



COAL-EX CONSULTING LTD.

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1985 EXPLORATION DATA
SUMMARY FOR THE
CHUTE CREEK COAL PROPERTY

VOLUME I

Coal Licence Nos. 6502, 6503, 7954-7960

Vancouver Island - Comox District

N. T. S. 92F/14

Latitude 49° 53' N

Longitude 125° 26' W

**Licences Held By: Nuspar Resources Ltd. and
Sulpetro Minerals Ltd.**

Operator: Nuspar Resources Ltd.

Consultant: JHP Coal-Ex Consulting Ltd.

Author: John H. Perry, P. Geol.

Work Performed: April - July, 1985

Date Submitted: February 10th, 1986

SUMMARY

The Chute Creek Coal Property is located on Vancouver Island, British Columbia, within a few kilometres of Campbell River. The property consists of nine coal licences and one block of private (freehold) coal land for a total of 2740.6 hectares. A further two licence areas, comprising 144 hectares, are under application. The property is well located for access to major forestry haul-roads, the Provincial Highway No. 1 and potential barge loading facilities in the Campbell River region.

The coal licences and the private coal block are owned by three different companies. Nuspar Resources Ltd. owns seven of the coal licences and has applied for the two additional licence areas, Sulpetro Minerals Ltd. holds two licences and Powell River Copper Ltd. owns the private coal rights. Nuspar is the operator of the property, having acquired options to purchase the coal holdings of the other two parties during 1984 and 1985.

Exploration undertaken during 1985 consisted primarily of drilling, geophysical logging, road construction and maintenance, trenching and test pitting, supplemented by geological mapping and subsequent coal analysis. The main purpose of this work was to establish the resources and quality of coal seams contained within a small area of the southern licences. A total of \$196,273 was spent on these activities.

In the main exploration area many thin coal seams, ranging from a few centimetres to just over a metre in thickness, are present within the Comox Formation. Four of the thicker seams have been identified as being potentially mineable. Within these potential mine areas the seams (named, in descending order, Seam A (Main), B, C and D) range in thickness from 0.36 metres to 1.15 metres. They are contained within

a coal "zone" that varies between 8.0 and 10.6 metres in thickness; it is this feature that supports the examination for mining of the thinner seam intersections. This coal "zone" is tentatively correlated with the No. 3 Seam from the Quinsam property.

The coal seams are cut by a series of high-angle normal faults which divide the exploration area into three structural "domains". In two cases the strata exhibit gentle, regular dips to the north-northwest and northeast while in the third domain the strata are interpreted to dip gently northwest and southeast about a shallow, basin-like warp. Fault displacements vary from 10 to 36 metres. The structural geology has been interpreted from drill hole data; the faults and fold have not been mapped in the field.

A total in-situ resource of 5.257 million tonnes has been calculated from the four coal seams in the main exploration area. From this resource, 3.345 million tonnes are considered to present potential mining opportunities while 1.912 million tonnes form a resource base which is not considered to be mineable. The resources contained within potential open-pit mining areas total 2.195 million tonnes; measured = 0.966×10^6 tonnes, indicated 0.426×10^6 tonnes and inferred = 0.803×10^6 tonnes. Within these "open-pit" areas all four coal seams were included in the resource calculations. A total of 1.150 million tonnes has been calculated for the potential underground mining areas; measured = 0.771×10^6 tonnes, indicated = 0.367×10^6 tonnes and inferred = 0.013×10^6 tonnes. Only Seam A (Main) is considered to present a possible opportunity for underground mining. It should be noted that these tonnages have been calculated for areas and coal seams that present possible mining opportunities. Proper engineering studies will be required to determine whether mineable reserves are present and what mining methods could be employed.

The coal is a high quality thermal coal of high volatile B

bituminous rank. On a dry, ash free basis the coal has a heat content of 8038 cal/g. At 6% moisture (the approximate average equilibrium moisture) heat contents range from 3893 cal/g (Seam B, at 39.28% ash) to 6374 cal/g (Seam A (Main), at 13.72% ash). Sulphur contents on the raw coal range considerably both within individual seams and between seams. Only in Seam D is the sulphur consistently less than one percent (0.47% to 0.74%). Moderate sulphur values from the raw coal are found in Seam B (0.68% to 1.24%) while much greater ranges and higher values are present in Seam A (Main), (0.88% to 4.54%) and Seam C (1.60% to 5.63%). Determinations of sulphur on "cleaned" coal, obtained as floats from a 1.6 specific gravity cut, indicate that the values may increase, decrease or stay the same as those obtained from the raw sample. Ash analyses indicate low water soluble alkalies and low Na_2O contents. Base to acid ratios are low as are most of the slagging and fouling indices. The Hardgrove Grindabilities vary from 45 to 49, free swelling indices indicate that the coal is non-agglomerating and fuel ratios are less than 1.62.

1.0 INTRODUCTION

The Chute Creek Coal Property is located on Vancouver Island, British Columbia (see Figure 1.1). The property consists of coal licences held by Nuspar Resources Ltd. and Sulpetro Minerals Ltd. and private (freehold) coal rights held by Powell River Copper Ltd. Nuspar is the operator of the property having acquired options to purchase both Sulpetro's coal licences and Powell River Copper's coal rights in 1984 and 1985, respectively.

This report presents the results of geological exploration carried out on the property during the period August 2nd, 1984 to July 31st, 1985. While a site visit in November, 1984 located one new coal occurrence, all other exploration activities were conducted between April 9th and July 31st, 1985. The focus of the 1985 exploration was to confirm the presence of a potentially mineable coal seam in an area where its existence was projected from 1984 data and to establish the in-situ resources and quality of the coal. This purpose was achieved and, as a result of the 1985 program, three additional coal seams were found; all four seams are considered to present opportunities for mining. Although the majority of the work was concentrated within a relatively small area of the southern licences, several drill holes were located in other parts of the property.

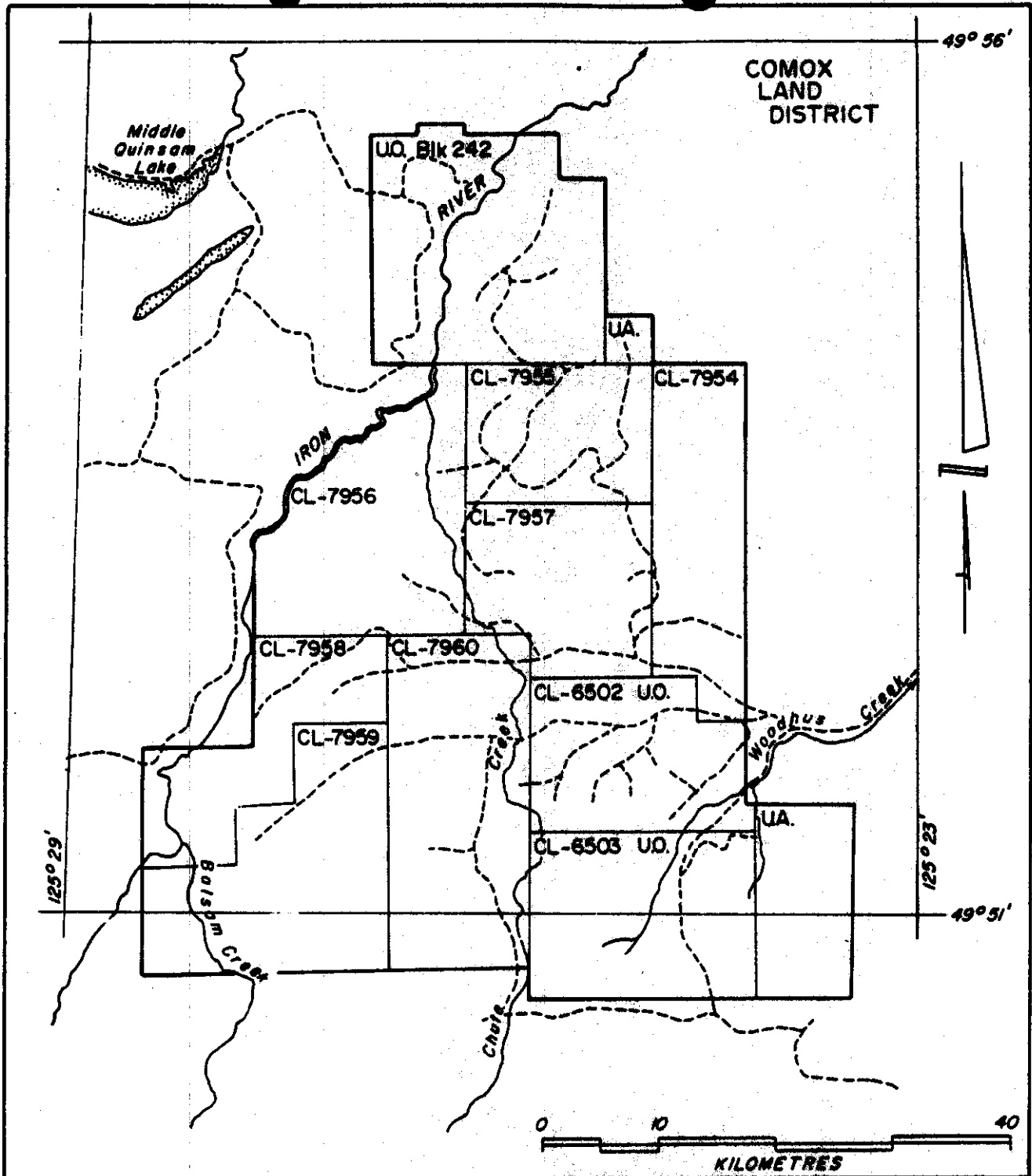
3.0 COAL LANDS

The Chute Creek Property currently consists of nine coal licences (2,348 hectares) and one block of privately held coal land (392.6 hectares), for a total of 2,740.6 hectares. A further 144 hectares are under licence application. Coal rights for the lands which comprise the property are owned by three separate companies: Nuspar Resources Ltd., Sulpetro Minerals Ltd. and Powell River Copper Ltd. Nuspar has acquired options to purchase the interests of the other two parties and is operator of the property. The coal licences, private (freehold) land and areas under application are listed in Table 3.1 and shown in Figure 3.1.

TABLE 3.1
CHUTE CREEK PROPERTY - LISTING OF COAL LANDS

Land Classification		Area (Hectares)	Held By
Coal Licence	6502	265	Sulpetro Minerals Ltd.
	6503	247	" " "
	7954	256	Nuspar Resources Ltd.
	7955	203	" " "
	7956	301	" " "
	7957	205	" " "
	7958	198	" " "
	7959	320	" " "
	7960	353	" " "
Private (Freehold) Block	242	<u>392.6</u>	Powell River Copper Ltd.
TOTAL		<u>2,740.6 hectares</u>	
Under Application:			
Adjoining Block	242	16	
Adjoining C.L.	6503	<u>128</u>	
		<u>144 hectares</u>	

Nuspar first obtained the option on Sulpetro's licences in mid-1984 and were granted a further seven coal licences by the British Columbia government that September. In mid-1985, Nuspar filed an



LEGEND

- U.O. - Under Option
- U.A. - Under Application
- CL - Coal Licence
- - Property Boundary
- - Coal Licence Boundary
- - - Roads and Trails

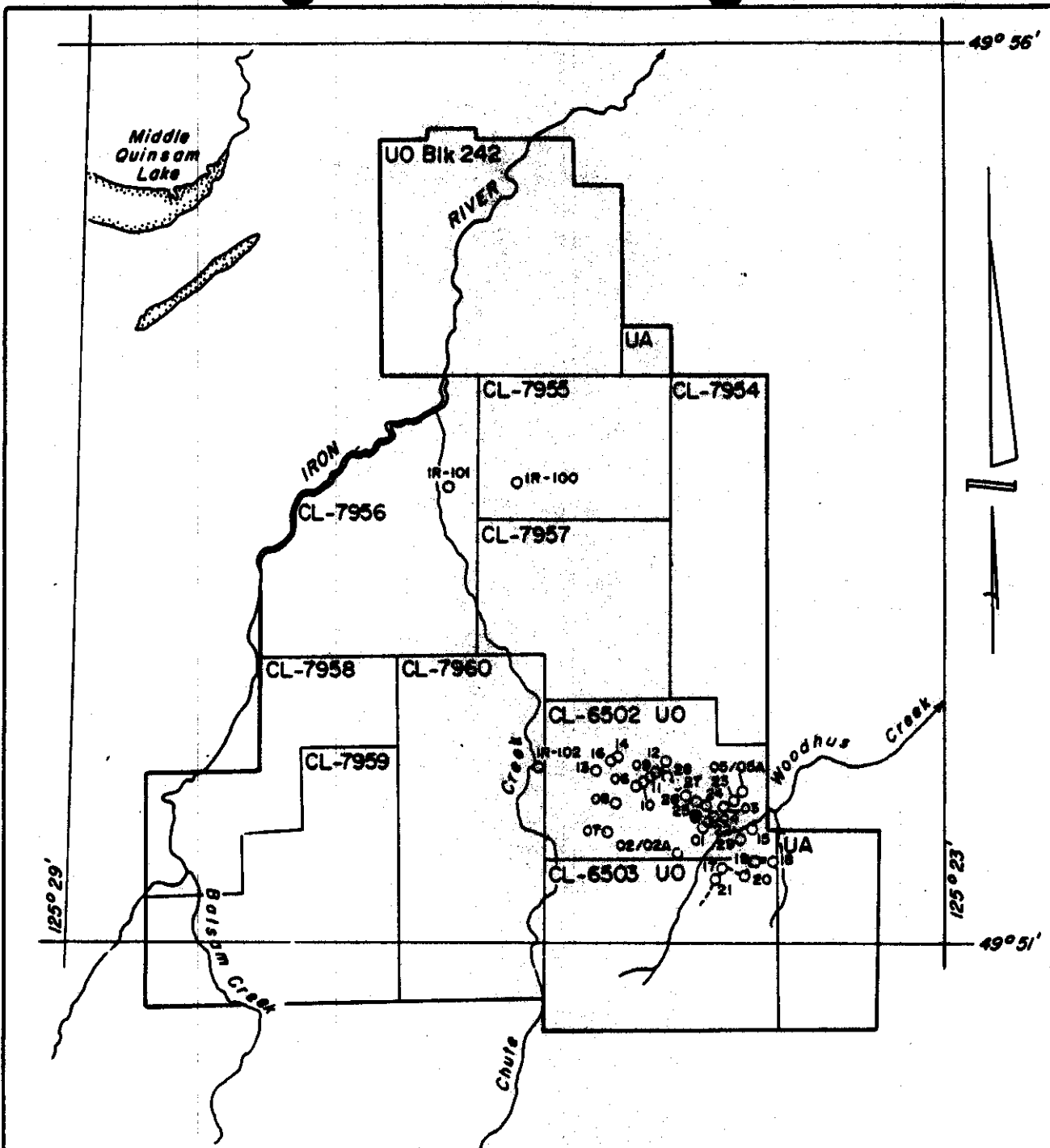
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**CHUTE CREEK PROJECT
COAL LICENCE MAP**

FIG. 3.1

Author: J. PERRY	Drawn: J. ELLAM	Scale: 1:50,000
		Date: Nov./85
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application for an additional 144 hectares, comprising two separate land lots and, at approximately the same time, negotiated an option with Powell River Copper on their coal rights to Block 242. The licences obtained by Nuspar in 1984 were named the Iron River Coal Property to distinguish them from the two Sulpetro licences which were called the Chute Creek Coal Property. In September, 1985 all the licences were consolidated under one common anniversary date (September 27th) and are now referred to as the Chute Creek Coal Property.



LEGEND

- CL Coal Licence
- UA Under Application
- UO Under Option
- ₂₂ 1985 drill hole, Chute Creek Licences*
- _{IR-100} 1985 drill hole, Iron River Licences*
- (* prior to amalgamation of all coal lands under the name Chute Creek)
- Test pit area
- New trails



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CHUTE CREEK PROJECT		
1985		
DRILL HOLE LOCATIONS		
FIG. 4.2		
Author: J. Perry	Drawn: J. Ellum	Scale: 1:50,000
		Date: Nov./85
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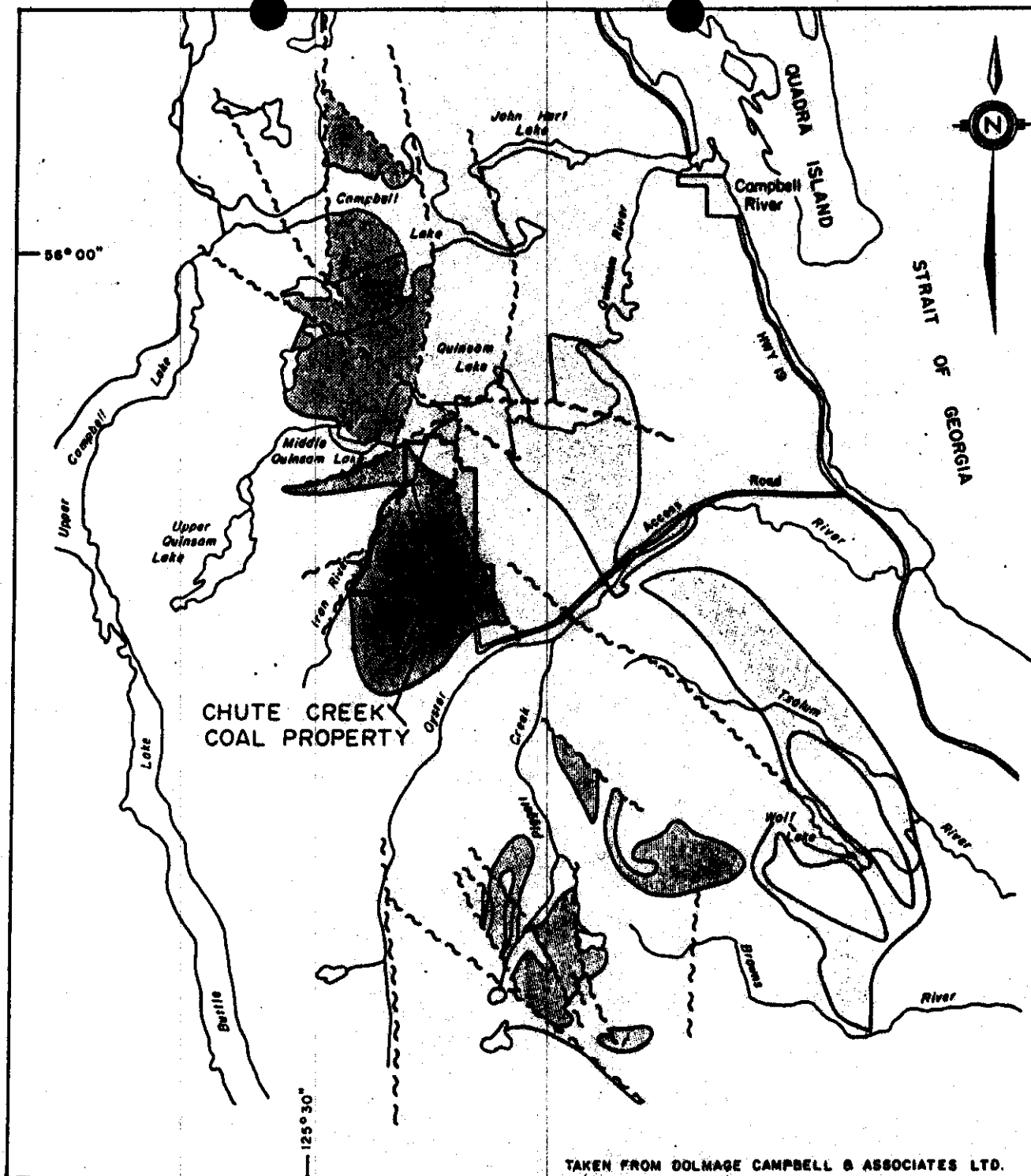
5.0 GEOLOGY

5.1 Regional Geology

The geology of this portion of Vancouver Island has been mapped and described by Muller (1977) with additional published work in the Quinsam Lake area reported by Eastwood (1984). Coal is found within the Comox Formation of the Upper Cretaceous Nanaimo Group. The Comox Formation is the lowest unit of this succession and is the only representative of the Nanaimo Group in the region. Overlying formations may be present beneath the deep overburden of the eastern coastal plain, but at higher elevations they have been removed by erosion. The regional distribution of the Comox Formation is shown in Figure 5.1.






The Upper Cretaceous strata of the Campbell River area have been separated into two "basins"; the Quinsam Basin and the Comox Basin (Dolmage Campbell, 1975). These basins do not necessarily correspond to original areas of deposition but are largely determined by post-Cretaceous faulting and preservation of the sediments within structurally depressed areas. The ground between these high-angle faults forms a series of gently warped and tilted blocks. Nanaimo group sediments within these fault blocks are often characterized by gently to moderately dipping beds.

In the Chute Creek area, Comox Formation lithologies unconformably overlie igneous, pyroclastic and sedimentary rocks of the Vancouver and Bonanza Groups and Island Intrusions. The Vancouver Group is Triassic in age while the Bonanza Group and Island Intrusions are both Jurassic. The generalized geology of the Chute Creek area is shown in Figure 5.2 while the distribution of Comox Formation lithologies and coal seams contained within the 1985 exploration area are shown on the Geology Maps (Figures 5.3 and 5.4) and Cross-Sections (Figures 5.5 and 5.6). Stratigraphic correlations of the strata penetrated by the drill holes are presented in Figures 5.7 to 5.9.



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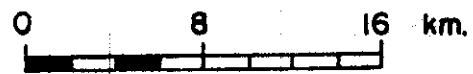
-  Quinsam basin
 -  Comox basin (extends to Strait of Georgia under overburden cover)
 -  Fault
 -  Geological contact
 -  Road
- } Comox Formation

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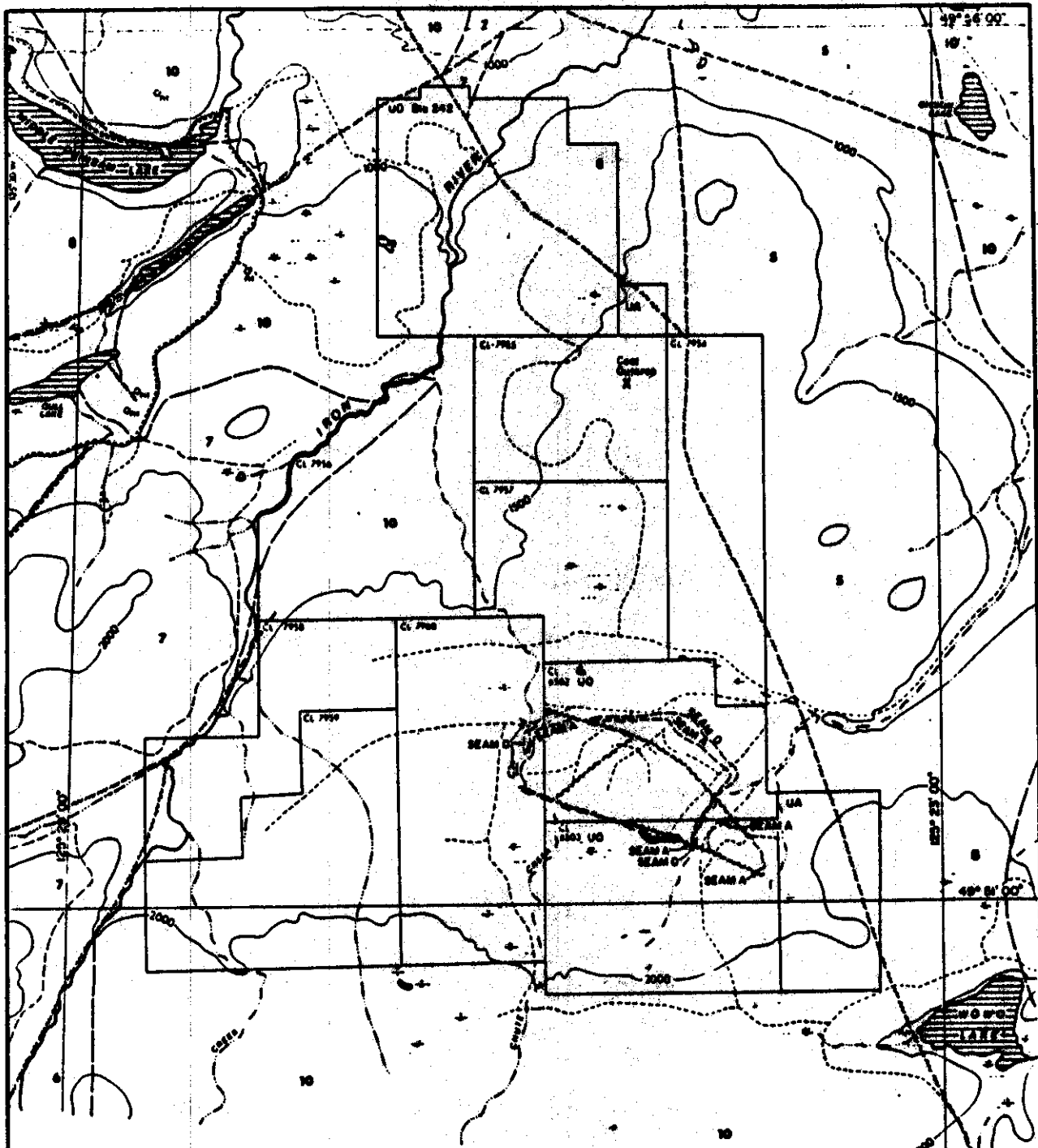
CHUTE CREEK COAL PROPERTY
**REGIONAL DISTRIBUTION OF
COMOX FORMATION LITHOLOGIES**

FIG. 5.1

PREPARED BY: J. PERRY	DRAWN BY: B. CARR
SCALE: AS SHOWN	
DATE: JANUARY 1988	



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LEGEND

Symbol	Period	Group	Formation
10	Upper Cretaceous	Nanaimo	Comox - sandstone, conglomerate, shale and COAL.
8	Jurassic	Island Intrusions	- granodiorites, quartz diorites, granites
7	Jurassic	Bonanza	- volcanics, tuffs, argillite, greywacke
6	Triassic	Vancouver	Quaraine - limestone
5	Triassic	Vancouver	Kermutsen - volcanics

(After Muller, 1977)

— — — — —	Geological Contact	UA	Under Application
— — — — —	Fault	uo	Under Option
- - - - -	Coal Seam Trace	CL	Coal Licence
— — — — —	Coal Licence Boundary		
-2000-	Topographic Contours (feet, A.S.L.)		



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CHUTE CREEK PROJECT
REGIONAL GEOLOGY

FIG. 5.2

Author: J. Perry	Drawn: J. Eitem	Scale: 1:50 000
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		N.T.S. 92F/14

5.2 Comox Formation

Immediately south of the property, along the northern slope of the Oyster River valley, the basal lithologies of the Comox Formation consist of thick conglomerate beds with interlayered coarse-grained sandstone. This basal conglomerate is generally confined to the lowest points on the pre-Nanaimo Group land surface and, therefore, varies significantly in lateral extent and thickness. The old land surface exhibits considerable vertical relief; in the Cumberland area the lowest coal seam in the Comox Formation locally laps onto it. Overlying the conglomerates is a sequence of medium-to-fine grained clastic sediments consisting mainly of interbedded fine to medium-grained sandstone and siltstone with occasional interbeds of shale and coal. It is this latter sequence which underlies most of the Chute Creek property.

Very little is known about the overall Comox Formation stratigraphy of this area. Outcrop is scattered and this, combined with a general lack of relief and the low dip of the beds, provides few opportunities to examine extensive stratigraphic sections. Luscar (1977) estimated a thickness of 457 metres of Comox strata in the southeastern portions of the property. This section, composited from mapping in Balsam Creek and drill hole data, consisted of sandstone and conglomerates with thin interbeds of siltstone and shale and a few very thin, poor-coal seams. Work during 1985 concentrated on defining a specific coal-bearing zone located at relatively shallow depths and most of the holes were stopped once this zone had been drilled. Several holes were, however, extended beyond this section and a few holes were collared below the main coal zone. Composite sections of these extend to 22 metres below the floor of Seam D thus providing an overall composite drilled section of 70.4 metres (holes 85-08, 85-03 and 85-05). Nearby, CanDel's deepest drill hole (C81-1) penetrated 153 metres of Comox strata. The upper 87 metres

consisted of interbedded sandstone and shale (plus, presumably, siltstone) with thin, clean coal seams throughout. The lower 66 metres was predominantly sandstone (Candel, 1981).

Examination of the data suggests that most of the 457 metre section described by Luscar comprises the basal conglomerate portion of the Comox Formation while drilled sections to the east and north-east are higher in the stratigraphy. This may well be complicated by a lateral facies change from the coal-bearing fine to medium grained clastics encountered in licences 6502 and 6503 to coarse-grained sediments and pinching out of coal seams to the south and southwest. No detailed study of the sedimentology of the area has been undertaken and no attempt has been made to correlate the stratigraphy in the southern coal licences to the central or northern parts of the property. The possibility does exist, however, for correlation of coal seams in the 1985 exploration area with those in the western parts of Block 242 and the Quinsam Project area. Further discussion of this is presented below along with discussions on coal seam stratigraphy.

5.3 Coal Seam Stratigraphy

5.3.1 Introduction

Coal is generally found in the lower half of the Comox Formation (Muller and Jeletzky, 1970). The seams are often quite variable in thickness and lateral extent and, on a regional basis, individual seams may split, merge, pinch out into shale beds, or be replaced by sandstone. In the Middle Quinsam Lake area, adjacent to Block 242, drilling has intersected coal seams over a stratigraphic interval of 107 metres. Three of these seams have been shown to maintain their thickness over a sufficient area to warrant development of the deposit (the Quinsam Coal Project).

Coal seams on the Chute Creek property have been described from outcrops, trenches and drilling. Prior to 1985 only one seam, referred to at that time as Coal Zone A, was considered to present any possibilities for mining (Nuspar, 1984). The 1985 exploration has confirmed this potential and that of an additional three coal seams discovered during the work program. The main coal sections within the original Coal Zone A are now referred to as Seam A (Main) and Seam A (Lower); only Seam A (Main) is considered to present a target for mining. The other three seams lie below Seam A (Lower) and are referred to as Seams B, C and D. Other thin seams and discontinuous coal splits are present within, above and below the main coal zone. Although some of these are present over a wide area, none are considered to be of economic importance. While these thinner seams are not described in any detail here, they may have importance in future mining evaluations of the main seams, especially those splits above the roof of Seam A (Main) in the area of underground mining potential.

As a result of the drill program it has been possible to establish positive correlation of the main coal seams throughout the property. This correlation is readily apparent from the signatures each seam makes on the geophysical logs (see Figures 5.7 to 5.9). The zone which encompasses Seams A to D varies in true thickness between 8.04 and 10.60 metres. It is thinnest in the central and eastern parts of the drilled area west of Woodhus Creek, but thickens to the south, north and northwest. These differences are caused by variations in both coal seam and interseam strata thicknesses. Part of the increase of the zone to the south, towards holes 85-02/02A and 85-07, is due to the thickening of interseam strata between

Seams A (Main) and B and, for hole 85-07, also to a thickening of strata between Seams B and C. North of a line joining holes 85-10 and 85-25 and in the area of 85-13, 85-14 and 85-16, the zone thickens because of an increase in strata between Seams C and D, except for drill hole 85-26 where the sediments between Seams B and C have thickened. Other, less significant inter-seam thickness variations are also present. The variations in coal seam thicknesses across the drilled area are discussed in the ensuing sections of this report.

Only one seam other than Seams A (Main), B, C and D attains a thickness and lateral extent worth mentioning here. This seam was intersected in drill holes C81-1, C81-2 and C81-3 at depths of 85.5, 57.8 and 60.0 metres, respectively. It ranges in thickness from 0.65 metres to 0.90 metres. The depth and thickness of this coal seam precluded it from further examination during 1985 and it has not been included for resource evaluation in this study.

No detailed studies have yet been undertaken to determine whether the main coal seams present in the southern licences of the Chute Creek property correlate with those described from the Quinsam property. A correlation is suggested, however, by two factors:

- (i) the coal zone encompassing Seam A (Main) to Seam D is similar to Quinsam's No. 3 Seam; both have four coal splits (or "seams") separated by three rock bands. The Quinsam No. 3 Seam is thinner but with proportionately more coal than the coal zone at Chute Creek;
- and
- (ii) the stratigraphic interval that contains the three main coal seams at Quinsam is approximately 60

metres thick. The interval between the lowest significant coal seam and Seam A (Main) at Chute Creek is 50 to 60 metres. It is possible that the coal seam penetrated at depth by the Sulpetro drilling is correlative with the No. 1 Seam at Quinsam.

Discussions relating to some of the more pertinent characteristics of Seams A (Main), B, C and D are presented below and may be seen on examination of the detailed (1:40) geophysical logs taken across the coal zone, presented in Appendix A.VII.

5.3.2 Seam A (Main)

Seam A (Main) averages approximately 1.05 metres in true thickness and ranges between 0.89 metres and 1.15 metres. It possesses good lateral continuity and is the only coal seam considered to be potentially mineable east of Woodhus Creek. The variation in the thickness of Seam A (Main) across the resource area is illustrated by the Isopach Map - Figure 5.10. The pattern indicated by the isopachs is a simple increase in thickness from the north, northeast and eastern portions of the area towards the southwest and west. A secondary thickening trend is present in the area around drill hole 85-22. The erosion of the top portions of Seam A (Main) in drill holes 85-24 and 85-25 precludes proper definition of this pattern. Observations at the road-cut trench indicate that rolls in the floor of Seam A (Main) up to 0.10 to 0.15 metres in amplitude may occur over a very short distance. The thicker intersection of Seam A (Main) in hole 85-22 may reflect such a situation. Seam A (Main) east of Woodhus Creek exhibits only a small variation in thickness, between 0.92 and 1.01 metres. In this area the seam must thin rapidly to the south as it is only 0.65 metres thick in hole C81-1.

Two rock bands are characteristically developed at

specific horizons within Seam A (Main). The most significant of these is located some 0.24 to 0.36 metres above the seam floor; it is quite consistent in its development and thickness over the entire drilled area. The band is a composite of two thinner carbonaceous claystone bands separated by a coal or poor-coal split. All three components, the upper claystone, middle coal and lower claystone are of similar or equal thickness; overall band width varies from 0.12 to 0.19 metres. The second rock band is located between 0.60 to 0.80 metres above the floor. This band is much thinner and occasionally may not be present at all. It varies from 0.01 to 0.05 metres in thickness. In approximately half of the cored sections this band is best described as a "pelletstone". Lithologically, it is composed of numerous pin-head sized spheres set in a carbonaceous clay and coaly matrix. The amount of matrix material varies considerably. Cross-sections through the spheres indicate a thin buff to light brown coloured rim with a dark brown to black interior. The spheres effervesce in dilute hydrochloric acid. It is possible that the spheres represent oolites (perhaps sideritic). In the remainder of the drill holes, this rock band is represented by carbonaceous claystone. Other, minor, rock bands within this coal seam are restricted to infrequent thin lenses and lamina usually less than 0.01 metre thick.

The floor of Seam A (Main) is usually a fine to medium grained sandstone. In the core samples the sandstone is often carbonaceous with coaly lenses at and just below the contact with the seam. In drill holes 85-07 and 85-08 this sandstone is replaced by finer grained lithologies such as carbonaceous claystone and siltstone. East of Woodhus Creek the sandstone is quite thin, only 0.19 to 0.26 metres, but thickens west of the creek to between 0.37 and 0.80 metres, except in hole 85-01 where it thins to approximately 0.15 metres. Underlying the sandstone is a thin coal zone referred to as Seam A (Lower). While this zone can be

traced consistently throughout the exploration area it is not considered to have any potential for mining at this time.

Roof lithologies of Seam A (Main) include carbonaceous claystone, siltstone and fine-grained silty sandstone. Often the top of the seam is defined by a thin band of interlaminated claystone, coal and/or poor-coal. In other instances, there is a thin coal split or rider between 0.10 and 0.50 metres above the roof which may replace the interlaminated band or be in addition to it. This coal split or rider seam is usually present northeast of a line joining drill holes 85-13, 85-10 and 85-04. Southwest of this line, rider seams and coal splits are usually present but are higher in the roof. There is a gradual coarsening trend to the roof lithologies from southwest to northeast across the exploration area such that, in the potential open-pit area between drill holes 85-04 and 85-16, a thick fine to medium grained, silty sandstone often lies in close proximity to the immediate seam roof. This may be due to channelling within the more usual claystone/siltstone roof as evidenced at the roadside trench, east of Woodhus Creek. The lithologies that comprise the roof are generally massive or possess only a slight fissility. Although no geotechnical work has been undertaken, the roof should prove to be relatively competent in the potential underground mine areas. Attention will have to be paid to the rider seams and coal splits, however.

5.2.3 Seam B

Seam B extends throughout most of the exploration area but is not well developed east of Woodhus Creek where only a residual coaly/carbonaceous zone is indicated in hole 85-20. Variations in seam thickness are illustrated on the Isopach Map - Figure 5.11. The seam thins from northeast to southwest; the pattern is straightforward apart from a minor complication in the area outlined by drill holes 85-06, 85-13, 85-28 and 85-26. Seam

6.0 COAL RESOURCES

6.1 Summary of Resource Evaluation

The coal resources of Seams A (Main), B, C and D have been calculated for the main 1985 exploration area. The total resource represents the in-situ (or in-place) tonnages for all of the seams, regardless of their mining potential. The resources have been divided into four categories: measured, indicated, inferred and resource base. The first three categories were applied to tonnages from coal seams considered to present potential mining opportunities. They reflect the level of confidence given to the calculated tonnages and broadly conform to the system proposed by the British Columbia Ministry of Energy, Mines & Petroleum Resources. Measured, indicated and inferred resources are those which have maximum data spacings of 375 metres, 750 metres and greater than 750 metres, respectively. The "resource base" category was assigned to those quantities that, at this point, do not present potential mining targets. A minimum seam thickness of 0.50 metres was applied to this category; no depth limitation was employed, as all the coal seams are relatively shallow.

The total resource area was divided into a number of "resource blocks" which reflect various mining targets. These blocks were classified as either potential open-pit or underground mine areas or, in one instance, a combination of both. The classifications were based upon overall coal seam thickness and depth from surface. No stringent limiting factors were applied; the potential mine areas are simply targets within which one or more coal seams may present an economic mining opportunity. Confirmation of the mineability and mining methods employed for each resource block will have to await engineering studies.

On the basis of the discussion above, a total resource of 5.257 million tonnes has been calculated for Seams A (Main), B, C and D

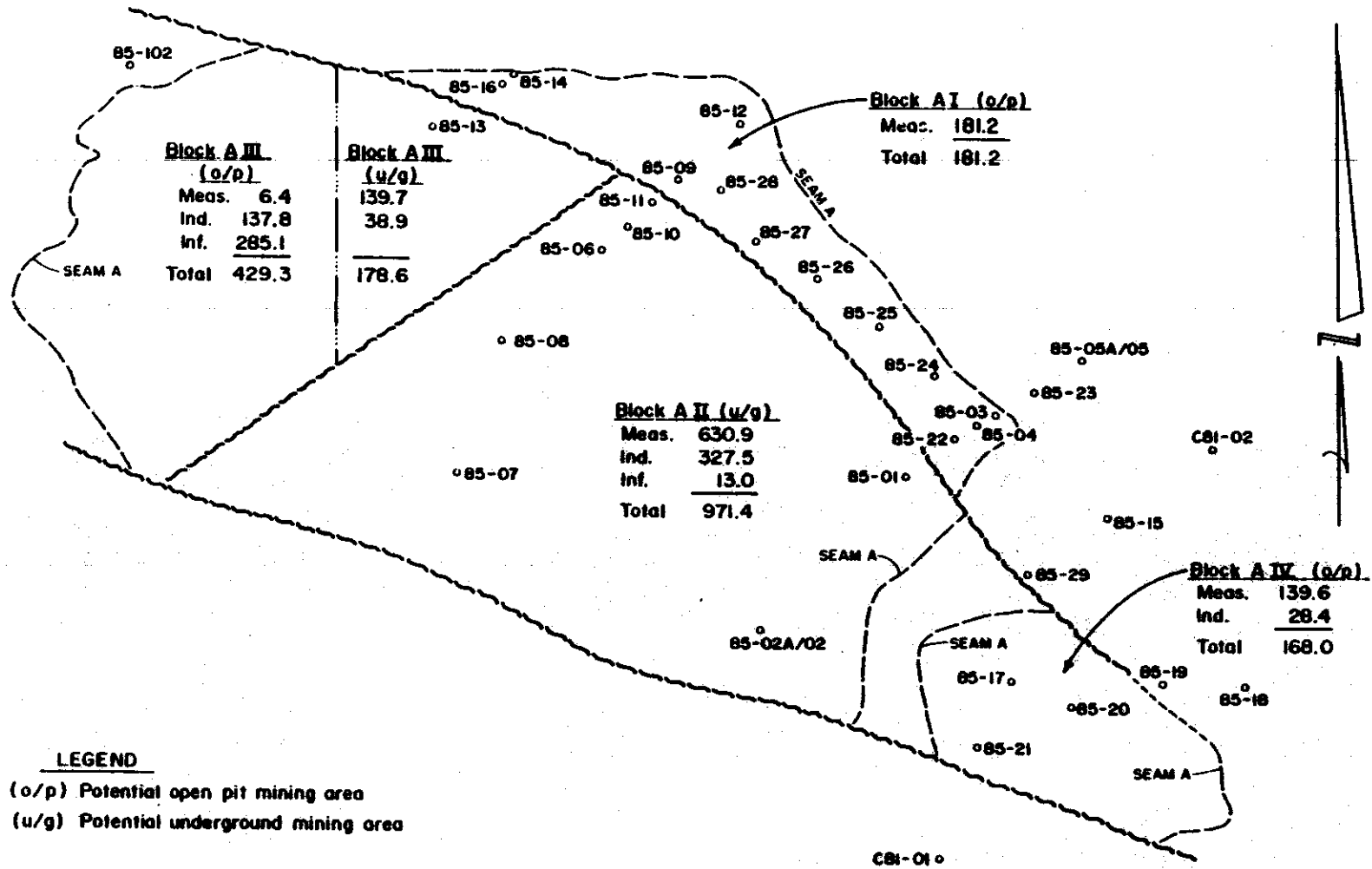
within the main 1985 exploration area. This tonnage comprises 3.345 million tonnes of potentially mineable resources and 1.912 million tonnes of coal which is not considered to be mineable, but which has been placed in the resource base category. A summary of the potentially mineable reserves is presented in Table 6.1 while additional resource summaries are presented in Figures 6.1 to 6.4 and Appendix A.VII.

A total 1.735 million tonnes of coal were placed in the measured resource category while indicated and inferred resources comprise 0.793 million and 0.816 million tonnes, respectively. Seam A (Main) is considered to present mining potential (both open-pit and underground) throughout the entire area while Seams B, C and D are believed to present only open-pit possibilities; these are found in Blocks I and III. The resource potential of each block is discussed in the following section.

6.2 Coal Resource Blocks

The main 1985 exploration area was divided into four coal resource blocks (illustrated in Figures 6.1 to 6.4) which represent potential mine areas. The boundaries of these blocks are formed by the projected sub-crops of the coal seams and the three high-angle, normal faults that cut across the area. As such, the resource blocks conform to the structural domains described in Section 5.4. Blocks I and III are equivalent to two domains while Blocks II and IV, separated by Woodhus Creek, comprise the third domain. The various resource categories and associated tonnages are summarized below:

- a) Block I - is a potential open-pit mining area containing measured and indicated coal resources of 0.806 and 0.001 million tonnes respectively, for a total of 0.807 million tonnes. All four seams are considered to be potentially mineable. No minimum seam thickness has been applied.



Block A III (o/p)

Meas.	6.4
Ind.	137.8
Inf.	285.1
Total	429.3

Block A III (u/g)

Meas.	139.7
Ind.	38.9
Total	178.6

Block A I (o/p)

Meas.	181.2
Total	181.2

Block A II (u/g)

Meas.	630.9
Ind.	327.5
Inf.	13.0
Total	971.4

Block A IV (o/p)

Meas.	139.6
Ind.	28.4
Total	168.0

LEGEND
 (o/p) Potential open pit mining area
 (u/g) Potential underground mining area

Note: All tonnages are x10³ tonnes



NUSPAR RESOURCES LTD.	
CHUTE CREEK PROJECT	
SEAM A (main)	
RESOURCE SUMMARY	
FIG. 6.1	
Author J. Perry	Drawn J. Ellam
N.T.S. 92F/14	

not to be mineable, no circles were constructed and the tonnages were allocated to the resource base category. The polygonal areas formed by intersection of all these lines formed the resource sub-blocks; these are illustrated for each seam in Figures 6.5 to 6.8. Each sub-block was planimeted and the resulting area was corrected for the effects of dip. The corrected area was then multiplied by the seam thickness and assigned specific gravity to give the in-situ coal tonnage. The detailed resource calculations for Seams A (Main), B, C and D are presented in Appendix A.II. No factors were applied to the calculations to take into account geological uncertainties with respect to precise fault locations or sub-crop patterns of the coal seams. Uncertainty does exist at these boundaries, however, particularly in portions of Blocks I, III and IV. As the exact locations of the sub-crops and faults could fall either side of their interpreted positions shown on the maps, the assignment of a valid geological factor is difficult. The precise locations of the seam sub-crops and the faults will need to be defined by future drilling.

6.4 Discussion

The resource calculations presented above have dealt with coal seams contained within the main 1985 exploration area. The exploration concentrated upon only a small portion of the property and the opportunity exists to expand the coal resources into adjacent and more distant areas. Targets for future exploration are:

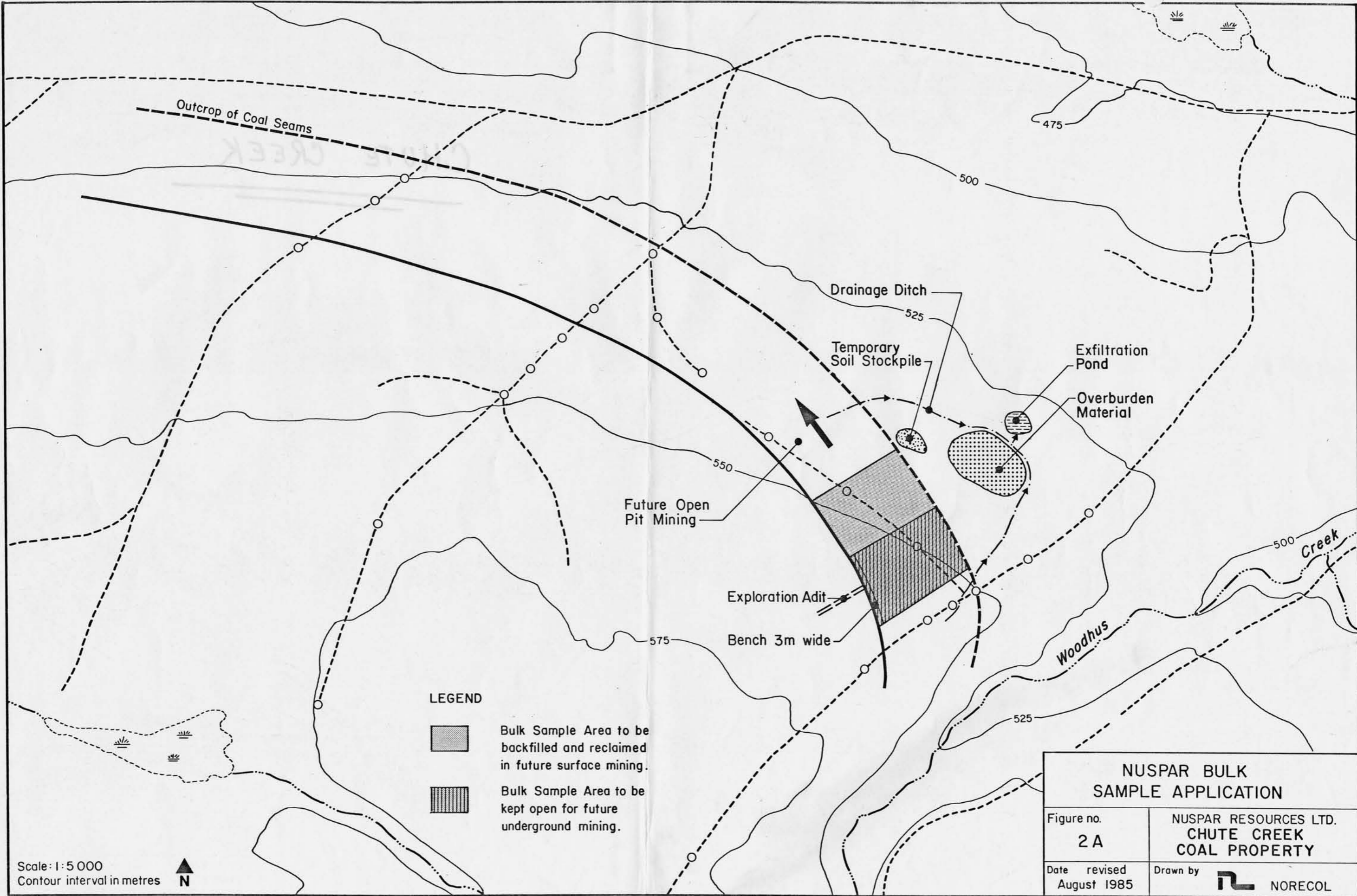
- (i) West of Chute Creek - the extrapolation of 1985 data through Block III suggests that some or all of Seams A (Main), B, C and D are present west of Chute Creek. Further drilling within Block III to confirm the geological interpretation and resource estimates presented herein, should allow more reliable interpretation of coal seam development west of the creek.
- (ii) South of the 1985 exploration area - portions of licence 6503

- may contain potentially underground mineable resources within Seam A (Main). In the southern parts of this coal licence Seam A (Main) may also provide limited open-pit opportunities.
- (iii) East and southeast of Block IV - Seam A (Main) may extend into the area under licence application, along the eastern edge of coal licence 6503.
 - (iv) Block 242, east of the Iron River - coal seams present on the western side of the river may extend under the eastern banks.



The coal licences which comprise the central and western portions of the property have undergone only limited exploration and further work is required to determine the resource potential of these areas. It is not known if Seams A (Main), B, C or D underlie these licences but even if these seams are found not to be present, the possibility exists for the occurrence of stratigraphically lower coal seams that may be potentially mineable. It is to be remembered that three seams are planned to be mined in the Quinsam area. Tentative correlations suggest that two of these should lie below the zone that contains Seam A (Main), B, C and D.

Potentially mineable coal resources for the Chute Creek property presently total 7.072 million tonnes. The 1985 exploration area in the southern licences contain 3.345 million and the western portion of Block 242 contains 3.727 million tonnes. No mining reserves have been calculated for this report. The resource tonnages present the amounts of coal potentially available for mining; engineering studies will be required to determine the precise quantities of mineable coal and, hence, the reserves that are contained within the property. The identification, in this report, of open-pit mining areas has been based on rudimentary observations of overall coal seam thicknesses and depth of cover. Consequently, it may be shown by engineering studies that these "open-pit" areas contain some coal which must be mined by underground methods. Care should

taken in calculating strip ratios from the Structural Cross-Sections (Figure 5.5, parts 1 to 9), as the surface profile has been taken from the topographic maps but the coal seams have been plotted using data based on the collar height surveys (see Section 4.2.6). The result of this is that the coal seams lie at slightly greater depths below the topography than would be the case if there were better agreement between the topographic contours and the drill collar elevations.




LEGEND

-  Bulk Sample Area to be backfilled and reclaimed in future surface mining.
-  Bulk Sample Area to be kept open for future underground mining.

Scale: 1:5 000
 Contour interval in metres



NUSPAR BULK SAMPLE APPLICATION	
Figure no. 2 A	NUSPAR RESOURCES LTD. CHUTE CREEK COAL PROPERTY
Date revised August 1985	Drawn by  NORECOL