N. E. Roberts.

APPENDIX II

GEOLOGICAL DATA SUMMARY

OF THE

WOLF MOUNTAIN COAL PROPERTY

93G/1 1982

for

WOLF MOUNTAIN COAL LTD.

By:

JHP COAL-EX CONSULTING LTD.
312 - 525 Seymour Street,
Vancouver, B. C.
V6B 3H7

November 14th, 1982

Summary of report #177

804

SUMMARY

The Wolf Mountain Coal Property is located on Vancouver Island, British Columbia, within a few kilometres of the city of Nanaimo. The property comprises an area of 1,179 hectares and is located to cover strata which are known to be coal-bearing. Immediately to the east of the property are several small towns, as well as the Provincial Highway No. 1 and the Esquimalt-Nanaimo rail line. The principle industries in the region are forestry, forest products and tourism.

Exploration of the Wolf Mountain property is being conducted by Wolf Mountain Coal Ltd., a private group which has an agreement with Netherlands Pacific to earn a 50% interest in the property. The Wolf Mountain property originally formed part of a much larger group of coal licences held by Netherlands Pacific. These coal licenses were optioned by Gulf Canada Resources Inc. in early 1981. Subsequent exploration by Gulf identified only the Wolf Mountain area as having any potential. As the total estimated coal reserves were not of the magnitude required by Gulf Canada, they withdrew their interest and the property reverted back to Netherlands Pacific.

Six coal seams have been identified within the Extension-Protection Formation of the Wolf Mountain Coal Property. These seams range in thickness from a few tens of centimetres up to 2.77 metres. Only one seam is presently considered to be of economic interest. This seam ranges in true thickness from 0.84 to 2.77 metres and is correlated with the Wellington seam, the major coal seam of the region and one which has supported many old workings.

The geologic structure of the property is an asymmetrical syncline, the axis of which plunges gently to the east. The structure noses in the western part of the coal reserve area. The southern limb is generally shallow, with dips to the north of approximately 7°. The northern limb

is steeper, with dips to the south of up to 27°.

A total in situ resource base of 3.25 million tonnes from one mineable seam has been calculated for the property, and underground mineable R.O.M. (product) reserves of 1.83 million have also been determined. A further 0.21 million tonnes of high ash coal will be produced from in-pit cleaning, due to the removal of at least one thin rock band. This material may well be marketable to local cement plants. The drill hole spacing, which approximates a 350 metre grid and the regular nature of the coal seam stratigraphy over most of the property, allow the coal resources to be placed in a proven category.

The coal contained within seam W.1 is a high quality thermal coal of the high volatile bituminous A type. Analytical results indicate that BTU levels of 12,000 and 13,000 can be obtained from coal with ash values of 15% and 10% respectively. Sulphur content is consistently less than one percent, sodium content is low, and the results obtained from Hardgrove index and ash fusion tests are favourable. The coal is also agglomerating with FSI values up to 4 for coal of 15% ash content.

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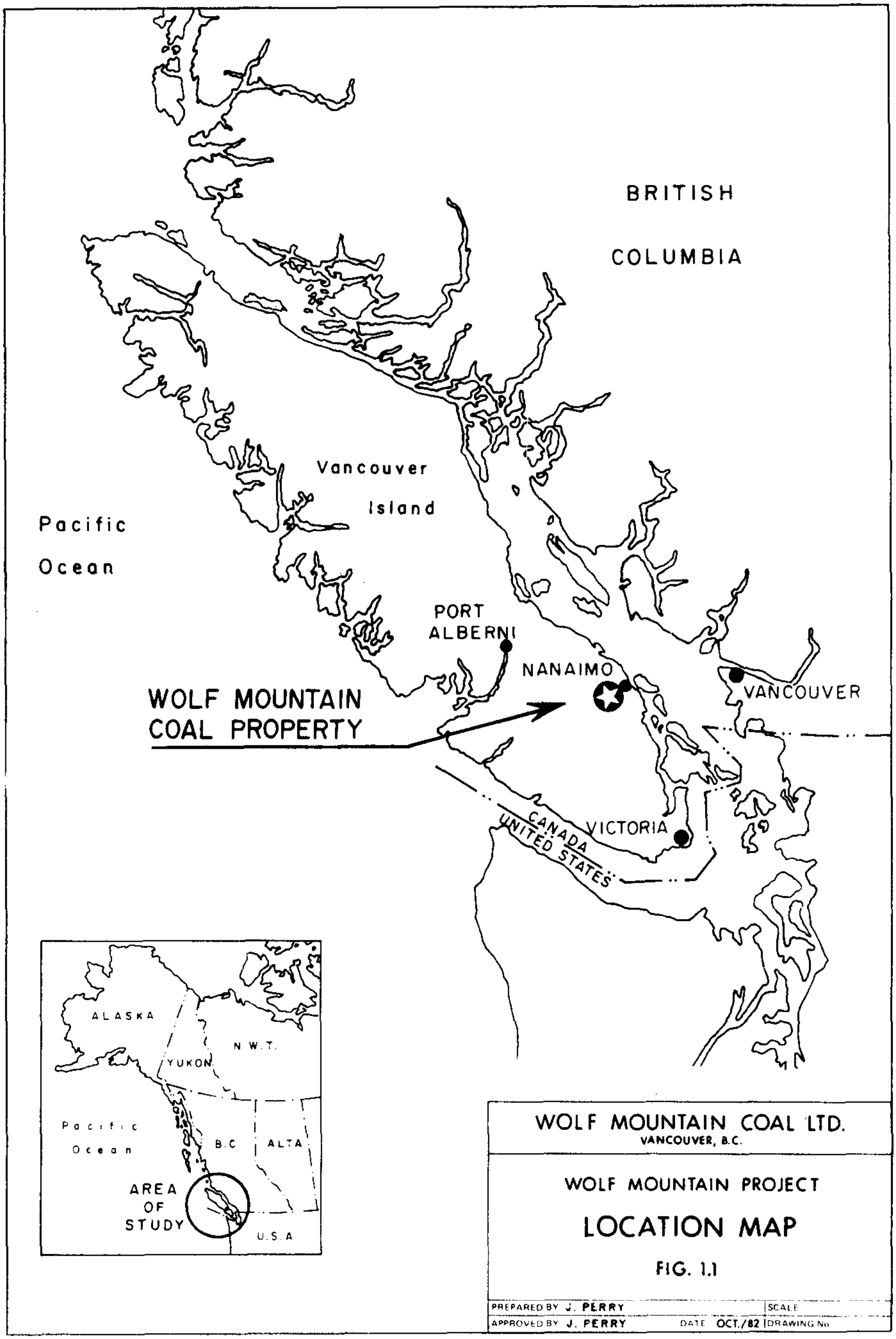
1.0 INTRODUCTION

This report presents a summary of the results obtained from the geological exploration performed on the Wolf Mountain Coal Property during the summer of 1982. The data contained herein have been compiled to accompany the Stage I submission on the property by Wolf Mountain Coal Ltd. A final geological report will be completed subsequent to the further drilling of one or two holes in mid-November.

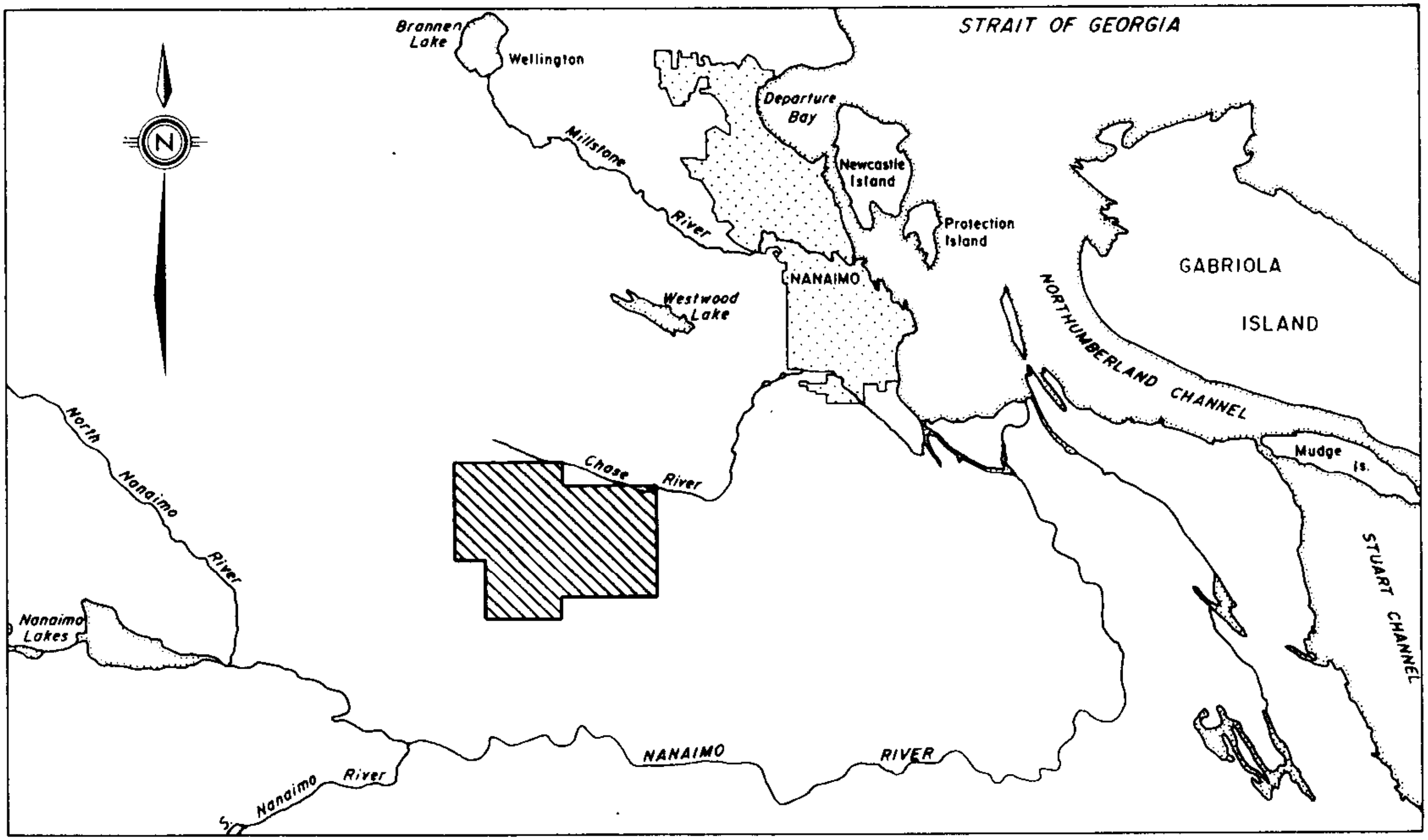
Eastern central Vancouver Island is an area that has a long history of coal mining. Although no mines are presently in production, coal was mined in this region between 1852 and 1967. Recent increases in demand for thermal coal for Pacific Rim markets have caused a number of companies to take a second look at Vancouver Island coalfields. Areas that were previously mined or of low tonnage potential are being reconsidered, as well as previously untested areas.

The Wolf Mountain Coal Property is comprised of 1,179 hectares located along the eastern side of Vancouver Island in the immediate vicinity of Nanaimo, British Columbia (see Figures 1.1 and 1.2). The property was acquired by Netherlands Pacific Mining Company Inc. as part of a much larger block of coal licences in 1979. This block plus another which lay a few kilometers to the north were optioned to Gulf Canada Resources Inc. in January, 1981. Gulf subsequently named these coal licences the "Benson Coal Property". Reconnaissance exploration comprising regional-scale geological mapping and rotary drilling was undertaken by Gulf Canada later that spring. Only the Wolf Mountain area was identified as having any potential but, as the total estimated reserves were not of the magnitude required, Gulf withdrew their interest. The property returned to Netherlands Pacific Mining Company Inc., who retained the coal licences around Wolf Mountain but allowed the rest to revert to the Crown.

Exploration of the property during the past summer has been conducted by Wolf Mountain Coal Ltd. This is a private group headed by Mr. Eric Roberts, P. Eng., which has recently entered into an agreement with Netherlands Pacific to acquire a 50% interest in the Wolf Mountain property. The focus of the exploration was to establish the reserves and quality of coal contained within the Wellington seam (seam W.1). Details of the geology, reserves and coal quality are presented in the following sections of the report.


BRITISH
COLUMBIA
Vancouver
Island
Pacific
Ocean
PORT
ALBERNI
NANAIMO
VANCOUVER
WOLF MOUNTAIN
COAL PROPERTY
VICTORIA
CANADA
UNITED STATES
ALASKA
N.W.T.
YUKON
Pacific
Ocean
B.C
ALTA
AREA
OF
STUDY
U.S.A

WOLF MOUNTAIN COAL LTD.
VANCOUVER, B.C.
WOLF MOUNTAIN PROJECT
LOCATION MAP
FIG. 1.1
PREPARED BY J. PERRY
SCALE
APPROVED BY J. PERRY
DATE OCT./82
DRAWING No.



WOLF MOUNTAIN COAL LTD.
VANCOUVER, B.C.

WOLF MOUNTAIN PROJECT

PROPERTY MAP

FIG. 1.2

PREPARED BY: J. PERRY		SCALE: 1:150,000
APPROVED BY: J. PERRY	DATE: OCT./82	DRAWING No.

2.0 LOCATION, ACCESS AND PHYSIOGRAPHY

The Wolf Mountain Coal Property lies close to the city of Nanaimo (population 47,000) and occupies part of the eastern coastal plain of central Vancouver Island, British Columbia. The property is located within a region where coal mining was, for a long time, the primary industry. Although no mines are operational at the present time, coal was mined around Nanaimo between 1852 and 1953. Today, the major industries in the Nanaimo region are forestry-related industries and tourism.

The Wolf Mountain Coal Property is composed of five coal licences which are located along the western limits of the Nanaimo coalfield, approximately 10 kilometres southwest of Nanaimo (Figure 2.1). Access to the property is excellent; a major unpaved, all-weather forestry road extends from just south of the property to Nanaimo. Branching out from this road are a number of secondary logging roads and trails which cut through the property.

The Provincial Highway No. 1 and the Esquimalt-Nanaimo rail line are located a short distance to the east of the property. The highway and rail line provide a major transportation corridor to port facilities along the eastern coast of Vancouver Island.

Wolf Mountain is a steep-sided hill which forms the southeastern portion of a northwest trending ridge (Blackjack Ridge). Elevations range from approximately 400 to 740 metres above sea-level. The slopes are relatively regular except near the top where cliffs and benches predominate. The main drainages on Wolf Mountain are Boulder Creek (west flank), Manson Creek (south flank) and Chase River which trends along the northern edge of the property. Most of the property is covered by forest, generally second growth pine, fir and alder. Recent logging operations have been undertaken on the southern and upper, south-eastern flanks and these areas will be slashed and cleared in the coming winter months.

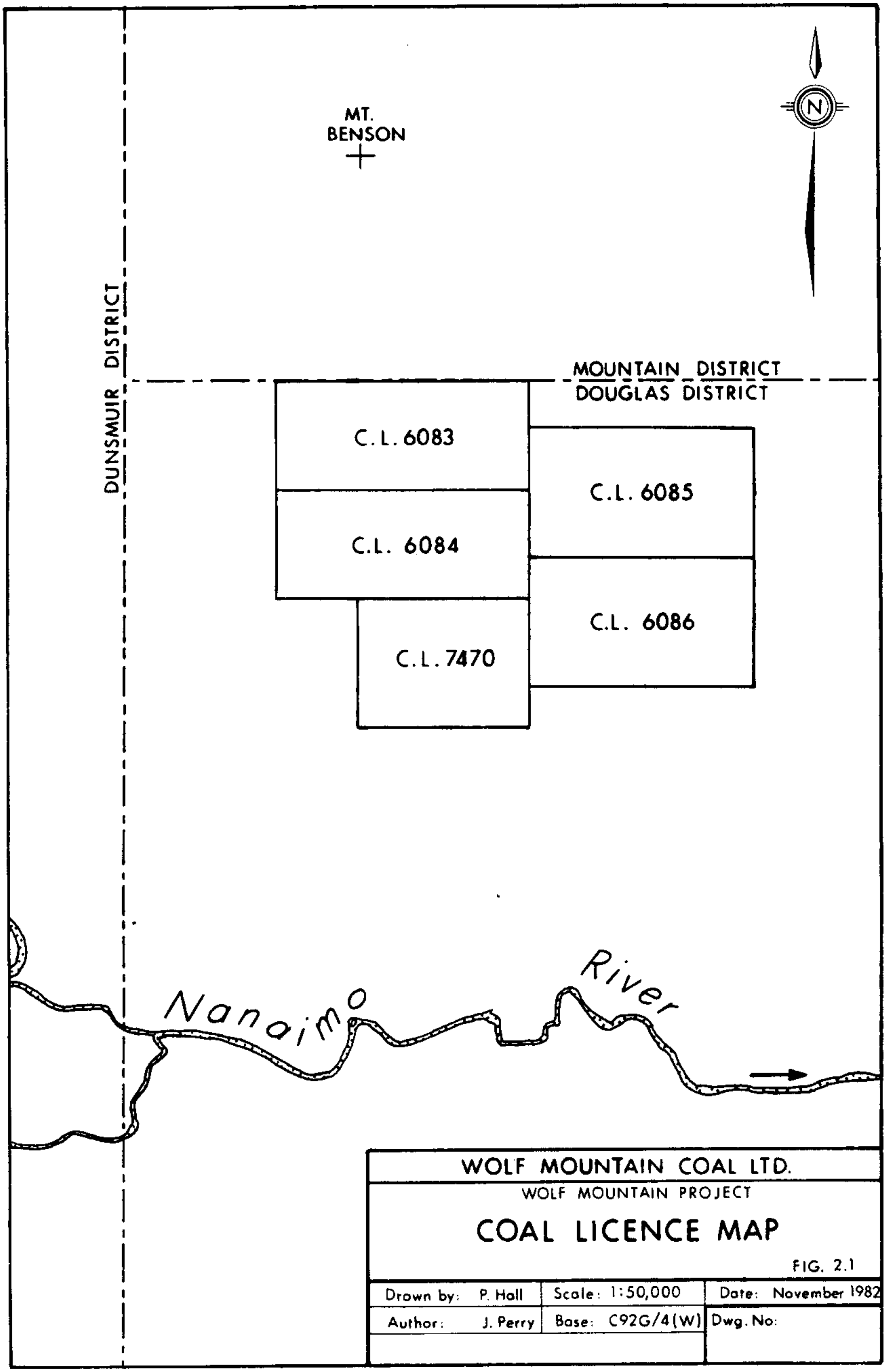

MT. BENSON
DUNSMUIR DISTRICT
MOUNTAIN DISTRICT
DOUGLAS DISTRICT
C.L. 6083
C.L. 6084
C.L. 6085
C.L. 6086
C.L. 7470
Nanaimo River
WOLF MOUNTAIN COAL LTD.
WOLF MOUNTAIN PROJECT
COAL LICENCE MAP
Drawn by: P. Hall
Scale: 1:50,000
Date: November 1982
Author: J. Perry
Base: C92G/4(W)
Dwg. No:

FIG. 2.1

3.0 SUMMARY OF EXPLORATION WORK

3.1 Pre 1982 Exploration Work

The search for and the mining of coal in the Nanaimo region was quite extensive between 1852 and 1953. The Nanaimo coalfield quickly became established as a major producer of high quality steam coal in western North America. By the time the industry closed down, a large portion of the coal seams had been mined.

The search for coal extended to Wolf Mountain, where several prospect holes were dug on seams W.2 and W.3 (see Buckham, 1947). The Wellington seam (seam W.1) was not found by these prospectors, probably because it does not sit right at the base of a conglomerate as it does in other parts of the coalfield. On Wolf Mountain it is seam W.2 (or Little Wellington) that sits in that position.

In 1981, Gulf Canada drilled a number of holes on and around Wolf Mountain as part of an exploration project over a much larger area. Only one hole was found to have significant coal seams, and that was on the top of Wolf Mountain (GBS-RDH-81-05). The exploration was at the reconnaissance level and was pursued no further by Gulf.

3.2 The 1982 Exploration Programme

The objectives of the 1982 Exploration Programme were to delineate the coal reserves on Wolf Mountain and acquire data on the coal quality from drill core and rotary drill cuttings.

To achieve these objectives, a programme of rotary drilling, geological mapping, down-hole geophysical logging and topographic mapping was carried out. Fourteen holes were drilled for a total of 570 metres. These holes were drilled on nine sites with two holes located on two sites and four holes on one site. The reason for twinning drill holes on three sites was so that a full core could be obtained across the coal seam using the depths derived from the initial hole to determine the core point. (The extra two holes on site 82-07 were necessary due to problems encountered in coring and poor coal recovery.) All holes were logged by down-hole geophysical techniques, except for the extra holes drilled for coring the coal seam.

Regional-scale geological mapping was undertaken on enlargements of existing 1:50,000 government maps. All drill hole locations were surveyed in and topographic maps were constructed at a scale of 1:2,500 using ground survey data and air-photographs. These maps were only available after the field-work was completed.

An extensive programme of analysis has been undertaken on the coal core, supplemented by more basic analysis of the rotary hole coal seam cuttings. The results of this phase of the programme are fully outlined in the "Coal Quality" section of this report.

4.0 GEOLOGY

4.1 Stratigraphy

4.1.1 General Stratigraphy

The Wolf Mountain Coal Property is located to cover coal-bearing strata within the Upper Cretaceous Nanaimo Group. The coal seams are found within the Extension-Protection Formation located just above the base of the Group. Strata of the Nanaimo Group unconformably overlie metasediments and igneous rocks of the Sicker and and Vancouver Groups and Island Intrusions. The distribution of the Nanaimo Group lithologies contained within the property is shown on the Geology Map and Structural Cross-Sections (Figures 4.1 and 4.2). Stratigraphic correlations of the rock units penetrated by the drill holes are presented in Figures 4.3 and 4.4.

The sediments that comprise the Nanaimo Group have been shown to represent five sedimentary cycles (Muller & Jeletzky, 1970). Four of the cycles are transgressive, each grading upwards from fluvial to deltaic and/or lagoonal, through nearshore to offshore marine. The fifth cycle is only deltaic. Each of the first four cycles is comprised of two formations: the first is a non-marine sandstone-conglomerate sequence which may contain lagoonal shale and coal; the second is an overlying, mainly marine,siltstone-shale sequence. Within the Nanaimo region only the lagoonal Extension-Protection Formation is coal-bearing. A general description of the stratigraphy of the lower portions of the Nanaimo Group is presented in Table 4.1.

TABLE 4.1

TABLE OF FORMATIONS -
LOWER PORTION OF THE UPPER CRETACEOUS
NANAIMO GROUP

Formation	Lithology	Regional Variation in Thickness (metres)
Extension-Protection	Sandstone, conglomerate shale, coal	0-580
Haslam	Shale, siltstone, fine-grained sandstone	0-305
Comox (Benson Member)	Sandstone, shale (Conglomerate)	0-410

4.1.2 Nanaimo Group

4.1.2.1 Comox Formation

The Comox Formation forms the lower part of the first depositional cycle. Rocks of this formation are generally represented by the basal conglomerate of the Benson Member, a sequence of massive conglomerate of considerable lateral and vertical variation. Finer grained Comox Formation lithologies are present but their thickness and extent are even more variable than that of the conglomerates. It is not known whether Comox Formation lithologies exist at depth throughout the property, but they are present in the southeast (as pebbly sandstones) and northeast (as the conglomeratic Benson Member). To the west, however, lithologies of the Haslam Formation directly overlie the basement volcanics. No significant coal seams have been found in the Comox Formation of the Nanaimo Region (Perry, 1981).

4.1.2.2 The Haslam Formation

The Haslam Formation represents the upper part of the first depositional cycle and is composed of a monotonous sequence of marine shales, siltstones, and fine-grained sandstones. The fine-grained lithologies of the upper portions of the Comox Formation are considered to be transitional with those of the overlying Haslam Formation. The Haslam shales are recessive and, hence, usually drift covered; exposures are largely confined to streams and occasional road-cuts. The shales and siltstones are commonly thin-bedded, dark grey to black when fresh, and often highly fossiliferous. They weather to a reddish-brown colour and appear in outcrop as oval, concentrically weathered masses, varying in size up to 1 metre in length. In drill hole

GBS-RDH-81-05, the Haslam Formation is at least 260 metres thick.

4.1.2.3 The Extension-Protection Formation

The Extension-Protection Formation conformably overlies the Haslam Formation and represents the lower part of the second depositional cycle. This formation contains the only coal seams of economic interest in the Nanaimo region. They are found in the lower half of the formation and were extensively mined between 1852 and 1953. The major seams are named Wellington, Newcastle and Douglas; most of the production came from the Wellington and Douglas seams.

The Extension-Protection Formation is a sequence of coarse clastic sediments composed mainly of interbedded conglomerates and sandstones with occasional interbeds of shale and coal. The conglomerates are generally massive and clast size ranges from small pebble to cobble. The clasts vary from rounded to subrounded and are composed predominantly of cherts, although granitic and volcanic clasts are quite common. Sandstone interbeds are common; the sandstone is generally medium to coarse grained, yellow weathering but olive grey when fresh and consists of quartz, feldspar, volcanic and chert grains. At the base of the formation is a thick sandstone called the East Wellington sandstone. This commonly forms the floor of the Wellington seam. On Wolf Mountain the thick conglomerate-sandstone horizons form cliffs and bluffs with the more recessive shales and coal at their base. The prominent "benched" topography developed around the upper southern and eastern flanks of the mountain results from the weathering back of the coals and shales. Only the lowermost portion of the Extension-Protection Formation are represented on the property. Consequently, only the lowermost coal seams, that is, those associated with the Wellington seam, are present. A discussion of the coal seam stratigraphy is presented below.

4.1.3 Coal Seam Stratigraphy

A total of six coal seams have been identified on the Wolf Mountain property (see Figure 4.4, drill hole GBS-RDH-81-05). However, because of thickness and quality considerations, only one of these is considered to be economically mineable. This seam is, throughout most of the property, the lowermost coal seam: it is referred to as seam W.1 and is correlated with the Wellington seam. Only in drill hole GBS-RDH-81-05 is there a seam which underlies seam W.1 and it is referred to as seam Wx. This thin seam was not intersected in any other drill holes (Fugures 4.3 and 4.4) and must, therefore, be of very limited extent. The main coal seams are numbered in ascending order, seam W.5 being the topmost coal seam. The areal extent of these coal seams diminishes rapidly from bottom to top due to the effects of erosion and the shape of the topography.

As a result of the drill programme it has been possible to establish positive correlation of the coal seams throughout the property. This correlation is readily apparent from the signatures each seam makes on the geophysical logs (see Figures 4.3 and 4.4). Some of the more pertinent characteristics of seam W.1 are summarized below.

Seam W.1 averages approximately 2.4 metres in true thickness, and ranges between 0.84 and 2.77 metres. Generally, however, the range in thickness is from 1.69 to 2.77 metres, as only one hole, WM-RDH-82-01 (0.84 metres) has a seam thickness of less than 1.69 metres. The seam possesses good lateral and vertical continuity, except in the vicinity of hole WM-RDH-82-01 where most of the seam shales out and several coal splits are present between seams W.1 and W.2. The variation in seam thickness across the reserve area is illustrated in Figure 4.5, the isopach map for seam W.1.

Two thin rock bands are characteristically developed in the top half of seam W.1, except in the western portions of the reserve area where only one is present. These bands are each of the order of 0.10 metres in thickness. Another rock and/or poor coal band is present near the base of the seam. Throughout most of the area this band is only a few centimetres thick, but ranges between 0.20 and 0.40 metres thick between holes WM-RDH-82-03, 09 and 07. Apart from these rock bands the rest of the seam is relatively free from rock or poor coal partings. The rock bands present in seam W.1 are usually highly carbonaceous, almost coaly, and are difficult to distinguish in structurally deformed portions of the coal seam.

The floor of seam W.1 is commonly a medium to coarse grained sandstone which may be highly carbonaceous at the contact with the coal seam. This sandstone, known as the East Wellington sandstone, is quite thick and forms the floor in the old workings nearby.

The roof of the seam is a sandstone in the western half of the reserve area and a shale in the eastern half. The sandstone is usually fine grained and often interlayered with very thin coal bands for the first 0.10 to 0.20 metres above the seam. The shale is quite competent, generally massive, with only a slight fissility and provides a sharp contact with the underlying coal.

As the other, minor, coal seams are not considered to possess any reserve potential, they have not been studied in any great detail. The only seam of any reasonable thickness is seam W.3. It is composed mainly of highly carbonaceous, coaly shale with only thin coal splits throughout and would not provide an economical product for marketing (see Section 6.0). These minor coal seams may also be correlated with seams described from other parts of the Nanaimo coalfield. Seam W.2 correlates with the Little Wellington seam, while seam W.3 probably correlates with a seam exposed at "Jack's Prospect" on the north bank of the Nanaimo River south of Extension (see Dowling, 1915 b).

The outcrop trace of the Wellington seam as presented on the Geology Map (Figure 4.1) has been projected using the drill hole and nearby strike and dip data. The coal seam has not yet been located on the ground due, mainly, to the amount of talus and overburden in the areas of projected seam outcrops.

4.2 Structural Geology

Prior to the 1982 exploration programme, a fault was believed to extend across the reserve area in a roughly west-southwest to east-north-east direction. The beds in the southern half were believed to dip at approximately 13° to the north and those in the northern half at 15° to the southwest. Present mapping and air-photograph study has failed to confirm the presence of a fault on Wolf Mountain.

Analysis of the data indicates that the structure of Wolf Mountain is that of a gentle, easterly plunging syncline which noses sharply in the west. The dip of the beds on the north flank of the fold is approximately 23° to the south. On the south flank the dips are about 20° to the northeast in the nose of the fold, but flatten out quickly to the east, where they dip approximately 6° north. The fold axis trends roughly east-west and the plunge of the fold averages 4° to the east. Details of the structure are well illustrated in the structural cross-sections and structure contour map for seam W.1, Figures 4.2 and 4.6 respectively.

Geological mapping to date has largely been on a reconnaissance basis and consequently, analysis of the structural geology has been hampered by the lack of seam W.1 outcrops and reliable bedding measurements. The conglomerates and sandstones that are exposed on Wolf Mountain show extensive cross-bedding and this accounts for the apparent discrepancy between surface bedding measurements as shown on the Geology Map (Figure 4.1) and the dip of the beds as determined from analysis of the drill hole data. This, however, is not considered to detract significantly from the structural interpretation presented herein which is based primarily on the drill hole data.

Very little data is available on the small-scale structures which may affect seam W.1. Examination of core from WM-RDH-82-02A, 06A and 07A indicates that the amount of disturbance in the east portion of the reserve area is very slight. It increases to the west in proximity to the nose of the syncline, as is indicated by intense shearing of the coal in hole WM-RDH-82-07A. Small scale roof structures which will be found in the underground operations of the proposed mine will be more prevalent in the western half than the eastern half of the reserve area.

5.0 RESERVES AND RESOURCES

5.1 Summary of Reserve and Resource Evaluation

A calculation of resources and reserves has been made for the Wolf Mountain Coal Property. The calculations have been applied to seam W.1 only. The resource calculation includes all coal in place within the seam, while the reserve calculations are intended to demonstrate the quantity of "run of mine" (R.O.M.) coal which might be extracted during mining. Table 5.1 and Figures 5.1 to 5.4 illustrate the results of these calculations.

On the basis of the discussion above, a total resource base of 3.25 million tonnes for seam W.1 has been calculated for the property, with an R.O.M. value of 1.83 million tonnes. A further 0.21 million tonnes of high ash coal will be available from in-pit cleaning. This material may well be marketable to local cement plants.

The in-situ resources have been placed in the proven category since the coal seams have been demonstrated to be very regular and, apart from in the vicinity of hole WM-RDH-82-01, thickness variations occur in a gradual manner. In addition, although the property has not been drilled on a grid pattern, the drill hole spacing averages approximately 350 metres, with a range in spacing from 250 to 470 metres.

5.2 Method of Resource and Reserve Calculations

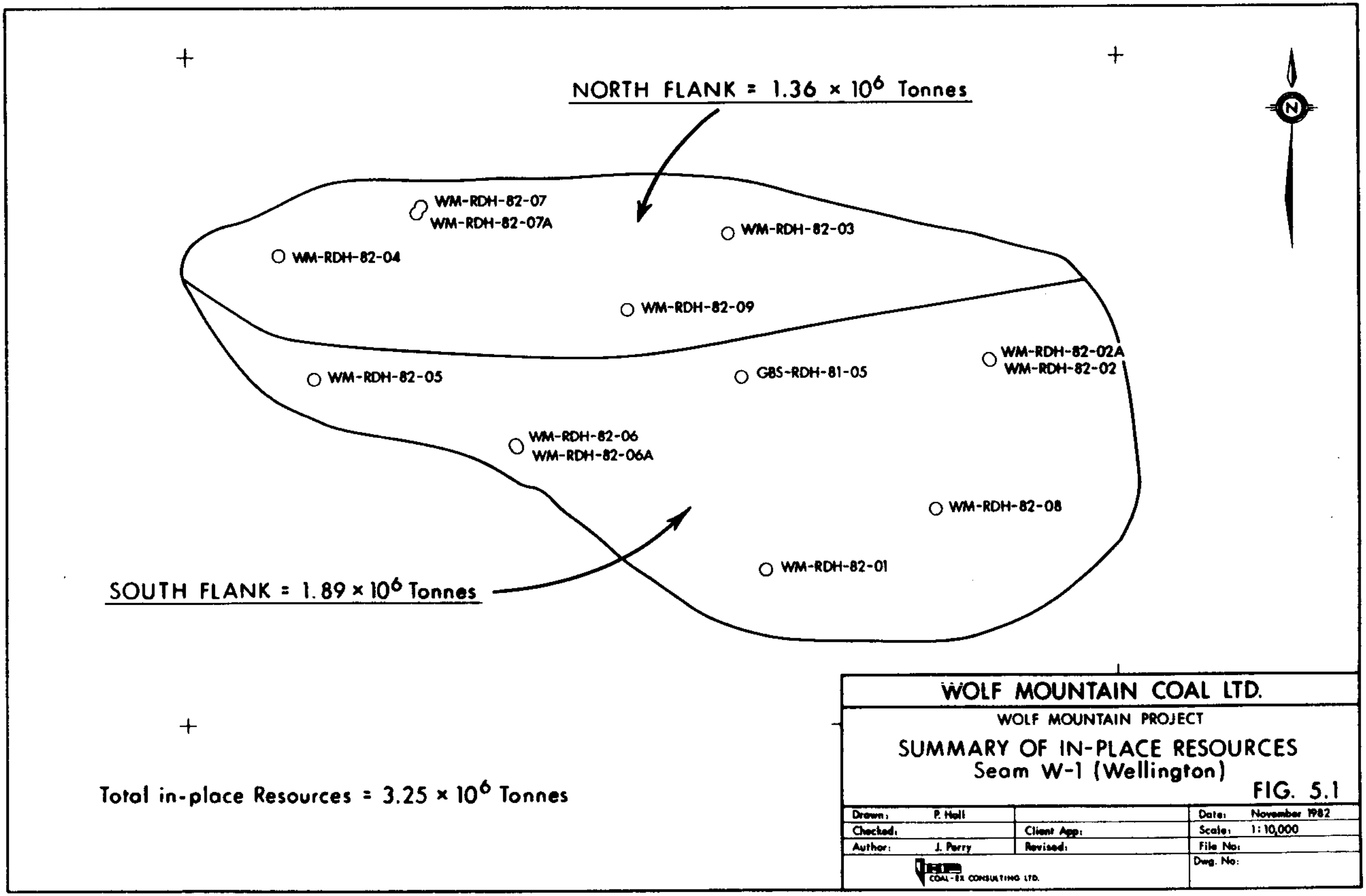
5.2.1 Total In-Place Coal Resources

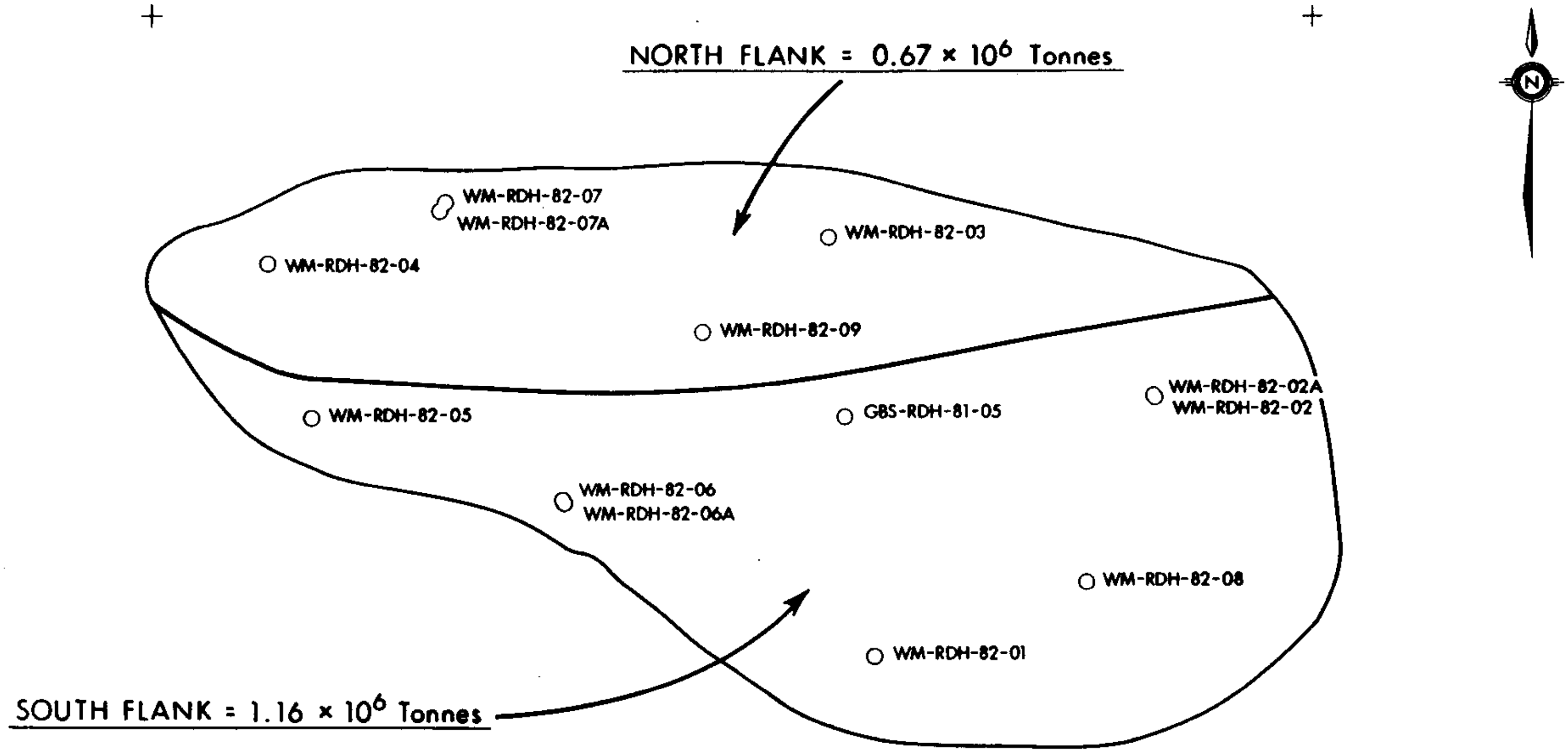
The in-situ resource calculations for the Wolf Mountain property were calculated by the planimeter method. The area was divided into blocks based on the structure

TABLE 5.1

SUMMARY OF RESOURCES AND RESERVES FOR SEAM W.1 -
WOLF MOUNTAIN

Reserve Block	In-Place Tonnes ($x10^6$) "Resources"	R.O.M.Tonnes ($x10^6$) "Reserves"	High Ash "Cut" Tonnes ($x10^6$)
A	0.1080	0.0519	0.0075
B	0.2747	0.1358	0.0153
C	0.1253	0.0624	0.0065
D	0.4370	0.2147	0.0256
E	0.4175	0.2066	0.0230
F	0.9413	0.6049	0.0540
G	0.3051	0.1873	0.0263
H	0.0413	--	--
I	0.1926	0.1163	0.0185
J	0.1758	0.1105	0.0126
K	0.0503	0.0305	0.0048
L	0.0684	0.0427	0.0052
M	0.1120	0.0692	0.0092
TOTAL	3.25	1.83	0.209 x 10^6 tonnes


NORTH FLANK = 1.36 × 10⁶ Tonnes
WM-RDH-82-07
WM-RDH-82-07A
WM-RDH-82-03
WM-RDH-82-04
WM-RDH-82-09
WM-RDH-82-02A
WM-RDH-82-02
WM-RDH-82-05
GBS-RDH-81-05
WM-RDH-82-06
WM-RDH-82-06A
WM-RDH-82-08
WM-RDH-82-01
SOUTH FLANK = 1.89 × 10⁶ Tonnes
N
Total in-place Resources = 3.25 × 10⁶ Tonnes
WOLF MOUNTAIN COAL LTD.
WOLF MOUNTAIN PROJECT
SUMMARY OF IN-PLACE RESOURCES
Seam W-1 (Wellington)
FIG. 5.1
Drawn: P. Hall
Checked:
Author: J. Perry
Client App:
Revised:
Date: November 1982
Scale: 1:10,000
File No:
Dwg. No:
COAL-EX CONSULTING LTD.



Total R.O.M. Reserves = 1.83 × 10^6 Tonnes

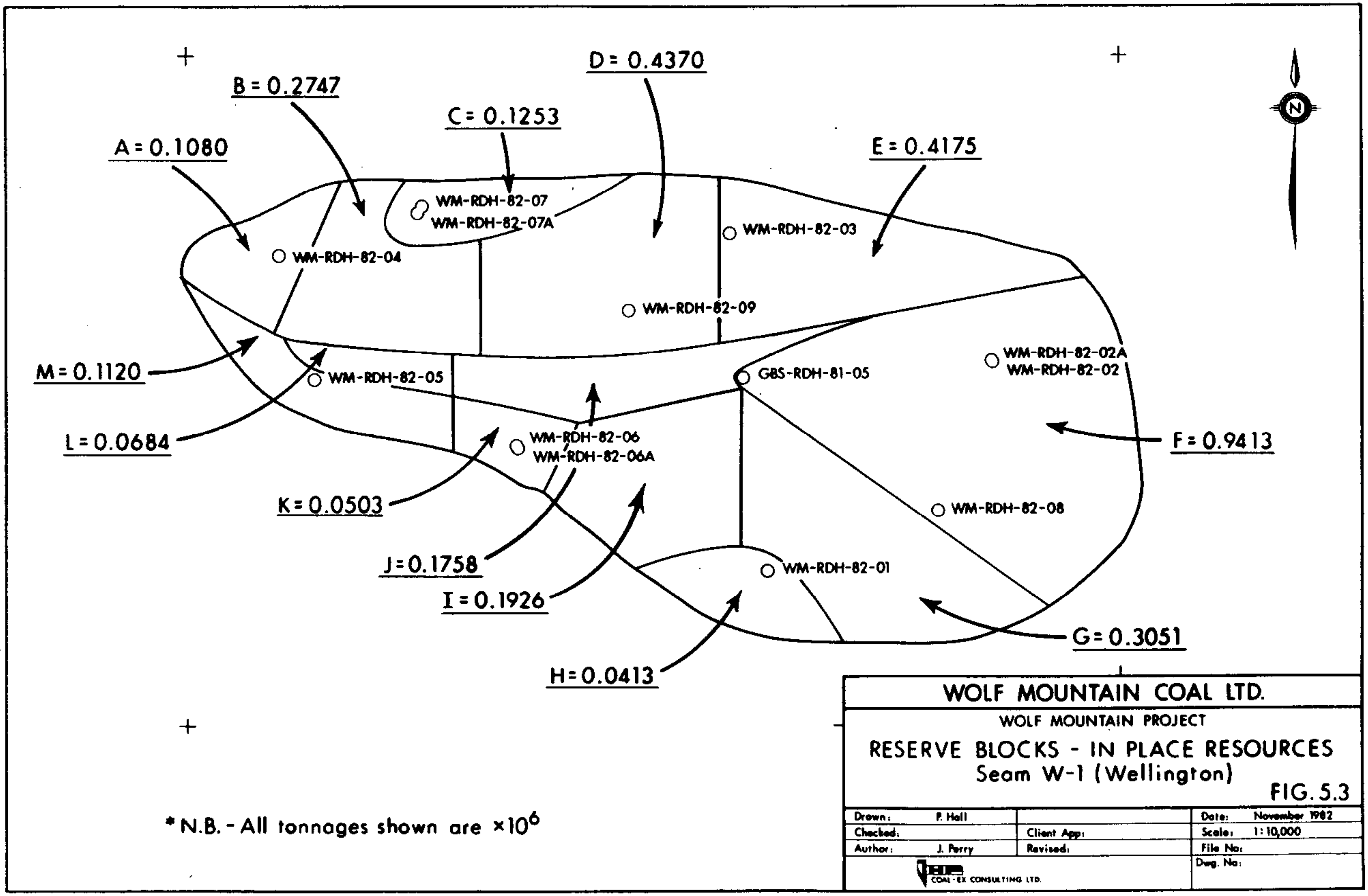
WOLF MOUNTAIN COAL LTD.

WOLF MOUNTAIN PROJECT

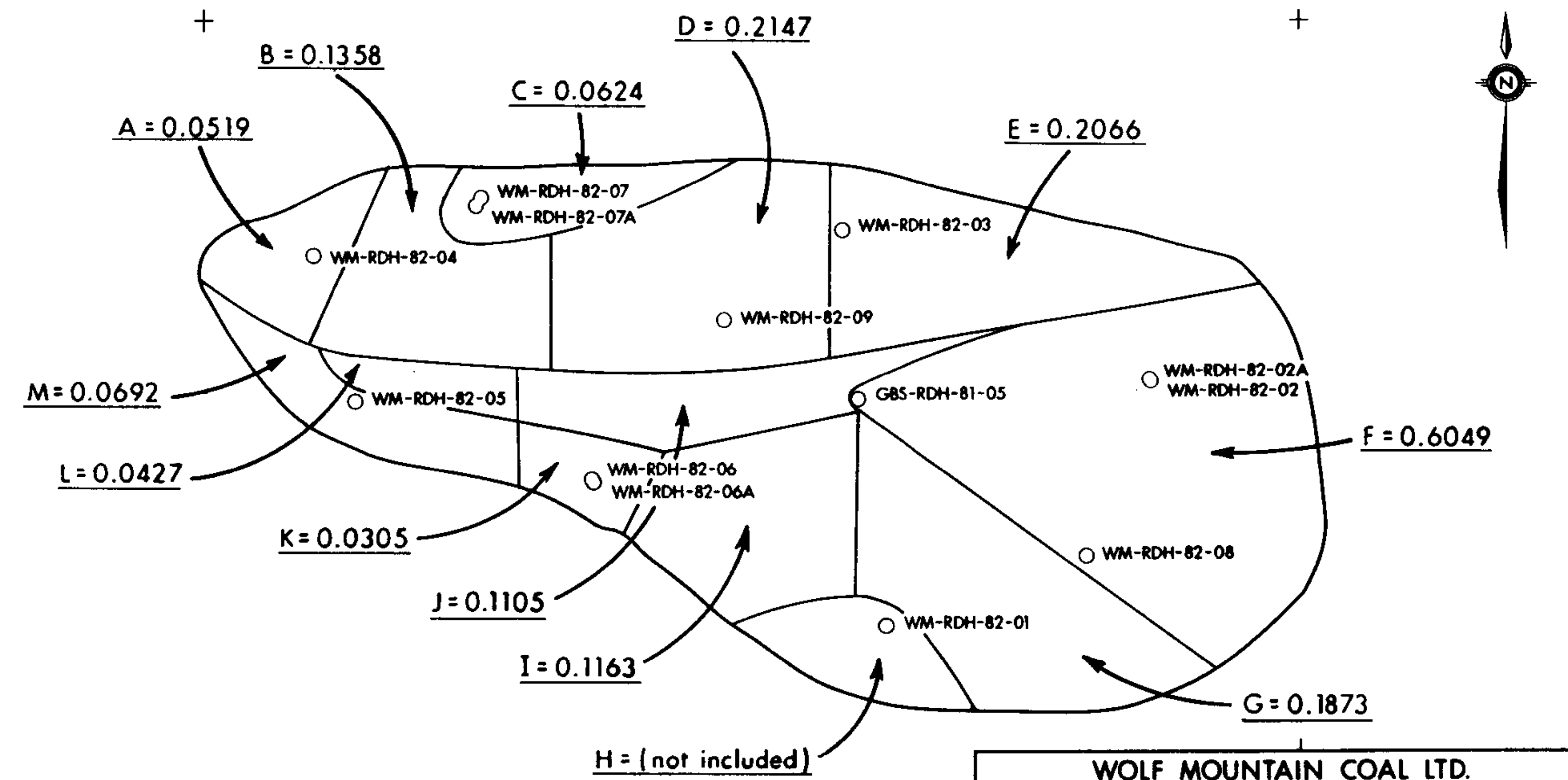
SUMMARY OF R.O.M. RESERVES
Seam W-1 (Wellington)

FIG. 5.2

Drawn: P. Hall		Date:	November 1982
Checked:	Client App:	Scale:	1:10,000
Author: J. Perry	Revised:	File No:	
COAL-EX CONSULTING LTD.		Dwg. No:	



A = 0.1080
B = 0.2747
C = 0.1253
D = 0.4370
E = 0.4175
F = 0.9413
G = 0.3051
H = 0.0413
I = 0.1926
J = 0.1758
K = 0.0503
L = 0.0684
M = 0.1120
WM-RDH-82-07
WM-RDH-82-07A
WM-RDH-82-03
WM-RDH-82-04
WM-RDH-82-09
WM-RDH-82-05
GBS-RDH-81-05
WM-RDH-82-02A
WM-RDH-82-02
WM-RDH-82-06
WM-RDH-82-06A
WM-RDH-82-08
WM-RDH-82-01
N
* N.B. - All tonnages shown are ×10^6
WOLF MOUNTAIN COAL LTD.
WOLF MOUNTAIN PROJECT
RESERVE BLOCKS - IN PLACE RESOURCES
Seam W-1 (Wellington)
FIG. 5.3
Drawn: P. Hall
Checked:
Author: J. Perry
Client App:
Revised:
Date: November 1982
Scale: 1:10,000
File No:
Dwg. No:
COAL-EX CONSULTING LTD.



* N.B.- All tonnages shown are $\times 10^6$

WOLF MOUNTAIN COAL LTD.

WOLF MOUNTAIN PROJECT

RESERVE BLOCKS - R.O.M. RESERVES
Seam W-1 (Wellington)

FIG. 5.4

Drawn: P. Hall		Date: November 1982	
Checked:	Client App:	Scale: 1:10,000	
Author: J. Perry	Revised:	File No:	
COAL-EX CONSULTING LTD.		Dwg. No:	

contours of seam W.1. These blocks were further subdivided according to the seam thickness as defined by the isopach map. Each "reserve block" was planimetered, the resulting area was corrected for the effects of dip and then multiplied by the seam thickness, specific gravity and geological factor to give the in-situ coal tonnage. The geological factor (90%) was applied for geological uncertainty such as precise structural definition of the seam, the effects of minor structures and those of overburden thickness (talus and/or till) around the proposed line of outcrop. The resulting tonnages are the total in-situ resource for seam W.1 for each reserve block.

5.2.2 Mineable R.O.M. Reserves

For the purposes of this calculation, areas where the seam thickness was less than one metre were not included. A seam thickness of one metre is considered to be a mininum practical limit to underground mining in western Canada at this time.

Present plans for the mining of seam W.1 call for the removal of at least one rock band from the coal seam as a method of producing a higher quality product. Mr Eric Roberts has suggested that these rock bands will be removed in total or in part by a 0.20 metre cut using a conventional miner. In most cases coal adjacent to the rock band will also be removed due to machine limitations and the thickness of the band itself. For the calculation of the R.O.M. reserves, the tonnage of this high ash material was calculated and subtracted from the in-place resource totals (Appendix I). The resulting tonnages were further reduced by applying a mining factor of 55% for the north flank of the syncline and 70% for the broad south flank to take into account the coal which will be recovered by the mining process. The resulting tonnages are the run of mine reserves. No adjustment has been made for the effects of any out-of-seam dilution which may be derived from the roof or floor.

6.0 COAL QUALITY

Data on the quality of coal from the Wolf Mountain property has come mainly from three drill cores of seam W.1 and one core of seam W.3. This data has been supplemented by analyses of the coal seam cuttings for seams W.1 and W.3 from the open hole drilling. Existing data from the Wellington seam from other parts of the Nanaimo coalfield (Clapp, 1914) has been used for comparison purposes only. The summary data for the core analyses are presented in Tables 6.1 and 6.2, and the detailed analytical data are in Appendix II.

The results confirm seam W.1 to be a high quality thermal coal of the high volatile bituminous A type. The coal is also agglomerating with free swelling indices (F.S.I.'s) of 3½ to 4, between 7% and 14.5% ash.

The most reliable information regarding the quality of seam W.1 has been obtained from the core samples. Each seam was divided into several samples (plys) which were then subjected to basic analytical tests. These plys were then combined into a single composite for each hole and analysed in more detail. The composite sample is meant to represent the product or run-of-mine coal on which the mineable reserves have been based. Consequently, not all of the ply samples have been included in the composites. Ply 10450 has not been included in seam W.1 composite for hole 82-02A, ply 10442 has been excluded from drill hole 82-06A, and ply 10544 excluded from hole 82-07A. Also, the amount of ply 10547 which was added to the composite of seam W.1 in hole 82-07A was reduced by 60% (to conform to the removal of a 0.20 cut).

The analytical results presented have not yet been adjusted for any coal lost in the removal of a 0.20 metre cut; neither have they been adjusted for core loss or the effects of out-of-seam dilution.

TABLE 6.1

PROXIMATE ANALYSES OF SEAM W.1 COMPOSITES (a.d.b.)

Hole #	Comp. No.	R.M. %	Ash %	V.M. %	F.C. %	C.V. BTU/lb %	Sulfur %	S.G. G/CM3	F.S.I.
82-02A	WDC-2	2.25	14.89	36.93	45.93	12090	0.42	1.36	4.0
82-06A	WDC-1	2.01	10.32	39.09	48.58	12884	0.96	1.32	4.0
82-07A	WDC-3	2.00	14.71	37.95	45.34	12175	0.46	1.35	3.0

TABLE 6.2

RESULTS FOR ASH FUSION, HARDGROVE INDEX AND EQUILIBRIUM MOISTURE ANALYSES FOR SEAM W.1

Hole #	Comp. #	Ash Fusion Temperature Deg. C					Hardgrove Index	Equil. Moist.
		Atmos.	I.D.	Soft.	Hem.	Fluid		
82-02A	WDC-2	Reducing	1270	1297	1308	1351	54	10.9
		Oxidizing	1290	1302	1323	1364		
82-06A	WDC-1	Reducing	1205	1225	1233	1246	53	11.2
		Oxidizing	1224	1230	1236	1247		
82-07A	WDC-3	Reducing	1302	1317	1345	1408	85	16.2
		Oxidizing	1317	1348	1372	1420		

As can be seen from Table 6.1, the composites exhibit quite consistent results. The moisture content is just above 2%, ash values are between 10.3% and 14.9%, and the calorific values are greater than 12,000 B.T.U.s/lb.

Sulphur values for drill holes 82-02A and 82-07A are well below 1.0%, while hole 82-06A shows a sulphur content of 0.96%. This latter value is considered to be anomolous and is probably due to the loss of relatively low sulphur coal from the lower part of the seam which would have reduced the average sulphur content. This is supported by the sulphur values obtained from the analyses of the rotary cuttings (Appendix II). Those values range from 0.34 to 0.83% sulphur; hole 82-06 shows a value of 0.73%.

Fuel ratios for the three composites vary between 1.19 and 1.24 and between 1.30 and 1.39 for the "cuttings" samples.

Good ash fusion temperatures are obtained from seam W.1 in holes 82-02A and 82-07A (Table 6.2). The values for hole 82-06A are somewhat low but, again, this may be the result of the loss of coal core.

With regard to the ash analyses for seam W.1 (Appendix II), it is worthwhile to note the low sodium content. Fairly high values are present for CaO (17.59% to 25.60%), consequently, the coal was analysed for CO_2 content. Values of 2.11 to 2.14% were found for the CO_2 percentage in the coal. This is enough to account for most of the remaining amount to bring the mathematical totals of the ash analyses to 100%.

The analyses of the rotary cuttings are generally consistent with the core analyses. The analyses were performed on the float portion of a 1.6 specific gravity cut to minimize the effects of roof and floor rock contamination. The results provide a good guide to the quality of the coal seam across the property.

The quality of the upper coal seam, W.3, has not been evaluated for the purposes of this report. Examination of the core and of the analytical results from seam W.3 (Appendix II) does, however, indicate that the seam is high in ash and composed of predominantly highly carbonaceous, coaly shale.

7.0 REFERENCES

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APPENDIX I

RESOURCE AND RESERVE CALCULATIONS

DETAILED CALCULATION FOR IN-PLACE RESOURCES

SEAM W.1 - WOLF MOUNTAIN

Reserve Block	Plan Area (m^2)	Assigned Dip °	Corrected Area (m^2)	Assigned True Thick (m)	Volume (m^3)	S.G.	Geological Factor	In-Place Tonnes ($x10^6$)
A	42416	27	47605	1.80	85689	1.40	0.90	0.1080
B	82334	25	90845	2.40	218028	1.40	0.90	0.2747
C	33383	25	36834	2.70	99452	1.40	0.90	0.1253
D	133517	22.5	144518	2.40	346843	1.40	0.90	0.4370
E	116283	26.5	129935	2.55	331334	1.40	0.90	0.4175
F	274917	6.5	276695	2.70	747077	1.40	0.90	0.9413
G	133667	6.5	134531	1.80	242157	1.40	0.90	0.3051
H	40750	6.5	41014	0.80	32811	1.40	0.90	0.0413
I	92067	6.5	92662	1.65	152893	1.40	0.90	0.1926
J	63317	3	63404	2.20	139488	1.40	0.90	0.1758
K	22667	15	23466	1.70	39893	1.40	0.90	0.0503
L	25800	3	25835	2.10	54254	1.40	0.90	0.0684
M	43333	18	45563	1.95	88849	1.40	0.90	0.1120
TOTALS	1104451 m^2		1152907 m^2		2578768 m^3			3.249 x 10^6 tonnes

Weighted Average Seam Thickness = 2.24 metres

DETAILED CLACULATION FOR R.O.M. RESERVES

SEAM W.1 - WOLF MOUNTAIN

Reserve Block	Area* (m^2)	Volume of One 0.20 m Cut (m^3)	S.G. of Cut Material	Geol. Factor	Tonnes of Cut ($x10^6$)	T.I.P. - T.O.C. ($x10^6$)	Mining Factor	R.O.M. Tonnes ($x10^6$)
A	47605	9521	1.60	0.90	0.0137	0.0943	0.55	0.0519
B	90845	18169	1.70	0.90	0.0278	0.2469	0.55	0.1358
C	36834	7367	1.79	0.90	0.0119	0.1134	0.55	0.0624
D	144518	28904	1.79	0.90	0.0466	0.3904	0.55	0.2147
E	129935	25987	1.79	0.90	0.0419	0.3756	0.55	0.2066
F	276695	55339	1.55	0.90	0.0772	0.8641	0.70	0.6049
G	134531	26906	1.55	0.90	0.0375	0.2676	0.70	0.1873
H		Seam less than 1.0 metres thick						
I	92662	18532	1.58	0.90	0.0264	0.1662	0.70	0.1163
J	63404	12681	1.58	0.90	0.0180	0.1578	0.70	0.1105
K	23466	4693	1.60	0.90	0.0068	0.0435	0.70	0.0305
L	25835	5167	1.60	0.90	0.0074	0.0610	0.70	0.0427
M	45563	9113	1.60	0.90	0.0131	0.0989	0.70	0.0692
				TOTALS	0.3283	2.8797	63.6%	1.8328

*Area corrected for dip

T.I.P. = Tonnes In-Place (resources)

T.O.C. = Tonnes of Cut

Total North Flank R.O.M. Reserves = 0.6714 x 10^6 Tonnes

Total South Flank R.O.M. Reserves = 1.1614 x 10^6 Tonnes

TOTAL R.O.M. RESERVES = 1.8328 x 10^6 Tonnes

Weighted Average Mining Factor = 63.6%

Total Tonnes of Cut Recovered =

0.3283 x 0.636 = 0.2088 x 10^6 Tonnes

APPENDIX II

COAL QUALITY ANALYSES

PLY SAMPLE THICKNESSES - SEAM W.1

Drill Hole	Ply Sample #	Total Ply Thickness (m)	% Rec.	Material Lost
82-02A	10449	0.47	100	
	10450	0.09	100	
	10540	0.43	100	
	10541	0.41	63.4	Coal & Rock
	10542	0.80	87.5	Coal
	10543	0.56	100	
	Total	2.76	90.9	
82-06A	10441	0.43	100	
	10442	0.09	100	
	10443	1.23	74.8	Coal
	Total	1.75	82.3	
	(10444)	(0.09)	(100)	(Roof Rock)
82-07A	10544	0.17	100	
	10545	1.23	75.6	Coal
	10546	0.85	87.1	Coal
	10547	0.34	100	
	10548	0.34	100	
	Total	2.93	85.7	

SEAM W.3

82-02A	10445	0.21	100	
	10446	0.06	100	
	10447	0.33	100	
	10448	0.61	100	
		1.30	0	Coal & Rock
	Total	2.51	48.2	

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SGS

TO: WOLF MOUNTAIN COAL CO.
Mr. Eric Roberts
5240 Gulf Place
West Vancouver, B.C.
V7W 2V9

CERTIFICATE OF ANALYSIS

No. C	DATE:
FILE: 8209-0768 C	Sept. 20, 1982

WOLF MOUNTAIN - 82-02-SEAM W1

RAW COAL - Proximate analysis
Calorific value, Sulfur
Specific gravity

TAG NO	BASIS	R.M. %	ASH %	V.M. %	F.C. %	C.V. BTU/LB	SULFUR %	S.G. G/CM3
10449	AIR DRY	2.29	12.38	38.79	46.54	12556	0.59	1.31
	DRY	-	12.67	39.70	47.63	12850	0.61	
10450	AIR DRY	3.13	51.72	0.00	0.00	6077	0.20	1.75
	DRY	-	53.39	0.00	0.00	6273	0.21	
10540	AIR DRY	2.36	21.53	35.53	40.58	10912	0.48	1.40
	DRY	-	22.05	36.39	41.56	11176	0.50	
10541	AIR DRY	2.82	38.02	28.40	30.76	8289	0.27	1.55
	DRY	-	39.12	29.22	31.66	8530	0.28	
10542	AIR DRY	2.11	8.25	39.20	50.44	13125	0.41	1.29
	DRY	-	8.43	40.04	51.53	13412	0.42	
10543	AIR DRY	2.11	7.04	40.14	50.71	13404	0.47	1.28
	DRY	-	7.19	41.01	51.80	13693	0.48	

10449 Free Swelling Index 3-1/2
10540 Free Swelling Index 2
10542 Free Swelling Index 4-1/2
10543 Free Swelling Index 4

L. Lakosil

L. Lakosil - Chief Coal Chemist.
SIGNATURE AND TITLE

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West Vancouver, B.C.

CERTIFICATE OF ANALYSIS

No. A	DATE:
FILE: 8209-0768C	Sept. 20, 1982

WOLF MOUNTAIN - 82-05-SEAM W1

RAW COAL - Proximate analysis
Calorific value, Sulfur
Specific gravity

TAG NO	BASIS	R.M. %	ASH %	V.M. %	F.C. %	C.V. BTU/LB	SULFUR %	S.G. G/CM3
10441	AIR DRY	1.98	13.36	38.30	46.36	12341	1.38	1.34
	DRY	-	13.63	39.07	47.30	12590	1.41	
10442	AIR DRY	2.82	61.09	0.00	0.00	4320	2.11	1.89
	DRY	-	62.86	0.00	0.00	4446	2.17	
10443	AIR DRY	2.11	11.48	38.33	48.08	12556	0.89	1.31
	DRY	-	11.73	39.16	49.11	12826	0.91	
10444	AIR DRY	1.10	63.92	0.00	0.00	4600	0.00	2.03
	DRY	-	64.63	0.00	0.00	4651	0.00	

10441 Free Swelling Index 4-1/2

10443 Free Swelling Index 4-1/2

L. Lakosil

L. Lakosil - Chief Coal Chemist
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CERTIFICATE OF ANALYSIS

No. D
FILE: 8209-0768C
DATE: Sept. 20, 1982

WOLF MOUNTAIN - 82-07-SEAM W1

RAW COAL - Proximate analysis
Calorific value, Sulfur
Specific gravity

TAG NO	BASIS	R.M. %	ASH %	V.M. %	F.C. %	C.V. BTU/LB	SULFUR %	S.G. G/CM3
10544	AIR DRY	1.69	44.09	0.00	0.00	7763	0.00	1.68
	DRY	-	44.84	0.00	0.00	7896	0.00	
10545	AIR DRY	2.03	14.54	38.04	45.39	12165	0.64	1.34
	DRY	-	14.84	38.83	46.33	12417	0.65	
10546	AIR DRY	1.94	6.48	41.88	49.70	13428	0.44	1.29
	DRY	-	6.61	42.71	50.68	13693	0.45	
10547	AIR DRY	2.54	52.36	24.52	20.58	5746	0.26	1.79
	DRY	-	53.72	25.16	21.12	5895	0.27	
10548	AIR DRY	1.95	11.45	38.29	48.31	12640	0.46	1.30
	DRY	-	11.68	39.05	49.27	12891	0.47	

10545 Free Swelling Index 3-1/2
10546 Free Swelling Index 3-1/2
10547 Free Swelling Index 1
10548 Free Swelling Index 3-1/2

L. Lakosil - Chief Coal Chemist.
SIGNATURE AND TITLE

WOLF MOUNTAIN - 8206-8202-8207

RAW COMPOSITES - Proximate analysis
FSI, Calorific value, Sulfur
Specific gravity, Grindability

COMP. NO	BASIS	R.M. %	ASH %	V.M. %	F.C. %	FSI	C.V. CAL/G (Should be BTU/LB.)	SULFUR %	S.G. G/CM3	HGI
WDC-1	AIR DRY	2.01	10.32	39.09	48.58	4.0	12884	0.96	1.32	53
	DRY	-	10.53	39.90	49.57	-	13148	0.98	-	-
WDC-2	AIR DRY	2.25	14.89	36.93	45.93	4.0	12090	0.42	1.36	54
	DRY	-	15.23	37.78	46.99	-	12368	0.43	-	-
WDC-3	AIR DRY	2.00	14.71	37.95	45.34	3.0	12175	0.46	1.35	85
	DRY	-	15.01	38.73	46.26	-	12424	0.47	-	-

WOLF MOUNTAIN - 8206-8202-8207

CLEAN COAL - Ultimate analysis

COMP. NO	BASIS	R.M. %	ASH %	CARBON %	HYDROGEN %	NITROGEN %	SULFUR %	OXYGEN %
WDC-1	AIR DRY	2.01	10.32	72.89	5.24	1.39	0.96	9.20
	DRY	-	10.53	74.39	5.12	1.42	0.98	7.56
WDC-2	AIR DRY	2.25	14.89	71.71	5.57	1.33	0.42	6.08
	DRY	-	15.23	73.36	5.44	1.36	0.43	4.18
WDC-3	AIR DRY	2.00	14.71	68.74	5.16	1.29	0.46	9.64
	DRY	-	15.01	70.14	5.04	1.32	0.47	8.02

*) Oxygen is calculated by difference
H and O on air dry basis include H and O in sample moisture

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TO:
WOLF MOUNTAIN COAL CO.
Mr. Eric Roberts,
5240 Gulf Place
West Vancouver, B.C.

CERTIFICATE OF ANALYSIS

No.	DATE:
FILE: 8210-0152 C	Oct. 26, 1982

WE HAVE ANALYZED the herein described composites (RAW COAL) and report as follows:

FORMS OF SULPHUR		TOTAL SULPHUR %	PYRITIC SULPHUR %	SULPHATE SULPHER %	ORGANIC SULPHUR %
Sample WDC - 1					
	AIR DRY	0.96	0.26	0.00	0.70
	DRY	0.98	0.26	0.00	0.72
Sample WDC - 2					
	AIR DRY	0.42	0.05	0.00	0.37
	DRY	0.43	0.05	0.00	0.38
Sample WDC - 3					
	AIR DRY	0.46	0.08	0.00	0.38
	DRY	0.47	0.08	0.00	0.39

EQUILIBRIUM MOISTURE

WDC - 1 .... 11.2%
WDC - 2 .... 10.9%
WDC - 3 .... 16.2%

L. Lakosil

L. Lakosil - Chief Coal Chemist.

SIGNATURE AND TITLE

LL:at

WOLF MOUNTAIN - 8207-8202-8206

RAW COAL - Fusibility of coal ash

COMP. NO.	ATMOSPHERE	ASH FUSION TEMPERATURE DEG.C INITIAL DEFORMATION	SOFTENING	HEMISPHERICAL	FLUID
WDC 1	REDUCING	1205	1225	1233	1246
	OXIDIZING	1224	1230	1236	1247
WDC 2	REDUCING	1270	1297	1308	1351
	OXIDIZING	1290	1302	1323	1364
WDC 3	REDUCING	1302	1317	1345	1408
	OXIDIZING	1317	1348	1372	1420

WOLF MOUNTAIN - 8207-8202-8206

RAW COAL - Fusibility of coal ash

COMP. NO.	ATMOSPHERE	ASH FUSION TEMPERATURE DEG.F INITIAL DEFORMATION	SOFTENING	HEMISPHERICAL	FLUID
WDC 1	REDUCING	2201	2238	2252	2275
	OXIDIZING	2236	2247	2257	2278
WDC 2	REDUCING	2318	2367	2388	2465
	OXIDIZING	2354	2377	2415	2488
WDC 3	REDUCING	2376	2404	2454	2568
	OXIDIZING	2404	2460	2502	2589

WOLF MOUNTAIN - 8210-0152-C

RAW COAL - Ash analysis

COMP. NO	SIO2 %	AL2O3 %	TIO2 %	FE2O3 %	CAO %	MGO %	NA2O %	K2O %	P2O5 %	SO3 %
WDC-1	32.77	14.63	0.60	5.66	25.60	3.95	0.35	0.55	0.50	6.47
WDC-2	43.96	19.47	0.80	3.78	17.59	3.24	0.52	1.01	0.63	3.34
WDC-3	40.71	22.21	0.84	2.92	18.59	2.83	0.48	1.07	0.16	3.02

RAW COAL - Slagging & Fouling indices

COMP. NO	SLAGGING	FOULING
WDC-1	0.74	0.26
WDC-2	0.17	0.21
WDC-3	0.19	0.19

GENERAL TESTING LABORATORIES

A Division of SGS SUPERVISION SERVICES INC.

L. Lakosil

per: L. Lakosil - Chief Coal Chemist

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V7W 2V9

CERTIFICATE OF ANALYSIS

No.	DATE:
FILE: 8211-1552C	Nov. 16, 1982

We have performed additional testing on your RAW COAL COMPOSITES per Mr. Perry's instructions and report as follows:

COMPOSITE NO;	CO_2 % in Coal	H_2O Soluble Na + K % in Coal
WDC - 1	2.14	0.06
WDC - 2	2.11	0.16
WDC - 3	2.12	0.17

Cc : Mr. Perry, P. Geol.
Coal-Ex Consulting
#312 - 525 Seymour Street,
Vancouver, B.C.
V6B 3H7

L. Lakosil

LL:at

L. Lakosil, Chief Coal Chemist.

SIGNATURE AND TITLE

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TO:
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West Vancouver, B.C.

CERTIFICATE OF ANALYSIS

No. B	DATE:
FILE: 8209-0768C	Sept. 20, 1982

WOLF MOUNTAIN - 82-02-SEAM W3

RAW COAL - Proximate analysis
Calorific value, Sulfur
Specific gravity

TAG NO	BASIS	R.M. %	ASH %	V.M. %	F.C. %	C.V. BTU/LB	SULFUR %	S.G. G/CM3
10445	AIR DRY	2.55	61.70	19.98	15.77	4495	0.31	1.87
	DRY	-	63.32	20.50	16.18	4612	0.32	
10446	AIR DRY	1.65	33.61	31.09	33.65	9358	0.48	1.47
	DRY	-	34.17	31.62	34.21	9515	0.49	
10447	AIR DRY	2.55	68.69	17.12	11.64	3192	0.17	2.00
	DRY	-	70.49	17.56	11.95	3275	0.18	
10448	AIR DRY	2.83	44.62	26.16	26.39	7366	0.37	1.63
	DRY	-	45.92	26.93	27.15	7580	0.38	

L. Lakosil

L. Lakosil - Chief Coal Chemist.

SIGNATURE AND TITLE

ROTARY – WOLF MOUNTAIN

COMPONENT SAMPLES – Float/Sink at 1.60 S.G.
1.60 FLOAT – Proximate, Calorific value, Sulfur, FSI
1.60 SINK – Residual Moisture, Ash

TAG NO	AIR DRY WEIGHT KG	CALC.DRY HEAD ASH %	F/S	BASIS	YIELD %	R.M. %	ASH %	V.M. %	F.C. %	SULFUR %	FSI	CALOR.VALUE BTU / lb.	M A F
WM 82-02 22-25m													
WR-1	0.7	69.96	F	AIR DRY	-	1.28	24.02	33.46	41.24	0.62	1.0	10,672	
				DRY	8.3	-	24.33	33.90	41.77	0.63	-	10,810	14,286
			S	AIR DRY	-	2.41	72.30	-	-	-	-		
				DRY	91.7	-	74.09	-	-	-	-		
WM 82-02 68-71m													
WR-2	1.6	22.23	F	AIR DRY	-	2.25	9.98	37.05	50.72	0.40	2.5	12,869	
				DRY	80.3	-	10.21	37.90	51.89	0.40	-	13,165	14,662
			S	AIR DRY	-	1.96	69.85	-	-	-	-		
				DRY	19.7	-	71.25	-	-	-	-		
WM 82-03 39.5-42m													
WR-3	1.5	38.05	F	AIR DRY	-	5.89	8.79	36.12	49.20	0.34	1.0	12,406	
				DRY	57.3	-	9.34	38.38	52.28	0.36	-	13,182	14,541
			S	AIR DRY	-	1.66	75.29	-	-	-	-		
				DRY	42.7	-	76.57	-	-	-	-		
WM 82-04 37.4-39.4m													
WR-4	3.2	39.19	F	AIR DRY	-	5.69	8.06	36.84	49.41	0.60	1.0	12,666	
				DRY	59.0	-	8.54	39.06	52.40	0.63	-	13,430	14,684
			S	AIR DRY	-	0.89	82.56	-	-	-	-		
				DRY	41.0	-	83.30	-	-	-	-		

ROTARY - WOLF MOUNTAIN

COMPONENT SAMPLES - Float/Sink at 1.60 S.G.
1.60 FLOAT - Proximate, Calorific value, Sulfur, FSI
1.60 SINK - Residual Moisture, Ash

TAG NO	AIR DRY WEIGHT KG	CALC.DRY HEAD ASH %	F/S	BASIS	YIELD %	R.M. %	ASH %	V.M. %	F.C. %	SULFUR %	FSI	CALOR.VALUE BTU / lb.	M A F
WM 82-05 37.6-40.1m													
WR-5	2.6	20.30	F	AIR DRY	-	2.55	6.65	39.05	51.75	0.64	1.5	13,307	
				DRY	79.7	-	6.82	40.08	53.10	0.66	-	13,655	14,654
			S	AIR DRY	-	1.03	72.48	-	-	-	-		
				DRY	20.3	-	73.24	-	-	-	-		
WM 82-06 18.8-20.6m													
WR-6	3.1	21.27	F	AIR DRY	-	1.94	7.74	37.85	52.47	0.73	1.5	13,087	
				DRY	79.3	-	7.90	38.59	53.51	0.74	-	13,346	14,491
			S	AIR DRY	-	1.20	71.60	-	-	-	-		
				DRY	20.7	-	72.47	-	-	-	-		
WM 82-08 10.9-12.8m													
WR-7	2.5	63.14	F	AIR DRY	-	1.93	18.24	35.42	44.41	0.63	1.0	11,275	
				DRY	14.7	-	18.60	36.12	45.28	0.64	-	11,497	14,124
			S	AIR DRY	-	1.57	69.71	-	-	-	-		
				DRY	85.3	-	70.82	-	-	-	-		
WM 82-08 56.4-59.2m													
WR-8	4.3	31.81	F	AIR DRY	-	1.68	11.51	37.45	49.36	0.83	1.5	12,636	
				DRY	64.8	-	11.71	38.09	50.20	0.85	-	12,852	14,556
			S	AIR DRY	-	1.29	67.92	-	-	-	-		
				DRY	35.2	-	68.81	-	-	-	-		

ROTARY - WOLF MOUNTAIN

COMPONENT SAMPLES - Float/Sink at 1.60 S.G.
1.60 FLOAT - Proximate, Calorific value, Sulfur, FSI
1.60 SINK - Residual Moisture, Ash

TAG NO	AIR DRY WEIGHT KG	CALC.DRY HEAD ASH %	F/S	BASIS	YIELD %	R.M. %	ASH %	V.M. %	F.C. %	SULFUR %	FSI	CALOR.VALUE BTU/lb.	M A F
WM 82-09 26.5-28.2m													
WR-9	1.7	49.41	F	AIR DRY	-	2.02	19.06	36.56	42.36	0.54	1.0	10,998	
				DRY	32.6	-	19.45	37.31	43.24	0.55	-	11,225	13,935
			S	AIR DRY	-	1.58	62.89	-	-	-	-		
				DRY	67.4	-	63.90	-	-	-	-		
WM 82-09 70.9-73.4m													
WR-10	1.0	40.48	F	AIR DRY	-	2.55	10.99	37.54	48.92	0.39	1.5	12,436	
				DRY	57.0	-	11.28	38.52	50.20	0.40	-	12,761	14,383
			S	AIR DRY	-	0.90	78.47	-	-	-	-		
				DRY	43.0	-	79.18	-	-	-	-		

GENERAL TESTING LABORATORIES

A Division of SGS SUPERVISION SERVICES INC.

L. Lakosil

per: L. Lakosil - Chief Coal Chemist.

PROXIMATE ANALYSES OF THE WELLINGTON SEAM

EXTENSION AREA*

	Location	M. %	Vols.%	Fixed Carbon %	Ash %	S %	Calorific Value BTU/lb
1.	Harewood Mine	1.58	33.84	52.17	11.85	0.56	12 238
2.	Extension Collieries	1.44	31.40	46.18	20.65	0.33	11 401
3.	Extension Collieries	1.52	35.27	57.04	5.85	0.32	13 416
4.	Extension Collieries	1.24	36.49	53.72	8.20	0.35	13 261
5.	Extension Collieries	1.28	35.26	55.83	7.30	0.33	13 199

* Taken from Clapp (1914)

WELLINGTON SEAM - ANALYSES*

Location	Proximate Analyses				Ultimate Analyses					Calorific Value Dry Coal BTU/lb	Calories Calculated from Ultimate Analysis	Fuel Ratio
	Moist.	Vol.	F.C.	Ash	C	H	N	O	S			
A	1.1	39.3	49.2	10.0	72.1	4.7	1.2	11.6	0.4	13 160	6 980	1.25
B	1.16	40.47	50.04	7.80	75.53	5.13	1.19	9.82	0.53	--	7 450	1.23
C	1.65	43.25	45.52	9.24	72.80	5.17	0.88	10.67	1.24	--	7 230	1.05

A = Regular sample of commercial coal 1½" screen and picking belt.
Extension Mine, Wellington Collieries Co. (recalculated to an air dry basis)

B = "Run of Mine"
Nos. 1, 2, and 3 Extension Mines, Canadian Collieries Co.

C = "Run of Mine"
East Wellington, No. 1 Mine, Vancouver - Nanaimo Coal Mining Co.

* Taken from Clapp (1914)

WOLF MOUNTAIN COAL LTD.

WOLF MOUNTAIN PROJECT

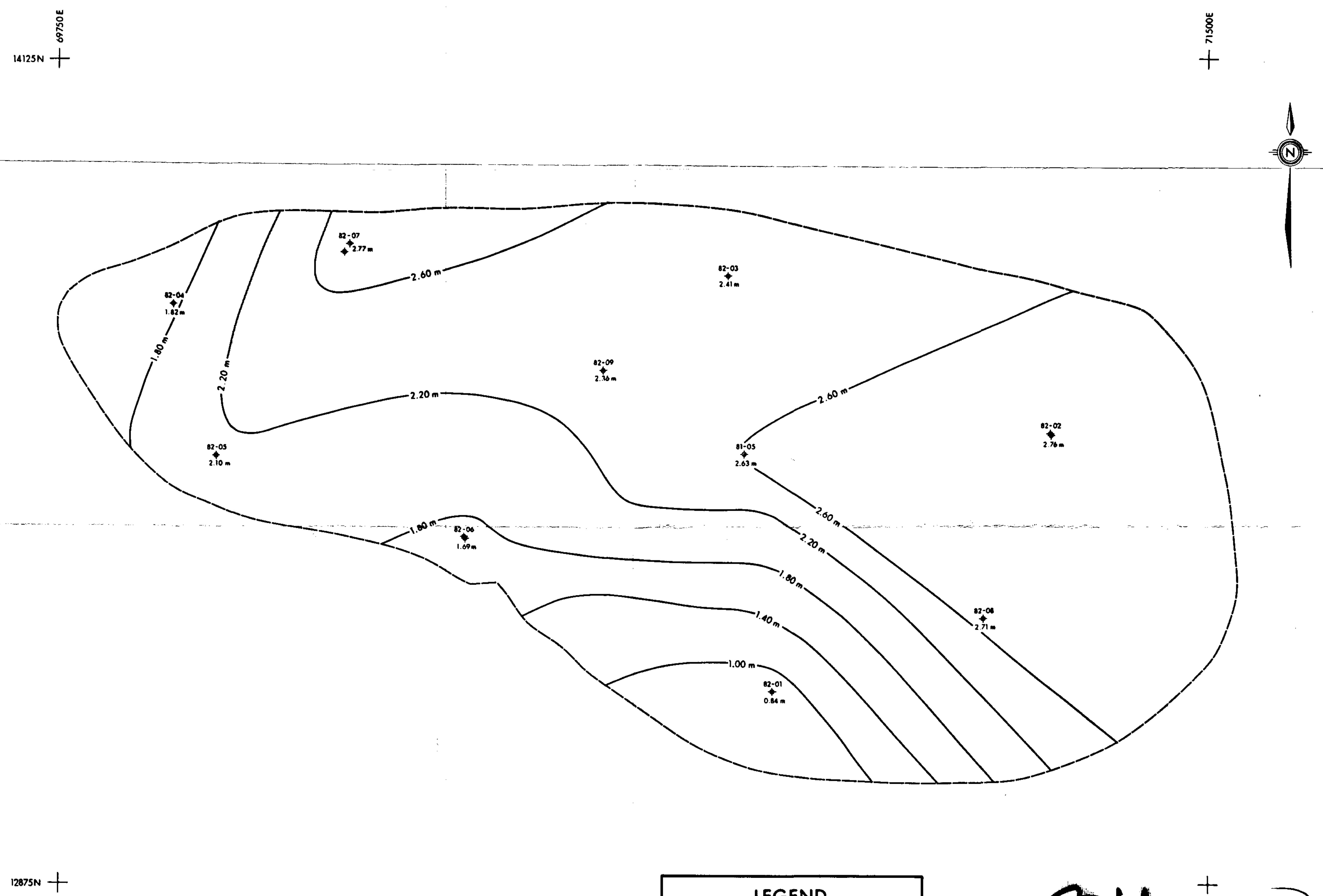
DRILL HOLE CORRELATION CHART

SOUTH FLANK

FIG. #4.4

Drawn: P. Hall
Checked:
Author: J. Perry
Client App.:
Revised:
Date: October 1982
Scale: 1:200 (vertical)
File No.:
Dwg. No.:

COAL-EX CONSULTING LTD.



LEGEND

- SEAM W-1 (WELLINGTON) -

— — — — —	projected seam outcrop
——2.20 m——	seam isopach (true thickness)
82-06 ✦ 1.69 m	drill hole showing true thickness of intersected seam

804

M2

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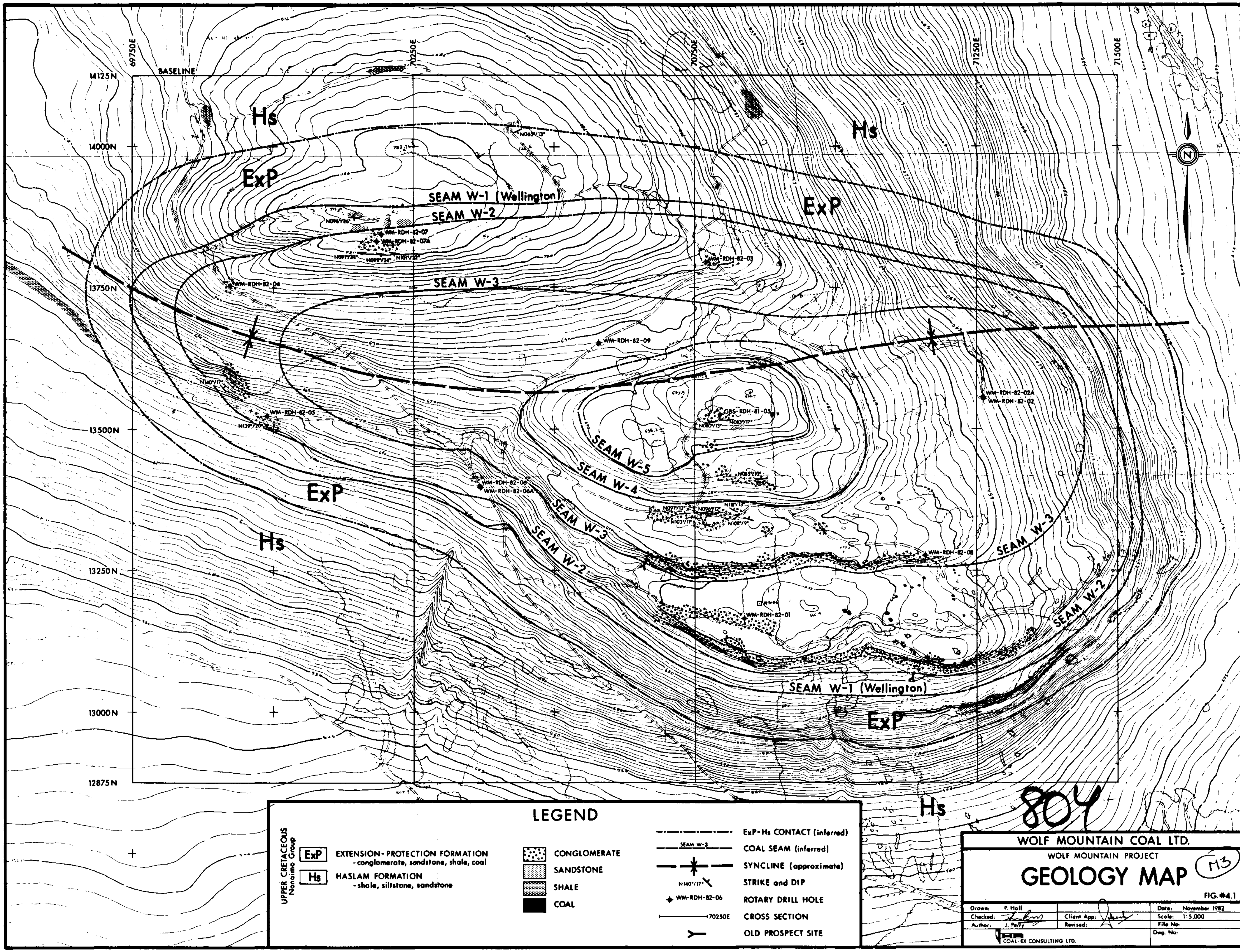
WOLF MOUNTAIN PROJECT

ISOPACH MAP

SEAM W-1 (Wellington)

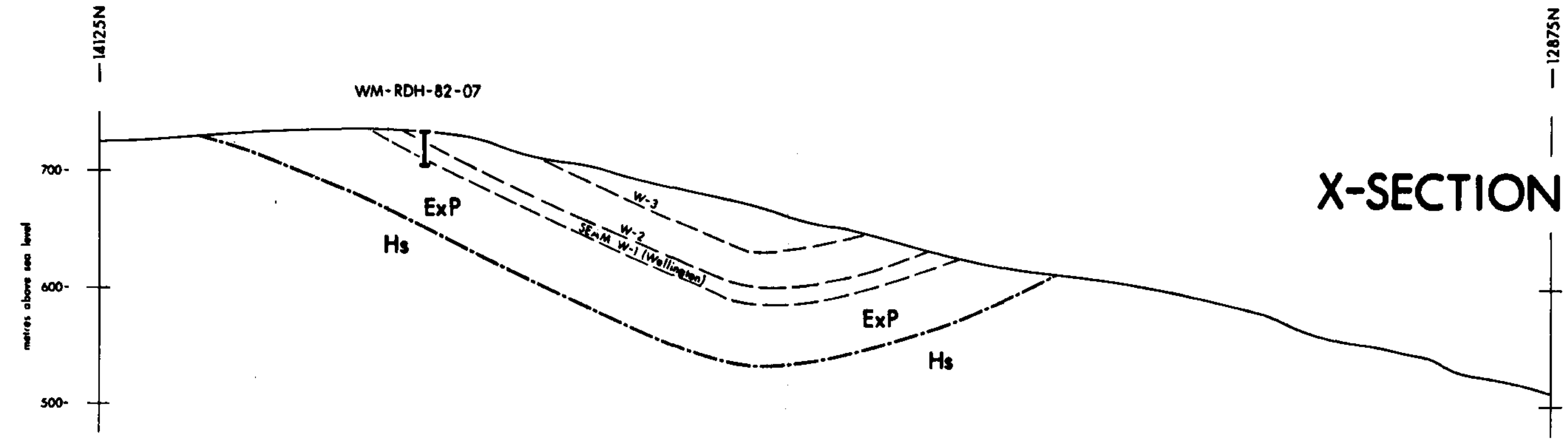
FIG. #4.5

Drawn: P. Hall		Date: November 1982
Checked:	Client App:	Scale: 1:5,000
Author: J. Perry	Revised:	File No:
COAL-EX CONSULTING LTD.		Dwg. No:



804
BASELINE
69750E
70250E
70750E
71250E
71500E
14125N
14000N
13750N
13500N
13250N
13000N
12875N
Hs
ExP
SEAM W-1 (Wellington)
SEAM W-2
SEAM W-3
SEAM W-4
SEAM W-5
WM-RDH-82-01
WM-RDH-82-02A
WM-RDH-82-02
WM-RDH-82-03
WM-RDH-82-04
WM-RDH-82-05
WM-RDH-82-06
WM-RDH-82-06A
WM-RDH-82-07
WM-RDH-82-07A
WM-RDH-82-08
WM-RDH-82-09
GBS-RDH-81-05
LEGEND
UPPER CRETACEOUS Nanaimo Group
ExP EXTENSION-PROTECTION FORMATION - conglomerate, sandstone, shale, coal
Hs HASLAM FORMATION - shale, siltstone, sandstone
CONGLOMERATE
SANDSTONE
SHALE
COAL
ExP-Hs CONTACT (inferred)
SEAM W-3
COAL SEAM (inferred)
SYNCLINE (approximate)
N140°/17°
STRIKE and DIP
WM-RDH-82-06
ROTARY DRILL HOLE
70250E
CROSS SECTION
OLD PROSPECT SITE
WOLF MOUNTAIN COAL LTD.
WOLF MOUNTAIN PROJECT
GEOLOGY MAP
M3
FIG. #4.1
Drawn: P. Hall
Checked:
Author: J. Perry
Client App:
Revised:
Date: November 1982
Scale: 1:5,000
File No:
Dwg. No:
COAL-EX CONSULTING LTD.

X-SECTION #70250



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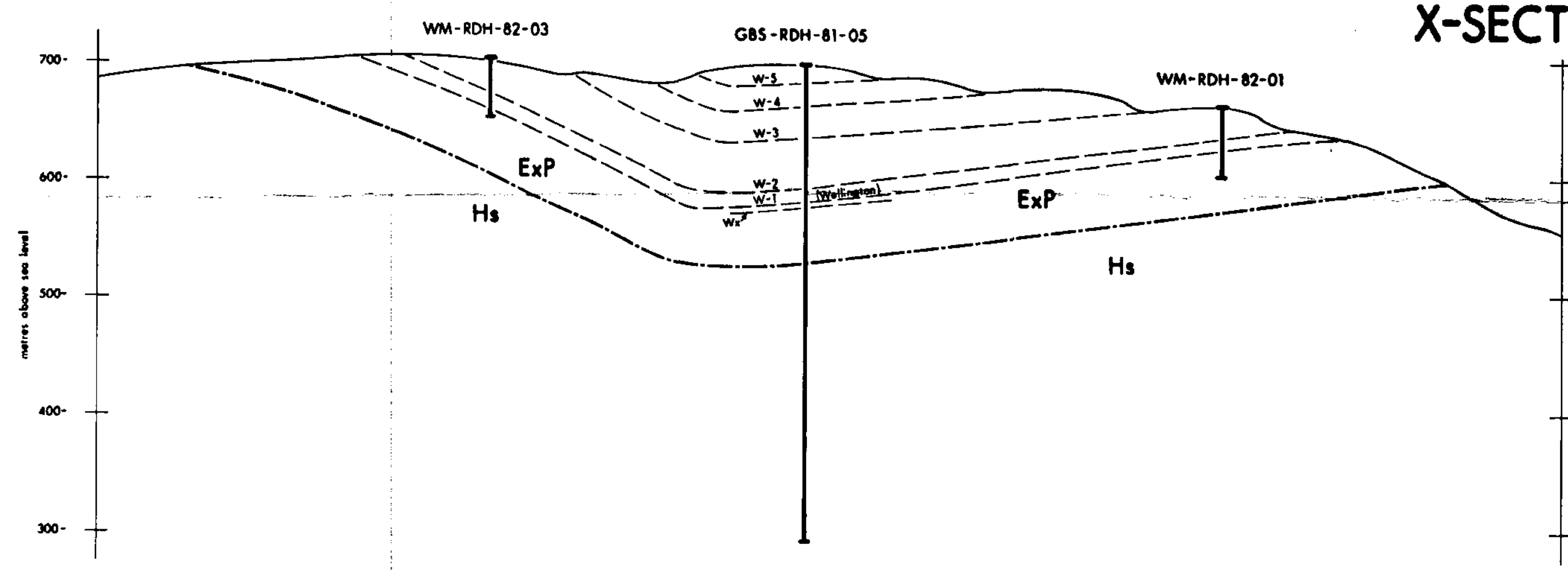

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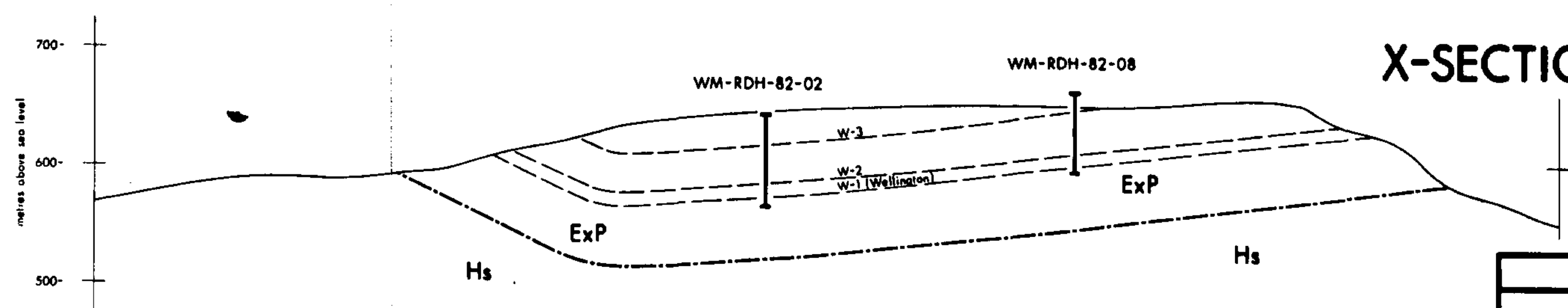


LEGEND

UPPER CRETACEOUS Nanaimo Group

ExP	EXTENSION-PROTECTION FORMATION - conglomerate, sandstone, shale, coal
Hs	HASLAM FORMATION - shale, siltstone, sandstone

804 (M4)

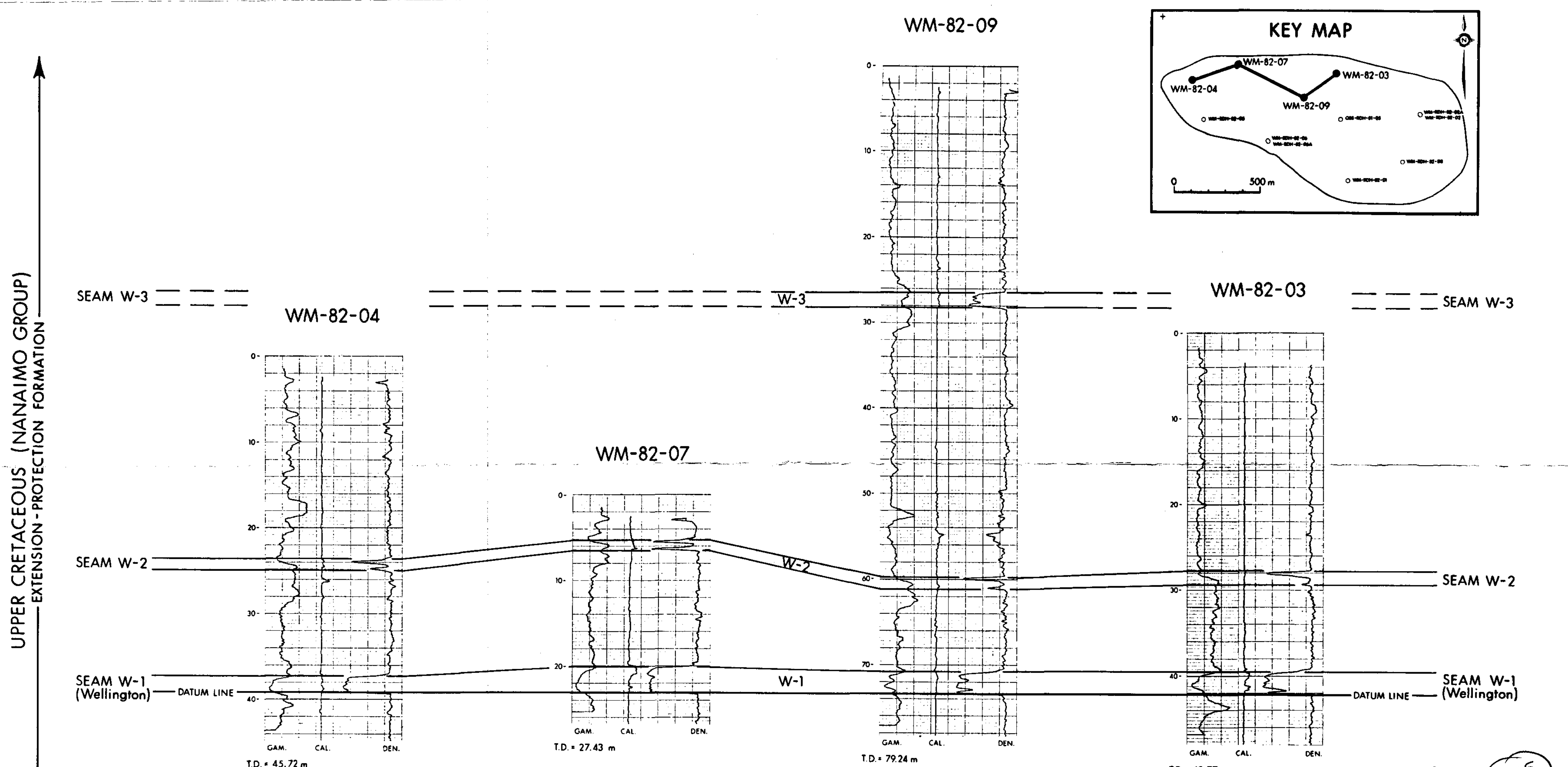
WOLF MOUNTAIN COAL LTD.

WOLF MOUNTAIN PROJECT

STRUCTURAL CROSS-SECTIONS

FIG. #4.2

Drawn: P. Hall		Date: November 1982	
Checked: [signature]	Client App: [signature]	Scale: 1:5,000	
Author: J. Perry	Revised:	File No.	
COAL-EX CONSULTING LTD.		Dwg No:	



804

M5

NOTE: No horizontal scale.

LEGEND

"70-" = Drill hole depth in metres
GAM = Natural gamma log
CAL. = Caliper log
DEN. = Density log

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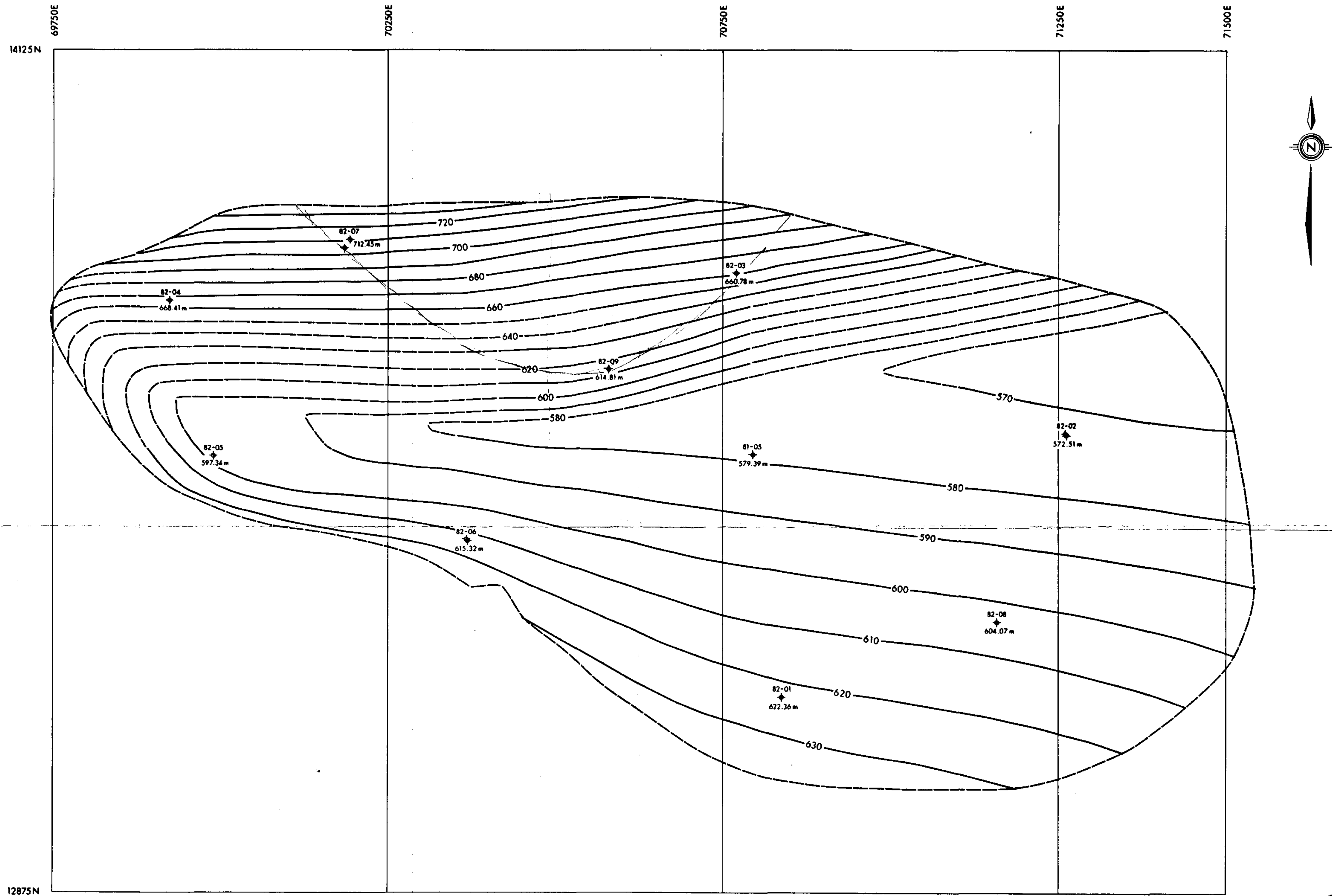
WOLF MOUNTAIN PROJECT

DRILL HOLE CORRELATION CHART
NORTH FLANK

FIG. #4.3

Drawn: P. Hall		Date:	October 1982
Checked: [signature]	Client App: [signature]	Scale:	1: 200 (vertical)
Author: J. Perry	Revised:	File No:	
COAL-EX CONSULTING LTD.		Dwg. No:	



LEGEND

- SEAM W-1 (WELLINGTON) -

————	projected seam outcrop
—630—	structure contour (defined, approximate) for base of seam in metres A.S.L.
82-06 ✦ 615.32 m	drill hole showing elevation of seam floor.

804 (Mb)

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WOLF MOUNTAIN PROJECT

STRUCTURE CONTOUR MAP

SEAM W-1 (Wellington)

FIG. #4.6

Drawn: P Hall		Date: November 1982	
Checked:	Client App.	Scale: 1:5,000	
Author: J. Perry	Revised:	File No:	
COAL-EX CONSULTING LTD.		Dwg. No:	