ....

Rejects Retained one month.

Pulps Retained one month unless specific arrangements made in advance.

A. Lime

Licensed Assayer of British Columbia

To: BEACONLARK FARMS INC.
1415 25A Street, S.E.
Calgary 4, Alta.
Attn: Mr. P. Graham

File No. 4808
Date Nov. 26, 1971
Samples Coal

Certificate of ASSAY

LORING LABORATORIES LTD.

SAMPLE No.	Float %	Sink %
SINK-FLOAT ANALYSIS S.G. 1.45		
ER-1		
521.4-522.4'	84.0	16.0
522.4-529.7'	75.6	24.4
528.6-530.0'	52.7	47.3
529.7-530.0'	88.5	11.5
1001.8-1002.5'	37.0	63.0
1003.8-1006.2'	48.0	52.0
1006.3-1007.0'	53.0	47.0
1010-1013'	28.5	71.5
ER-4		
89.0-92.7'	95.4	4.6
481.8-485'	92.2	7.8
489-493'	93.7	6.3
493-495'	96.9	3.1
ER-5		
142-145.5'	35.3	64.7
536.4-540.6'	46.6	53.4
897.6-901.1'	63.1	36.9

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES ....

Rejects Retained one month.
Pulps Retained one month unless specific arrangements made in advance.

ii

C. L. McIsaac
Licensed Assayer of British Columbia

To: MEADOWLARK FARMS INC.
1415 25A St. S.W.,
Calgary 4, Alta.

Attn: Mr. P. Graham

File No. 4808
Date Nov. 26, 1971
Samples Coal

Certificate of ASSAY

LORING LABORATORIES LTD.

SAMPLE No.	I.M. H2O %	V.M. %	ASH %	F.C. %	FSI
RAW COAL					
BR - 4 outcrop	3.01	31.57	11.09	54.33	N.A.

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES ....

Rejects Retained one month.

Pulps Retained one month unless specific arrangements made in advance.

iii

To: MEADOWLARK FARMS INCORPORATED,
1415 25A Street S.W.,
Calgary 4, Alberta
Attn: Mr. P. Graham

File No. 4883
Date Dec. 23, 1971
Samples Coal

Certificate of ASSAY of
LORING LABORATORIES LTD.

SAMPLE No.	INH %H2O	% V.M.	% ASH	% F.C.	% S	B.T.U. / lb.	FSI
RAW COAL							
BR-4 126.5'	.64	24.14	40.79	34.43	.50	8,454	1
BR-4 628-632'	.40	-	-	-	.31	6,696	-
BR-5 622-625'	.52	-	-	-	.50	11,319	-
BR-5 988-990.5'	.52	-	-	-	.72	13,024	-
BR-5 1000-1004'	.47	-	-	-	.44	7,443	-

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES ....

Rejects Retained one month.
Pulps Retained one month unless specific arrangements made in advance.

Licensed Assayer of British Columbia

To: MEADOWLARK FARMS INC.
1415 25A Street, S.W.,
Calgary 4, Alberta

Attn: Mr. P. Graham

File No. 4931
Date Jan. 12, 1972
Samples Pulps

Certificate of ASSAY

LORING LABORATORIES LTD.

SAMPLE No.	FSI
BR-4 628-632'	N.A.
BR-5 622-625'	½
BR-5 988-990.5'	2½
BR-5 1000-1004'	1

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES . . . .

Rejects Retained one month.

Pulps Retained one month unless specific arrangements made in advance.