REPORT ON EXPLORATION WORK
PERFORMED ON COAL LICENCES
148, 162, 163, 4460, 4461, 4462, 4463,
4726, 4727, 6043, 6044, 6343
(GROUP NO. 277 SUPP). DURING THE PERIOD
MARCH 28, 1980 TO SEPTEMBER 1, 1980

No. 277 Supp.

BOWRON COALFIELD

LAND DISTRICT - CARIBOO
N.T.S. GRID - 93H/13
LATITUDE - 53°50' N
LONGITUDE - 121°55' W

OWNER/OPERATOR

NORCO RESOURCES LTD.

CONSULTANT/AUTHOR

I. BOROVIC, P.ENG., GEOLOGIST
(IGNA ENGINEERING & CONSULTING LTD.)

FIELD WORK: MARCH 28, 1980 TO SEPT. 1, 1980

REPORT SUBMITTED: FEBRUARY 17, 1981

Report revised and resubmitted on September 30, 1981
in compliance with Ministry of E.M. & P.R. letter
dated June 26, 1981. Receipt of this letter was
delayed by the postal strike August 3, 1981.

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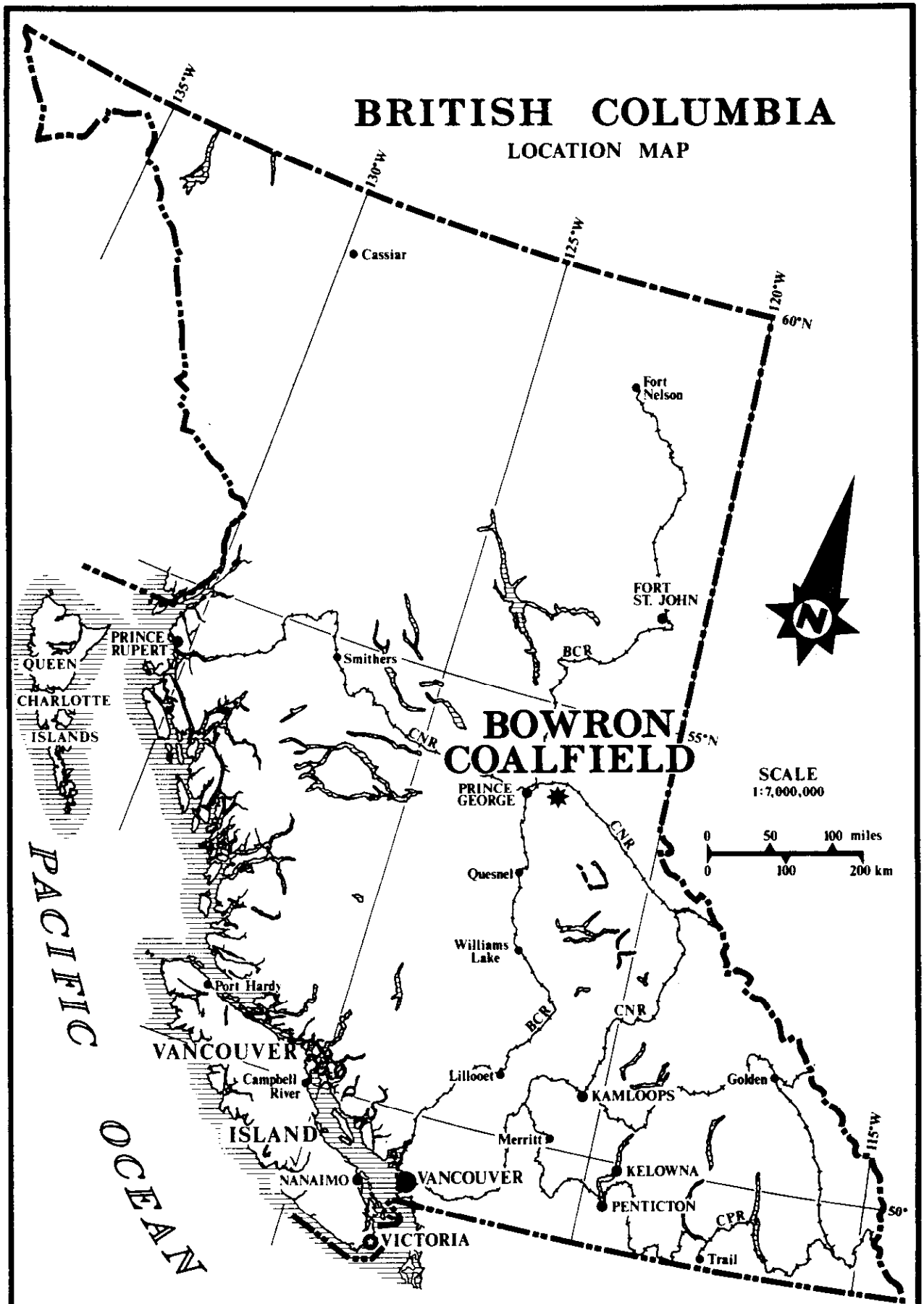
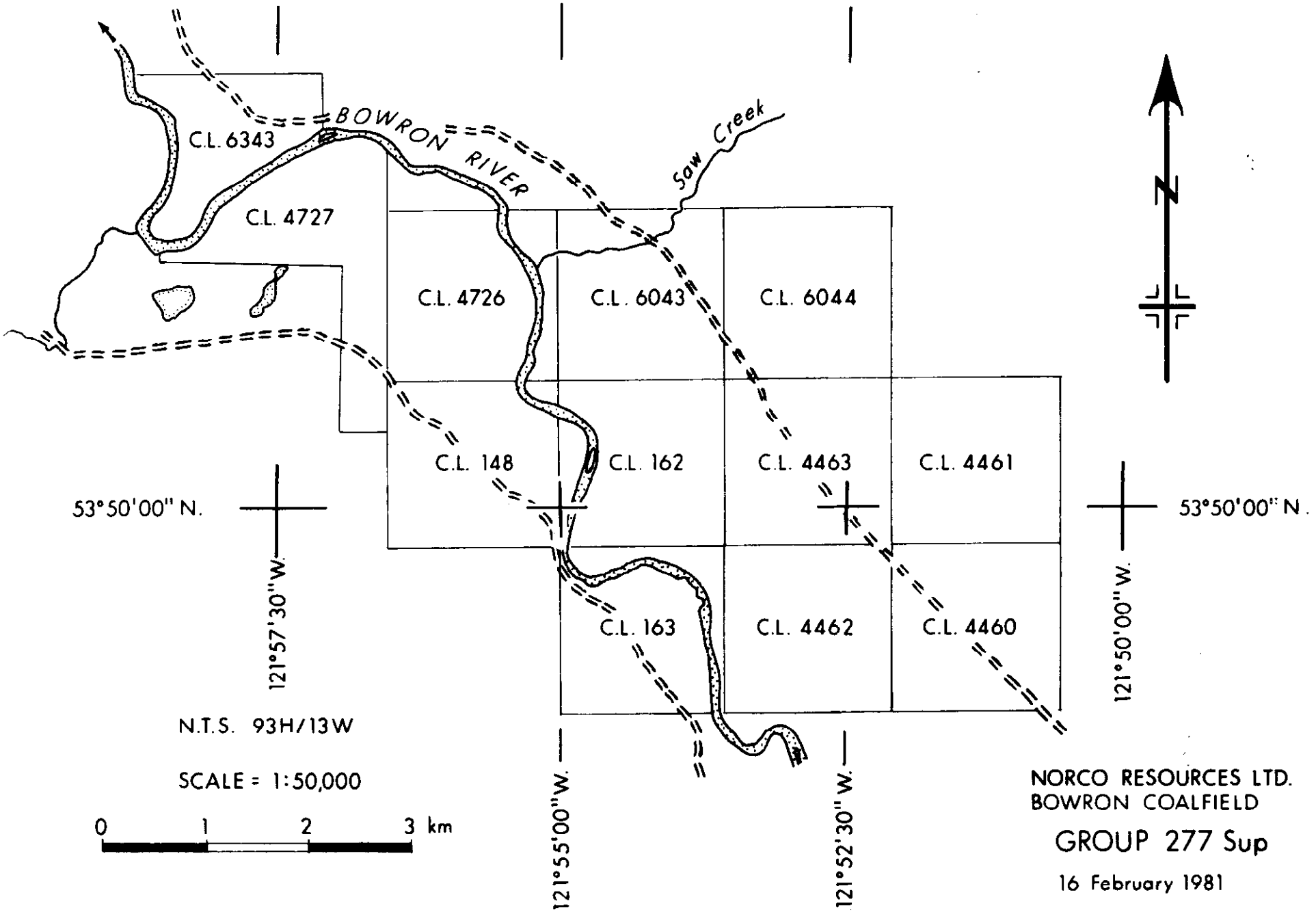


IGNA engineering & consulting ltd.	NORCO RESOURCES LTD. **BOWRON COALFIELD**	DATE FIG. No. 1



NORCO RESOURCES LTD.
BOWRON COALFIELD

GROUP 277 Sup

16 February 1981

FIG. No. 2

(A) INTRODUCTION

(1) Scope of Report

This report describes the exploration work done to date; the results of regional mapping, ground magnetometer, airmag and refraction seismic surveys, diamond and rotary drilling. Furthermore, it describes and discusses results of coal analyses from diamond drilled holes and proposes continuation of the drilling programme.

(2) Overall Property

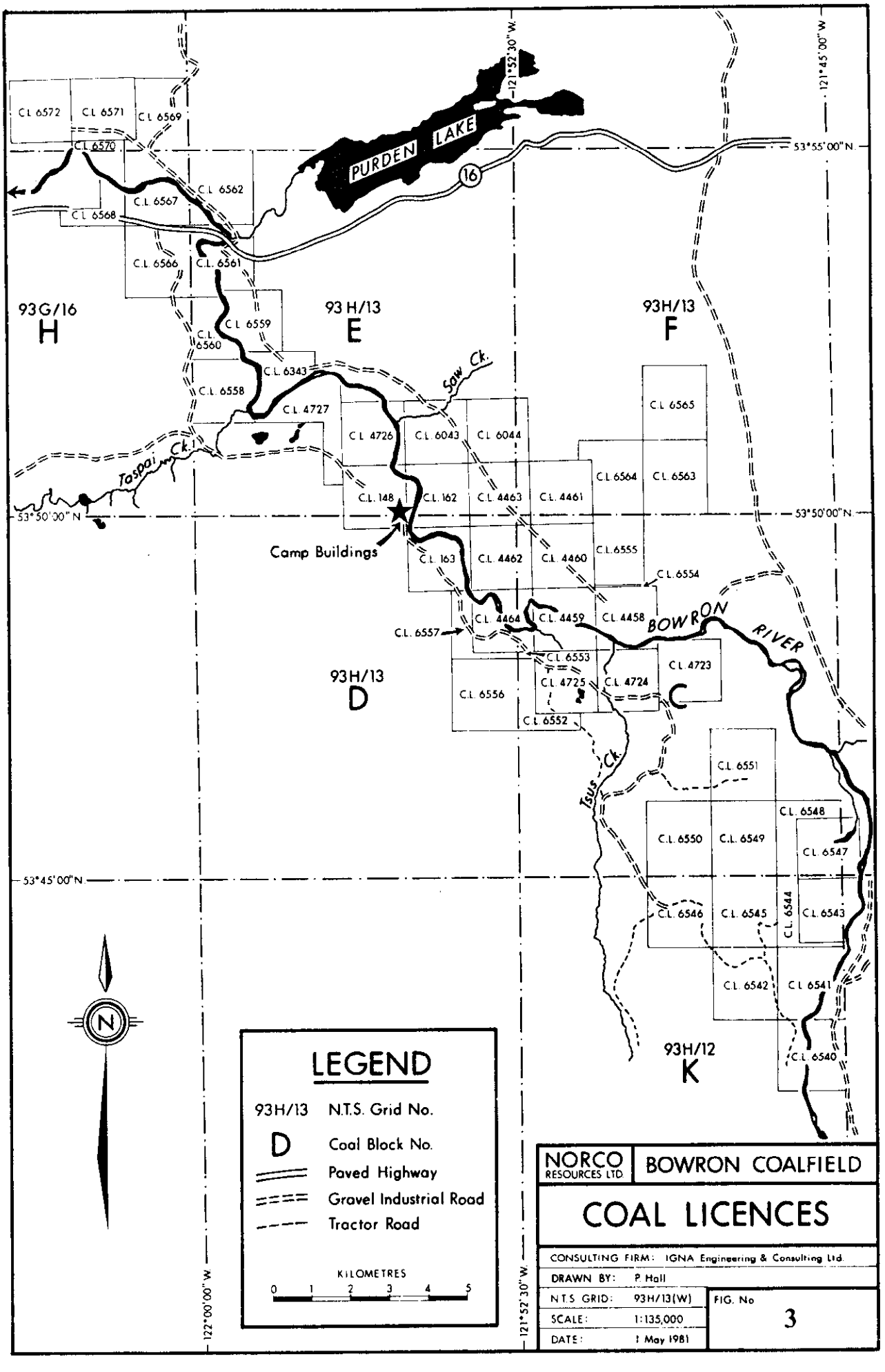
The property consists of the following 18 coal licences totalling an area of approximately 4,589 hectares:

Coal Licence Numbers: 148, 162, 163, 4723, 4724, 4725, 4726, 4727, 4458, 4459, 4460, 4461, 4462, 4463, 4464, 6043, 6044, 6343(formerly No. 4728).

The Licences and their locations are shown on Plates No. 1 and 2. Norco has applied for an additional 33 coal licences with a total of 7,452 hectares contiguous to the northwest and to the southeast of the licences committed to and part of the Taipower Agreement.

(3) Location and Access

Approximately centre lat. 53°50'; long. 121°55', 8 km south of Purden Lake and 62 road miles east of Prince George. An easy access is provided by a number of excellent logging roads. Highway 16 passes through the northern end of the property.


PURDEN LAKE
16
C.L. 6572
C.L. 6571
C.L. 6569
C.L. 6570
C.L. 6562
C.L. 6567
C.L. 6568
C.L. 6566
C.L. 6561
C.L. 6559
C.L. 6560
C.L. 6343
C.L. 6558
C.L. 4727
C.L. 4726
C.L. 6043
C.L. 6044
C.L. 6565
C.L. 6564
C.L. 6563
C.L. 148
C.L. 162
C.L. 4463
C.L. 4461
C.L. 163
C.L. 4462
C.L. 4460
C.L. 6555
C.L. 6554
C.L. 4464
C.L. 4459
C.L. 4458
C.L. 6557
C.L. 6553
C.L. 4725
C.L. 4724
C.L. 4723
C.L. 6556
C.L. 6552
C.L. 6551
C.L. 6548
C.L. 6550
C.L. 6549
C.L. 6547
C.L. 6546
C.L. 6545
C.L. 6544
C.L. 6543
C.L. 6542
C.L. 6541
C.L. 6540
Saw Ck.
Taspai Ck.
Camp Buildings
BOWRON RIVER
Tsus Ck.
93G/16
H
93 H/13
E
93H/13
F
93H/13
D
93H/12
K
C
53°55'00"N
53°50'00"N
53°45'00"N
121°52'30"W
121°45'00"W
122°00'00"W
N
LEGEND
93H/13 N.T.S. Grid No.
D Coal Block No.
Paved Highway
Gravel Industrial Road
Tractor Road
KILOMETRES
0 1 2 3 4 5
NORCO RESOURCES LTD.
BOWRON COALFIELD
COAL LICENCES
CONSULTING FIRM: IGNA Engineering & Consulting Ltd.
DRAWN BY: P. Hall
N.T.S. GRID: 93H/13(W)
SCALE: 1:135,000
DATE: 1 May 1981
FIG. No 3

(4) HISTORY OF EXPLORATION

1871 G. M. Dawson (1876-77) noted that coal about 18 inches thick was seen in 1871 by Dewdney on Bear River (now Bowron) near latitude 54 close to the crossing of the Canadian Pacific survey-line.

1909 The coal occurrences were brought to the attention of A. E. Hepburn of Vancouver in 1909 by J. Wendle, of Barkerville, who had seen them first in 1898.

1910 The coal exposures near todays Norco camp were first explored by J. Wendle, who drove a short adit for A. E. Hepburn. The adit was located at the northern end of the exposure of coal formed on outcropping along the river for about 80 m. The adit exposed two seams. An eight foot seam was exposed in the left hand crosscut and the right hand crosscut exposed a six foot seam.

1911 Hepburn held leases covering fourteen sections (one square mile) totalling 8,960 acres. The lots were surveyed and the property was examined by D.F.J. Galloway (1914).

1946 No work was done on the property until it was acquired by Bowron Coal Co. Ltd. in 1946. The company built a camp and constructed "tractor road" (cat road) from railway station Hansard to the camp on the east side of the river. Some diamond drilling was done around the main coal showings and construction of the new road from Prince George across Buckhorn Lake was begun.

1947 The Bowron Coal Co. Ltd. trenched and extended 10 m to the southeast of the portal the coal bearing formation and drilled 73 feet vertical hole near the adit.

1948 Four drill holes totalling 269.5 m were completed and another hole was drilled later in the year. The holes were drilled in order to test the extension of the coal - seams intersected in the adit.

The six drill holes cut about 91.3 m of coal measures with numerous coal seams of variable thickness. The correlation among the holes in spite of close spacing was nearly impossible. Coal quality was tested and the following tabulation shows the results:

Sample Number	H_2O at 105° C	Ash	Vol. Comb. Matter	Fixed Carbon	Sulphur	B. T. U.
	%	%	%	%	%	%
1	6.1	4.7	33.9	55.3	0.6	12,160
2	5.8	9.7	35.5	49.0	0.9	11,340
3	5.8	13.6	33.7	46.9	1.0	10,760
4	5.0	14.3	34.0	46.7	1.6	10,989
5	6.0	18.0	31.0	45.0	1.0	10,120

1967 Northern Coal Mines Limited continued its programme of surface diamond drilling with four holes totalling 3,900 feet. Another six holes were drilled under the supervision of Dr. J. M. Black, Consulting Geologist. Dr. Black's coal reserve calculation shows some 21,000,000 tonnes of in situ coal.

1967 Two adits were driven:

(1) No. 2 mine or North "Slope"(-12°) has exposed upper and middle seams. It is located north of southeast corner of lot 9592 CL 7 near the high water mark east of the old camp and is flooded.

(2) No. 1 mine or South "Slope" is located about 1,000 m to the southeast of North "Slope". It explored the upper seams only and is also flooded.

1971 Bethlehem Copper Corp. held an option on the property, completing 5 additional diamond drill holes.

1971-1976 No exploration. The company dropped all but three licences and reorganized under the name of Norco Resources Ltd.

1976 In the summer and early fall, the north workings were dewatered, and a 12 ton bulk sample was obtained for detailed studies and analyses in Edmonton, Alberta.

1977 An extensive drilling programme of 25 diamond drill holes totalling 5,701.3 m (18,706 ft.) under the supervision of J. R. Kerr, P. Eng. was completed. The area of about 1,000 m x 1,000 m was drilled on 150 m centers. Results of drilling combined with previous work shows potential 80.0 million tons of coal resources in the area of the Bowron Coal basin.

Underhill and Underhill completed topographic control survey of the area and Pacific Survey took low level air photographs.

A preliminary feasibility study of 900 tonne/day coal mining operation was prepared by Wright Engineers Ltd. of Vancouver.

1978 - 1979 No exploration. The company consolidated its holdings and received additional licences to cover the entire known basin. Some of the licences were granted by the Provincial Government and seven licences were taken over from Zulu Explorations Ltd.

(B) 1980 EXPLORATION WORK

(1) Summary

The following exploration work was accomplished during the 1980 exploration season:

- Geological Mapping 1:10,000 scale
- Geophysical Survey:
  - (a) Airmag interpretation
  - (b) Groundmag survey
  - (c) Shallow seismic survey
- Drilling:
  - (a) Diamond drilling of 6 holes
  - (b) Rotary drilling of 8 holes
  - (c) Downhole geophysical logging

Since the renewal anniversary for the coal licences is uniformly dated to March 28, which occurs in the middle of the 1980 exploration programme, the work reports covering this period have had to be split between two years. Although the work above did in fact comprise the 1980 Exploration Programme, only that portion not already claimed in 1980 is being submitted herewith for 1981 credit. Work already filed is included in this report in summary form to preserve the conceptual continuity of the whole programme. Detailed reporting of the methodologies used in these summaries are contained within last year's work submissions. The work credits being applied for in this submission relate primarily to exploration drilling costs. The licences in which this

drilling was done are listed in the section entitled "Diamond and Rotary Drilling" and are precisely marked on the drillhole location map in the pocket at the back of the report. The type of equipment used and the names of the drilling contractors are listed at the bottom of the drillhole tabulation chart. All other incidental work credits being claimed herewith such as access road costs, equipment rental, draughting, etc., pertain to the property as a whole rather than to specific licences. Accordingly, the costs incurred from these works are apportioned between the two groups in the same ratio as the amount of drilling done on these groups.

(2) Geological Mapping (see 1979-1980 report)

Surface geological mapping produced an outcrop map at a scale of 1:10,000 which covered an area of approximately 50 km^2. Its purpose was to serve as a correlation tool for the groundmag survey. The mapping base was later enlarged to include more of the surrounding area and a new map covering an area of approximately 95 km^2 was evolved. Credit for the map extension is applied for in the 1981 submission.

(3) Geophysical Survey (see 1979-1980 report)

(a) Interpretation of Government airmag survey showed that some structural forms in the area of the basin could be recognized and picked by groundmag survey.

(b) The ground magnetic survey followed. It showed uniformity of the magnetic field over the interior of the basin with minor fluctuations due to deep seated structural variations and in magnetic susceptibility of volcanic and other rocks of the Slide Mountain group. The basin area was roughly delineated and with the support of geological mapping, the basinal width extended to about 3,000 metres.

(c) Seismic Refraction Survey:

The survey was conducted in order to find depth to bedrock and was quite successful in describing deep canyons in the limited area of Hole 80-1 and 80-3 in particular. It also pointed out depth to bedrock in areas of recent drilling. The survey was of great help in locating drillholes and should be used in future to determine not only depth of over-burden but also to assist in recognizing possible faults. Seismic lines were cut on coal licences 162, 163, 4458, 4459, and 4724 as shown on Fig. 6 of the 79/80 work reports.

(4) Diamond and Rotary Drilling

The exploration basin is an area of dense surface brush cover and thick overburden beneath. Geological mapping uncovered very sparce outcrop occurrences and very little of the much needed geological information could be obtained from this approach. A drilling programme was the only alternative.

The first six holes drilled in the 1980 exploration programme were diamond drilled using a Longyear 44 drill. However, due to severe binding problems occasioned in drilling through the till material that comprised the overburden, four of these holes had to be abandoned before reaching bedrock. Core samples were obtained only from drillholes number 2 and 4, with DDH #2 being reported on in last year's work report and DDH #4 in this report. The assay reports for DDH #4 are contained in an appendix at the back of the report for Group 277 Supp. Confronted with the too frequent failure of the diamond drill rig to perform the job, it was removed from the property and replaced with a rotary rig which successfully completed the drilling programme. The rotary drill does not collect core and therefore no core samples are available from these latter holes for visual examination. However, through the use of downhole electrologging, much of the same data that would be available from core samples could be deduced geophysically. Copies of those logs have been provided with this report under

PERDEN MOUNTAIN

BOWRON RIVER

C.L. 6343
C.L. 4727
C.L. 4726
C.L. 6043
C.L. 6044
C.L. 148
C.L. 162
C.L. 4463
C.L. 4461
C.L. 163
C.L. 4462
C.L. 4460
C.L. 4464
C.L. 4459
C.L. 4458
C.L. 4725
C.L. 4724
C.L. 4723

570 000 m E
580 000 m E
5 970 000 m N
5 960 000 m N
121°55'00" W
121°50'00" W
53°50'00" N
1300 m
1200 m
1100 m
1000 m
900 m
800 m
Campsite
Kenneth Ck
Sow Ck
Swamp Ck

LEGEND

- Group #311
- Group #277 Supp.
- Drill hole
- Marsh
- C.L.162 Coal Licence No.
- Forest Dev. road

0 1 2 3 km

IGNA engineering & consulting ltd.

NORCO RESOURCES LTD.
BOWRON COALFIELD

WORK GROUPS

DRAWN BY: P. Hall
N.T.S. GRID: 93H/13
SCALE: 1:50,000
CONTOURS: 100 m

DATE: 23 MARCH 81

FIG. No. 4

separate cover.

Closely spaced drilling (300 m centres) provided the necessary information for seam correlation, depositional environment and structure.

New drill cross-sections have been drawn up to show in generalized form the results of the 1980 drilling programme. See figs. 5 to 7. The scale of these cross-sections has been adjusted to correspond to that of the drillhole location map (in pocket) on which the section lines have been drawn. For a more detailed evaluation of the drillhole data, the drill logs provided under separate cover should be reviewed.

The drilling in thesecond half of the 1980 programme has been divided into two areas corresponding to work groups Nos. 277 Supp. and 311. Within Group 277 Supp. all drilling took place on coal licences 162 and 163. Within Group 311, drilling was on licences 4459 and 4725. The drillhole location map (in pocket) as well as the composite grouping map within the report (see Fig. 4) illustrate the drillhole locations more precisely.

Drilling costs are based exclusively on contractors' invoices. The following table lists the pertinent drilling data for each of the drillholes referenced in this report:

TABLE NO. 1: 1980 DRILLHOLE DATA TABULATION

HOLES DRILLED PRIOR TO MARCH 28, 1980 LICENCE ANNIVERSARY

HOLE NO.	LAT.	LONG.	START DATE	FINISH DATE	O/B (m)	HOLE DEPTH (m)	SEAM LOC. (m)	SEAM HT. (m)
80-1	34+80S	26+60E	16-2-80	30-2-80	313.0	313.0	-	-
80-2	8+20N	6+50E	2-3-80	9-3-80	129.8	510.8	406-417	11

HOLES DRILLED WITHIN GROUP NO. 277 SUPP

HOLE NO.	LAT.	LONG.	START DATE	FINISH DATE	O/B (m)	HOLE DEPTH (m)	SEAM LOC. (m)	SEAM HT. (m)
80- 3	13+60N	6+80E	12-3-80	19-3-80	231.6	231.6	-	-
80- 4	13+20N	4+80E	20-3-80	26-3-80	150.0	398.4	324-328	4.5
80- 7	11+10N	7+40E	7-5-80	13-5-80	18.3	460.2	418-426	4
80- 8	3+80N	5+60E	14-5-80	17-5-80	12.0	262.1	219-227	7
80- 9	10+80N	4+70E	17-5-80	19-5-80	12.0	354.0	265-271 274-280	6
80-12	9+00N	8+90E	7-6-80	19-6-80	19.7	621.8	504-510	6
80-13	14+10N	7+50E	20-6-80	2-7-80	12.0	640.0	449-453	9
80-14	20+40N	10+00E	6-7-80	3-8-80	42.4	545.4	506-513	7

HOLES DRILLED WITHIN GROUP NO. 311

HOLE NO.	LAT.	LONG.	START DATE	FINISH DATE	O/B (m)	HOLE DEPTH (m)	SEAM LOC. (m)	SEAM HT. (m)
80- 5	22+10S	21+90E	9-4-80	10-4-80	6.0	6.0	-	-
80- 6	29+60S	22+80E	10-4-80	12-4-80	117.0	117.0	-	-
80-10	17+50S	22+30E	20-5-80	3-6-80	311.0	612.5	445- ?	?
80-11	22+70S	16+60E	4-6-80	7-6-80	70.0	256.0	-	-

NOTES

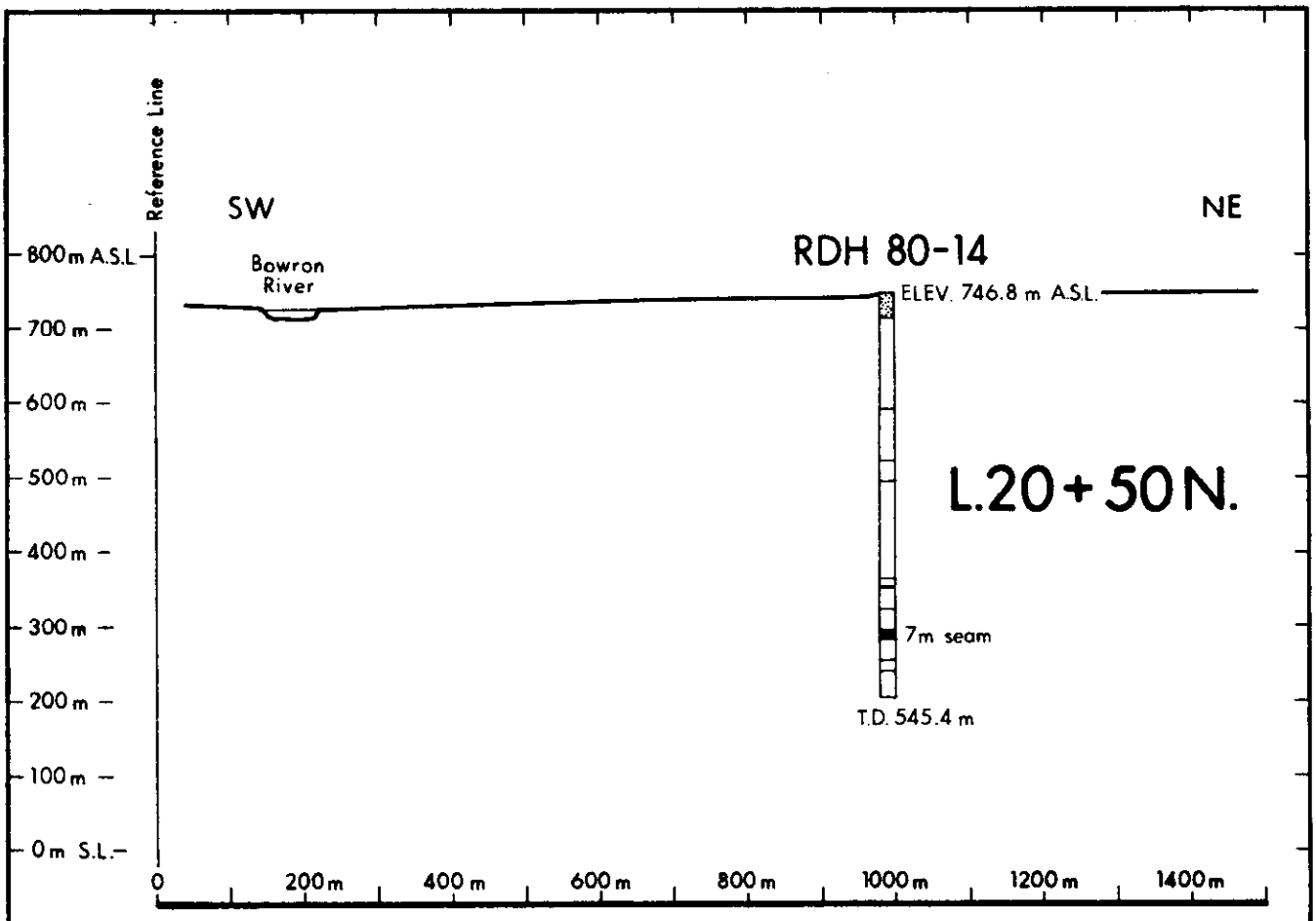
(1) Holes 1-6: Core drilled (Longyear 44) - J. T. Thomas Diamond Drilling Ltd.

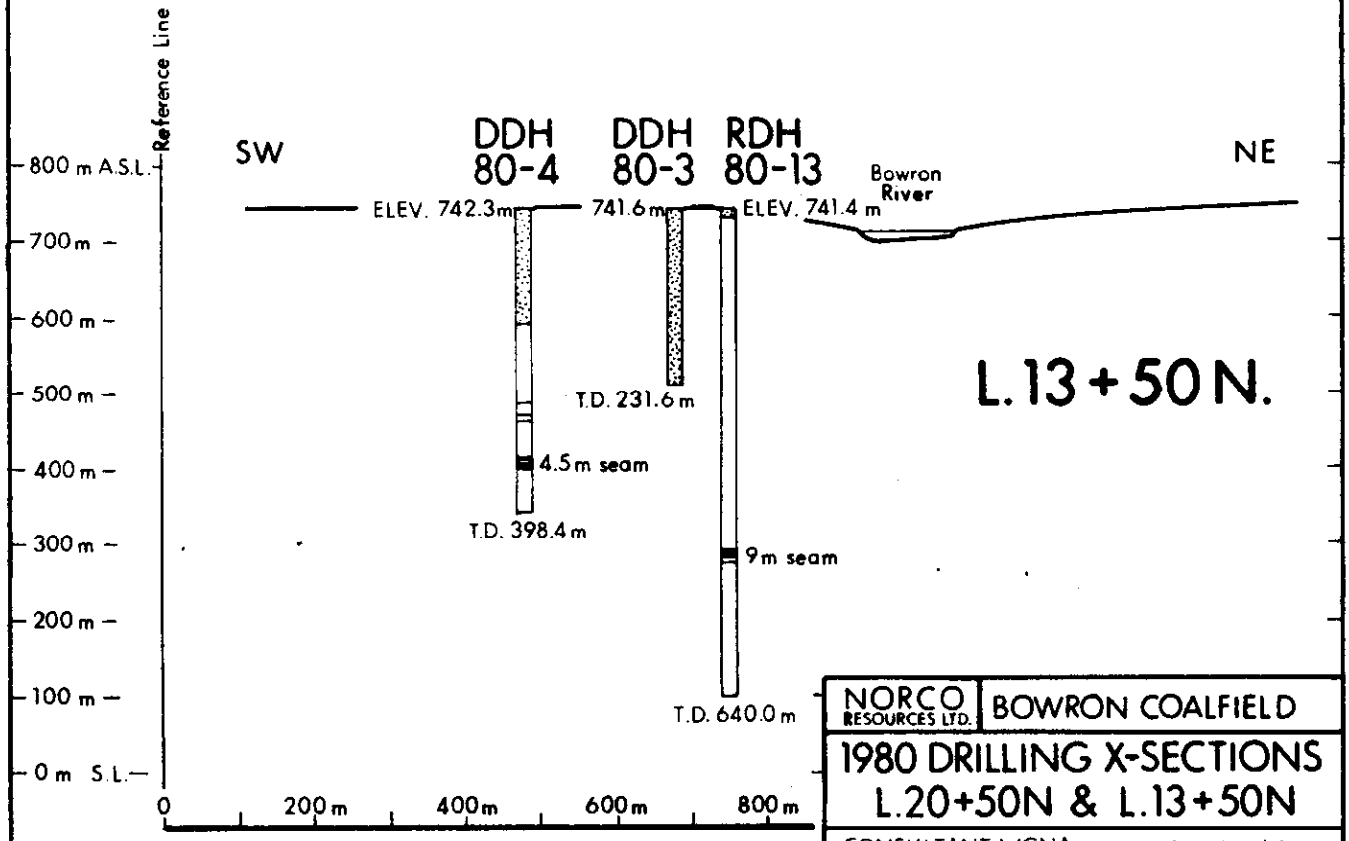
(2) Holes 7-14: Rotary drilled (Ingersoll-Rand Cyclone TH60) -Interior Water Wells Ltd.

(3) Holes 1,3,4,5 abandoned due to equipment failure

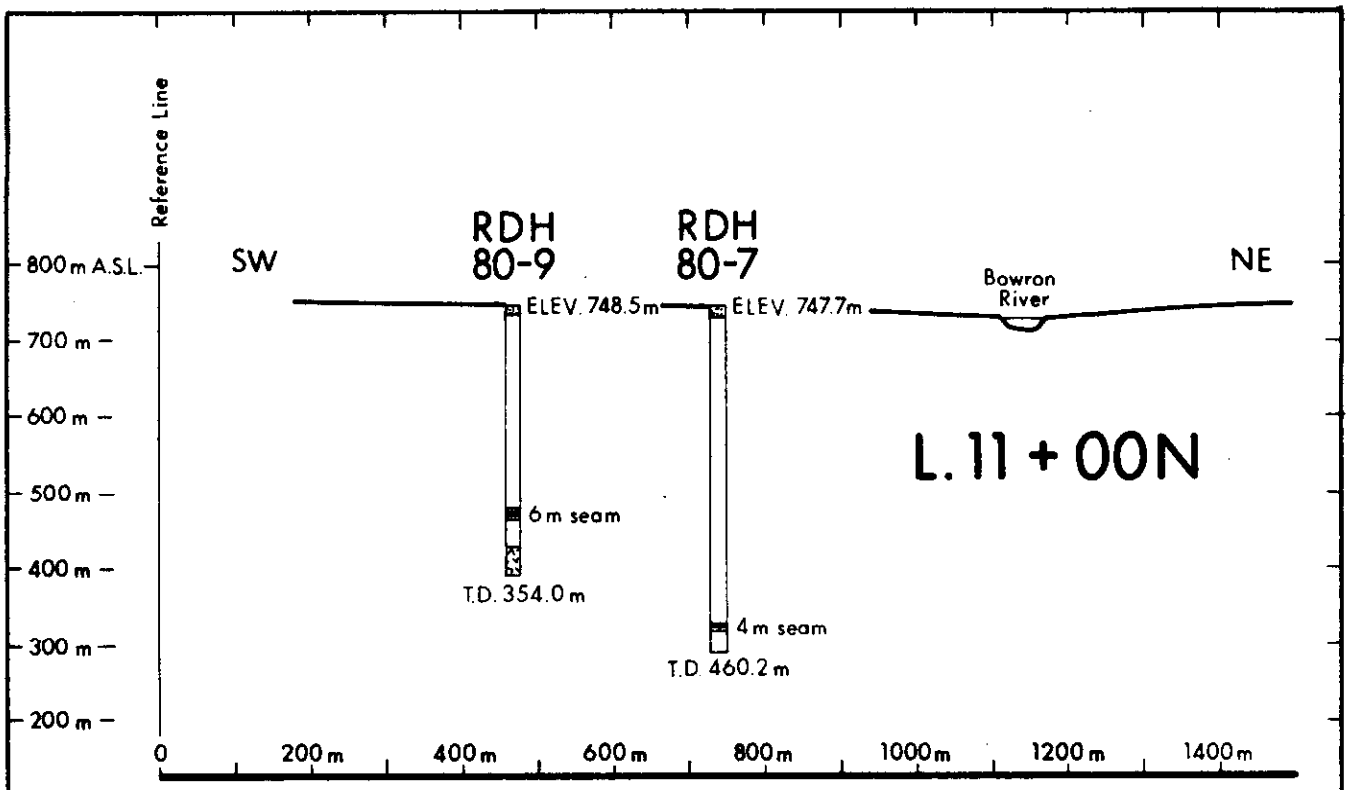
(4) Hole 10 caved in at 371 m preventing logging below that depth.

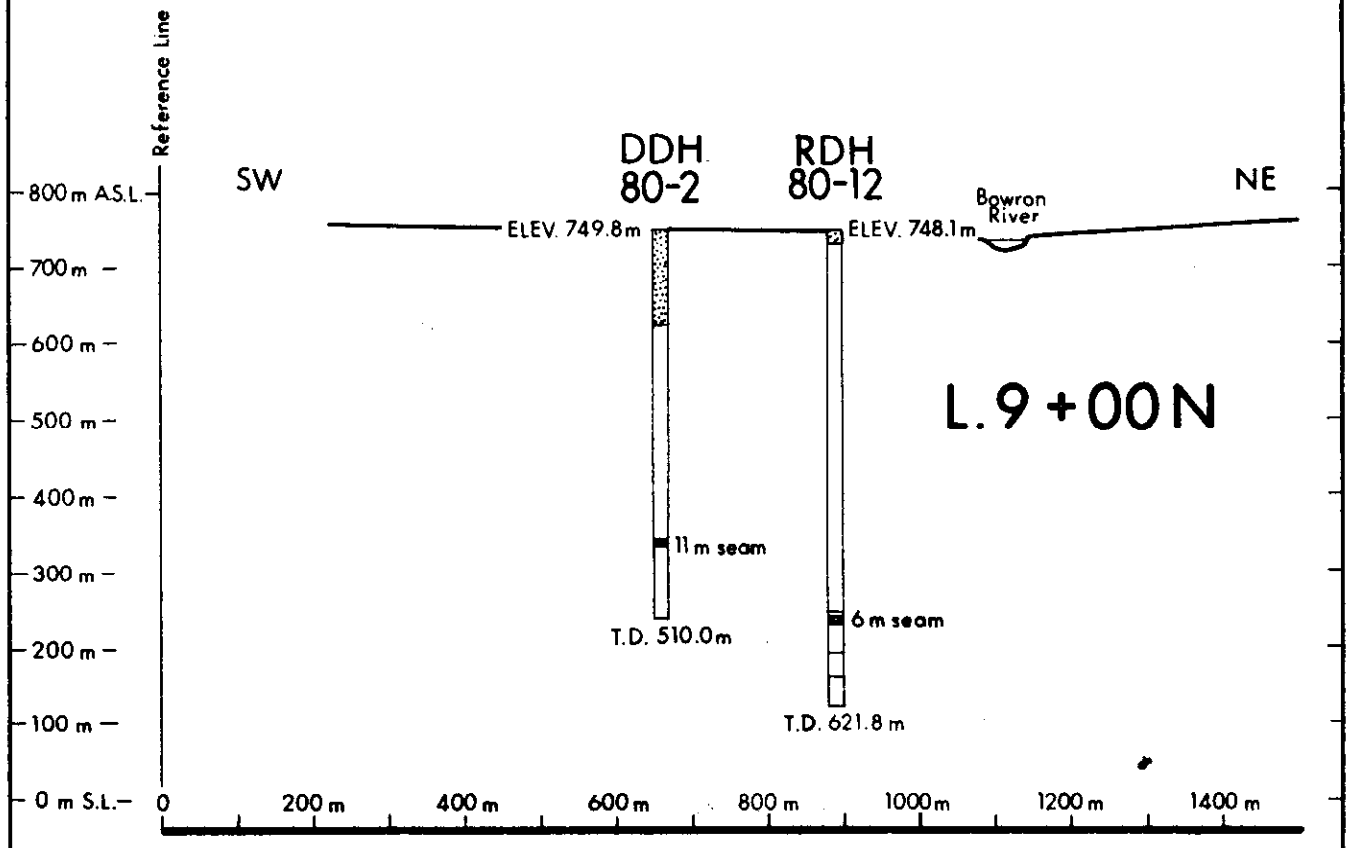
(5) Hole 11 outside coal basin (volcanics)



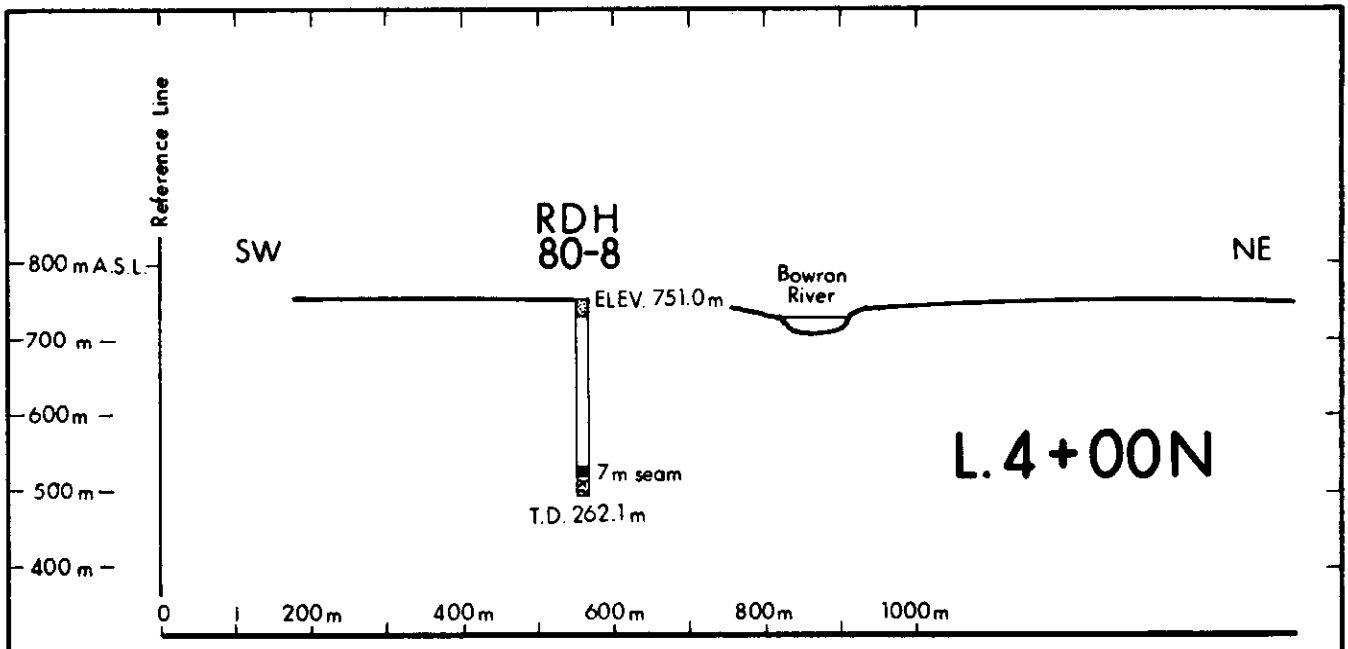


NORCO RESOURCES LTD.	BOWRON COALFIELD
1980 DRILLING X-SECTIONS L.20+50N & L.13+50N	
CONSULTANT : IGNA engineering & consulting ltd.	
GEOLOGY BY : I. Borovic, P.Eng.	
DRAWN BY : P. Hall	FIG. No. 5
SCALE : 1:10,000	
DATE : 18 Sept. 1981	





NORCO RESOURCES LTD.	BOWRON COALFIELD
1980 DRILLING X-SECTIONS L.11+00N & L.9+00N	
CONSULTANT: IGNA engineering & consulting ltd.	
GEOLOGY BY: I. Borovic, P.Eng.	
DRAWN BY: P. Hall	
SCALE: 1:10,000	FIG. No. 6
DATE: 18 Sept. 1981	



NORCO RESOURCES LTD.	BOWRON COALFIELD
1980 DRILLING X-SECTIONS L.4+00N	
CONSULTANT: IGNA engineering & consulting ltd. GEOLOGY BY: I. Borovic, P.Eng. DRAWN BY: P. Hall SCALE: 1:10,000 DATE: 18 Sept. 1981	FIG. No. 7

(C) GEOLOGICAL SETTING

(1) General Geology

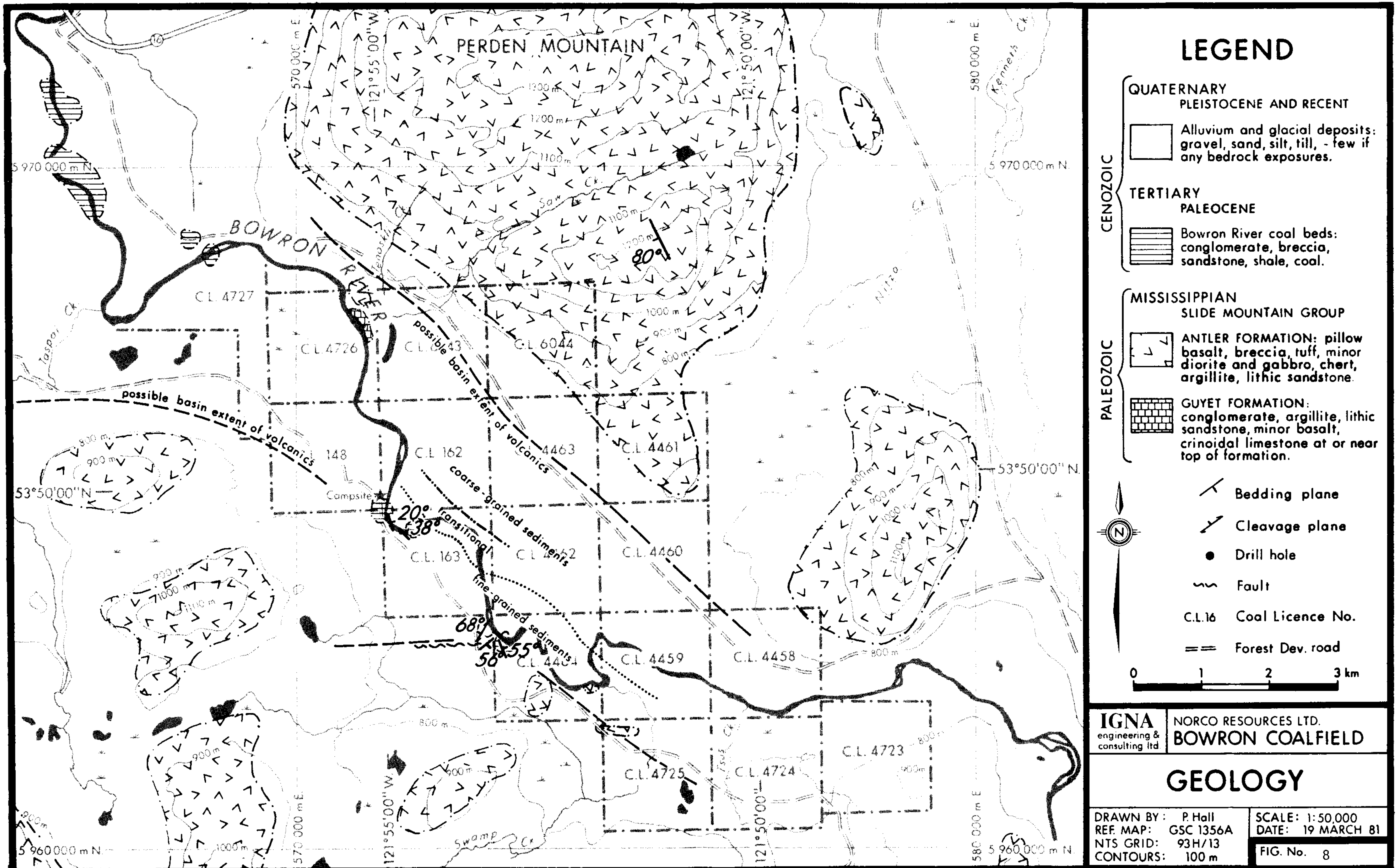
The sequence of pretertiary rocks that underlie the Bowron River area are composed of sediments and volcanics of the Mississippian age Slide Mountain group. The Slide Mountain group consists of moderately folded greenstones, flow breccias, argillites, cherts, and minor limestone.

Occurring within a northwest striking trough of regional magnitude, Tertiary, sedimentary rocks unconformably overlie the basement assemblage. The trough attains an average width of 1.5 - 2.0 km and strikes southeastward beneath overburden for a distance of about 30 - 35 km.

General Geology of the Tertiary Succession from Princeton to Prince George, B.C.

From youngest to oldest:

6. Volcanics - flat - lying sheets flows (Miocene - Pliocene)
5. Sediments - commonly absent (Miocene)
4. Volcanics - relatively flat - lying (Oligocene) - erosion, folding, faulting (Orogenic phase - which one?)
3. Sediments - continental, folded, faulted (Eocene) coal bearing
2. Volcanics - (Eocene and Oligocene)
1. Sediments - confined to north end of belt (Paleocene) coal bearing


PERDEN MOUNTAIN
BOWRON RIVER
Saw Ck
Taspai Ck
Kenneth Ck
Nitzo
Swamp Ck
Campsite
possible basin extent of volcanics
possible basin extent of volcanics
coarse-grained sediments
transitional
fine-grained sediments
C.L. 4727
C.L. 4726
C.L. 6643
C.L. 6044
C.L. 148
C.L. 162
C.L. 4463
C.L. 4461
C.L. 163
C.L. 4462
C.L. 4460
C.L. 4464
C.L. 4459
C.L. 4458
C.L. 4725
C.L. 4724
C.L. 4723
80°
20°
38°
68°
55°
58
1300 m
1200 m
1100 m
1000 m
900 m
800 m
5 970 000 m N.
5 960 000 m N.
570 000 m E.
580 000 m E.
121°55'00"W.
121°50'00"W.
53°50'00"N.
LEGEND
CENOZOIC
QUATERNARY
PLEISTOCENE AND RECENT
Alluvium and glacial deposits: gravel, sand, silt, till, - few if any bedrock exposures.
TERTIARY
PALEOCENE
Bowron River coal beds: conglomerate, breccia, sandstone, shale, coal.
PALEOZOIC
MISSISSIPPIAN
SLIDE MOUNTAIN GROUP
ANTLER FORMATION: pillow basalt, breccia, tuff, minor diorite and gabbro, chert, argillite, lithic sandstone.
GUYET FORMATION: conglomerate, argillite, lithic sandstone, minor basalt, crinoidal limestone at or near top of formation.
Bedding plane
Cleavage plane
Drill hole
Fault
C.L.16 Coal Licence No.
Forest Dev. road
0 1 2 3 km
N
IGNA engineering & consulting ltd
NORCO RESOURCES LTD.
BOWRON COALFIELD
GEOLOGY
DRAWN BY: P. Hall
REF. MAP: GSC 1356A
NTS GRID: 93H/13
CONTOURS: 100 m
SCALE: 1:50,000
DATE: 19 MARCH 81
FIG. No. 8

(2) Local Geology

The river valley is almost entirely covered with overburden. Rare outcrops of coal seams are found only along the creeks. The sides of the river valley are underlain by green coloured volcanic rocks including fine tuffs, breccias, and lavas. The coal is found in a series of sandstones, shales, mudstones, and conglomerates that outcrop occassionally and only along the river.

The coal measures are composed of grey and buff sandstones interbedded with light grey to dark grey mudstones, shales, siltstones, carbonaceous shales, and lenses of conglomerate. The conglomerates are composed of subrounded , subspherical pebbles, cobbles and boulders of greenish volcanic rocks, whitish quartzites, and black cherts. The clasts can reach up to twenty-five cm in diameter. The distribution of outcrops suggests that the coal bearing sediments underlie the Bowron River Valley forming a basin about 1,500 - 2,000 meters wide by 30 km long.

(3) Detailed Geology

The Bowron River Basin is underlain by rocks of the Slide Mountain Group, and the Bowron River coal bearing sediments. The Slide Mountain Group was differentiated into the Guyet and Antler formations. (Sutherland Brown: 1957 and 1963). The Antler formation is composed of basic volcanic rocks, tuffs, chert, argillite, and limestone. The age of the older Guyet formation, based on Brachiopods (Kindle) and conodonts (C.F. Thompson, 1967) found in the Greenberry limestone member is lower Mississippian. The Antler formation is unconformably overlain by a succession of coal bearing

clastic rocks referred to as the Bowron River sediments. These sediments are composed of conglomerates, sandstones, shales, coal, sedimentary breccias. The age of the Bowron River sediments was determined from fossil leaves (W.A. Bell). In 1948, Holland reported the poorly preserved fossilized plant remains were submitted to Dr. W.A. Bell for identification. Bell considered the plants to be of Upper Cretaceous (Campanien-Maestrichtian) Age. A second age determination was made on fossil spore and pollen grains. G. E. Rouse of the University of British Columbia reported, " I am reasonably sure that the Bowron suite is Tertiary in age." Therefore, results indicate an Upper Cretaceous-Lower Tertiary time for disposition of the sedimentary succession. The Bowron River sediments are overlain by glacial, and glaciofluvial deposits.

(4) SLIDE MOUNTAIN GROUP

(a) Volcanics:

Green, pyritiferous locally fractured and brecciated. Some fractures are filled with stilbite. They locally contain serpentinite.

(b) Limestone:

Two limestone types occur. One is light grey in colour, the other is dark grey to black. Both are composed of sparite, and are barren of megafossils. The darker limestone has an argillaceous content. Both are highly fractured, and brecciated.

(c) Chert:

Chert occurs as lenses in the green volcanics. It ranges from light to dark grey red and green in colour. Green colouration occurs near conformable contact with the volcanics. The chert has undergone some slight re-crystallization.

(5) BOWRON RIVER SEDIMENTS

(a) Basal Conglomerate:

The basal conglomerate was deposited on the erosional surface of the Slide Mountain Group. It is light green in colour, and consists of subangular to subrounded clasts of green stone, chert, and limestone. Some fine grained, silt sized clasts also occur, and may have been derived from volcanic materials. The conglomerate is mainly clast supported. It also contains interbedded lenses of medium to fine grained sand. Carbonaceous materials also occur within these lenses. The basal conglomerate was observed in drill core, and outcrop in the 1980 drill area.

(b) Basal Clays:

The basal clays are light green to green-grey in colour. They are clay to silt sized, and consist of chlorite, micas, and smectites. The abundance of smectites in some samples show that they are of volcanic origin. Some of the clays weather easily, and show swelling properties on exposure to rain. Thin lenses of coal occur in several of the clay beds. The clays are abundant in the 1977 drill area but were not encountered in the 1980 drill holes. They appear to overlie the basal conglomerates but may also be contemporaneous with them.

(c) Sedimentary Breccia:

Two types of sedimentary breccia occur in the basin. Type 1 contains light red brown ferruginous mud as matrix material, Type II contains a very fine grained black argillaceous sediment as a matrix. Type II matrix may also contain iron sulphide. Both breccias contain subangular clasts which are variable in size. The clasts are composed of volcanogenic, igneous, and metamorphic quartz, as well as chert, and calcium carbonate. The breccias also contain lesser amounts of argillitic fragments, micas, and carbonaceous materials. The breccia beds are generally not thicker than two meters, and can occur as a single bed or as several thin beds separated by conglomerate, and carbonaceous siltstone. The breccias are generally found beneath the lower coal zone, but have been observed higher in the succession.

(d) Lower Coal Zone:

The lower coal zone has been described in detail in other sections of the report. The zone is variable in thickness, but is laterally persistant within the basin. Reflectance measurements of vitrinite show the coal rank is high volatile bituminous B. Maceral analysis determined that the coal is composed mainly of the exinite, and vitrinite maceral groups. According to Stach's classification (Stach 1975), the coal is intermediate in composition between a vitrite, and a clarite, and therefore is a coal which is suitable for thermal use or as a blending component for metallurgical uses.

(e) Shale:

Shale beds dominate the lithology in the mid-western area of the basin (see geological map). The shales are massive to very finely laminated. Alternating laminae may be as thin as 0.5 mm, and alternate between light brown, and black in colour. The more massive shales are light brown to brown - grey. The highly laminated nature of the shales suggest that they are varves. The shales may occur as thin beds, or may be hundreds of meters thick.

(f) Black Marker:

This unit occurs within the upper part of the thick, shale sequence. It is very distinct in both hand sample, and on the gamma ray/neutron logs. It is dark black, and contains thin bands of fine grained volcanogenic quartz and calcium carbonate, The thin bands show varying degrees of soft sediment deformation and micro faulting. The black material appears to be argillitic in composition, and may contain iron sulphide. On the gamma ray/neutron plot, the black marker shows a distinct, synchronous increase in gamma radiation, and decrease in neutron porosity. The pattern is very unique and can be easily correlated. This unit is generally 15 to 20 meters thick. It can occur between 100, and 170 meters above the lower coal zone, but generally lies between 140 and 160 meters above the coal.

(g) Siltstone:

Siltstones occur throughout the stratigraphic succession. They are laminated to massive, but generally tend to be massive. They occur in a wide range of colours, but the most common is light to dark brown. The silts contain abundant plant fossils, and are usually very carbonaceous near the coals.

(h) Sandstone and Conglomerate:

The sandstones display a wide range of grain size and degree of sorting throughout the basin . They range from very fine grained to very coarse grained, and from well sorted to very poorly sorted. With the exception of the sand lenses in the basal conglomerate, the composition of the sandstones remains remarkably similar. They consist of subangular to subrounded grains of quartz, chert, and calcium carbonate with lesser amounts of argillaceous, micaceous grains, detrital micas, and carbonaceous materials such as coalified plant fragments. The quartz occurs primarily in igneous, and metamorphic forms, and the cherts contain variable argillaceous content. The cement is siliceous.

The conglomerates, like the sandstones occur throughout the basin. The conglomerates range from grit to cobble size and show varying degrees or sorting. They have the same composition as the sandstones, but generally tend to be better sorted. Medium to coarse grained sand may occur as matrix material, but the conglomerates are usually clast supported.

(6) DEPOSITIONAL ENVIRONMENTS

The suite of Bowron River sediments differ in proportion of lithofacies types within the basin. Based on the dominant sediment type the basin has been divided into three distinct areas: the coarse grained, the fine grained, and the transition areas (See geological map). There is no doubt that the Slide Mountain Group underlies all parts of the basin. The basal conglomerate overlies the volcanics, and appears to be common to all three areas. The basal clays are most extensively developed in the coarse grained area, and may overlie or be contemporaneous with the basal conglomerates. Basal clays were not encountered in two diamond drill holes in the fine grained area and more cored holes are required to verify the presence or absence of the unit in the fine grained area. The sedimentary breccia occurs in both areas, and is usually found within twenty meters of the lower coal zone. It is often found within a sequence of clast supported conglomerates, and carbonaceous shale or siltstone. Type II breccia is most often found in the fine grained area, and Type I is most common in the coarse grained area. Both of these sedimentary breccias represent debris flows, which are generally subaerial, and represent mass flow of rapidly deposited water laiden sediments. They are common in alluvial fan environments, and may represent flood events.

Division of the basin into different sedimentary environments does not appear well defined until after the deposition of the Lower coal zone.

The top of the Lower coal zone terminates the similiarity between environments of the coarse, and fine grained areas. After the deposition

of the lower coal zone, the coarse grained area remained subaerial whereas the fine grained area became subaqueous. The change in environmemt produced a corresponding change in the sediments deposited in these areas.

(a) Coarse Grained Area:

The coarse grained area is dominated by an extensive development of sandstones, and conglomerates, which may reach thickness of tens of meters. They occur interbedded with silts and shales of variable carbonaceous content. Fluctuations of coarse, and fine sediments is often rapid, and frequent, although examples of graded bedding (normal and convoluted) also occur. The area also contains the development of two coal zones above the lower coal, but their lateral persistance is limited. Common sedimentary structures are crossbedding, convoluted bedding, scour, and fill structures, flame, and load structures. The nature of the sediments, and sedimentary structures suggest a lowland, marshy environment which was cut by numerous, meandering channels, and subject to occassional floods. One of the more suitable environments for this area appears to be a distal alluvial fan environment. This environment dominates the basin to the north, and northeast of the present Norco camp. (See geological map)

(b) Fine Grained Area:

The fine grained area is dominated by a thick development of fine grained sediments. It consists primarily of shales which may reach thicknesses of hundreds of meters. The shales are massive to laminated, but the laminated shales are much more abundant. The

laminae consists of alternating brown and black layers which may be as thin as half a millimeter. The darker bands appear to be the thicker of the two. The regularity of the laminae and alternation in colour suggest that they are varves. The shale sequence is occassionally interrupted by beds of medium to coarse grained sandstone, which are generally less than 1 - 2 meters thick. Common structures associated with the sands are scour and load structures. Rip up clasts of the underlying shale are common, and the sands terminate in an abrupt fining upward sequence. No further coal development is found above the lower coal zone, but the shales do contain the black marker in the upper part of the succession. The black marker represents a very low energy sub-aqueous, anoxic environment. If the finely laminated shales are varves, then the fine grained area represents a lacusterine environment. The infrequent inclusion of sands are most likely the result of flood events. The fine grained environment occurs in a belt which runs northwest - southeast, and parallels the western margin of the basin. The fine grained area becomes transitional with the coarse grained area to the north, and northeast of the present Norco camp. The southern, and eastern extent of the fine grained area is to be determined by further drilling.

(c) Transitional Area:

The transitional area consists of interfingering lithologies of the fine, and coarse grained areas. It represents the overlap of alluvial fan, and lacusterine environments. The transitional

area occurs as a linear belt which trends northwest - southeast and parallels the fine grained area.

Coarse grained content in the transitional area increases to the east, and north.

(d) Structure:

The coal bearing rocks were unconformably deposited in the North-west - Southeast striking basin, which is a trough of the regional importance. The southwestern contact of the basin was extensively drilled in the past and has the appearance of a normal fault. The sediments at the western edge of the basin have a dip of 35^{0} - 45^{0} to the northeast but toward the centre of the basin the sediments dip gently from 8^{0} - 15^{0} to the southwest defining a broad asymmetrical synclinal structure. There is an obvious shallowing of the basin toward the northwest and deepening with thickening of coal seams toward the middle of the basin and toward the south-east. The basin also plunges to the south at a gentle angle. Tertiary sediments were found in fault contact with volcanics south of the 1980 drill area (See geological map). Indirect evidence for post depositional faulting is the abundance of fine grained sediments adjacent to a fault scarp. Drilling has shown that the dip of the beds steepens near the contact with the volcanics. This is most likely the result of post depositional faulting and drag folding.

The internal structure of the basin remains fairly coherent away from

the contact. Evidence viewed thus far does not support the existence of any major structural dislocations within the drilled areas. Structure contours on the marker beds conform fairly well, and do not show any structural discontinuity throughout the stratigraphic succession.

Therefore, longitudinal faults, as presented on J. R. Kerr's (1977) sections are not satisfactorily supported with evidence collected from the 1980 drilling program. Relatively flat lying seams in the middle of the structure are a logical solution until evidence of any faulting in that area is established.

(7) COAL PETROLOGY

(a) Petrography

A petrographic study of the coal from the Bowron River coal basin was done by J. Roger Donaldson, of the G.S.C. in 1972. The seam sampled and studied is located in underground workings on the west bank of the Bowron River near Norco's campsite (North "Slope").

> "In general appearance, the coal examined is a bended coal, composed almost entirely of the bright components vitrain and clarain. Subordinate amounts of shaley coal, coaly shale, and shale also occur. The coal has a high luster and is hard and dense."

The following mega and microscopic profile (by J. R. Donaldson) shows that this particular seam is split by four distinct partings. The pure coal contained between these partings was divided into nine petrographic intervals based on relative proportions of the entities present.

The resulting breakdown showed that intervals I and V are composed mainly of the shale rich parts while the remaining seven are of clean coal.

The last right hand column of the profile represents results of the microscopic reflectance study. These show that the mean maximum reflectants (Ro) of the vitrinite component is almost constant from the top to the bottom of the seam.

The average reflectance for the whole seam is calculated to be 0.65% Ro Max.

(b) Macerals

Macerals identified are vitrinite, exinite, resinite, micrinite, semi fusinite, and fusinite. Mineral matter was also determined.

Seam composition:

Vitrinite:	60 - 90%
Resinite:	Relatively high - 8%; two types are distinguished:
	(1) Canadian resin (Soluble) - 4%
	(2) Insoluble resin - 4%

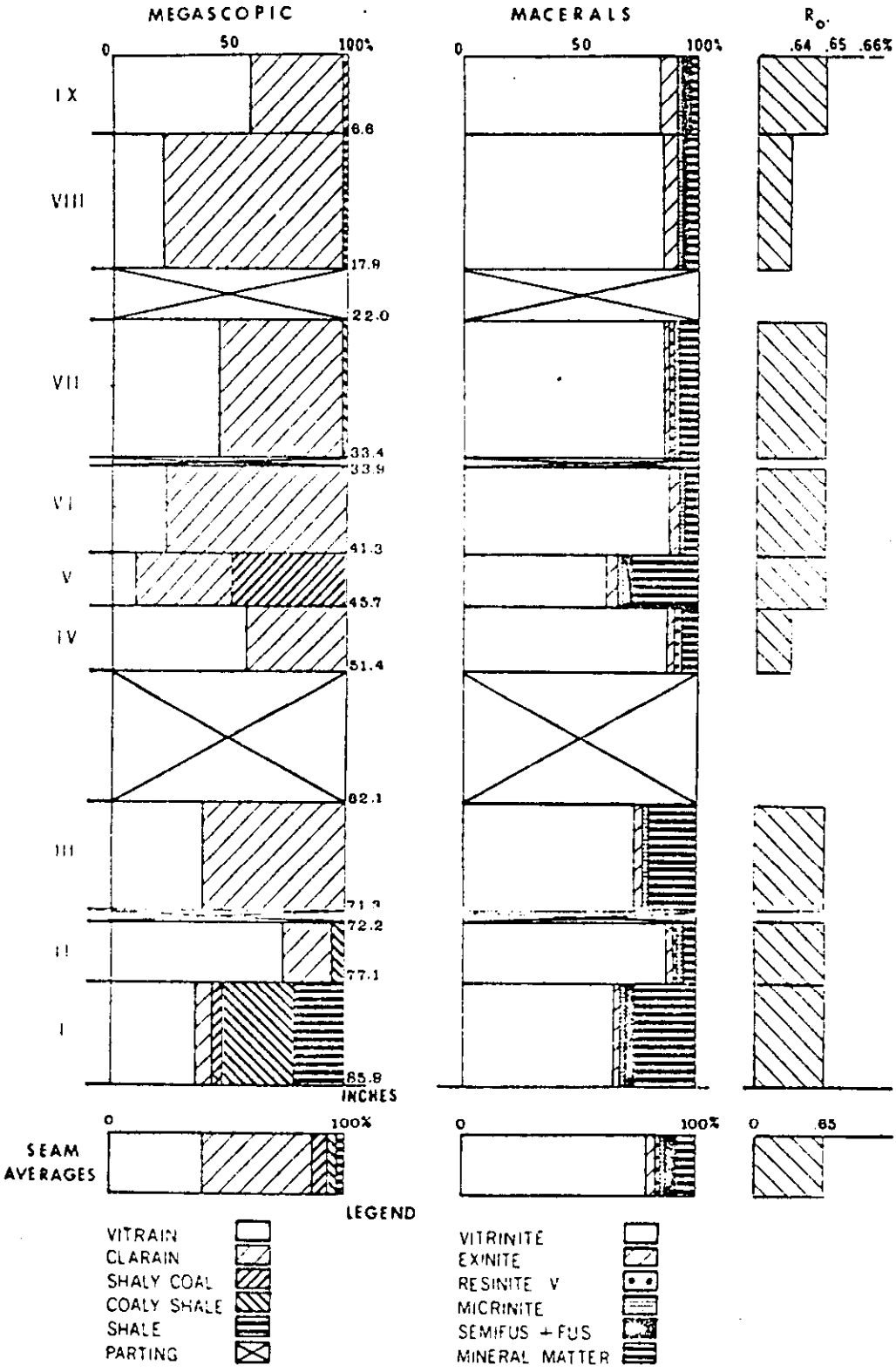


TABLE No. 2: PETROGRAPHIC COMPOSITION AND R_o INDICES OF THE UPPER SEAM, BOWRON RIVER, B.C.

(c) Resin

Coal seams in the Bowron River Coal basin contains about 8% of natural resins which could be commercially important.

The table below shows results of research:

"REFINED RESIN"	AMBER RESIN
Megascopically invisible Comprised about 8% of raw coal.	Amber nodules elongated to about 1 inch; random distribution through seams; visually "guesstimated" at 4% raw coal.
Microscopic; opaque; reddish brown; irregular outlines.	Light amber; transparent; sharp edges; conchoidal fracture.
Completely soluble in pyridine; actually "a soluble fraction of coal."	Completely insoluble in chloroform, benzene or pyridine.
Softens about 200°C. S.G. = 1.05-1.05. Makes a 25% concentrate in coal-resin fraction float at S.G. 1.30	Does not soften at 400°C. Melts and volatilizes about 450°C. Separation: mechanical? or froth floatation?
Possible Uses: (a) Low cost rubber extender (b) Compares favourably with Congo resin in varnishes (c) High quality baked coatings.	Uses: Not tested, but appears to be superior to "Refined Resin" for coating and varnishes.

Research conducted indicates that so called "Refined Resin" and "Amber Resin" from Bowron River Coal are of superior quality than known commercial "Congo Resin".

Subject to favourable exploration and further research on extraction and marketing, the Bowron River resin could be a valuable asset to the Company for years to come.

Petrographic analysis of coal samples obtained from 1977 drill core was conducted by R. Linds, in 1980. The coal samples from this area were found to have variable reflectance values but generally agreed to the value obtained by Donaldson of 0.65% Ro. Max. The samples are very close compositionally to those described by Donaldson, with the exception of micrinite as the only inertinite present. The coal rank, based on reflectance analysis, showed no tendancy toward increase with depth, and therefore, appears to maintain a consistant rank vertically throughout the basin. Pyrite constitutes the majority of the mineral matter contained in the coal, and occurs mainly in framboidal form. The pyrite does not occur disseminated through the seams but is found to form discrete bands within the coal.

(D) COAL DEPOSIT

(1) Setting:

As indicated in previous chapters on geophysics, geology, stratigraphy, and structure of the coal bearing area, the coal is found in a linear basinal structure elongated northwest - southeast for about 30 - 40 km and with a width from 1,500 to 2,500 km.

The basin is outlined on both sides by volcanic and sedimentary rocks of the Mississippian Slide Mountain Group. It appears to be an asymmetrical trough where the southwestern edge is an unconformity with younger faulting indicated by recent investigations. The northeastern edge of the basin is probably:

(a) A. Sutherland Brown (1967) "down dropped fault, possibly active during deposition"

or:

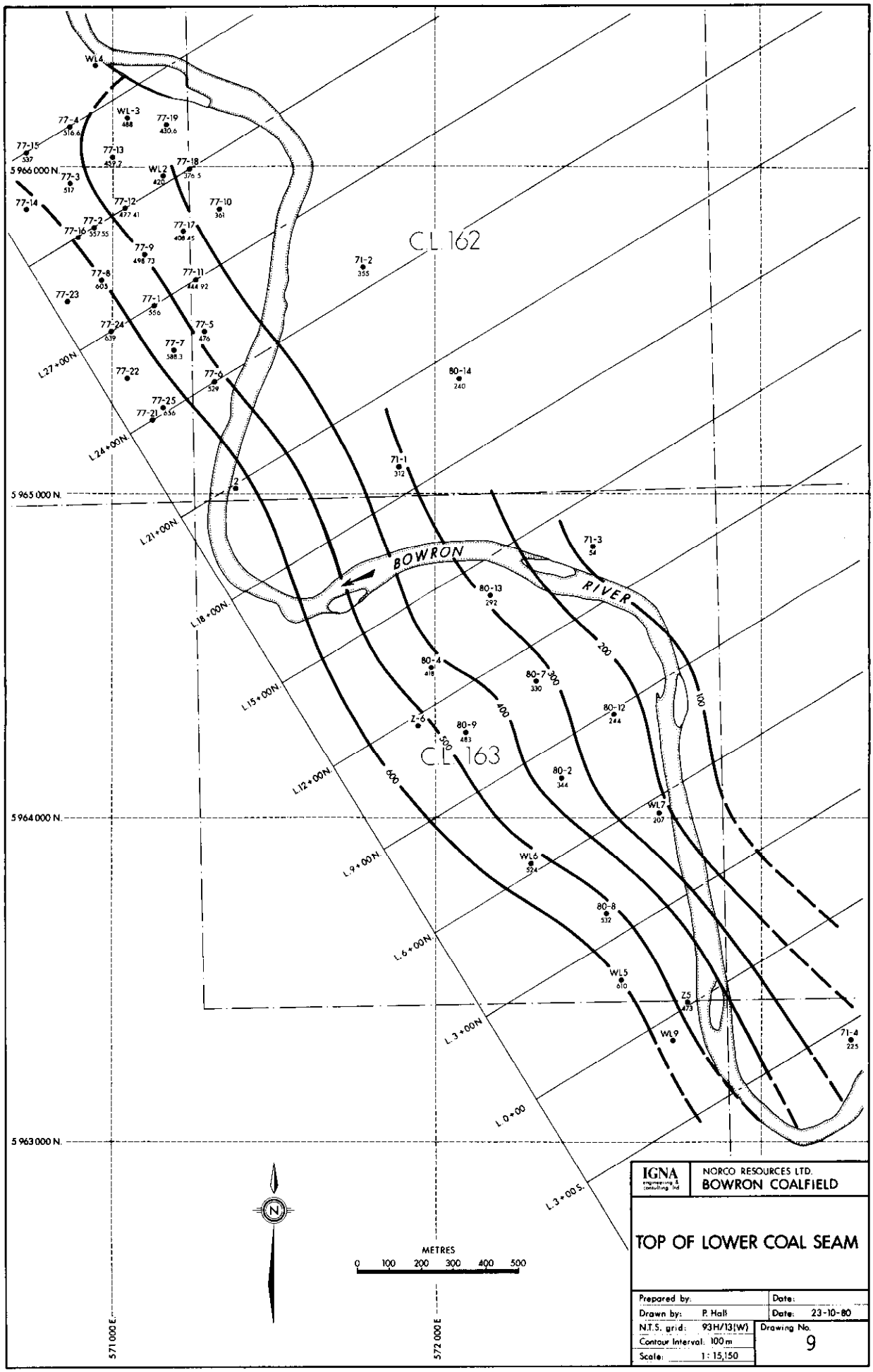
(b) just the northeastern flank of the asymmetrical synclinal trough with some graben type faulting.

Both theories remain to be proven.

(2) Coal Seams Correlation

Previous and recent drilling and underground exploratory workings have established that coal measures occupy 75 - 100 m of the base of the sedimentary sequence and that coal extends over an area 4,300 by 1,400 meters and that the full extent of the coal bearing basin is as yet to be explored.

Three seams have been identified in that particular area on the west bank of the Bowron River. These are Upper or Main seam, with an average thickness of 2.4 m; Middle seam, with an average thickness of 3.4 m; and Lower seam, with an average thickness of 4.0 m. Out of the three seams, the lower seam shows the best development of continuously thick coal. It appears that the distance from the volcanics in the base of the basin to the



IGNA engineering & consulting ltd

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BOWRON COALFIELD

TOP OF LOWER COAL SEAM

Prepared by:		Date:	
Drawn by:	P. Hall	Date:	23-10-80
N.T.S. grid:	93H/13(W)	Drawing No.	9
Contour Interval:	100 m		
Scale:	1:15,150		

lower seam is fairly consistent, giving confidence in lateral persistency and correlation of the lower seam. The middle and upper seams are less developed and appear to have a lesser lateral extent.

The lower coal seams show a variation in thickness. Thinning and swelling of the seams has been observed throughout the drill areas. The continuity of the seams have not been disrupted, and it is felt that these features represent a variable paleo-topography, where coals thicken in paleotopographical lows and thin over highs. Another possible, but yet unproven cause may be differential subsidence within the basin.

(3) Coal Reserves

The past exploration has been concentrated in the area of the western edge of the Bowron River basin.

(a) 1967: Dr. J. Black (1967) estimated indicated and probable reserves at 20,185,000 tons of in situ coal.

(b) 1977: Coal reserves calculated by John Kerr on the basis of his work and previous exploration were as follows:

Proven reserves		6,000,000 tonnes
Drill indicated		55,000,000 tonnes
Unexplored potential reserves		100,000,000 tonnes
	to	250,000,000 tonnes
TOTAL RESERVE POTENTIAL:		161,000,000 tonnes
	to	311,000,000 tonnes

(c) 1980: Borovic:

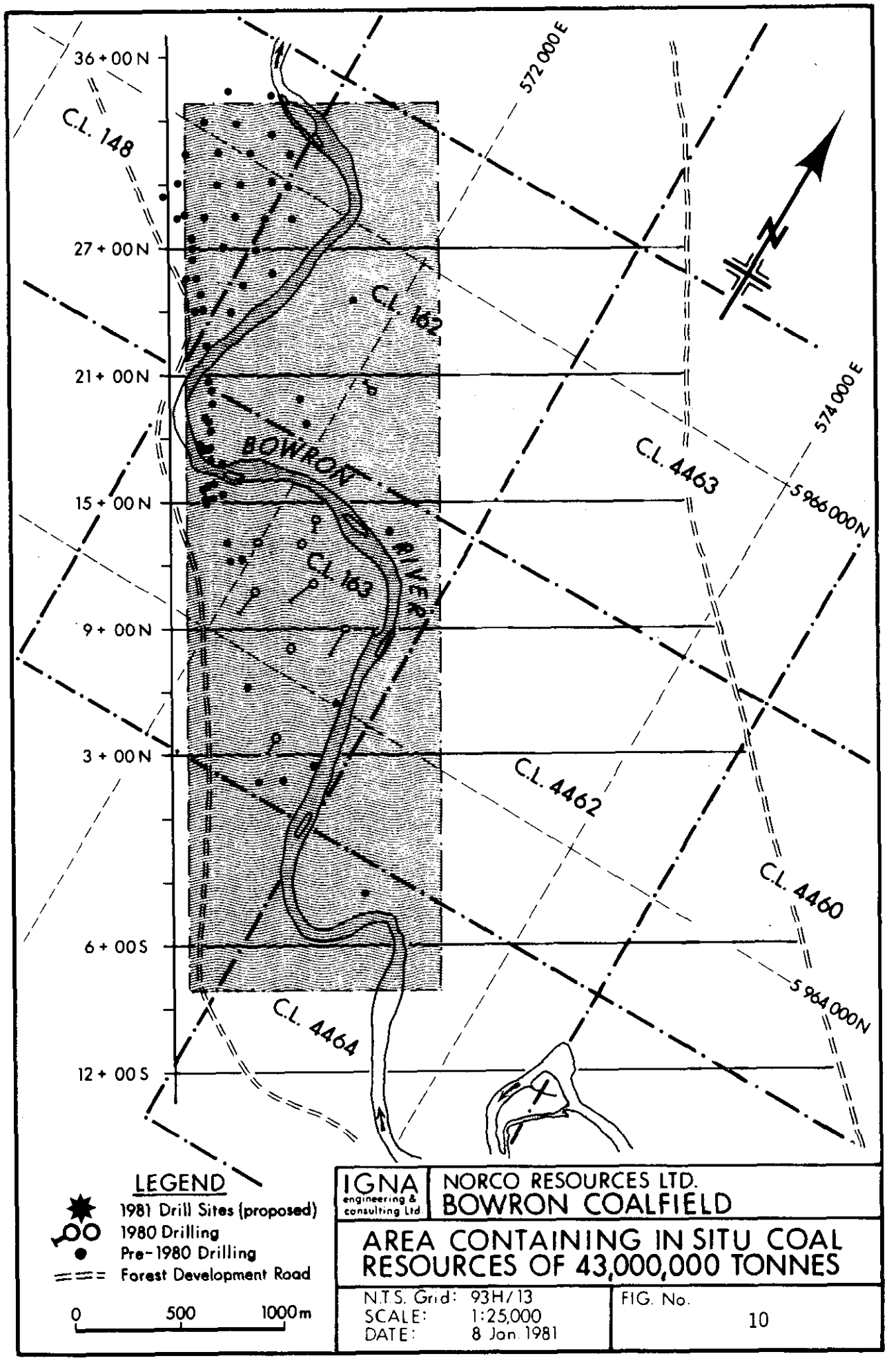
Exploration drilling during 1980 was concentrated on proving the continuity of coal and outlying coal reserves in the central area of the coal basin.

Diamond and rotary drilling was extended over an area 4,300 m long, 1,400 m wide, with an average true thickness of the lower coal seam of 4.0 m.

The author's calculations show that the drilled out area of 4,300 m length, 1,400 m width, and an average true thickness of the lower coal seam being 4.0 m contains from 35,280,000 to 43,344,000 metric tonnes of in-situ coal. Calculation is based on 30% indicated average ash content with specific gravity of run-of-mine coal is 1.8.

Furthermore, it appears that the trough shaped asymmetrical syncline extends south for at least another 1,500 to 2,000 metres and that the width of the total bearing structure is about 1,700 to 2,000 m.

Therefore, we can expect 67,320,000 metric tonnes of indicated in-situ coal reserves for the ares 5,500 m long, 1,700 m wide with an average thickness of the lower coal seam of 4.0 m.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BOWRON
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1981 Drill Sites (proposed)
1980 Drilling
Pre-1980 Drilling
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IGNA engineering & consulting Ltd
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AREA CONTAINING IN SITU COAL RESOURCES OF 43,000,000 TONNES
N.T.S. Grid: 93H/13
SCALE: 1:25,000
DATE: 8 Jan. 1981
FIG. No.
10

(E) CONCLUSIONS

The exploration to date has proven coal reserves in the order of 35 to 43 million metric tonnes. It has also shown that the asymetrical synclinal coal bearing structure has potential reserves of more that 67 million tonnes.

The coal is ranked as high volatile, Bituminous "B", thermal coal with average ash values (DDH 80-2 & 80-4) from 22.6% to 33.47% and average sulphur content (DDH 80-2 & 80-4) from 1.9% to .95%.

Previous washing tests and recent analyses show that coal could be washed to lower than 10% ash content. Sulphur, which is contained mainly in the form of framboidal to massive pyrite as indicated in previous analyses, should wash to the acceptable limits of less than 1%.

The roof and floor of the lower coal seam are mainly composed of sandstone, siltstone, and laminated mudstones with good supporting properties.

It is my opinion that Norco's coal deposit has a good potential of becoming a coal producer, especially in view of the fact that additional tonnage is indicated in the central basin area, and that there are still large potential coal bearing areas unexplored to the north and to the south.

(F) RECOMMENDATIONS

Continued drilling to prove indicated resources of more than 67,000,000 tonnes and sinking of an underground exploration decline in order to gain valuable knowledge for underground mine development and to obtain large coal samples which are necessary for washability tests are recommended.

The following equipment and personnel is necessary in order to complete the exploration program and finalize the feasibility study:

(1) Rotary Drill, comparable in size to a Fairling 2500, capable of drilling holes without difficulty, up to 1,000 meters and more for fast exploratory and fill-in drilling.

(2) Rotary Drill, Ingersoll Rand Cyclone TH60, for setting of casing.

(3) Diamond Drill for coring and cementing the holes.

(4) Underground mining contractor with miners for underground development.

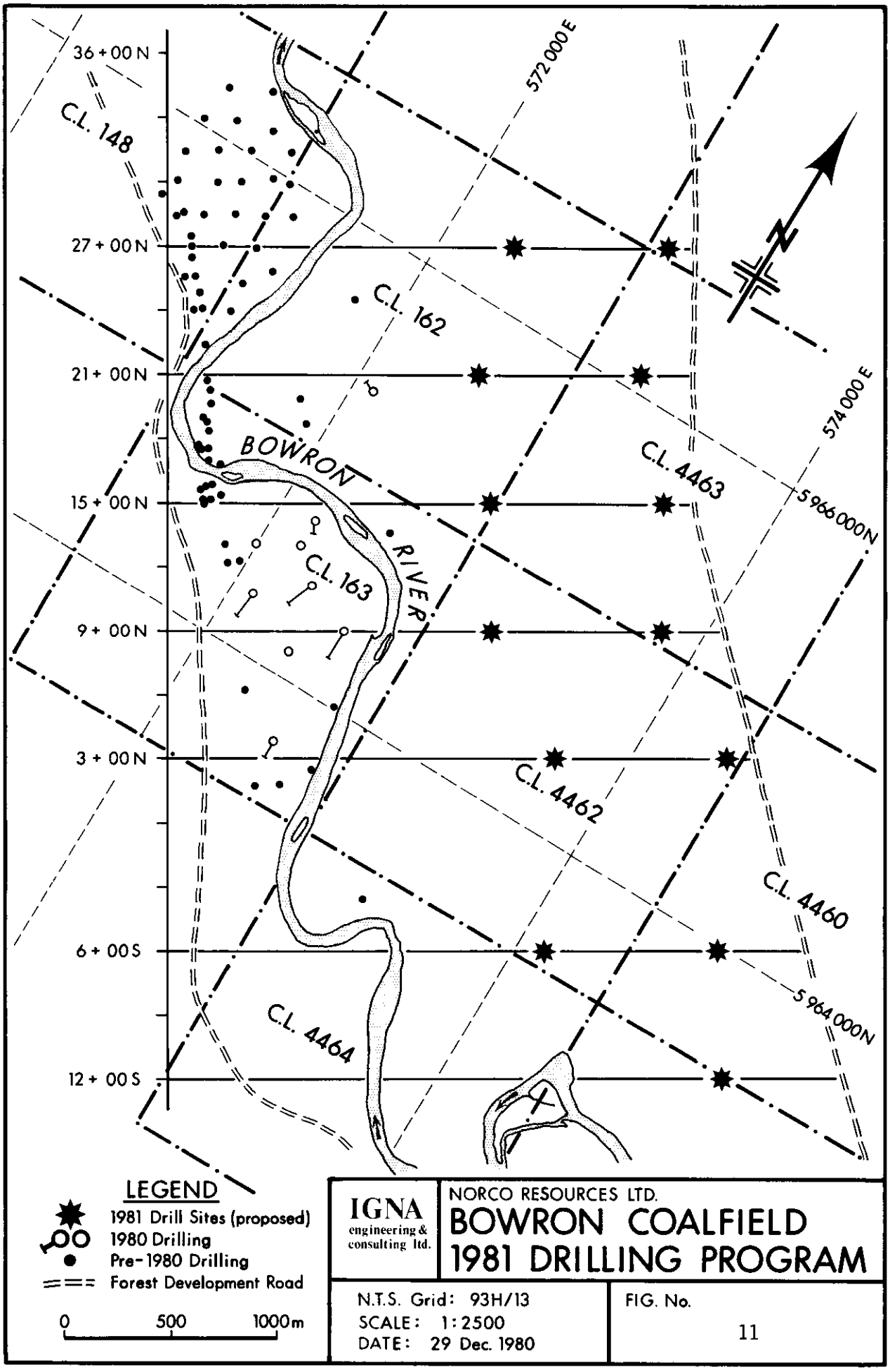
(5) Geophysical wireline tools for down hole logging.

(6) Seismic survey to help with structural studies and mine design.

(7) Engineering group with supervisor and three geologists for geological engineering work.

(8) Support crew - cook, camp manager, bulldozer operator, 2 helpers.

The program will consist mainly of rotary drilling with diamond drilling for core to supplement geological knowledge, correlation of the seams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1980 Drilling
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Forest Development Road
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500
1000m
IGNA
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NORCO RESOURCES LTD.
BOWRON COALFIELD
1981 DRILLING PROGRAM
N.T.S. Grid: 93H/13
SCALE: 1:2500
DATE: 29 Dec. 1980
FIG. No.
11

and coal quality analyses.

Every hole will be logged with electrical logging equipment.

Sinking of a two compartment decline will start immediately after completion of 23 necessary holes.

A seismic survey will be done in the later phase of development drilling to help determine the detailed structure of the future mine area.

NORCO RESOURCES LTD.

BOWRON COALFIELD

(1) STATEMENT OF COSTS

March 28, 1980 - Sept. 30, 1980

GROUP NO. 277 SUPP.

CATEGORY OF WORK	APPORTIONMENT	UNIT COST	GROUP COST	NOTES
Geological Mapping	-	-	-	(1)
Geophysical Mapping	-	-	-	(1)
Topographic Mapping	78%	$ 2,027.00	$ 1,581.06	(2)
Road Construction	78%	$ 35,242.00	$ 27,488.76	(3)
Surface Work				
Drill Collar Survey	9/14 holes	$ 7,002.00	$ 4,501.29	(4)
Drilling				
Core (Wireline)	630/753m	$ 91,181.46	$ 76,287.28	(5)
Rotary (Reverse)	2883.5/3752m	$523,614.55	$402,410.09	(6)
Logging	3513.5/4505m	$ 53,724.00	$ 41,899.96	(7)
Testing	100%	$ 1,910.00	$ 1,910.00	(8)
OTHER WORK				
Engineering/Environmental	78%	$ 87,318.71	$ 68,108.04	(9)
Geological Consultant	78%	$ 24,775.00	$ 19,324.50	(10)
Camp Wages				
Maintenance Staff	78%	$ 25,920.00	$ 20,217.60	(11)
Field Staff	78%	$ 24,200.00	$ 18,876.00	(12)
Camp Expenses	78%	$ 65,777.46	$ 51,306.42	(13)
Camp Equipment	78%	$ 14,353.00	$ 11,195.34	(14)
Fuel	3513.5/4505m	$ 32,656.00	$ 25,468.78	(15)
Transportation	78%	$ 1,500.00	$ 1,170.00	(16)

OFF-PROPERTY COSTS	APPORTIONMENT	UNIT COST	GROUP COST	NOTES
Transportation	78%	$ 5,441.00	$ 4,243.98	(17)
Printing & Reprographics	78%	$ 1,270.87	$ 991.28	(18)
In-House Draughting	78%	$ 2,550.00	$ 1,989.00	(19)
Report Assembly	78%	$ 1,050.00	$ 819.00	(20)

ON - PROPERTY COSTS:	$771,745.12
OFF-PROPERTY COSTS:	$ 8,043.26
TOTAL EXPENDITURES:	$779,788.38

(G)

NORCO RESOURCES LTD.

BOWRON COALFIELD

(2) EXPLANATORY NOTES TO ACCOMPANY STATEMENT OF COSTS

(1) Claimed in previous year.

(2) Topographic Survey

Extension to original base map.
Supplier = Pacific Survey Corp.
Job. No. = #80-93
Scale = 1:10,000
Duration = May 5 - June 13, 1980
Area Covered = 45 km^2

Apportionment ratio is based on drilling depths of a total of 4505 m, "Group #311" had 991.5 or 22%
"Group #277 Supp" had 3513.5 m or 78%.

(3) A 6150 m road 6m wide was constructed for Norco by contractor, "Kode Sand & Gravel Ltd." of Prince George. The Forest Service have granted Special Use Permit #9485 to cover this route.

(4) The 1980 drilling programme drilled 14 holes. Two were claimed for last year. However, for apportioning the drill collar survey costs the ratios of 5/14 and 9/14 are used so that all the holes are included rather than just those drilled after March 28, 1980.

(5) Drilling was by J. T. Thomas Diamond Drilling Ltd. using a Longyear 44 drill for NQ core. DDH #1 and #2 were drilled prior to the March 28 anniversary and credit for those holes was claimed in last year's work submission. Drilling costs are apportioned in the ratio of depths drilled within groups to total DDH depths drilled. Drill core is stored at the Norco campsite located within Coal Licence #148.

(6) Drilling was by Interior Water Wells Ltd. of Prince George, using an Ingersoll-Rand Cyclone TH60 drill for 15 mm hole size. Drilling costs are apportioned in the ratio of depths drilled within groups to total depths drilled.

(7) Downhole Electrologging was by Roke Oil Enterprises Ltd. of Calgary. Sidewall Densilog, Gamma Ray Neutron Log and Focussed Beam Logs were done. Costs were apportioned in the ratio of drillhole depths within groups to total property-wide drillhole depths exclusive of DDH #1 and #2 which were referenced in last year's report.

(8) Relates only to Group 277 Supp. Testing was based on samples taken from DDH #4 core. Work was done by the Commercial Testing and Engineering Co. of North Vancouver. 10 composite coal plies samples and 14 shale plies samples were analysed.

(9) Work was performed by Associated Mining Consultants Ltd. (formerly "Intermin"). Cost shown comprises billings for period March 30, 1980 to August 30, 1980. (Invoices dated April 30-Sept. 30, 1980) Costs are arbitrarily apportioned in the ratio of the number of holes drilled in each group.

(10) Geological consulting by I. Borovic of IGNA Engineering and Consulting Ltd. Costs are based on billings presented to the company.

(11) Camp Wages - Maintenance Staff:

POSITION	NAME	WAGE/MO.	DURATION	TOTAL
Caretaker	B. Carey	$ 1,500	5 Mo.	$ 7,500
Cook	P. LeFleur	$ 2,430	4 Mo.	$ 9,720
Cook	L. Collin	$ 2,500	1 Mo.	$ 2,500
Cooks Helper	I. LaFleur	$ 2,500	2 Mo.	$ 5,000
Cooks Helper	S. Spencer	$ 1,200	1 Mo.	$ 1,200
			TOTAL:	$25,920

(12) Camp Wages - Field Staff:

POSITION	NAME	WAGE/MO.	DURATION	TOTAL
Geologist	R. Linds	$ 2,500	4 Mo.	$10,000
Geol. Asst.	R. Bylo	$ 2,000	5 Mo.	$10,000
Field Asst.	W. Eisbrenner	$ 1,200	3.5 Mo.	$ 4,200
			TOTAL:	$24,200

(13) Camp Expenses:
$15,860.46 food billing from KELLY DOUGLAS and $49,917.00 ATCO Pacific Ltd. billing for sub-contractor to install septic field for Norco camp and for camp outfitting costs.

(14) Camp Equipment:

Purchase of camp supply vehicle, (1/2 ton 4WD Chevrolet Suburban Carryall) @ $11,123.00 and a Wajax MK V fire pump @ $3,230.00.

(15) Fuel costs are for operation of drill rigs and for camp heating. Apportioning of the costs are in the ratio of drill depths within groups to total property-wide drilling.

(16) A 3/4 ton 4x4 Chev. pick-up truck was rented from Hallmark Resources Ltd. for the months of June-July 1980 at the rate of $750.00 per month for purpose of transporting drill rods and supplies to the drill rigs.

(17) Commerical air fares for transporting employees between Prince George and company head office in Vancouver.

(18) Invoices from Superior Reproductions Ltd. for diazo reprographics services for period of April 1 to Sept. 30, 1980.

(19) Since the original draughting was done prior to knowledge of B.C. Reg. 555/79, much had to be redone to comply with these new regulations.

Ten days @ $150.00/day were charged to the original submission with six days @ $175.00/day to the September revisions.

(20) Three days @ $200.00 are charged for the original report assembly with an additional two days @ $225.00/day for the September revisions.

(21) Reclamation permit number is #C135.

(H)

NORCO
BOWRON RIVER

1981 BUDGET ESTIMATES

PHASE 2

Drilling

Rotary:

13 Holes, 600 m each @ 150.00/m	$ 1,170,000.00
Rotary and Diamond Drilling:	
10 Holes 600 m each @ 150.00/m	900,000.00
Coal Analyses:	
250 @ $100.00/sample	25,000.00
PHASE 2 TOTAL:	$ 2,095,000.00

PHASE 3

Seismic Survey

Initial Testing 3 lines $150,000.00
Final Testing 17 lines $450,000.00

PHASE 3 TOTAL:	$ 600,000.00

PHASE 4

The Compartment Decline:

Sinking $ 650.00/foot in rock
$1,200.00/foot in OB

PHASE 4 TOTAL:	$ 1,540,000.00

PHASE 2, 3, & 4

Geology - Engineering:

Supervisor, Two Geologists, Assistant Five Months	$ 80,000.00
Transportation and Travel (Truck, Airplane, Helicopter)	$ 30,000.00
Food and Shelter 3,240 man/days @$50.00/man/day	$ 162,000.00
TOTAL:	$ 272,000.00

BUDGET SUMMARY

Phase 2		$ 2,095,000.00
Phase 3		600,000.00
Phase 4		1,540,000.00
Phase 2, 3, 4		272,000.00
	PHASE 2 + 3 + 4 +(2+3+4):	
	SUBTOTAL(A):	$ 4,507,000.00

SUPPLIES

Office		$ 2,000.00
Medical		500.00
General Office and Communications		8,000.00

ENVIRONMENTAL

Public Relations		2,000.00
Ecology		2,000.00
Legal		5,000.00
	SUBTOTAL (B):	$ 19,500.00
	SUBTOTAL (A)	$ 4,507,000.00
	SUBTOTAL (B)	19,500.00
		$ 4,526,500.00

ADMINISTRATION

(2%) of budget total		$ 93,000.00
		$ 4,619,500.00
CONTINGENCIES (10%)		460,000.00
	ESTIMATED BUDGET:	$ 5,079,500.00

January 8, 1981

I. BOROVIC, P.ENG.

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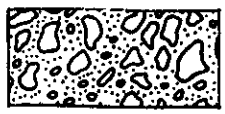
TRENHOLME, L.S.	(1975)	-	Summary Report August 25.
TRENHOLME, L.S.	(1976)	-	Report of Bowron River Coal Deposit March 10.
TRENHOLME, L.S.	(1977)	-	Report on Bowron River Coal Deposit January 27.

TABLE NO. 3

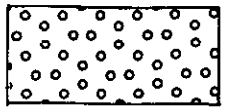
LITHOLOGY LEGEND

QUATERNARY



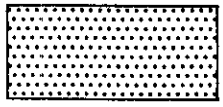
LT141

OVERBURDEN:
Glacial and glaciofluvial till.



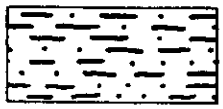
LT129

CONGLOMERATE:
Moderate to poorly sorted. Grit to cobble size. Composed mainly of quartz and argillaceous and non-argillaceous cherts. Contains medium to fine grained sand of same composition as matrix. Matrix and clast supported. Calcium carbonate occurs as clasts. Siliceous cementation.



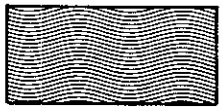
LT906

SANDSTONE:
Moderate to poorly sorted. Fine to coarse grained. Composition same as for conglomerate.



AF429

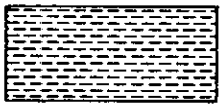
SILTSTONE:
Massive to laminated. Contains plant fossils. Very carbonaceous in places.



LT189

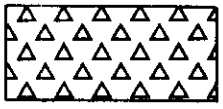
BLACK MARKER:
Fine to medium sized grains of volcanogenic quartz and calcium carbonate in discrete layers in argillite. Abundant soft sediment deformation.

TERTIARY



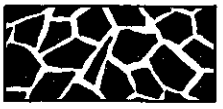
LT121

SHALE:
Massive to very finely laminated, with alternating light and dark layers.



LT240

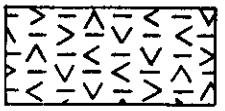
SEDIMENTARY BRECCIA (Type #1):
Matrix is mud. Clasts are angular and comprised of volcanogenic and metamorphic quartz, chert and calcium carbonate. Lesser amounts of argillitic fragments, micas and carbonaceous material.



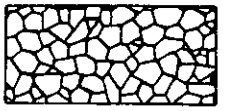
LT101

SEDIMENTARY BRECCIA (Type #2):
Same as Type #1 except that matrix is argillite, possibly containing iron sulphide.

COAL:
High volatile bituminous (non-coking). Intermediate composition between a vitrite and a clarite.



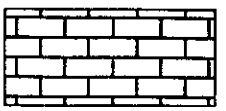
CLAYS (Volcanic Origin?):
Light green. Composed of chlorite, micas and smectites. Some show swelling properties and weather very easily. Variable stratigraphic occurrence.



LT103

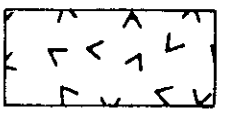
BASAL CONGLOMERATES:
Light green in outcrop. Composed mainly of volcanic fragments, chert, quartz and carbonate. Finely grained argillitic clast materials are most likely of volcanic origin.

MISSISSIPPIAN
Slide Mtn. Group



LT123

LIMESTONE:
Light grey, highly fractured and brecciated mesocrystalline sparite.



AF401

VOLCANICS:
Green, locally fractured and brecciated. Some fractures filled with Stilbite.

IGNA engineering & consulting ltd.

CERTIFICATE

I, Ignacije Borovic, of the city of Vancouver, B.C. do hereby certify that:

(1) I am a member of the Association of Professional Engineers in the Province of British Columbia.

(2) I am employed by Igna Engineering & Consulting Ltd. with office at 4258 West 10th Avenue, Vancouver, B.C.

(3) I am a graduate of the University of Zagreb and I have practiced continuously as a geologist and graduate geological engineer since 1962.

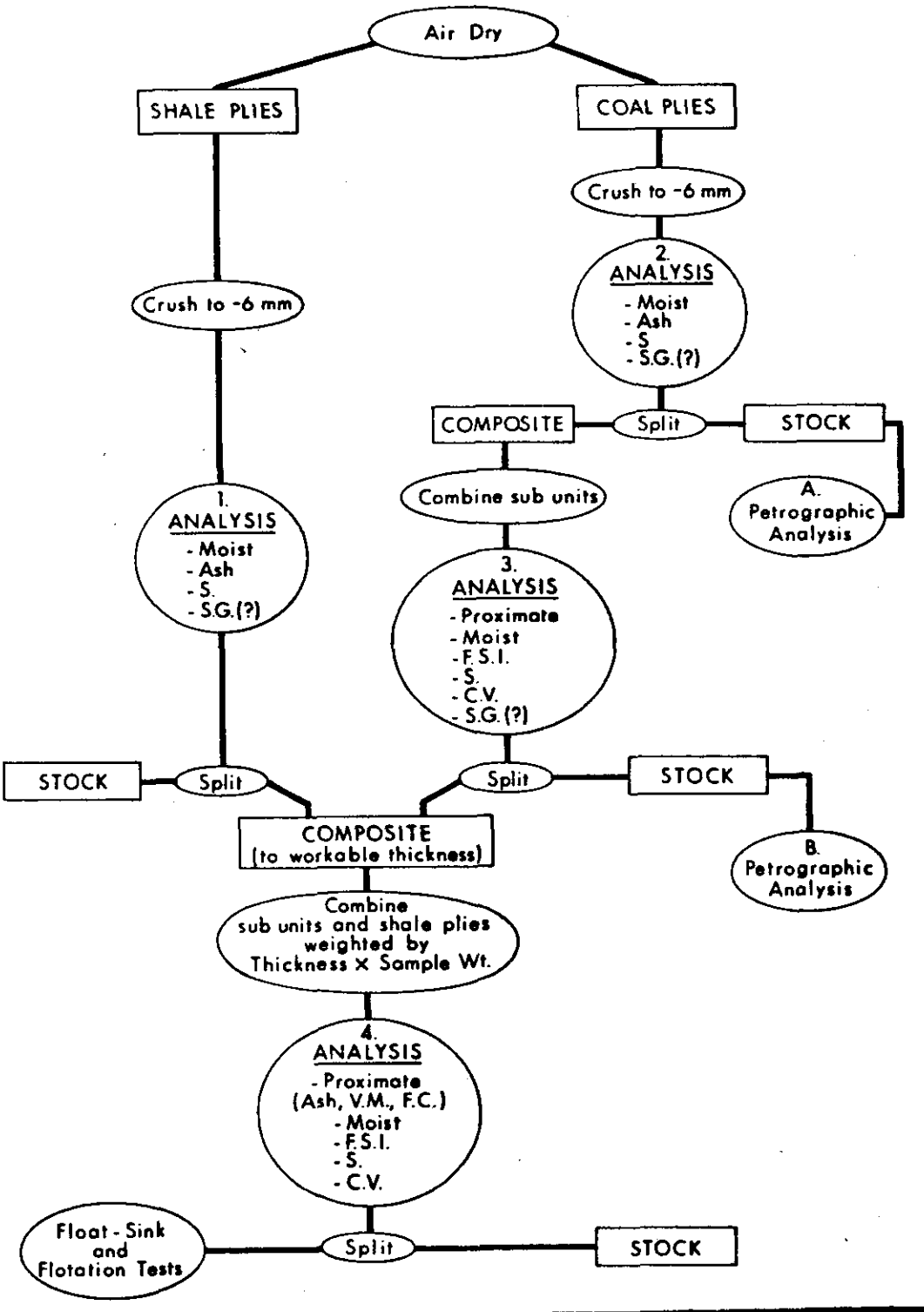
(4) I do not have any direct or indirect interest in the properties or securities of NORCO RESOURCES LTD. nor do I expect to receive any.

(5) This report is based on research, study and exploration work performed under my supervision.

(6) Permission is granted to NORCO RESOURCES LTD. to use this report to satisfy requirements of Securities Commission and/or Stock Exchange.

I. Borovic, P. Eng.

In Vancouver, B.C.
January 8, 1981



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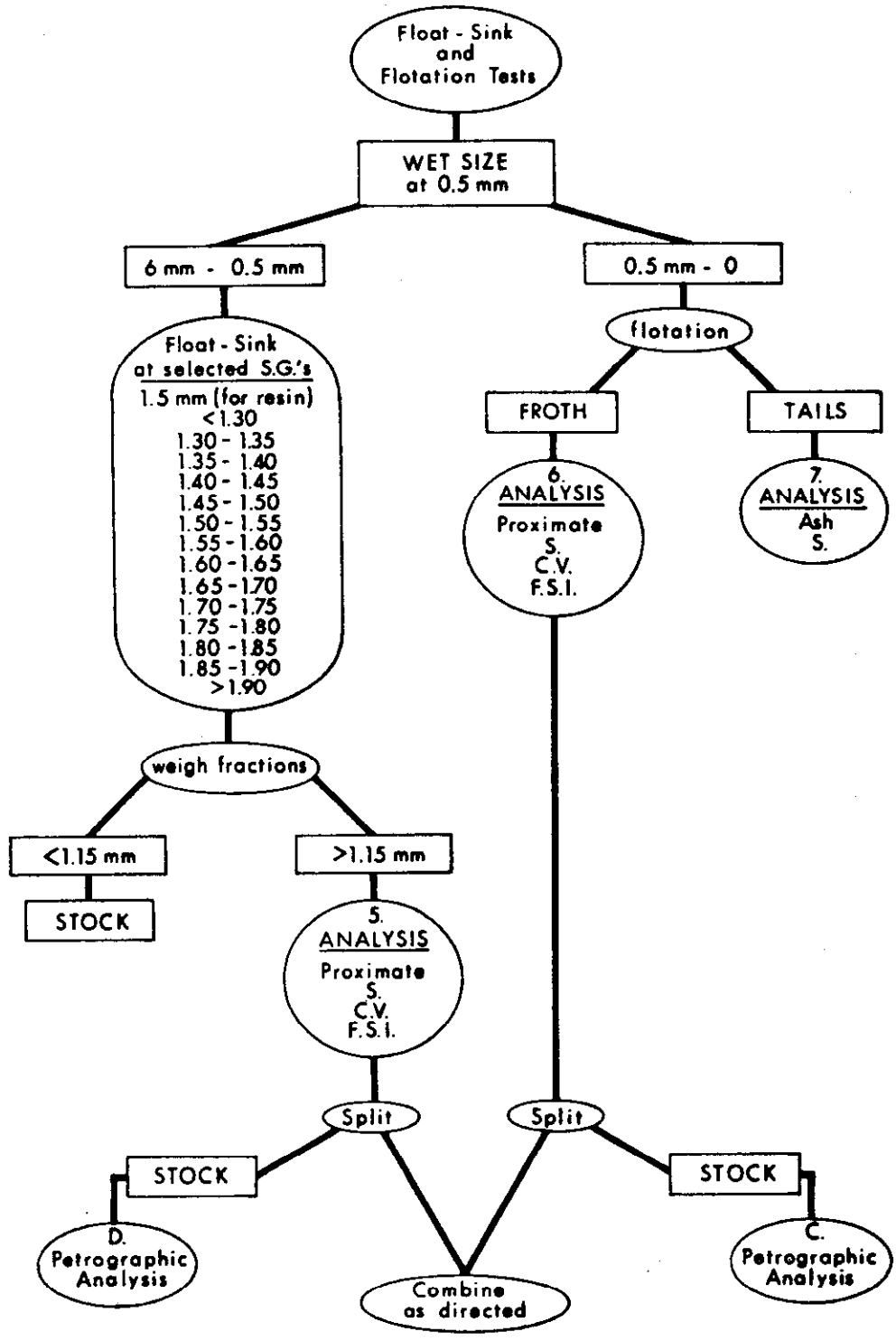
BOWRON COALFIELD

ASSAY PROCEDURE FLOWSHEET PART 1

DRAWN BY: P. Hall
SCALE: Natural
DATE: 24 MARCH 1981

FIG. No. 12



IGNA engineering & consulting ltd.

NORCO RESOURCES LTD.

BOWRON COALFIELD

ASSAY PROCEDURE FLOWSHEET PART 2

DRAWN BY: P. Hall
NATURAL SCALE
DATE: 24 MARCH 1981

FIG. No. 13

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147 RIVERSIDE DRIVE, NORTH VANCOUVER, B.C.
V7H 1T6, CANADA
OFFICE TEL. (604) 929-2228

NORCO RESOURCES LTD.
412 - 200 Granville Street
VANCOUVER, BC
V7C 1S4

August 7, 1980

Sample identification by
Norco Resources Ltd.
Hole No. 80-4

Kind of sample reported to us	Coal - 6B (13B, 19B)
Sample taken at	-----
Sample taken by	-----
Date sampled	-----
Date received	June 20/80

Analysis report no. 64-19552

PROXIMATE ANALYSIS

	As Rec'd.	Dry Basis
% Moisture	2.53	xxxx
% Ash	28.79	29.54
% Volatile	20.77	21.31
% Fixed Carbon	47.91	49.15
	100.00	100.00
BTU	8970	9203
% Sulphur	0.89	0.91
FREE SWELLING INDEX (CBI)	1	1

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING
Division of Peabody International Corporation (Canada) Ltd.

S. Morrin
Regional Manager

Original Copy Watermarked
For Your Protection

Charter Member

F-464

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OFFICE TEL. (604) 929-2228

NORCO RESOURCES LTD.
412 - 200 Granville Street
VANCOUVER, BC
V7C 1S4

August 7, 1980

Sample identification
by
Norco Resources Ltd.
Hole No. 80-4

Kind of sample reported to us: Coal - 5B (21B)

Sample taken at: -----

Sample taken by: -----

Date sampled: -----

Date received: June 20/80

Analysis report no. 64-19551

PROXIMATE ANALYSIS

	As Rec'd.	Dry Basis
% Moisture	3.04	xxxx
% Ash	30.08	31.02
% Volatile	28.38	29.27
% Fixed Carbon	38.50	39.71
	100.00	100.00
BTU	9101	9386
% Sulphur	0.54	0.56
FREE SWELLING INDEX (CBI)	1-1/2	1-1/2

Respectfully submitted,
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S. Morrin
Regional Manager

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NORCO RESOURCES LTD.
412 - 200 Granville Street
VANCOUVER, BC
V7C 1S4

August 7, 1980

Sample identification by
Norco Resources Ltd.
Hole No. 80-4

Kind of sample reported to us: Coal - 4B (15B, 17B)

Sample taken at: -----

Sample taken by: -----

Date sampled: -----

Date received: June 20/80

Analysis report no. 64-19550

PROXIMATE ANALYSIS

	As Rec'd.	Dry Basis
% Moisture	2.93	xxxx
% Ash	22.04	22.71
% Volatile	28.69	29.56
% Fixed Carbon	46.34	47.73
	100.00	100.00
BTU	9821	10117
% Sulphur	1.37	1.41
FREE SWELLING INDEX (CBI)	1	1

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S. Morrin
Regional Manager

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NORCO RESOURCES LTD.
412 - 200 Granville Street
VANCOUVER, BC
V7C 1S4

August 7, 1980

Sample identification by
Norco Resources Ltd.
Hole No. 80- 4

Kind of sample reported to us: Coal - 3B (11B)

Sample taken at: -----

Sample taken by: -----

Date sampled: -----

Date received: June 20/80

Analysis report no. 64-19549

PROXIMATE ANALYSIS

	As Rec'd.	Dry Basis
% Moisture	2.99	xxxx
% Ash	20.79	21.43
% Volatile	33.25	34.27
% Fixed Carbon	42.97	44.30
	100.00	100.00
BTU	10008	10316
% Sulphur	1.01	1.04
FREE SWELLING INDEX (CBI)	1-1/2	1-1/2

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COMMERCIAL TESTING & ENGINEERING
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S. Morrin
Regional Manager

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OFFICE TEL. (604) 929-2228

NORCO RESOURCES LTD.
412 - 200 Granville Street
VANCOUVER, BC
V7C 1S4

August 7, 1980

Sample identification by
Norco Resources Ltd.
Hole No. 80- 4

Kind of sample reported to us: Coal - 2B (5B, 7B)

Sample taken at: -----

Sample taken by: -----

Date sampled: -----

Date received: June 20/80

Analysis report no. 64-19548

PROXIMATE ANALYSIS

	As Rec'd.	Dry Basis
% Moisture	2.49	xxxx
% Ash	34.30	35.18
% Volatile	29.44	30.18
% Fixed Carbon	33.77	34.64
	100.00	100.00
BTU	8213	8423
% Sulphur	1.04	1.07
FREE SWELLING INDEX (CBI)	1	1

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING
Division of Peabody International Corporation (Canada) Ltd.

S. Morrin
Regional Manager

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V7H 1T6, CANADA
OFFICE TEL. (604) 929-2228

NORCO RESOURCES LTD.
412 - 200 Granville Street
VANCOUVER, BC
V7C 1S4

August 7, 1980

Sample identification by
Norco Resources Ltd.
Hole No. 80-4

Kind of sample reported to us: Coal - 1B (2B, 3B)

Sample taken at: -----

Sample taken by: -----

Date sampled: -----

Date received: June 20/80

Analysis report no. 64-19547

PROXIMATE ANALYSIS

	As Rec'd.	Dry Basis
% Moisture	1.80	xxxx
% Ash	51.48	52.42
% Volatile	25.08	25.54
% Fixed Carbon	21.64	22.04
	100.00	100.00
BTU	5760	5866
% Sulphur	0.61	0.62
FREE SWELLING INDEX (CBI)	0	0

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING
Division of Peabody International Corporation (Canada) Ltd.

S. Morrin
Regional Manager

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Charter Member

CABLE ADDRESS COMTECO
TELEX 04-352697

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434

Please address all correspondence to:
147 Riverside Dr., North Vancouver, B.C. V7H 1T6

SINCE 1908

Office: Tel. (604) 929-2228

SHALE	% Total Moisture	Sulphur	Ash	Wt. (gm.)
Sample (Hole No. 4)				
1B-324.00-324.20	2.33	0.13	85.06	423.5
4B-326.25-326.42	2.50	0.80	75.70	268.6
6B-326.42-327.13	1.78	0.26	77.76	133.9
8B-327.96-328.50	1.42	0.02	80.11	959.7
9B-328.50-328.83	3.65	0.02	54.76	413.3
10B-328.83-329.94	1.44	0.05	84.20	1625.7
12B-330.92-331.00	1.22	0.09	75.90	171.7
14B-331.18-331.92	1.76	0.54	65.74	953.6
16B-332.23-334.79	1.14	1.74	76.12	3503.2
18B-336.24-336.50	1.01	0.05	82.24	467.4
20B-336.50-337.37	1.14	0.15	71.62	648.5
22B-338.05-338.28	0.40	0.04	79.61	410.7
23B-338.28-339.54	2.53	0.60	57.17	865.6
24B-339.54-339.74	1.07	0.38	84.93	355.4

July 17/80

CABLE ADDRESS COMTECO
TELEX 04-352697

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434

Please address all correspondence to:
147 Riverside Dr., North Vancouver, B.C. V7H 1T6

Office: Tel. (604) 929-2228

COAL	% Total Moisture	Sulphur	Ash	Wt. (gm.)
Sample (Hole No. 4)				
2B-324.20-325.04	2.55	1.13	66.78	561.7
3B-325.04-326.25	4.61	0.59	31.49	622.7
5B-326.42-327.02	5.58	1.05	22.43	296.7
7B-327.13-327.96	3.77	0.83	44.74	372.3
11B-329.94-330.92	4.54	1.46	21.66	709.2
13B-331.00-331.18	6.51	1.00	3.60	101.8
15B-331.92-332.23	5.92	0.73	23.91	137.9
17B-334.79-336.24	4.05	1.26	35.60	589.9
19B-336.50-336.72	4.37	0.83	45.49	194.6
21B-337.37-338.05	5.33	0.62	30.02	213.8

July 10/80

SEISMIC REFRACTION SURVEY

BOWNRON RIVER

Prepared for

NORCO RESOURCES LTD.

VANCOUVER, BRITISH COLUMBIA

Prepared by

GEO-PHYSI-CON CO. LTD.

CALGARY, ALBERTA

June, 1980
80-20

TABLE OF CONTENTS

INTRODUCTION

This report presents the results of a seismic refraction survey to determine the depth to bedrock along existing cut lines at the Norco Resources Bowron River property. The work was authorized in a telephone conversation with Mr. R. Borovic (a consulting geologist for Norco Resources). The location of the seismic refraction survey lines is shown on Figure 1.

The depth to bedrock determined from the interpretation of seismic refraction surveys must be verified by drill holes; the results can be used to provide optimum test hole locations.

DATA ACQUISITION

The geophysical field program was conducted during the period May 6 to May 11, 1980 along existing cut lines by a four man crew.

A Geometrics ES1210-F 12-channel signal enhancement seismograph was used for the seismic refraction survey. The manufacturer's specifications on that instrument are given in Appendix A. Explosives (75% Forcite) were used as the seismic source.

Along lines 1, 2 and 4, five shots on each 12-geophone spread were recorded; two shots from both ends of the line, two shots offset 220 metres from both ends of the line and a shot at the centre of the line. The purpose of the centre shot was to obtain reliable first layer velocities. The shots at the ends of the cable were required to obtain reliable second layer velocities and delay times for the first layer while the purpose of the 220 metre offset shots was to obtain arrivals refracted from the bedrock at most geophones.

The surface elevation is relatively uniform in the floodplain of the Bowron River and for that reason no elevation corrections have been made to the data.

DATA PROCESSING

The basic data obtained from refraction seismic surveys are arrival times from surface shots at surface geophones as a function of distance. These arrivals are first corrected for elevation, and subsequently the time of travel is plotted versus distance (Figure 2a).

To compute depth to bedrock the time-delay method was used. First, a plot is made of the difference in arrival times at the same geophones from shots symmetrically offset from the ends of a spread of 12-geophones. Geophones that record arrivals refracted from the bedrock invariably fall with little scatter on a straight line with a slope of $2/V_2$ (Figure 2b). Figure 2b is also used to separate geophones recording arrivals with travel paths entirely in the overburden. In the example of Figure 2b only 4 geophones record arrivals refracted from the bedrock. Next, the delay time (defined in Figure 2d) is computed for these 4 geophones, as well as the depth to bedrock (Figure 2c).

RESULTS

Figures 3, 4 and 5 show the interpreted results of the seismic refraction survey. Over most of the study area, a three layer structure was present. The first layer is most likely comprised of sands and gravels above the water table with a seismic velocity of 345 $\pm$30 metres per second. The boundary between the first and second layers is expected to represent the water table. The material comprising the second layer is expected to be saturated sands and gravels with seismic velocities ranging from 1740 to 2200 metres per second.

At line 1 (Figure 3), seismic spreads were located on both the east and west of the Bowron River. The depth to bedrock on the east side of the river varies from 15 to 40 metres. There is a decrease in the depth to bedrock approximately 500 metres east from the Bowron River. In this area, the depth to bedrock decreases from 30 to 15 metres over a distance of 40 metres.

To the west of the river, the depth to bedrock can be subdivided into 3 groups; i) between 320 and 560 metres from the river there appears to be a channel with depths to bedrock ranging from 80 to 100 metres, ii) between 280 and 310, 560 and 780, and 820 and 860 metres from the river, the depth to bedrock ranges from 65 to 70 metres, iii) approximately 800 metres from the river, there appears to be a narrow feature in the bedrock (approximately 40 metres wide). It was not possible to interpret the depth to bedrock in this area; this section probably is a fault rather than a channel.

Seismic spreads were located to the west of the creek along line 2 (Figure 4). In general the depth to bedrock decreases from 65 metres at the creek to 40 metres approximately 400 metres to the west. Between 160 and 200 metres west of the creek, a region with depth to bedrock greater than 70 metres is expected; because it is a narrow feature depth to bedrock could not be interpreted.

At line 4 (Figure 5), the depth to bedrock increases with increasing distance from the river. The depth to bedrock is expected to increase from approximately 30 metres to in excess of 50 metres at about 700 metres east of the river.

RECOMMENDATIONS

A workable difference in seismic velocity between overburden (about 2000 m/sec) and bedrock (>3200 m/sec) was observed on all the survey lines, so that seismic refraction surveying can be used to map depth to bedrock. The accuracy of depth to bedrock determination by seismic refraction surveying mainly depends on:

i) The detail to which overburden velocities are obtained. Cost to a large extent determines the detail that can be achieved.

ii) The availability of drill hole control. Test holes placed on the geophysical lines allows calibration of the data.

Since no test hole control was available on the lines at this time, the accuracy of depth to bedrock interpretations from the seismic refraction survey is expected to be no better than ±25%.

Seismic refraction surveying also appears to delineate deep narrow depressions (probably faults) in the bedrock. The exact depth and nature of these features must be determined by drilling.

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF ALBERTA
PERMIT NUMBER
P 2802
Geo Physi Con Co. Ltd.

Respectfully submitted,

GEO-PHYSI-CON CO. LTD.,

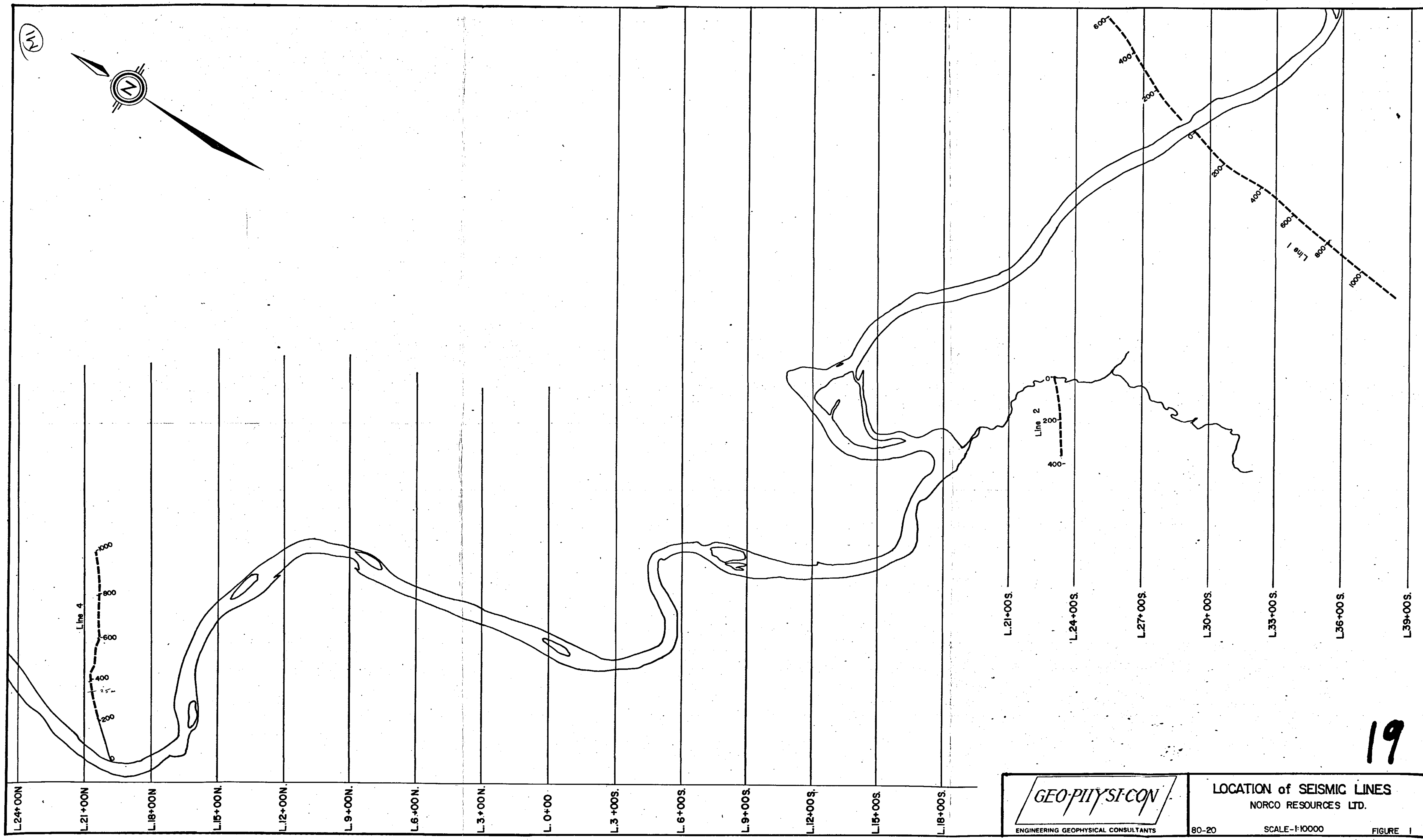
Per:

J. D. Henderson, B.Sc.

Per:

Pieter Hoekstra, Ph.D.,P.Eng.
President

Calgary, Alberta
June 1980
80-20



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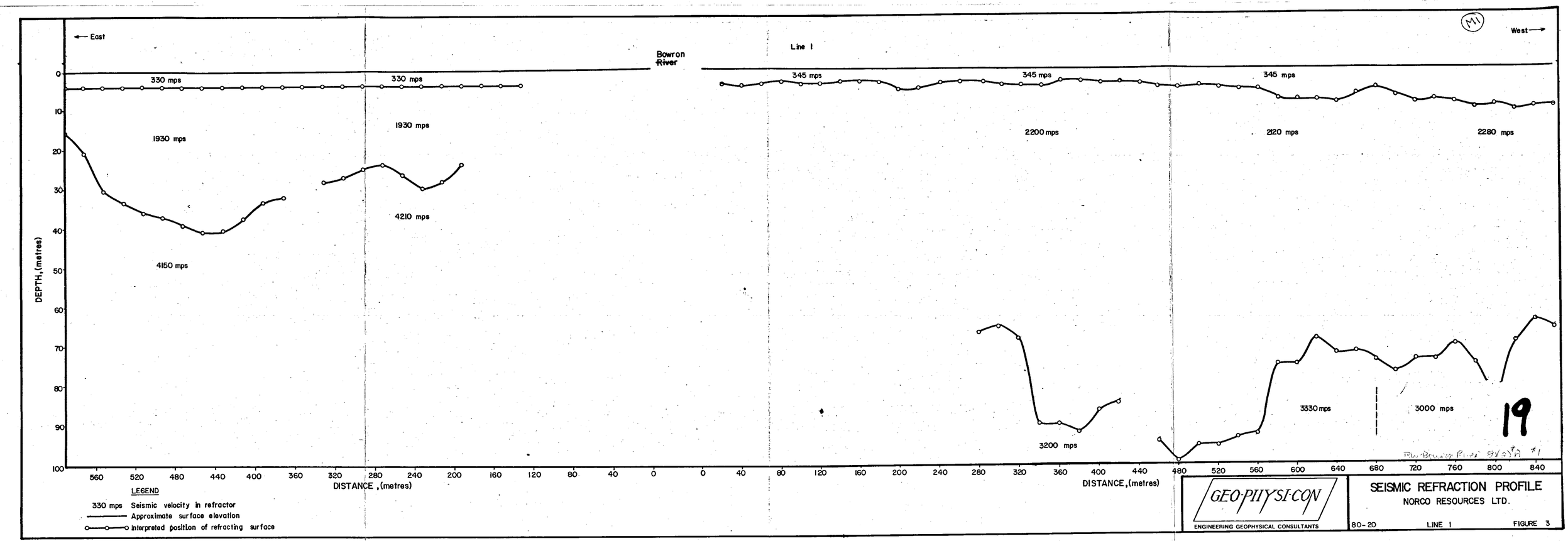
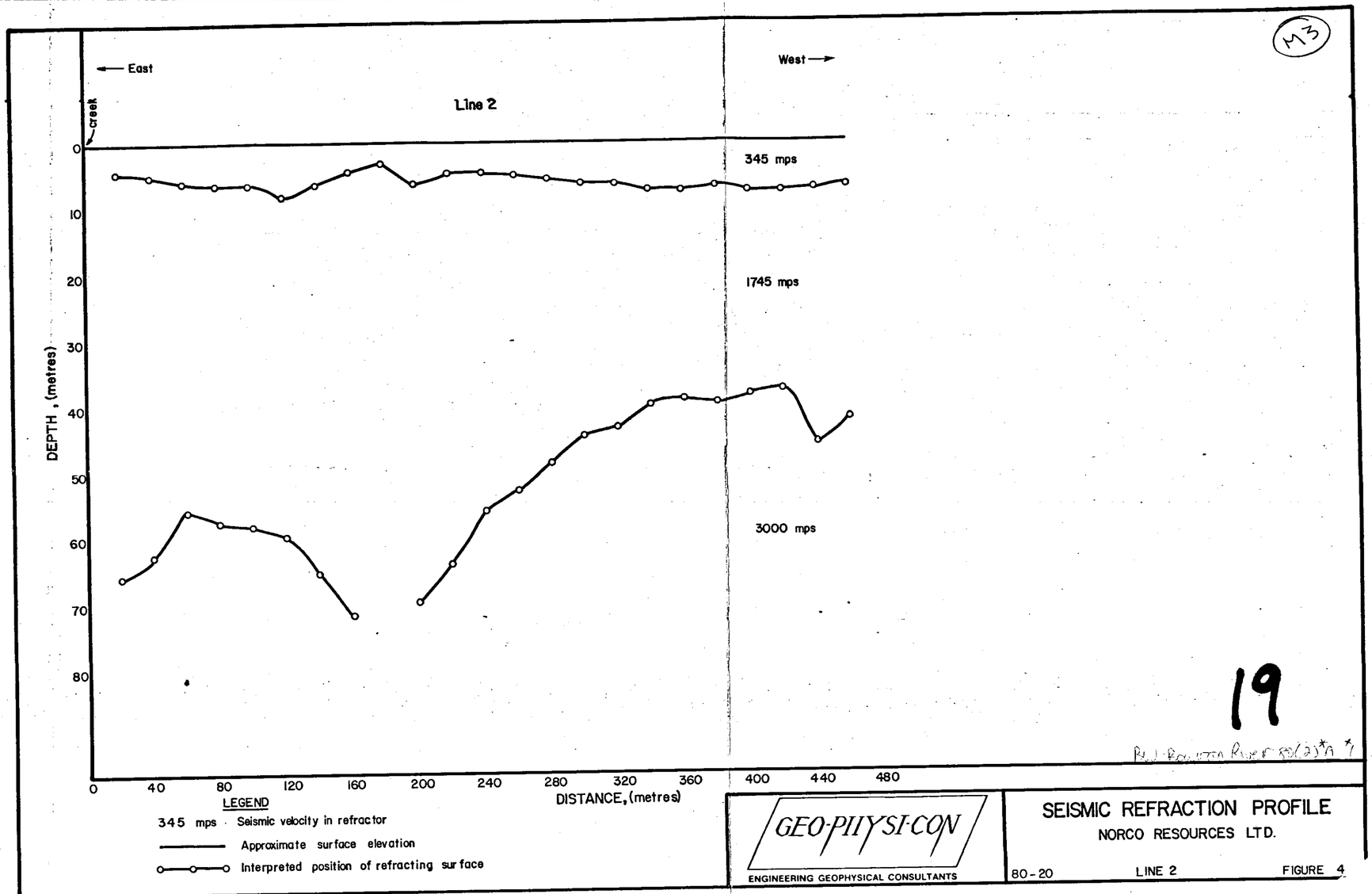
ENGINEERING GEOPHYSICAL CONSULTANTS

LOCATION of SEISMIC LINES
NORCO RESOURCES LTD.

80-20 SCALE-1:10000 FIGURE 1

19


East
West
Bowron River
Line 1
330 mps
330 mps
1930 mps
1930 mps
4210 mps
4150 mps
345 mps
345 mps
345 mps
2200 mps
2120 mps
2280 mps
3200 mps
3330 mps
3000 mps
DEPTH, (metres)
DISTANCE, (metres)
LEGEND
330 mps Seismic velocity in refractor
Approximate surface elevation
Interpreted position of refracting surface
GEO-PHYSI-CON
ENGINEERING GEOPHYSICAL CONSULTANTS
SEISMIC REFRACTION PROFILE
NORCO RESOURCES LTD.
80-20 LINE 1 FIGURE 3



M3

19

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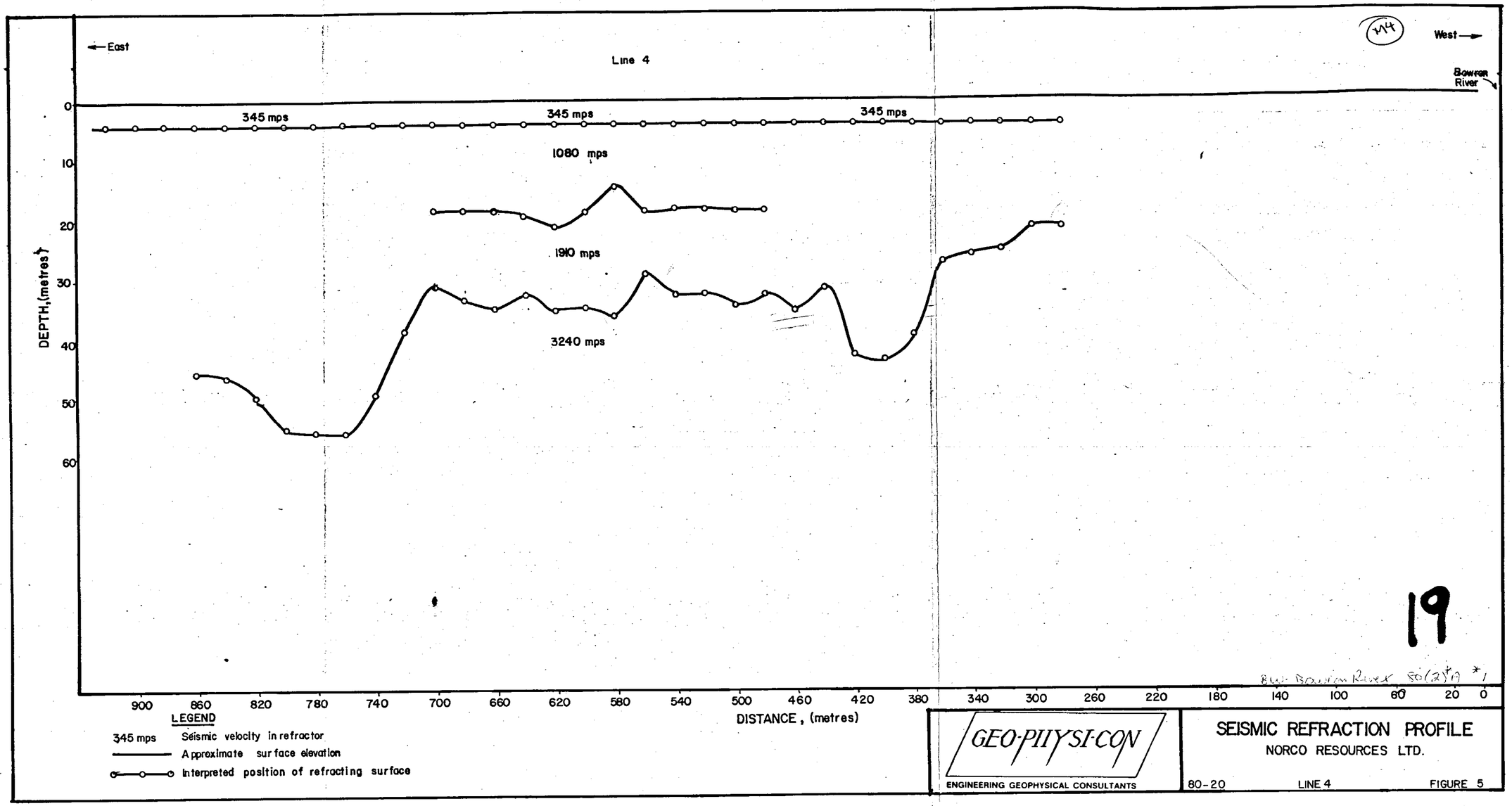
SEISMIC REFRACTION PROFILE
NORCO RESOURCES LTD.

80-20 LINE 2 FIGURE 4


← East
Line 4
West →
Bowron River
345 mps
345 mps
345 mps
1080 mps
1910 mps
3240 mps
DEPTH, (metres)
0
10
20
30
40
50
60
900
860
820
780
740
700
660
620
580
540
500
460
420
380
340
300
260
220
180
140
100
60
20
0
DISTANCE, (metres)
LEGEND
345 mps Seismic velocity in refractor
Approximate surface elevation
Interpreted position of refracting surface
GEO-PHYSICON
ENGINEERING GEOPHYSICAL CONSULTANTS
SEISMIC REFRACTION PROFILE
NORCO RESOURCES LTD.
80-20
LINE 4
FIGURE 5

BW - Bowron River 50(1) A-2

REPORT ON EXPLORATION WORK
PERFORMED ON COAL LICENCES
4458, 4459, 4464, 4723, 4724, 4725
(GROUP NO. 311) DURING THE PERIOD
MARCH 28, 1980 TO SEPTEMBER 1, 1980

No. 311

BOWRON COALFIELD

LAND DISTRICT - CARIBOO
N.T.S. GRID - 93H/13
LATITUDE - 53°50' N
LONGITUDE - 121°55' W

OWNER/OPERATOR
NORCO RESOURCES LTD.

CONSULTANT/AUTHOR
I. BOROVIC, P.ENG., GEOLOGIST
(IGNA ENGINEERING & CONSULTING LTD.)

FIELD WORK: MARCH 28, 1980 TO SEPT. 1, 1980

REPORT SUBMITTED: FEBRUARY 17, 1981

Report revised and resubmitted on September 30, 1981 in compliance with Ministry of E.M. & P.R. letter dated June 26, 1981. Receipt of this letter was delayed by the postal strike to August 13, 1981.

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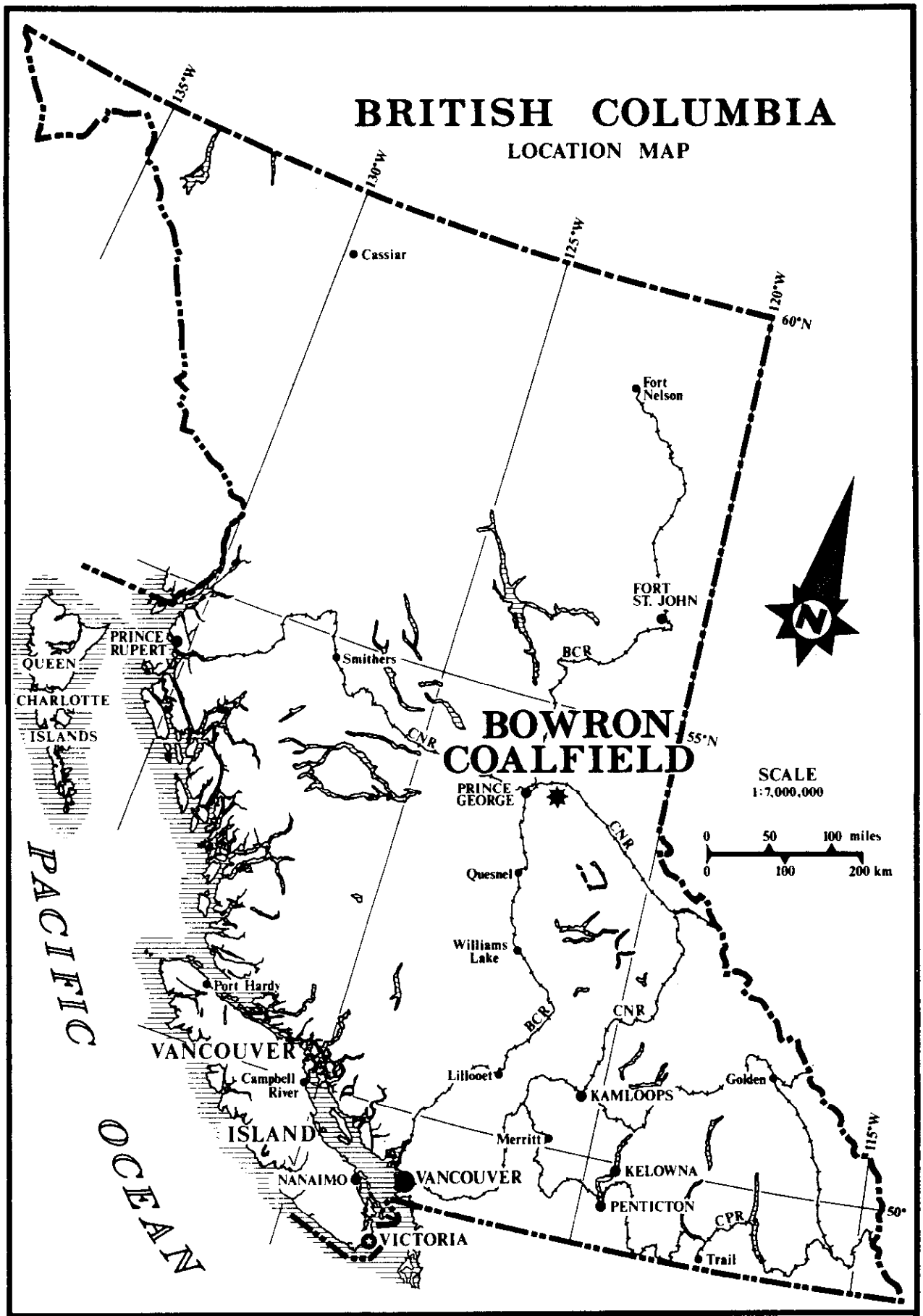
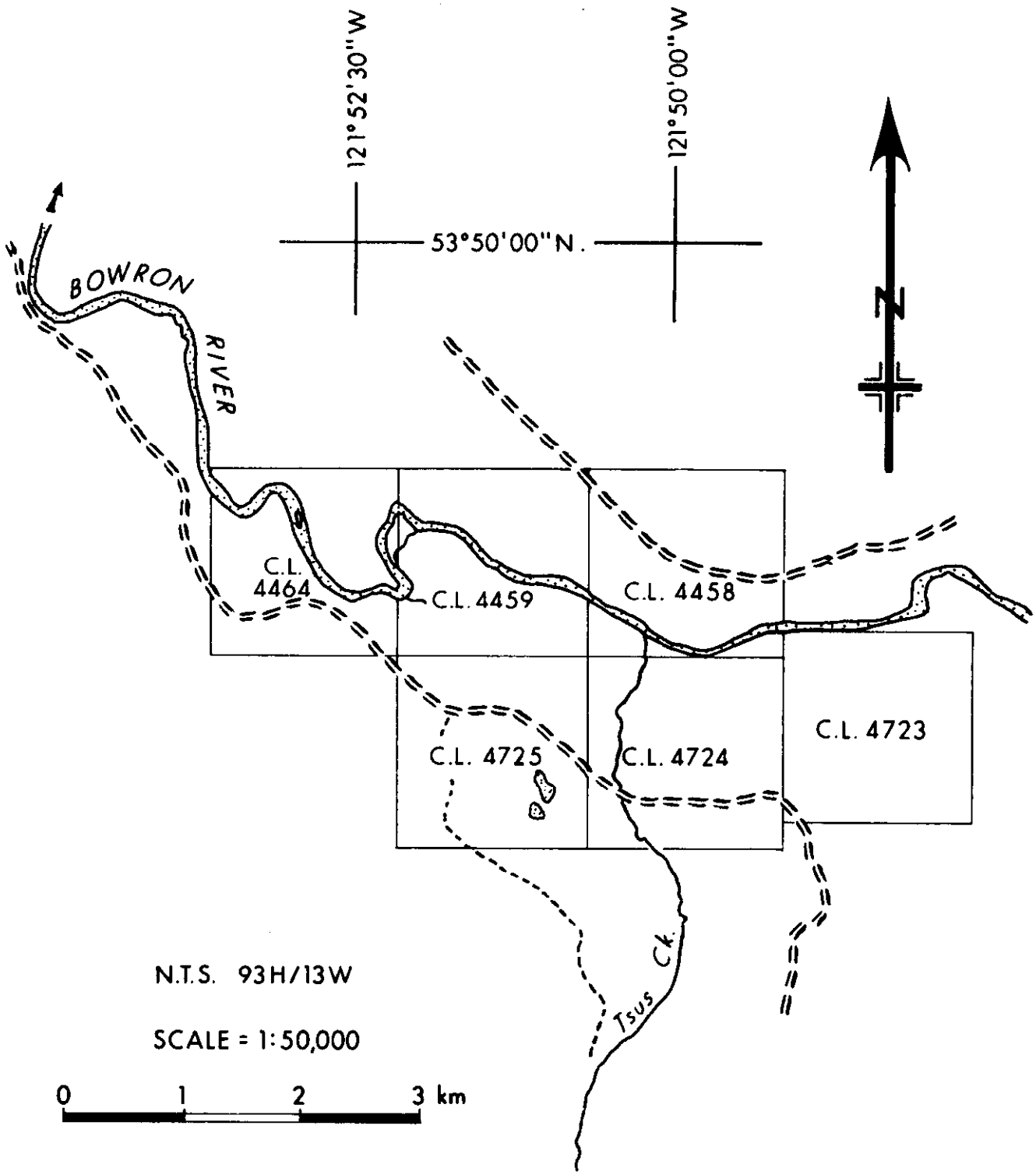
TABLE OF CONTENTS



IGNA engineering & consulting ltd.	NORCO RESOURCES LTD. **BOWRON COALFIELD**	DATE FIG. No. 1



NORCO RESOURCES LTD.
BOWRON COALFIELD

GROUP 311

16 February 1981

FIG. No. 2

DW-Bowron River 80(2)A *1

(A) INTRODUCTION

(1) Scope of Report

This report describes the exploration work done to date; the results of regional mapping, ground magnetometer, airmag and refraction seismic surveys, diamond and rotary drilling. Furthermore, it describes and discusses results of coal analyses from diamond drilled holes and proposes continuation of the drilling programme.

(2) Overall Property

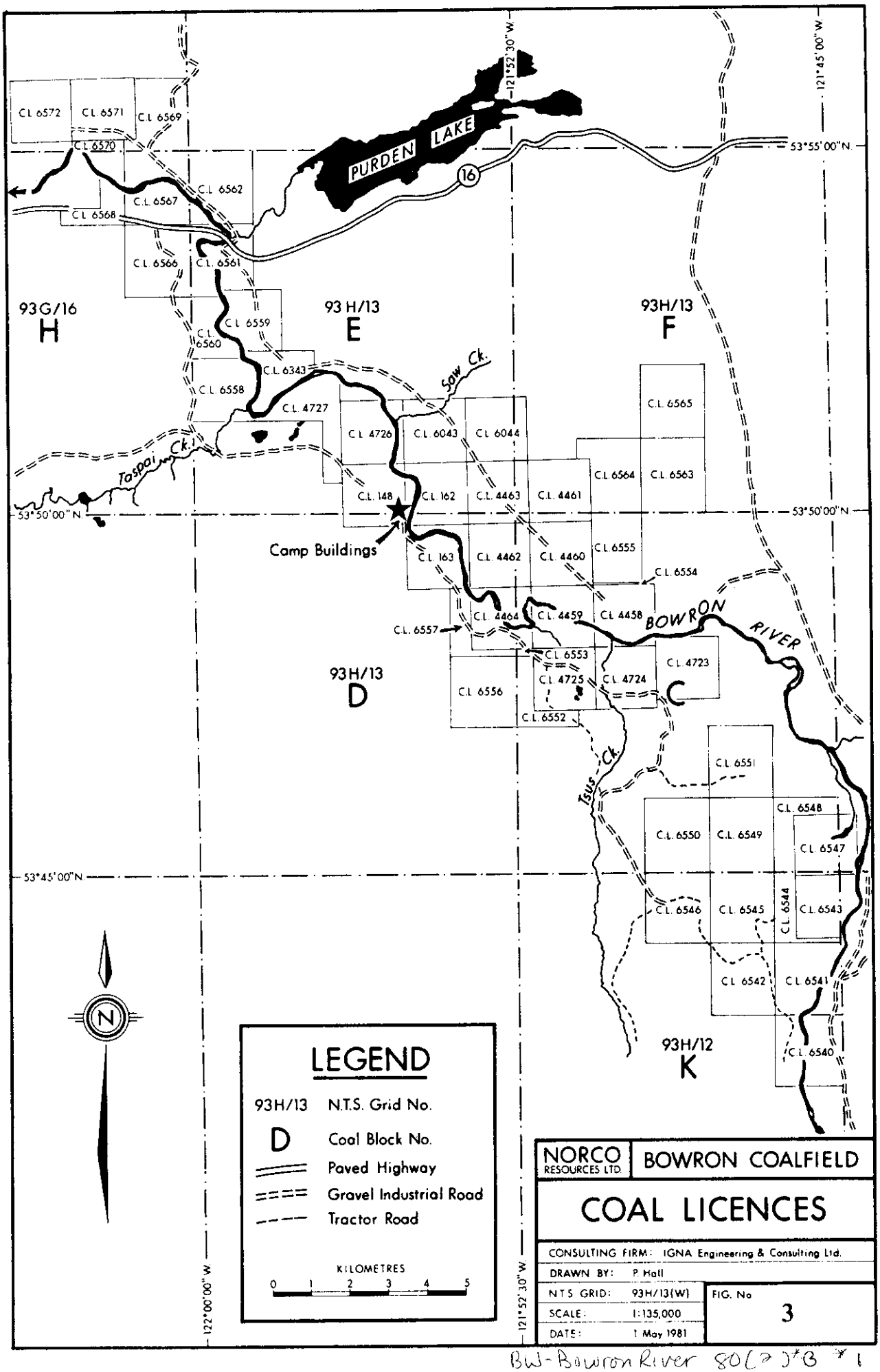
The property consists of the following 18 coal licences totalling an area of approximately 4,589 hectares:

Coal Licence Numbers: 148, 162, 163, 4723, 4724, 4725, 4726, 4727, 4458, 4459, 4460, 4461, 4462, 4463, 4464, 6043, 6044, 6343(formerly No. 4728).

The Licences and their locations are shown on Plates No. 1 and 2. Norco has applied for an additional 33 coal licences with a total of 7,452 hectares contiguous to the northwest and to the southeast of the licences committed to and part of the Taipower Agreement.

(3) Location and Access

Approximately centre lat. 53°50'; long. 121°55', 8 km south of Purden Lake and 62 road miles east of Prince George. An easy access is provided by a number of excellent logging roads. Highway 16 passes through the northern end of the property.



BW-Bowron River 80(?)*B *1

(4) HISTORY OF EXPLORATION

1871 G. M. Dawson (1876-77) noted that coal about 18 inches thick was seen in 1871 by Dewdney on Bear River (now Bowron) near latitude 54 close to the crossing of the Canadian Pacific survey-line.

1909 The coal occurrences were brought to the attention of A. E. Hepburn of Vancouver in 1909 by J. Wendle, of Barkerville, who had seen them first in 1898.

1910 The coal exposures near todays Norco camp were first explored by J. Wendle, who drove a short adit for A. E. Hepburn. The adit was located at the northern end of the exposure of coal formed on outcropping along the river for about 80 m. The adit exposed two seams. An eight foot seam was exposed in the left hand crosscut and the right hand crosscut exposed a six foot seam.

1911 Hepburn held leases covering fourteen sections (one square mile) totalling 8,960 acres. The lots were surveyed and the property was examined by D.F.J. Galloway (1914).

1946 No work was done on the property until it was acquired by Bowron Coal Co. Ltd. in 1946. The company built a camp and constructed "tractor road" (cat road) from railway station Hansard to the camp on the east side of the river. Some diamond drilling was done around the main coal showings and construction of the new road from Prince George across Buckhorn Lake was begun.

1947 The Bowron Coal Co. Ltd. trenched and extended 10 m to the southeast of the portal the coal bearing formation and drilled 73 feet vertical hole near the adit.

1948 Four drill holes totalling 269.5 m were completed and another hole was drilled later in the year. The holes were drilled in order to test the extension of the coal - seams intersected in the adit.

The six drill holes cut about 91.3 m of coal measures with numerous coal seams of variable thickness. The correlation among the holes in spite of close spacing was nearly impossible. Coal quality was tested and the following tabulation shows the results:

Sample Number	H_2O at 105° C	Ash	Vol. Comb. Matter	Fixed Carbon	Sulphur	B. T. U.
	%	%	%	%	%	%
1	6.1	4.7	33.9	55.3	0.6	12,160
2	5.8	9.7	35.5	49.0	0.9	11,340
3	5.8	13.6	33.7	46.9	1.0	10,760
4	5.0	14.3	34.0	46.7	1.6	10,989
5	6.0	18.0	31.0	45.0	1.0	10,120

1967 Northern Coal Mines Limited continued its programme of surface diamond drilling with four holes totalling 3,900 feet. Another six holes were drilled under the supervision of Dr. J. M. Black, Consulting Geologist. Dr. Black's coal reserve calculation shows some 21,000,000 tonnes of in situ coal.

1967 Two adits were driven:

(1) No. 2 mine of North "Slope"(-12°) has exposed upper and middle seams. It is located north of southeast corner of lot 9592 CL 7 near the high water mark east of the old camp and is flooded.

(2) No. 1 mine or South "Slope" is located about 1,000 m to the southeast of North "Slope". It explored the upper seams only and is also flooded.

1971 Bethlehem Copper Corp. held an option on the property, completing 5 additional diamond drill holes.

1971-1976 No exploration. The company dropped all but three licences and reorganized under the name of Norco Resources Ltd.

1976 In the summer and early fall, the north workings were dewatered, and a 12 ton bulk sample was obtained for detailed studies and analyses in Edmonton, Alberta.

1977 An extensive drilling programme of 25 diamond drill holes totalling 5,701.3 m (18,706 ft.) under the supervision of J. R. Kerr, P. Eng. was completed. The area of about 1,000 m x 1,000 m was drilled on 150 m centers. Results of drilling combined with previous work shows potential 80.0 million tons of coal resources in the area of the Bowron Coal basin.

Underhill and Underhill completed topographic control survey of the area and Pacific Survey took low level air photographs.

A preliminary feasibility study of 900 tonne/day coal mining operation was prepared by Wright Engineers Ltd. of Vancouver.

1978 - 1979 No exploration. The company consolidated its holdings and received additional licences to cover the entire known basin. Some of the licences were granted by the Provincial Government and seven licences were taken over from Zulu Explorations Ltd.

(B) 1980 EXPLORATION WORK

(1) Summary

The following exploration work was accomplished during the 1980 exploration season:

- Geological Mapping 1:10,000 scale
- Geophysical Survey:
  - (a) Airmag interpretation
  - (b) Groundmag survey
  - (c) Shallow seismic survey – in BW-Bowron River 80(1)A
- Drilling:
  - (a) Diamond drilling of 6 holes
  - (b) Rotary drilling of 8 holes
  - (c) Downhole geophysical logging

Since the renewal anniversary for the coal licences is uniformly dated to March 28, which occurs in the middle of the 1980 exploration programme, the work reports covering this period have had to be split between two years. Although the work above did in fact comprise the 1980 Exploration Programme, only that portion not already claimed in 1980 is being submitted herewith for 1981 credit. Work already filed is included in this report in summary form to preserve the conceptual continuity of the whole programme. Detailed reporting of the methodologies used in these summaries are contained within last year's work submissions. The work credits being applied for in this submission relate primarily to exploration drilling costs. The licences in which this

drilling was done are listed in the section entitled "Diamond and Rotary Drilling" and are precisely marked on the drillhole location map in the pocket at the back of the report. The type of equipment used and the names of the drilling contractors are listed at the bottom of the drillhole tabulation chart. All other incidental work credits being claimed herewith such as access road costs, equipment rental, draughting, etc., pertain to the property as a whole rather than to specific licences. Accordingly, the costs incurred from these works are apportioned between the two groups in the same ratio as the amount of drilling done on these groups.

(2) Geological Mapping (see 1979-1980 report)

Surface geological mapping produced an outcrop map at a scale of 1:10,000 which covered an area of approximately 50 km^2. Its purpose was to serve as a correlation tool for the groundmag survey. The mapping base was later enlarged to include more of the surrounding area and a new map covering an area of approximately 95 km^2 was evolved. Credit for the map extension is applied for in the 1981 submission.

(3) Geophysical Survey (see 1979-1980 report)

(a) Interpretation of Government airmag survey showed that some structural forms in the area of the basin could be recognized and picked by groundmag survey.

(b) The ground magnetic survey followed. It showed uniformity of the magnetic field over the interior of the basin with minor fluctuations due to deep seated structural variations and in magnetic susceptibility of volcanic and other rocks of the Slide Mountain group. The basin area was roughly delineated and with the support of geological mapping, the basinal width extended to about 3,000 metres.

(c) Seismic Refraction Survey:

The survey was conducted in order to find depth to bedrock and was quite successful in describing deep canyons in the limited area of Hole 80-1 and 80-3 in particular. It also pointed out depth to bedrock in areas of recent drilling. The survey was of great help in locating drillholes and should be used in future to determine not only depth of over-burden but also to assist in recognizing possible faults. Seismic lines were cut on coal licences 162, 163, 4458, 4459, and 4724 as shown on Fig. 6 of the 1980 work reports.

(4) Diamond and Rotary Drilling

The exploration basin is an area of dense surface brush cover and thick overburden beneath. Geological mapping uncovered very sparce outcrop occurrences and very little of the much needed geological information could be obtained from this approach. A drilling programme was the only alternative.

The first six holes drilled in the 1980 exploration programme were diamond drilled using a Longyear 44 drill. However, due to severe binding problems occasioned in drilling through the till material that comprised the overburden, four of these holes had to be abandoned before reaching bedrock. Core samples were obtained only from drillholes number 2 and 4, with DDH #2 being reported on in last year's work report and DDH #4 in this report. The assay reports for DDH #4 are contained in an appendix at the back of the report for Group 277 Supp. Confronted with the too frequent failure of the diamond drill rig to perform the job, it was removed from the property and replaced with a rotary rig which successfully completed the drilling programme. The rotary drill does not collect core and therefore no core samples are available from these latter holes for visual examination. However, through the use of downhole electrologging, much of the same data that would be available from core samples could be deduced geophysically. Copies of those logs have been provided with this report under

PERDEN MOUNTAIN

121°55'00" W

121°50'00" W

570 000 m E

580 000 m E.

5 970 000 m N.

5 960 000 m N.

53°50'00" N

BOWRON RIVER

Sow Ck.

Jenoski Ck.

Tatpa Ck.

Nizo Ck.

Kenneth Ck.

Tsus Ck.

Swamp Ck.

Campsite

C.L. 6343
C.L. 4727
C.L. 4726
C.L. 6043
C.L. 6044
C.L. 148
C.L. 162
C.L. 4463
C.L. 4461
C.L. 163
C.L. 4462
C.L. 4460
C.L. 4464
C.L. 4459
C.L. 4458
C.L. 4725
C.L. 4724
C.L. 4723

1300 m
1200 m
1100 m
1000 m
900 m
800 m

LEGEND

- Group #311
- Group #277 Supp.
- Drill hole
- Marsh
- C.L. 162 Coal Licence No.
- Forest Dev. road

0 1 2 3 km

IGNA engineering & consulting ltd.

NORCO RESOURCES LTD.

BOWRON COALFIELD

WORK GROUPS

DRAWN BY: P. Hall
N.T.S. GRID: 93H/13
SCALE: 1:50,000
CONTOURS: 100 m

DATE: 23 MARCH 81

FIG. No. 4

BW-Bowron River 80(2)*B *1

separate cover.

Closely spaced drilling (300 m centres) provided the necessary information for seam correlation, depositional environment and structure.

New drill cross-sections have been drawn up to show in generalized form the results of the 1980 drilling programme. See figs. 5 and 6. The scale of these cross-sections has been adjusted to correspond to that of the drillhole location map (in pocket) on which the section lines have been drawn. For a more detailed evaluation of the drillhole data, the drill logs provided under separate cover should be reviewed.

The drilling in thesecond half of the 1980 programme has been divided into two areas corresponding to work groups Nos. 277 Supp. and 311. Within Group 277 Supp. all drilling took place on coal licences 162 and 163. Within Group 311, drilling was on licences 4459 and 4725. The drillhole location map (in pocket) as well as the composite grouping map within the report (see Fig. 4) illustrate the drillhole locations more precisely.

Drilling costs are based exclusively on contractors' invoices. The following table lists the pertinent drilling data for each of the drillholes referenced in this report:

TABLE NO. 1: 1980 DRILLHOLE DATA TABULATION

HOLES DRILLED PRIOR TO MARCH 28, 1980 LICENCE ANNIVERSARY

HOLE NO.	LAT.	LONG.	START DATE	FINISH DATE	O/B (m)	HOLE DEPTH (m)	SEAM LOC. (m)	SEAM HT. (m)
80-1	34+80S	26+60E	16-2-80	30-2-80	313.0	313.0	-	-
80-2	8+20N	6+50E	2-3-80	9-3-80	129.8	510.8	406-417	11

HOLES DRILLED WITHIN GROUP NO. 277 SUPP

HOLE NO.	LAT.	LONG.	START DATE	FINISH DATE	O/B (m)	HOLE DEPTH (m)	SEAM LOC. (m)	SEAM HT. (m)
80- 3	13+60N	6+80E	12-3-80	19-3-80	231.6	231.6	-	-
80- 4	13+20N	4+80E	20-3-80	26-3-80	150.0	398.4	324-328	4.5
80- 7	11+10N	7+40E	7-5-80	13-5-80	18.3	460.2	418-426	4
80- 8	3+80N	5+60E	14-5-80	17-5-80	12.0	262.1	219-227	7
80- 9	10+80N	4+70E	17-5-80	19-5-80	12.0	354.0	265-271 274-280	6
80-12	9+00N	8+90E	7-6-80	19-6-80	19.7	621.8	504-510	6
80-13	14+10N	7+50E	20-6-80	2-7-80	12.0	640.0	449-453	9
80-14	20+40N	10+00E	6-7-80	3-8-80	42.4	545.4	506-513	7

HOLES DRILLED WITHIN GROUP NO. 311

HOLE NO.	LAT.	LONG.	START DATE	FINISH DATE	O/B (m)	HOLE DEPTH (m)	SEAM LOC. (m)	SEAM HT. (m)
80- 5	22+10S	21+90E	9-4-80	10-4-80	6.0	6.0	-	-
80- 6	29+60S	22+80E	10-4-80	12-4-80	117.0	117.0	-	-
80-10	17+50S	22+30E	20-5-80	3-6-80	311.0	612.5	445- ?	?
80-11	22+70S	16+60E	4-6-80	7-6-80	70.0	256.0	-	-

NOTES

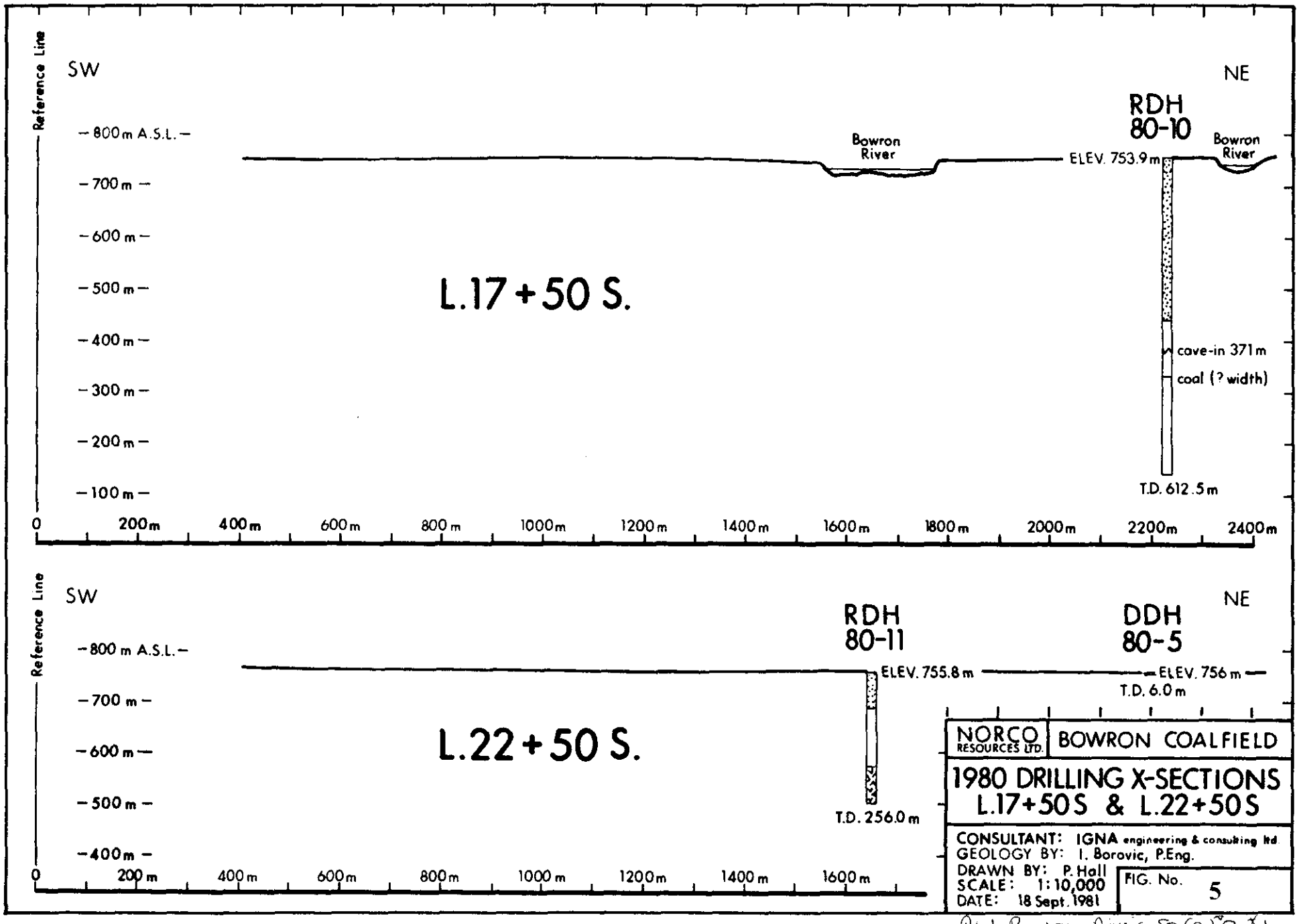
(1) Holes 1-6: Core drilled (Longyear 44) - J. T. Thomas Diamond Drilling Ltd.

(2) Holes 7-14: Rotary drilled (Ingersoll-Rand Cyclone TH60) -Interior Water Wells Ltd.

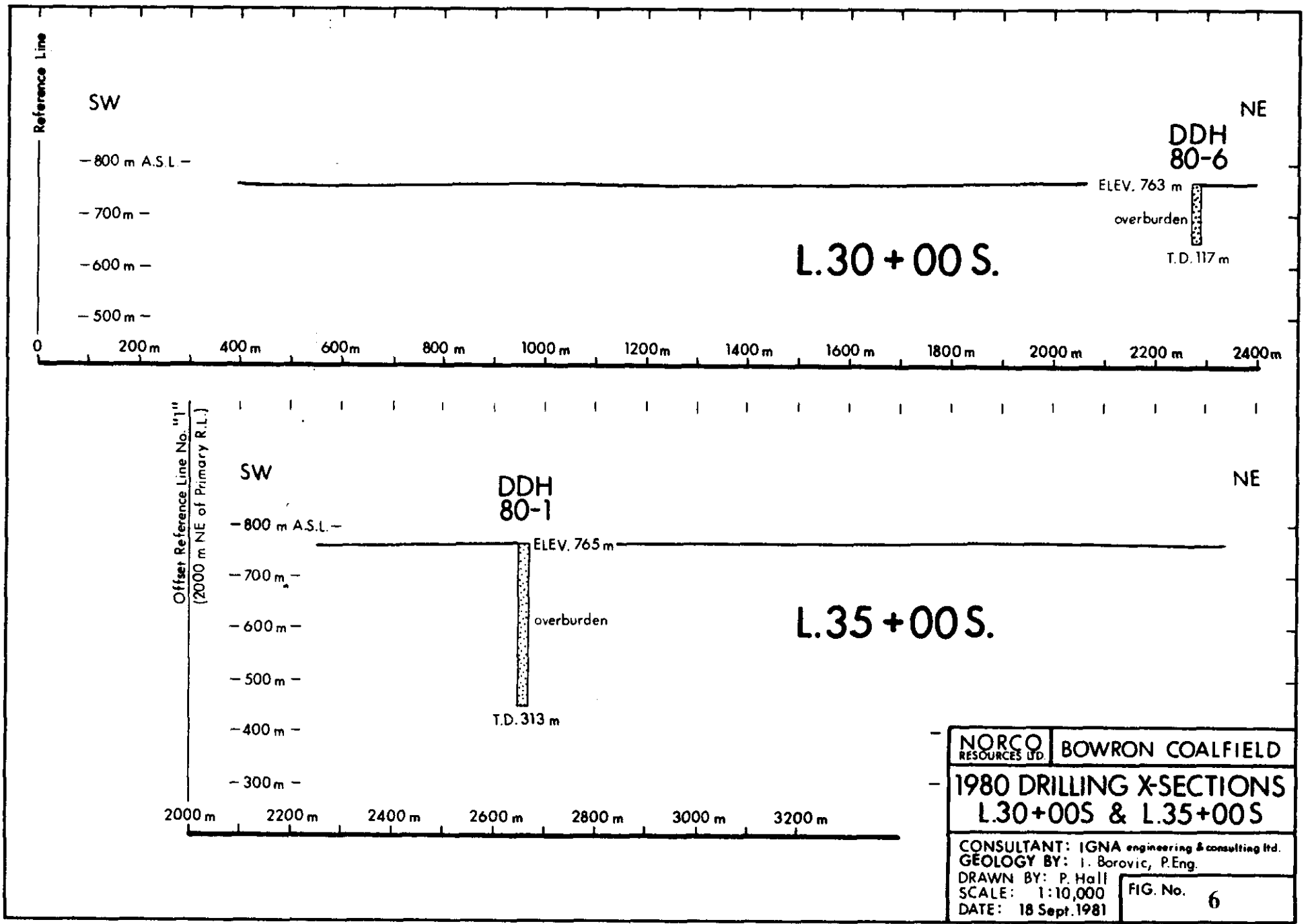
(3) Holes 1,3,4,5 abandoned due to equipment failure

(4) Hole 10 caved in at 371 m preventing logging below that depth.

(5) Hole 11 outside coal basin (volcanics)



BW-Bowron River 80(2)B *1



BW - Bowron River 80(2)B #1

(C) GEOLOGICAL SETTING

(1) General Geology

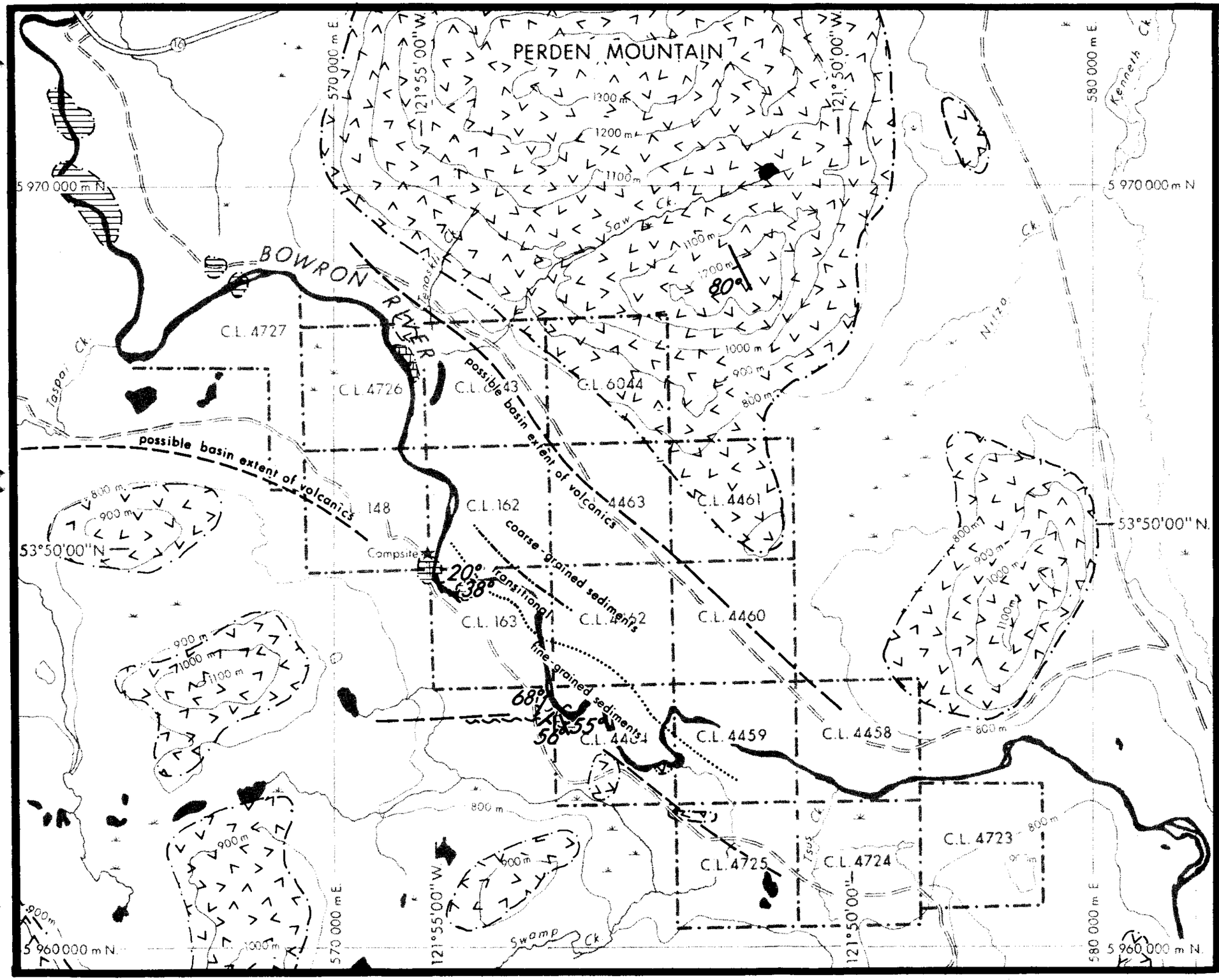
The sequence of pretertiary rocks that underlie the Bowron River area are composed of sediments and volcanics of the Mississippian age Slide Mountain group. The Slide Mountain group consists of moderately folded greenstones, flow breccias, argillites, cherts, and minor limestone.

Occurring within a northwest striking trough of regional magnitude, Tertiary, sedimentary rocks unconformably overlie the basement assemblage. The trough attains an average width of 1.5 - 2.0 km and strikes southeastward beneath overburden for a distance of about 30 - 35 km.

General Geology of the Tertiary Succession from Princeton to Prince George, B.C.

From youngest to oldest:

6. Volcanics - flat - lying sheets flows (Miocene - Pliocene)
5. Sediments - commonly absent (Miocene)
4. Volcanics - relatively flat - lying (Oligocene) - erosion, folding, faulting (Orogenic phase - which one?)
3. Sediments - continental, folded, faulted (Eocene) coal bearing
2. Volcanics - (Eocene and Oligocene)
1. Sediments - confined to north end of belt (Paleocene) coal bearing



LEGEND

CENOZOIC

QUATERNARY
PLEISTOCENE AND RECENT

Alluvium and glacial deposits: gravel, sand, silt, till, - few if any bedrock exposures.

TERTIARY
PALEOCENE

Bowron River coal beds: conglomerate, breccia, sandstone, shale, coal.

PALEOZOIC

MISSISSIPPIAN
SLIDE MOUNTAIN GROUP

ANTLER FORMATION: pillow basalt, breccia, tuff, minor diorite and gabbro, chert, argillite, lithic sandstone.

GUYET FORMATION: conglomerate, argillite, lithic sandstone, minor basalt, crinoidal limestone at or near top of formation.

Bedding plane

Cleavage plane

Drill hole

Fault

C.L.16 Coal Licence No.

Forest Dev. road

0 1 2 3 km

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BOWRON COALFIELD

GEOLOGY

DRAWN BY: P. Hall
REF. MAP: GSC 1356A
NTS GRID: 93H/13
CONTOURS: 100 m

SCALE: 1:50,000
DATE: 19 MARCH 81

FIG. No. 7

BW-Bowron River 80(2)*B *1

(2) Local Geology

The river valley is almost entirely covered with overburden. Rare outcrops of coal seams are found only along the creeks. The sides of the river valley are underlain by green coloured volcanic rocks including fine tuffs, breccias, and lavas. The coal is found in a series of sandstones, shales, mudstones, and conglomerates that outcrop occassionally and only along the river.

The coal measures are composed of grey and buff sandstones interbedded with light grey to dark grey mudstones, shales, siltstones, carbonaceous shales, and lenses of conglomerate. The conglomerates are composed of subrounded , subspherical pebbles, cobbles and boulders of greenish volcanic rocks, whitish quartzites, and black cherts. The clasts can reach up to twenty-five cm in diameter. The distribution of outcrops suggests that the coal bearing sediments underlie the Bowron River Valley forming a basin about 1,500 - 2,000 meters wide by 30 km long.

(3) Detailed Geology

The Bowron River Basin is underlain by rocks of the Slide Mountain Group, and the Bowron River coal bearing sediments. The Slide Mountain Group was differentiated into the Guyet and Antler formations. (Sutherland Brown: 1957 and 1963). The Antler formation is composed of basic volcanic rocks, tuffs, chert, argillite, and limestone. The age of the older Guyet formation, based on Brachiopods (Kindle) and conodonts (C.F. Thompson, 1967) found in the Greenberry limestone member is lower Mississippian. The Antler formation is unconformably overlain by a succession of coal bearing

clastic rocks referred to as the Bowron River sediments. These sediments are composed of conglomerates, sandstones, shales, coal, sedimentary breccias. The age of the Bowron River sediments was determined from fossil leaves (W.A. Bell). In 1948, Holland reported the poorly preserved fossilized plant remains were submitted to Dr. W.A. Bell for identification. Bell considered the plants to be of Upper Cretaceous (Campanien-Maestrichtian) Age. A second age determination was made on fossil spore and pollen grains. G. E. Rouse of the University of British Columbia reported, " I am reasonably sure that the Bowron suite is Tertiary in age." Therefore, results indicate an Upper Cretaceous-Lower Tertiary time for disposition of the sedimentary succession. The Bowron River sediments are overlain by glacial, and glaciofluvial deposits.

(4) SLIDE MOUNTAIN GROUP

(a) Volcanics:

Green, pyritiferous locally fractured and brecciated. Some fractures are filled with stilbite. They locally contain serpentinite.

(b) Limestone:

Two limestone types occur. One is light grey in colour, the other is dark grey to black. Both are composed of sparite, and are barren of megafossils. The darker limestone has an argillaceous content. Both are highly fractured, and brecciated.

(c) Chert:

Chert occurs as lenses in the green volcanics. It ranges from light to dark grey red and green in colour. Green colouration occurs near conformable contact with the volcanics. The chert has undergone some slight re-crystallization.

(5) BOWRON RIVER SEDIMENTS

(a) Basal Conglomerate:

The basal conglomerate was deposited on the erosional surface of the Slide Mountain Group. It is light green in colour, and consists of subangular to subrounded clasts of green stone, chert, and limestone. Some fine grained, silt sized clasts also occur, and may have been derived from volcanic materials. The conglomerate is mainly clast supported. It also contains interbedded lenses of medium to fine grained sand. Carbonaceous materials also occur within these lenses. The basal conglomerate was observed in drill core, and outcrop in the 1980 drill area.

(b) Basal Clays:

The basal clays are light green to green-grey in colour. They are clay to silt sized, and consist of chlorite, micas, and smectites. The abundance of smectites in some samples show that they are of volcanic origin. Some of the clays weather easily, and show swelling properties on exposure to rain. Thin lenses of coal occur in several of the clay beds. The clays are abundant in the 1977 drill area but were not encountered in the 1980 drill holes. They appear to overlie the basal conglomerates but may also be contemporaneous with them.

(c) Sedimentary Breccia:

Two types of sedimentary breccia occur in the basin. Type 1 contains light red brown ferruginous mud as matrix material, Type II contains a very fine grained black argillaceous sediment as a matrix. Type II matrix may also contain iron sulphide. Both breccias contain subangular clasts which are variable in size. The clasts are composed of volcanogenic, igneous, and metamorphic quartz, as well as chert, and calcium carbonate. The breccias also contain lesser amounts of argillitic fragments, micas, and carbonaceous materials. The breccia beds are generally not thicker than two meters, and can occur as a single bed or as several thin beds separated by conglomerate, and carbonaceous siltstone. The breccias are generally found beneath the lower coal zone, but have been observed higher in the succession.

(d) Lower Coal Zone:

The lower coal zone has been described in detail in other sections of the report. The zone is variable in thickness, but is laterally persistant within the basin. Reflectance measurements of vitrinite show the coal rank is high volatile bituminous B. Maceral analysis determined that the coal is composed mainly of the exinite, and vitrinite maceral groups. According to Stach's classification (Stach 1975), the coal is intermediate in composition between a vitrite, and a clarite, and therefore is a coal which is suitable for thermal use or as a blending component for metallurgical uses.

(e) Shale:

Shale beds dominate the lithology in the mid-western area of the basin (see geological map). The shales are massive to very finely laminated. Alternating laminae may be as thin as 0.5 mm, and alternate between light brown, and black in colour. The more massive shales are light brown to brown - grey. The highly laminated nature of the shales suggest that they are varves. The shales may occur as thin beds, or may be hundreds of meters thick.

(f) Black Marker:

This unit occurs within the upper part of the thick, shale sequence. It is very distinct in both hand sample, and on the gamma ray/neutron logs. It is dark black, and contains thin bands of fine grained volcanogenic quartz and calcium carbonate, The thin bands show varying degrees of soft sediment deformation and micro faulting. The black material appears to be argillitic in composition, and may contain iron sulphide. On the gamma ray/neutron plot, the black marker shows a distinct, synchronous increase in gamma radiation, and decrease in neutron porosity. The pattern is very unique and can be easily correlated. This unit is generally 15 to 20 meters thick. It can occur between 100, and 170 meters above the lower coal zone, but generally lies between 140 and 160 meters above the coal.

(g) Siltstone:

Siltstones occur throughout the stratigraphic succession. They are laminated to massive, but generally tend to be massive. They occur in a wide range of colours, but the most common is light to dark brown. The silts contain abundant plant fossils, and are usually very carbonaceous near the coals.

(h) Sandstone and Conglomerate:

The sandstones display a wide range of grain size and degree of sorting throughout the basin . They range from very fine grained to very coarse grained, and from well sorted to very poorly sorted. With the exception of the sand lenses in the basal conglomerate, the composition of the sandstones remains remarkably similar. They consist of subangular to subrounded grains of quartz, chert, and calcium carbonate with lesser amounts of argillaceous, micaceous grains, detrital micas, and carbonaceous materials such as coalified plant fragments. The quartz occurs primarily in igneous, and metamorphic forms, and the cherts contain variable argillaceous content. The cement is siliceous.

The conglomerates, like the sandstones occur throughout the basin. The conglomerates range from grit to cobble size and show varying degrees or sorting. They have the same composition as the sandstones, but generally tend to be better sorted. Medium to coarse grained sand may occur as matrix material, but the conglomerates are usually clast supported.

(6) DEPOSITIONAL ENVIRONMENTS

The suite of Bowron River sediments differ in proportion of lithofacies types within the basin. Based on the dominant sediment type the basin has been divided into three distinct areas: the coarse grained, the fine grained, and the transition areas (See geological map). There is no doubt that the Slide Mountain Group underlies all parts of the basin. The basal conglomerate overlies the volcanics, and appears to be common to all three areas. The basal clays are most extensively developed in the coarse grained area, and may overlie or be contemporaneous with the basal conglomerates. Basal clays were not encountered in two diamond drill holes in the fine grained area and more cored holes are required to verify the presence or absence of the unit in the fine grained area. The sedimentary breccia occurs in both areas, and is usually found within twenty meters of the lower coal zone. It is often found within a sequence of clast supported conglomerates, and carbonaceous shale or siltstone. Type II breccia is most often found in the fine grained area, and Type I is most common in the coarse grained area. Both of these sedimentary breccias represent debris flows, which are generally subaerial, and represent mass flow of rapidly deposited water laiden sediments. They are common in alluvial fan environments, and may represent flood events.

Division of the basin into different sedimentary environments does not appear well defined until after the deposition of the Lower coal zone.

The top of the Lower coal zone terminates the similiarity between environments of the coarse, and fine grained areas. After the deposition

of the lower coal zone, the coarse grained area remained subaerial whereas the fine grained area became subaqueous. The change in environmemt produced a corresponding change in the sediments deposited in these areas.

(a) Coarse Grained Area:

The coarse grained area is dominated by an extensive development of sandstones, and conglomerates, which may reach thickness of tens of meters. They occur interbedded with silts and shales of variable carbonaceous content. Fluctuations of coarse, and fine sediments is often rapid, and frequent, although examples of graded bedding (normal and convoluted) also occur. The area also contains the development of two coal zones above the lower coal, but their lateral persistance is limited. Common sedimentary structures are crossbedding, convoluted bedding, scour, and fill structures, flame, and load structures. The nature of the sediments, and sedimentary structures suggest a lowland, marshy environment which was cut by numerous, meandering channels, and subject to occassional floods. One of the more suitable environments for this area appears to be a distal alluvial fan environment. This environment dominates the basin to the north, and northeast of the present Norco camp. (See geological map)

(b) Fine Grained Area:

The fine grained area is dominated by a thick development of fine grained sediments. It consists primarily of shales which may reach thicknesses of hundreds of meters. The shales are massive to laminated, but the laminated shales are much more abundant. The

laminae consists of alternating brown and black layers which may be as thin as half a millimeter. The darker bands appear to be the thicker of the two. The regularity of the laminae and alternation in colour suggest that they are varves. The shale sequence is occassionally interrupted by beds of medium to coarse grained sandstone, which are generally less than 1 - 2 meters thick. Common structures associated with the sands are scour and load structures. Rip up clasts of the underlying shale are common, and the sands terminate in an abrupt fining upward sequence. No further coal development is found above the lower coal zone, but the shales do contain the black marker in the upper part of the succession. The black marker represents a very low energy sub-aqueous, anoxic environment. If the finely laminated shales are varves, then the fine grained area represents a lacusterine environment. The infrequent inclusion of sands are most likely the result of flood events. The fine grained environment occurs in a belt which runs northwest - southeast, and parallels the western margin of the basin. The fine grained area becomes transitional with the coarse grained area to the north, and northeast of the present Norco camp. The southern, and eastern extent of the fine grained area is to be determined by further drilling.

(c) Transitional Area:

The transitional area consists of interfingering lithologies of the fine, and coarse grained areas. It represents the overlap of alluvial fan, and lacusterine environments. The transitional

area occurs as a linear belt which trends northwest - southeast and parallels the fine grained area.

Coarse grained content in the transitional area increases to the east, and north.

(d) Structure:

The coal bearing rocks were unconformably deposited in the North-west - Southeast striking basin, which is a trough of the regional importance. The southwestern contact of the basin was extensively drilled in the past and has the appearance of a normal fault. The sediments at the western edge of the basin have a dip of 35^{o} - 45^{o} to the northeast but toward the centre of the basin the sediments dip gently from 8^{o} - 15^{o} to the southwest defining a broad asymmetrical synclinal structure. There is an obvious shallowing of the basin toward the northwest and deepening with thickening of coal seams toward the middle of the basin and toward the south-east. The basin also plunges to the south at a gentle angle. Tertiary sediments were found in fault contact with volcanics south of the 1980 drill area (See geological map). Indirect evidence for post depositional faulting is the abundance of fine grained sediments adjacent to a fault scarp. Drilling has shown that the dip of the beds steepens near the contact with the volcanics. This is most likely the result of post depositional faulting and drag folding.

The internal structure of the basin remains fairly coherent away from

the contact. Evidence viewed thus far does not support the existence of any major structural dislocations within the drilled areas. Structure contours on the marker beds conform fairly well, and do not show any structural discontinuity throughout the stratigraphic succession.

Therefore, longitudinal faults, as presented on J. R. Kerr's (1977) sections are not satisfactorily supported with evidence collected from the 1980 drilling program. Relatively flat lying seams in the middle of the structure are a logical solution until evidence of any faulting in that area is established.

(7) COAL PETROLOGY

(a) Petrography

A petrographic study of the coal from the Bowron River coal basin was done by J. Roger Donaldson, of the G.S.C. in 1972. The seam sampled and studied is located in underground workings on the west bank of the Bowron River near Norco's campsite (North "Slope").

> "In general appearance, the coal examined is a bended coal, composed almost entirely of the bright components vitrain and clarain. Subordinate amounts of shaley coal, coaly shale, and shale also occur. The coal has a high luster and is hard and dense."

The following mega and microscopic profile (by J. R. Donaldson) shows that this particular seam is split by four distinct partings. The pure coal contained between these partings was divided into nine petrographic intervals based on relative proportions of the entities present.

The resulting breakdown showed that intervals I and V are composed mainly of the shale rich parts while the remaining seven are of clean coal.

The last right hand column of the profile represents results of the microscopic reflectance study. These show that the mean maximum reflectants (Ro) of the vitrinite component is almost constant from the top to the bottom of the seam.

The average reflectance for the whole seam is calculated to be 0.65% Ro Max.

(b) Macerals

Macerals identified are vitrinite, exinite, resinite, micrinite, semi fusinite, and fusinite. Mineral matter was also determined.

Seam composition:

Vitrinite:	60 - 90%
Resinite:	Relatively high - 8%; two types are distinguished:
	(1) Canadian resin (Soluble) - 4%
	(2) Insoluble resin - 4%

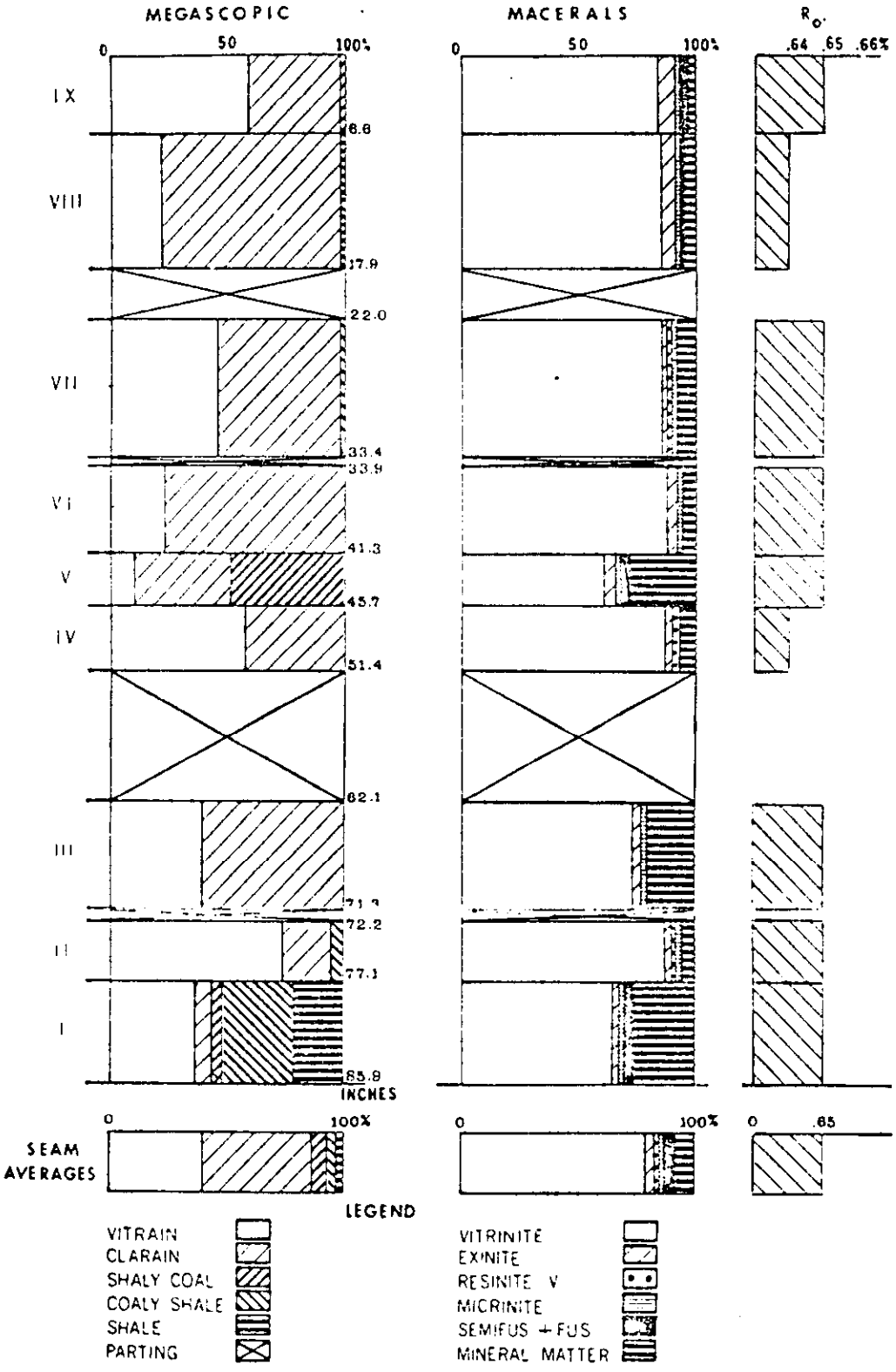


TABLE No. 2: PETROGRAPHIC COMPOSITION AND R_o INDICES OF THE UPPER SEAM, BOWRON RIVER, B.C.

(c) Resin

Coal seams in the Bowron River Coal basin contains about 8% of natural resins which could be commercially important.

The table below shows results of research:

"REFINED RESIN"	AMBER RESIN
Megascopically invisible Comprised about 8% of raw coal.	Amber nodules elongated to about 1 inch; random distribution through seams; visually "guess-timated" at 4% raw coal.
Microscopic; opaque; reddish brown; irregular outlines.	Light amber; transparent; sharp edges; conchoidal fracture.
Completely soluble in pyridine; actually "a soluble fraction of coal."	Completely insoluble in chloroform, benzene or pyridine.
Softens about 200°C. S.G. = 1.05-1.05. Makes a 25% concentrate in coal-resin fraction float at S.G. 1.30	Does not soften at 400°C. Melts and volatilizes about 450°C. Separation: mechanical? or froth floatation?
Possible Uses: (a) Low cost rubber extender (b) Compares favourably with Congo resin in varnishes (c) High quality baked coatings.	Uses: Not tested, but appears to be superior to "Refined Resin" for coating and varnishes.

Research conducted indicates that so called "Refined Resin" and "Amber Resin" from Bowron River Coal are of superior quality than known commercial "Congo Resin".

Subject to favourable exploration and further research on extraction and marketing, the Bowron River resin could be a valuable asset to the Company for years to come.

Petrographic analysis of coal samples obtained from 1977 drill core was conducted by R. Linds, in 1980. The coal samples from this area were found to have variable reflectance values but generally agreed to the value obtained by Donaldson of 0.65% Ro. Max. The samples are very close compositionally to those described by Donaldson, with the exception of micrinite as the only inertinite present. The coal rank, based on reflectance analysis, showed no tendancy toward increase with depth, and therefore, appears to maintain a consistant rank vertically throughout the basin. Pyrite constitutes the majority of the mineral matter contained in the coal, and occurs mainly in framboidal form. The pyrite does not occur disseminated through the seams but is found to form discrete bands within the coal.

(D) COAL DEPOSIT

(1) Setting:

As indicated in previous chapters on geophysics, geology, stratigraphy, and structure of the coal bearing area, the coal is found in a linear basinal structure elongated northwest - southeast for about 30 - 40 km and with a width from 1,500 to 2,500 km.

The basin is outlined on both sides by volcanic and sedimentary rocks of the Mississippian Slide Mountain Group. It appears to be an asymmetrical trough where the southwestern edge is an unconformity with younger faulting indicated by recent investigations. The northeastern edge of the basin is probably:

(a) A. Sutherland Brown (1967) "down dropped fault, possibly active during deposition"

or:

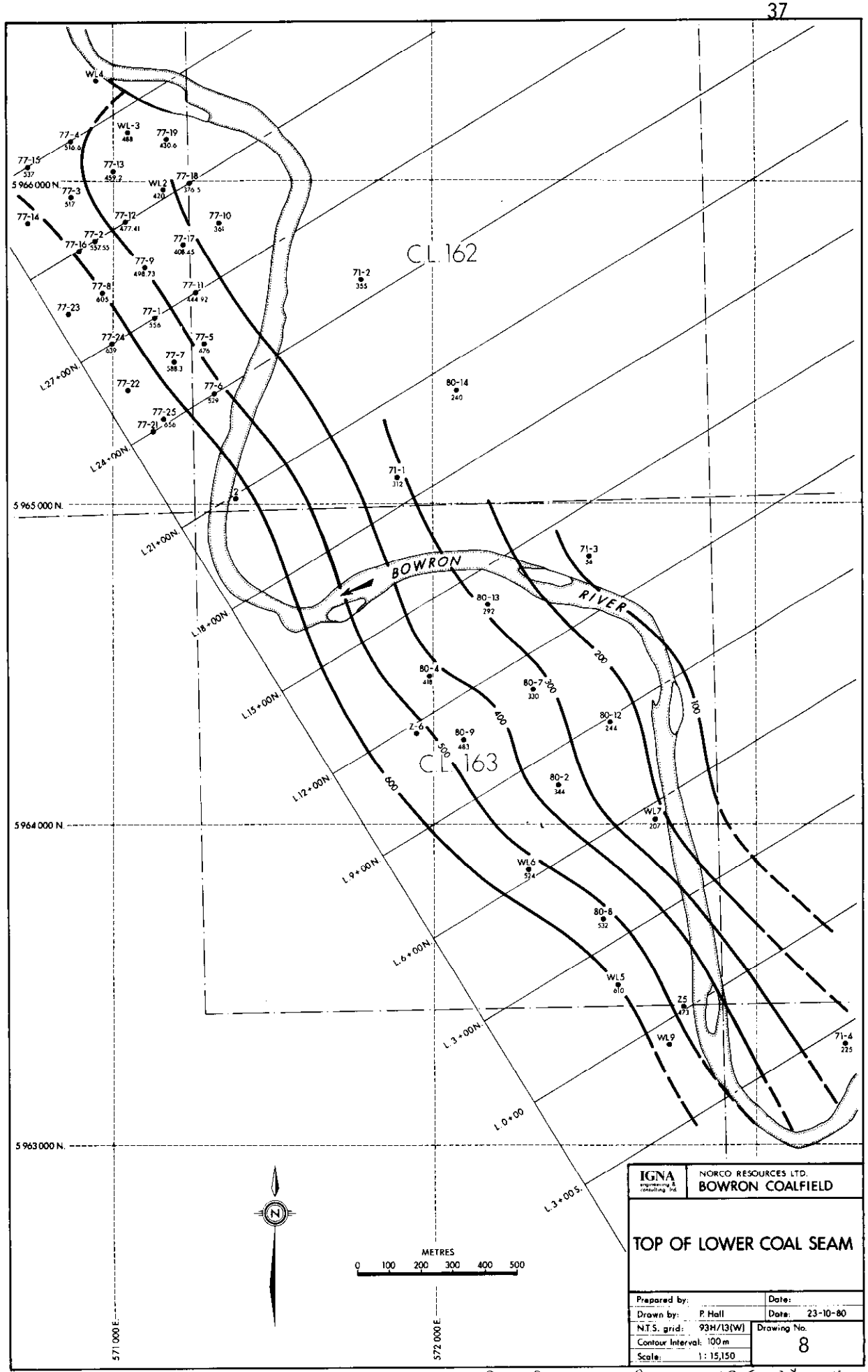
(b) just the northeastern flank of the asymmetrical synclinal trough with some graben type faulting.

Both theories remain to be proven.

(2) Coal Seams Correlation

Previous and recent drilling and underground exploratory workings have established that coal measures occupy 75 - 100 m of the base of the sedimentary sequence and that coal extends over an area 4,300 by 1,400 meters and that the full extent of the coal bearing basin is as yet to be explored.

Three seams have been identified in that particular area on the west bank of the Bowron River. These are Upper or Main seam, with an average thickness of 2.4 m; Middle seam, with an average thickness of 3.4 m; and Lower seam, with an average thickness of 4.0 m. Out of the three seams, the lower seam shows the best development of continuously thick coal. It appears that the distance from the volcanics in the base of the basin to the



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BOWRON COALFIELD

TOP OF LOWER COAL SEAM

Prepared by:		Date:	
Drawn by:	P. Hall	Date:	23-10-80
N.T.S. grid:	93H/13(W)	Drawing No.	8
Contour Interval:	100 m		
Scale:	1: 15,150		

BW-Bowron River 80(2)*B #1

lower seam is fairly consistent, giving confidence in lateral persistency and correlation of the lower seam. The middle and upper seams are less developed and appear to have a lesser lateral extent.

The lower coal seams show a variation in thickness. Thinning and swelling of the seams has been observed throughout the drill areas. The continuity of the seams have not been disrupted, and it is felt that these features represent a variable paleo-topography, where coals thicken in paleotopographical lows and thin over highs. Another possible, but yet unproven cause may be differential subsidence within the basin.

(3) Coal Reserves

The past exploration has been concentrated in the area of the western edge of the Bowron River basin.

(a) 1967: Dr. J. Black (1967) estimated indicated and probable reserves at 20,185,000 tons of in situ coal.

(b) 1977: Coal reserves calculated by John Kerr on the basis of his work and previous exploration were as follows:

Proven reserves		6,000,000 tonnes
Drill indicated		55,000,000 tonnes
Unexplored potential reserves		100,000,000 tonnes
	to	250,000,000 tonnes
TOTAL RESERVE POTENTIAL:		161,000,000 tonnes
	to	311,000,000 tonnes

(c) 1980: Borovic:

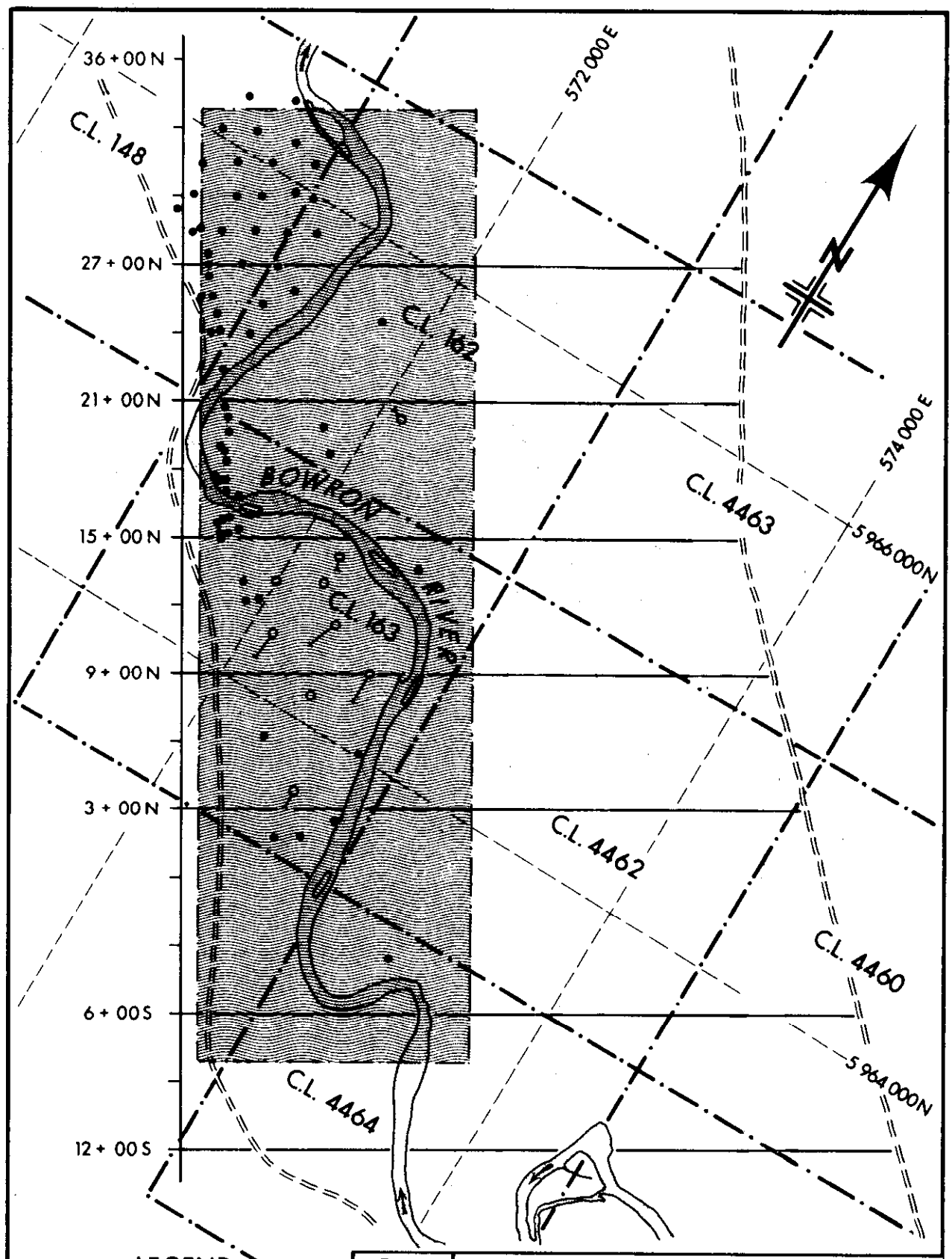
Exploration drilling during 1980 was concentrated on proving the continuity of coal and outlying coal reserves in the central area of the coal basin.

Diamond and rotary drilling was extended over an area 4,300 m long, 1,400 m wide, with an average true thickness of the lower coal seam of 4.0 m.

The author's calculations show that the drilled out area of 4,300 m length, 1,400 m width, and an average true thickness of the lower coal seam being 4.0 m contains from 35,280,000 to 43,344,000 metric tonnes of in-situ coal. Calculation is based on 30% indicated average ash content with specific gravity of run-of-mine coal is 1.8.

Furthermore, it appears that the trough shaped asymmetrical syncline extends south for at least another 1,500 to 2,000 metres and that the width of the total bearing structure is about 1,700 to 2,000 m.

Therefore, we can expect 67,320,000 metric tonnes of indicated in-situ coal reserves for the ares 5,500 m long, 1,700 m wide with an average thickness of the lower coal seam of 4.0 m.



LEGEND

- 1981 Drill Sites (proposed)
- 1980 Drilling
- Pre-1980 Drilling
- Forest Development Road

0 500 1000 m

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BOWRON COALFIELD

AREA CONTAINING IN SITU COAL RESOURCES OF 43,000,000 TONNES

N.T.S. Grid: 93H/13	FIG. No.
SCALE: 1:25,000	9
DATE: 8 Jan. 1981	

BW - Bowron River 80(2)#B #1

(E) CONCLUSIONS

The exploration to date has proven coal reserves in the order of 35 to 43 million metric tonnes. It has also shown that the asymetrical synclinal coal bearing structure has potential reserves of more that 67 million tonnes.

The coal is ranked as high volatile, Bituminous "B", thermal coal with average ash values (DDH 80-2 & 80-4) from 22.6% to 33.47% and average sulphur content (DDH 80-2 & 80-4) from 1.9% to .95%.

Previous washing tests and recent analyses show that coal could be washed to lower than 10% ash content. Sulphur, which is contained mainly in the form of framboidal to massive pyrite as indicated in previous analyses, should wash to the acceptable limits of less than 1%.

The roof and floor of the lower coal seam are mainly composed of sandstone, siltstone, and laminated mudstones with good supporting properties.

It is my opinion that Norco's coal deposit has a good potential of becoming a coal producer, especially in view of the fact that additional tonnage is indicated in the central basin area, and that there are still large potential coal bearing areas unexplored to the north and to the south.

(F) RECOMMENDATIONS

Continued drilling to prove indicated resources of more than 67,000,000 tonnes and sinking of an underground exploration decline in order to gain valuable knowledge for underground mine development and to obtain large coal samples which are necessary for washability tests are recommended.

The following equipment and personnel is necessary in order to complete the exploration program and finalize the feasibility study:

(1) Rotary Drill, comparable in size to a Fairling 2500, capable of drilling holes without difficulty, up to 1,000 meters and more for fast exploratory and fill-in drilling.

(2) Rotary Drill, Ingersoll Rand Cyclone TH60, for setting of casing.

(3) Diamond Drill for coring and cementing the holes.

(4) Underground mining contractor with miners for underground development.

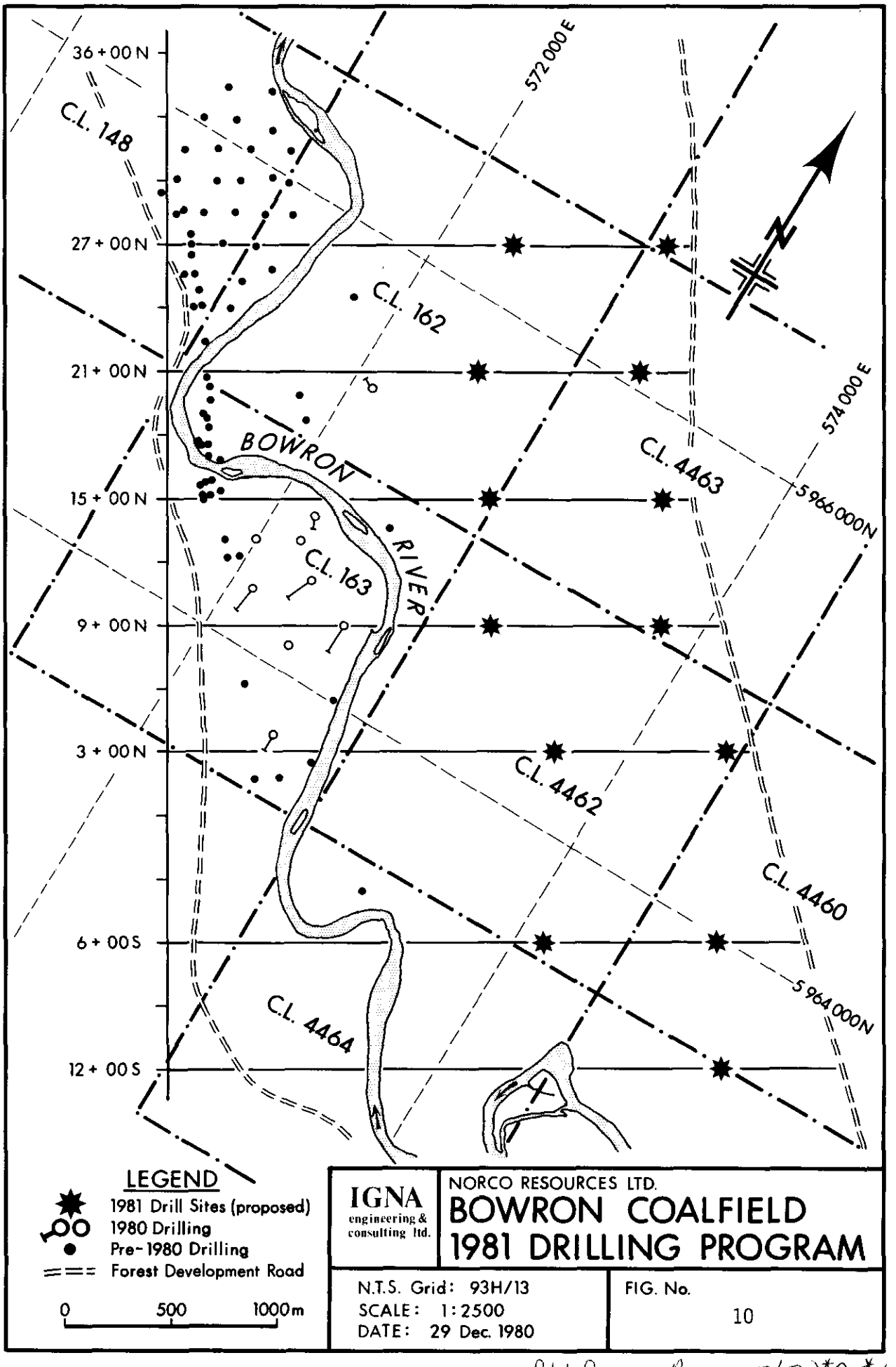
(5) Geophysical wireline tools for down hole logging.

(6) Seismic survey to help with structural studies and mine design.

(7) Engineering group with supervisor and three geologists for geological engineering work.

(8) Support crew - cook, camp manager, bulldozer operator, 2 helpers.

The program will consist mainly of rotary drilling with diamond drilling for core to supplement geological knowledge, correlation of the seams



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and coal quality analyses.

Every hole will be logged with electrical logging equipment.

Sinking of a two compartment decline will start immediately after completion of 23 necessary holes.

A seismic survey will be done in the later phase of development drilling to help determine the detailed structure of the future mine area.

(G)

NORCO RESOURCES LTD.

BOWRON COALFIELD

(1) STATEMENT OF COSTS

March 28, 1980 - Sept. 30, 1980

GROUP NO. 311

CATEGORY OF WORK	APPORTIONMENT	UNIT COST	GROUP COST	NOTES
Geological Mapping	-	-	-	(1)
Geophysical Mapping	-	-	-	(1)
Topographic Mapping	22%	$ 2,027.00	$ 445.94	(2)
Road Construction	22%	$ 35,242.00	$ 7,753.24	(3)
Surface Work				
Drill Collar Survey	5/14 holes	$ 7,002.00	$ 2,500.71	(4)
Drilling				
Core (Wireline)	123/753m	$ 91,181.46	$ 14,894.18	(5)
Rotary (Reverse)	868.5/3752m	$523,614.55	$121,204.46	(6)
Logging	991.5/4505m	$ 53,724.00	$ 11,824.04	(7)
Testing	-	-	-	(8)
OTHER WORK				
Engineering/Environment	22%	$ 87,318.71	$ 19,210.12	(9)
Geological Consultant	22%	$ 24,775.00	$ 5,450.50	(10)
Camp Wages				
Maintenance Staff	22%	$ 25,920.00	$ 5,702.40	(11)
Field Staff	22%	$ 24,200.00	$ 5,324.00	(12)
Camp Expenses	22%	$ 65,777.46	$ 14,471.04	(13)
Camp Equipment	22%	$ 14,353.00	$ 3,157.66	(14)
Fuel	991.5/4505m	$ 32,656.00	$ 7,187.22	(15)
Transportation	22%	$ 1,500.00	$ 330.00	(16)

OFF-PROPERTY COSTS	APPORTIONMENT	UNIT COST	GROUP COST	NOTES
Transportation	22%	$ 5,441.00	$ 1,197.02	(17)
Printing & Reprographics	22%	$ 1,270.87	$ 279.59	(18)
In-House Draughting	22%	$ 2,550.00	$ 561.00	(19)
Report Assembly	22%	$ 1,050.00	$ 231.00	(20)

ON - PROPERTY COSTS:	$219,455.51
OFF-PROPERTY COSTS:	$ 2,268.61
TOTAL EXPENDITURES:	$221,724.12

(G)

NORCO RESOURCES LTD.

BOWRON COALFIELD

(2) EXPLANATORY NOTES TO ACCOMPANY STATEMENT OF COSTS

(1) Claimed in previous year.

(2) Topographic Survey

Extension to original base map.
Supplier = Pacific Survey Corp.
Job. No. = #80-93
Scale = 1:10,000
Duration = May 5 - June 13, 1980
Area Covered = 45 km^2

Apportionment ratio is based on drilling depths of a total of 4505 m, "Group #311" had 991.5 or 22%
"Group #277 Supp" had 3513.5 m or 78%.

(3) A 6150 m road 6m wide was constructed for Norco by contractor, "Kode Sand & Gravel Ltd." of Prince George. The Forest Service have granted Special Use Permit #9485 to cover this route.

(4) The 1980 drilling programme drilled 14 holes. Two were claimed for last year. However, for apportioning the drill collar survey costs the ratios of 5/14 and 9/14 are used so that all the holes are included rather than just those drilled after March 28, 1980.

(5) Drilling was by J. T. Thomas Diamond Drilling Ltd. using a Longyear 44 drill for NQ core. DDH #1 and #2 were drilled prior to the March 28 anniversary and credit for those holes was claimed in last year's work submission. Drilling costs are apportioned in the ratio of depths drilled within groups to total DDH depths drilled. Drill core is stored at the Norco campsite located within Coal Licence #148.

(6) Drilling was by Interior Water Wells Ltd. of Prince George, using an Ingersoll-Rand Cyclone TH60 drill for 15 mm hole size. Drilling costs are apportioned in the ratio of depths drilled within groups to total depths drilled.

(7) Downhole Electrologging was by Roke Oil Enterprises Ltd. of Calgary. Sidewall Densilog, Gamma Ray Neutron Log and Focussed Beam Logs were done. Costs were apportioned in the ratio of drillhole depths within groups to total property-wide drillhole depths exclusive of DDH #1 and #2 which were referenced in last year's report.

(8) Relates only to Group 277 Supp. Testing was based on samples taken from DDH #4 core. Work was done by the Commercial Testing and Engineering Co. of North Vancouver. 10 composite coal plies samples and 14 shale plies samples were analysed.

(9) Work was performed by Associated Mining Consultants Ltd. (formerly "Intermin"). Cost shown comprises billings for period March 30, 1980 to August 30, 1980. (Invoices dated April 30-Sept. 30, 1980) Costs are arbitrarily apportioned in the ratio of the number of holes drilled in each group.

(10) Geological consulting by I. Borovic of IGNA Engineering and Consulting Ltd. Costs are based on billings presented to the company.

(11) Camp Wages - Maintenance Staff:

POSITION	NAME	WAGE/MO.	DURATION	TOTAL
Caretaker	B. Carey	$ 1,500	5 Mo.	$ 7,500
Cook	P. LeFleur	$ 2,430	4 Mo.	$ 9,720
Cook	L. Collin	$ 2,500	1 Mo.	$ 2,500
Cooks Helper	I. LaFleur	$ 2,500	2 Mo.	$ 5,000
Cooks Helper	S. Spencer	$ 1,200	1 Mo.	$ 1,200
			TOTAL:	$25,920

(12) Camp Wages - Field Staff:

POSITION	NAME	WAGE/MO.	DURATION	TOTAL
Geologist	R. Linds	$ 2,500	4 Mo.	$10,000
Geol. Asst.	R. Bylo	$ 2,000	5 Mo.	$10,000
Field Asst.	W. Eisbrenner	$ 1,200	3.5 Mo.	$ 4,200
			TOTAL:	$24,200

(13) Camp Expenses:
$15,860.46 food billing from KELLY DOUGLAS and $49,917.00 ATCO Pacific Ltd. billing for sub-contractor to install septic field for Norco camp and for camp outfitting costs.

(14) Camp Equipment:

Purchase of camp supply vehicle, (1/2 ton 4WD Chevrolet Suburban Carryall) @ $11,123.00 and a Wajax MK V fire pump @ $3,230.00.

(15) Fuel costs are for operation of drill rigs and for camp heating. Apportioning of the costs are in the ratio of drill depths within groups to total property-wide drilling.

(16) A 3/4 ton 4x4 Chev. pick-up truck was rented from Hallmark Resources Ltd. for the months of June-July 1980 at the rate of $750.00 per month for purpose of transporting drill rods and supplies to the drill rigs.

(17) Commerical air fares for transporting employees between Prince George and company head office in Vancouver.

(18) Invoices from Superior Reproductions Ltd. for diazo reprographics services for period of April 1 to Sept. 30, 1980.

(19) Since the original draughting was done prior to knowledge of B.C. Reg. 555/79, much had to be redone to comply with these new regulations.

Ten days @ $150.00/day were charged to the original submission with six days @ $175.00/day to the September revisions.

(20) Three days @ $200.00 are charged for the original report assembly with an additional two days @ $225.00/day for the September revisions.

(21) Reclamation permit number is #C135.

(H)

NORCO
BOWRON RIVER

1981 BUDGET ESTIMATES

PHASE 2	
Drilling	
Rotary:	
13 Holes, 600 m each @ 150.00/m	$ 1,170,000.00
Rotary and Diamond Drilling:	
10 Holes 600 m each @ 150.00/m	900,000.00
Coal Analyses:	
250 @ $100.00/sample	25,000.00
PHASE 2 TOTAL:	$ 2,095,000.00
PHASE 3	
Seismic Survey	
Initial Testing 3 lines $150,000.00 Final Testing 17 lines $450,000.00	
PHASE 3 TOTAL:	$ 600,000.00
PHASE 4	
The Compartment Decline:	
Sinking $ 650.00/foot in rock $1,200.00/foot in OB	
PHASE 4 TOTAL:	$ 1,540,000.00
PHASE 2, 3, & 4	
Geology - Engineering:	
Supervisor, Two Geologists, Assistant Five Months	$ 80,000.00
Transportation and Travel (Truck, Airplane, Helicopter)	$ 30,000.00
Food and Shelter 3,240 man/days @$50.00/man/day	$ 162,000.00
TOTAL:	$ 272,000.00

BUDGET SUMMARY

Phase 2		$ 2,095,000.00
Phase 3		600,000.00
Phase 4		1,540,000.00
Phase 2, 3, 4		272,000.00
	PHASE 2 + 3 + 4 +(2+3+4):	
	SUBTOTAL(A):	$ 4,507,000.00

SUPPLIES

Office		$ 2,000.00
Medical		500.00
General Office and Communications		8,000.00

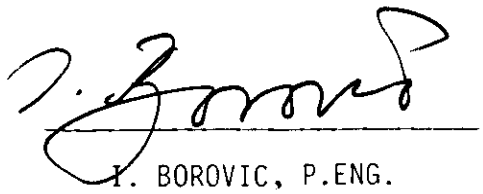
ENVIRONMENTAL

Public Relations		2,000.00
Ecology		2,000.00
Legal		5,000.00
	SUBTOTAL (B):	$ 19,500.00
	SUBTOTAL (A)	$ 4,507,000.00
	SUBTOTAL (B)	19,500.00
		$ 4,526,500.00

ADMINISTRATION

(2%) of budget total		$ 93,000.00
		$ 4,619,500.00
CONTINGENCIES (10%)		460,000.00
	ESTIMATED BUDGET:	$ 5,079,500.00

January 8, 1981



I. BOROVIC, P.ENG.

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TRENHOLME, L.S. (1977) - Report on Bowron River Coal Deposit January 27.

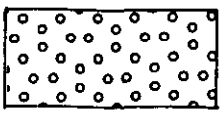
TABLE NO. 3

LITHOLOGY LEGEND

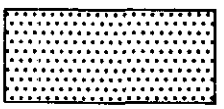
QUATERNARY

LT141 

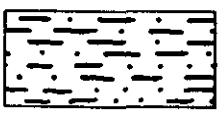
OVERBURDEN:
Glacial and glaciofluvial till.

LT129 

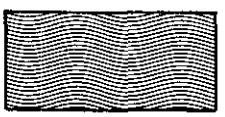
CONGLOMERATE:
Moderate to poorly sorted. Grit to cobble size. Composed mainly of quartz and argillaceous and non-argillaceous cherts. Contains medium to fine grained sand of same composition as matrix. Matrix and clast supported. Calcium carbonate occurs as clasts. Siliceous cementation.

LT906 

SANDSTONE:
Moderate to poorly sorted. Fine to coarse grained. Composition same as for conglomerate.

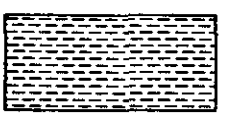
AF429 

SILTSTONE:
Massive to laminated. Contains plant fossils. Very carbonaceous in places.

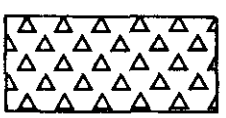
LT189 

BLACK MARKER:
Fine to medium sized grains of volcanogenic quartz and calcium carbonate in discrete layers in argillite. Abundant soft sediment deformation.

TERTIARY

LT121 

SHALE:
Massive to very finely laminated, with alternating light and dark layers.

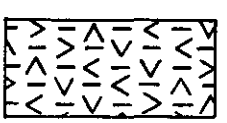
LT240 

SEDIMENTARY BRECCIA (Type #1):
Matrix is mud. Clasts are angular and comprised of volcanogenic and metamorphic quartz, chert and calcium carbonate. Lesser amounts of argillitic fragments, micas and carbonaceous material.

LT101 

SEDIMENTARY BRECCIA (Type #2):
Same as Type #1 except that matrix is argillite, possibly containing iron sulphide.

COAL:
High volatile bituminous (non-coking). Intermediate composition between a vitrite and a clarite.



CLAYS (Volcanic Origin?):
Light green. Composed of chlorite, micas and smectites. Some show swelling properties and weather very easily. Variable stratigraphic occurrence.

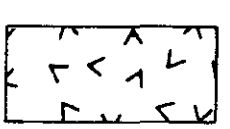
LT103 

BASAL CONGLOMERATES:
Light green in outcrop. Composed mainly of volcanic fragments, chert, quartz and carbonate. Finely grained argillitic clast materials are most likely of volcanic origin.

MISSISSIPPIAN
Slide Mtn. Group

LT123 

LIMESTONE:
Light grey, highly fractured and brecciated mesocrystalline sparite.

AF401 

VOLCANICS:
Green, locally fractured and brecciated. Some fractures filled with Stilbite.

IGNA engineering & consulting ltd.

CERTIFICATE

I, Ignacije Borovic, of the city of Vancouver, B.C. do hereby certify that:

(1) I am a member of the Association of Professional Engineers in the Province of British Columbia.

(2) I am employed by Igna Engineering & Consulting Ltd. with office at 4258 West 10th Avenue, Vancouver, B.C.

(3) I am a graduate of the University of Zagreb and I have practiced continuously as a geologist and graduate geological engineer since 1962.

(4) I do not have any direct or indirect interest in the properties or securities of NORCO RESOURCES LTD. nor do I expect to receive any.

(5) This report is based on research, study and exploration work performed under my supervision.

(6) Permission is granted to NORCO RESOURCES LTD. to use this report to satisfy requirements of Securities Commission and/or Stock Exchange.

I. Borovic, P. Eng.

In Vancouver, B.C.
January 8, 1981

568 000 E
569 000 E
570 000 E
571 000 E
572 000 E
573 000 E
574 000 E
575 000 E
576 000 E
577 000 E
578 000 E
579 000 E

5 968 000 N
5 967 000 N
5 966 000 N
5 965 000 N
5 964 000 N
5 963 000 N
5 962 000 N
5 961 000 N
5 960 000 N

C.L. 4727
C.L. 4726
C.L. 6043
C.L. 6044
C.L. 6565
C.L. 6564
C.L. 6563
C.L. 148
C.L. 162
C.L. 4463
C.L. 4461
C.L. 6555
C.L. 163
C.L. 4462
C.L. 4460
C.L. 6554
C.L. 4464
C.L. 4459
C.L. 4458
C.L. 6557
C.L. 6553
C.L. 4723
C.L. 4725
C.L. 4724
C.L. 6552

BOWRON RIVER

Buckhorn Forest Development Road
Beaver Forest Development Road

CAMPSITE

L 57+00N
L 54+00N
L 51+00N
L 48+00N
L 45+00N
L 42+00N
L 39+00N
L 36+00N
L 33+00N
L 30+00N
L 27+00N
L 24+00
L 21+00N
L 18+00N
L 15+00N
L 12+00N
L 9+00N
L 6+00N
L 3+00N
L 0+00N
L 3+00S
L 6+00S
L 9+00S
L 12+00S
L 15+00S
L 18+00S
L 21+00S
L 24+00S
L 27+00S
L 30+00S
L 33+00S
L 36+00S

330° Az

LEGEND

- 1971 AND EARLIER DRILLING
- 1977 DRILLING
- 1980 DRILLING
- 1981 DRILLING
- OLD ADITS
- TRACTOR ROAD
- C.L. 162 COAL LICENCE NUMBER

0 0.5 1 km

NORCO RESOURCES LTD.

BOWRON COALFIELD

DRILLHOLE LOCATIONS 19
CENTRAL LICENCE AREA

Consulting Firm:	IGNA Engineering & Consulting Ltd.
Drawn by:	P. Hall
N.T.S. Grid:	93H/13 (W)
Scale:	1:10,000
Date:	23 June 1981

Bowron River 50 (2) A

FIG. No. 14

ELEV.

800m

750m

700m

650m

600m

550m

500m

450m

400m

350m

300m

250m

200m

150m

100m

50m

0

REFERENCE LINE

DDH 77-15

DDH 77-4

DDH WL-3
(50m south of section)

Bowron River

Tertiary Sediments

Tertiary Sediments

Slide Mtn. Formation

236.8m

282.5m

296.3m

Slide Mtn. Formation

LEGEND

NORCO RESOURCES LTD.

BOWRON RIVER COAL DEPOSIT

PRINCE GEORGE, B.C.

DIAMOND DRILL SECTION
L33+00N

19

BW-Bowron River 80/21A

IGNA Engineering & Consulting Ltd.

DATE REVISED	DRAFTED BY	APPROVED BY	SCALE 1:2000
January 1980	P. Hall	I. Borovic	DRAWING NO.

PH80011

ELEV.
800m
750m
700m
650m
600m
550m
500m
450m
400m
350m
300m
250m
200m
150m
100m
50m
0

REFERENCE LINE

DDH 77-22
DDH 77-7
DDH 77-5
DDH WL-1A
(57m north of section)

Bowron River

35.4m
208.2m
328.3m
350.5m

Slide Mtn. Formation

Tertiary Sediments

Tertiary Sediments

Slide Mtn. Formation

LEGEND

NORCO RESOURCES LTD.

BOWRON RIVER COAL DEPOSIT

PRINCE GEORGE, B.C.

DIAMOND DRILL SECTION

L 24+00N 19

BW-Bowron River 80(2)A

IGNA Engineering & Consulting Ltd.

DATE REVISED	DRAFTED BY	APPROVED BY	SCALE
January 1980	P. Hall	I. Borovic	1:2000

DRAWING NO.

PH80011

ELEV.
800m
750m
700m
650m
600m
550m
500m
450m
400m
350m
300m

REFERENCE LINE

DDH 77-20

DDH WL-4

Bowron River

Tertiary Sediments

105.8m

Slide Mtn. Formation

274.0m

M4

LEGEND

ELEV.
250 m
200 m
150m
100m
50m
0

NORCO RESOURCES LTD.

BOWRON RIVER COAL DEPOSIT

PRINCE GEORGE, B.C.

DIAMOND DRILL SECTION
L 34 + 50N 19

BW-Bowron River 80(2)A

IGNA Engineering & Consulting Ltd.

DATE REVISED	DRAFTED BY	APPROVED BY	SCALE 1:2000
January 1980	P. Hall	I. Borovic	DRAWING NO.

PM80011

ELEV.

800m

750m

700m

650m

600m

550m

500m

450m

400m

350m

300m

REFERENCE LINE

DDH 77-14

DDH 77-3

DDH 77-13

DDH 77-19

Bowron River

Tertiary Sediments

136.2 m

Slide Mtn. Formation

258.2 m

316.1 m

Tertiary Sediments

346.5 m

Slide Mtn. Formation

45

LEGEND

ELEV.

250 m

200 m

150 m

100 m

50 m

0

NORCO RESOURCES LTD.

BOWRON RIVER COAL DEPOSIT

PRINCE GEORGE, B.C.

DIAMOND DRILL SECTION

L 31 + 50 N

19

BW-Bowron River 80(2)A

IGNA Engineering & Consulting Ltd.

DATE REVISED	DRAFTED BY	APPROVED BY	SCALE 1:2000
January 1980	P. Hall	I. Borovic	
			DRAWING NO.

H80011

ELEV.
800m
750m
700m
650m
600m
550m
500m
450m
400m
350m
300m

REFERENCE LINE

DDH 77-23
DDH 77-8
DDH 77-9
DDH 77-17
DDH 77-10

Bowron River

44.8m

Tertiary Sediments

Slide Mtn. Formation

175.6m

Tertiary Sediments

270.3m

Slide Mtn. Formation

370.9m

431.9m

LEGEND

ELEV.
250m
200m
150m
100m
50m
0

NORCO RESOURCES LTD.

BOWRON RIVER COAL DEPOSIT

PRINCE GEORGE, B.C.

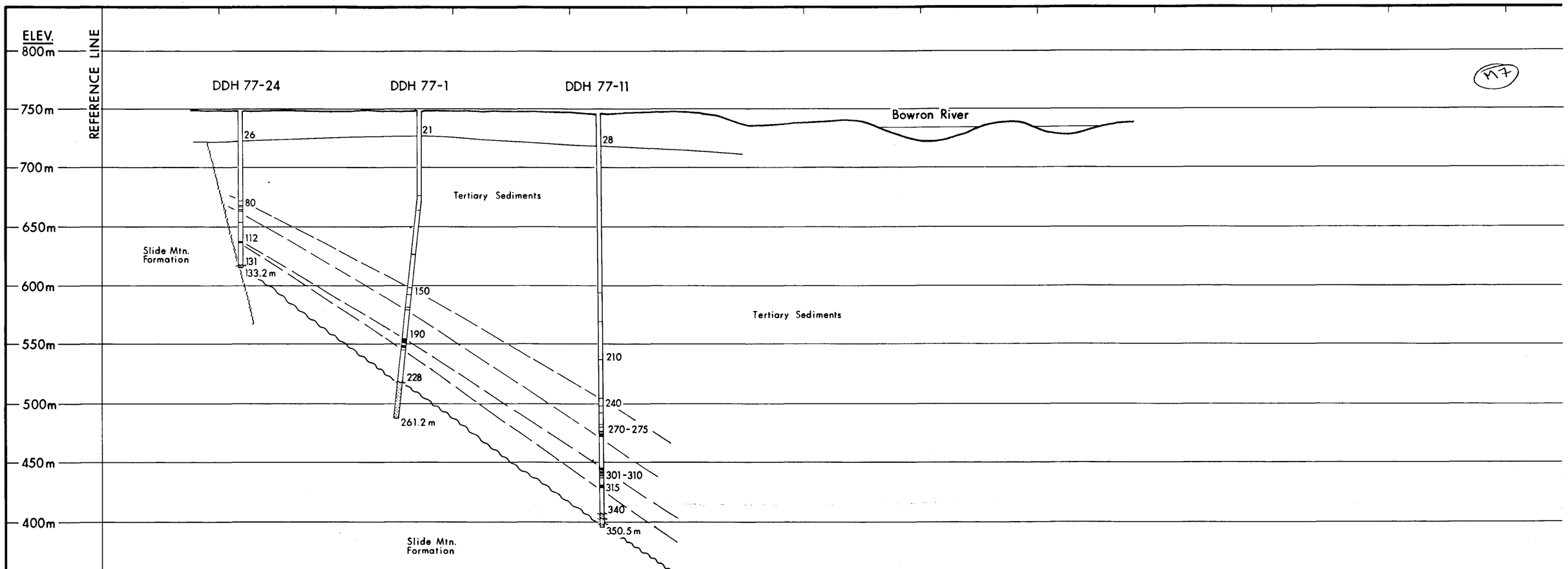
DIAMOND DRILL SECTION
L28 + 50N

19

BW-Bowron River SD(2)17

IGNA Engineering & Consulting Ltd.

DATE REVISED	DRAFTED BY	APPROVED BY	SCALE 1:2000
January 1980	P. Hall	I. Borovic	DRAWING NO.



LEGEND

ELEV.
250m
200m
150m
100m
50m
0

NORCO RESOURCES LTD.

BOWRON RIVER COAL DEPOSIT

PRINCE GEORGE, B.C.

DIAMOND DRILL SECTION L27+00N

19

BW-Bowron River 80(2)A

IGNA Engineering & Consulting Ltd.

DATE REVISED	DRAFTED BY	APPROVED BY	SCALE 1:2000
January 1980	P. Hall	I. Borovic	
			DRAWING NO.

PH80011

ELEV.
800m
750m
700m
650m
600m
550m
500m
450m
400m
350m
300m

REFERENCE LINE

DDH 77-16 | DDH 77-2 | DDH 77-12 | DDH WL-2 (25m north of section) | DDH 77-18

Bowron River

44

53

63.1m

Slide Mtn. Formation

Tertiary Sediments

227.7m

312.7m

Tertiary Sediments

280

330

347

355-360

363.3m

Slide Mtn. Formation

381.6m

LEGEND

ELEV.
250m
200m
150m
100m
50m
0

NORCO RESOURCES LTD.

BOWRON RIVER COAL DEPOSIT

PRINCE GEORGE, B.C.

DIAMOND DRILL SECTION L30+00N

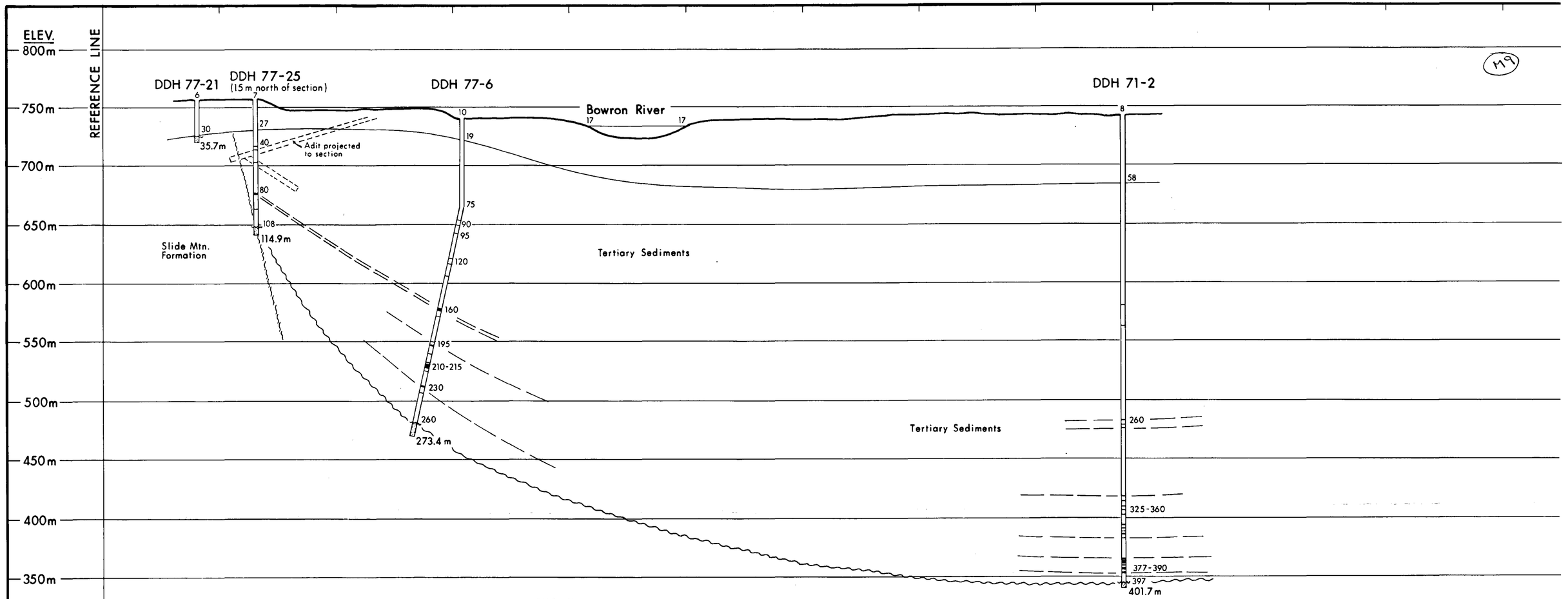
19

BW - Bowron River 80(21)A

IGNA Engineering & Consulting Ltd.

DATE REVISED	DRAFTED BY	APPROVED BY	SCALE 1:2000
January 1980	P. Hall	I. Borovic	DRAWING NO.

PHA0011



M9

LEGEND

ELEV.
250 m
200 m
150 m
100 m
50 m
0

NORCO RESOURCES LTD.

BOWRON RIVER COAL DEPOSIT

PRINCE GEORGE, B.C.

DIAMOND DRILL SECTION
L 25 + 50 N

19

AW-Bowron River SDL2 19A

IGNA Engineering & Consulting Ltd.

DATE REVISED	DRAFTED BY	APPROVED BY	SCALE 1:2000
January 1980	P. Hall	I. Borovic	DRAWING NO.

ELEV.
800m
750m
700m
650m
600m
550m
500m
450m
400m
350m
300m

REFERENCE LINE

Willow Creek Forest Road

DDH 80-6

RDH 80-7

Bowron River

M10

ELEV.
250m
200m
150m
100m
50m
0

LEGEND

NORCO RESOURCES LTD.

BOWRON RIVER COAL DEPOSIT

PRINCE GEORGE, B.C.

DRILL SECTION

L.12+00 N. 19

IGNA Engineering & Consulting Ltd.

DATE REVISED	DRAFTED BY	APPROVED BY	SCALE 1:2000
January 1980	P. Hall	I. Borovic	
November 1980			DRAWING NO.

PH80011

BW-Bowron River 80(2)A

ELEV.
800m
750m
700m
650m
600m
550m
500m
450m
400m
350m
300m

REFERENCE LINE

Willow Creek Forest Road

RDH 80-8

GRN 2

Bowron River

(11)

ELEV.
250m
200m
150m
100m
50m
0

LEGEND

NORCO RESOURCES LTD.

BOWRON RIVER COAL DEPOSIT

PRINCE GEORGE, B.C.

DRILL SECTION
L.3+00 N.

19

BW-Bowron River 8D(2)A

IGNA Engineering & Consulting Ltd.

DATE REVISED	DRAFTED BY	APPROVED BY	SCALE 1:2000
January 1980	P. Hall	I. Borovic	
November 1980			DRAWING NO.

PH80011

ELEV.
800m
750m
700m
650m
600m
550m
500m
450m
400m
350m
300m

REFERENCE LINE

Willow Creek Forest Road

RDH 80-9

DDH 80-2

RDH 80-12

Bowron River

H1a

LEGEND

ELEV.
250m
200m
150m
100m
50m
0

NORCO RESOURCES LTD.

BOWRON RIVER COAL DEPOSIT

PRINCE GEORGE, B.C.

DRILL SECTION

L.9+00 N. **19**

BW-BowronRiver 80(3)A

IGNA Engineering & Consulting Ltd.

DATE REVISED	DRAFTED BY	APPROVED BY	SCALE 1:2000
January 1980	P. Hall	I. Borovic	
November 1980			DRAWING NO.

PH80011

ELEV.
800m
750m
700m
650m
600m
550m
500m
450m
400m
350m
300m
250m
200m
150m
100m
50m
0

REFERENCE LINE

Willow Creek Forest Road

Bowron River

RDH 80-14

113

L 21 00N

LEGEND

NORCO RESOURCES LTD.

BOWRON RIVER COAL DEPOSIT

PRINCE GEORGE, B.C.

DRILL SECTION

L.21+00N. 19

BW-Bowron River 80(2)A

IGNA Engineering & Consulting Ltd.

DATE REVISED	DRAFTED BY	APPROVED BY	SCALE 1:2000
January 1980	P. Hall	I. Borovic	
November 1980			DRAWING NO.

ELEV.
800m
750m
700m
650m
600m
550m
500m
450m
400m
350m
300m

REFERENCE LINE

Willow Creek Forest Road

RDH 80-13

Bowron River

M14

LEGEND

ELEV.
250m
200m
150m
100m
50m
0

NORCO RESOURCES LTD.

BOWRON RIVER COAL DEPOSIT

PRINCE GEORGE, B.C.

DRILL SECTION

L.15+00 N.

19

IGNA Engineering & Consulting Ltd.

DATE REVISED	DRAFTED BY	APPROVED BY	SCALE 1:2000
January 1980	P. Hall	I. Borovic	
November 1980			DRAWING NO.

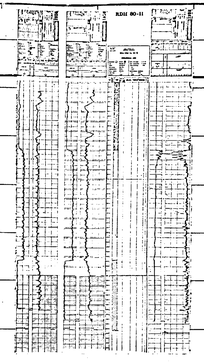
PH80011

BW-Bowron River (1979)

ELEV.
800m
750m
700m
650m
600m
550m
500m
450m
400m
350m
300m

REFERENCE LINE

Willow Creek Forest Road



LEGEND

ELEV.
250m
200m
150m
100m
50m
0

NORCO RESOURCES LTD.

BOWRON RIVER COAL DEPOSIT

PRINCE GEORGE, B.C.

DRILL SECTION

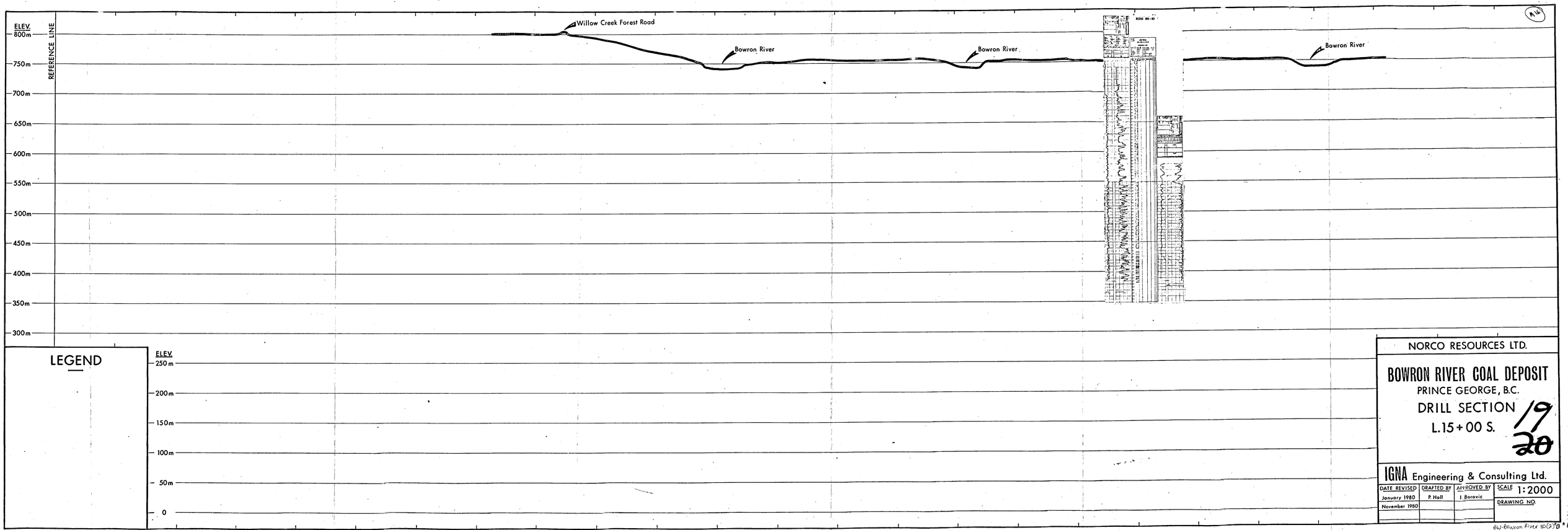
L. 24+00 S.

17
20

IGNA Engineering & Consulting Ltd.

DATE REVISED	DRAFTED BY	APPROVED BY	SCALE 1:2000
January 1980	P. Hall	I. Borovic	
November 1980			DRAWING NO.

BW-BOWRON RIVER 80(2)73-1


ELEV.
800m
750m
700m
650m
600m
550m
500m
450m
400m
350m
300m
REFERENCE LINE
Willow Creek Forest Road
Bowron River
Bowron River
Bowron River
RDH 80-10
R-16
LEGEND
ELEV.
250 m
200m
150m
100m
50m
0
NORCO RESOURCES LTD.
BOWRON RIVER COAL DEPOSIT
PRINCE GEORGE, B.C.
DRILL SECTION 19 20
L.15+00 S.
IGNA Engineering & Consulting Ltd.
DATE REVISED
January 1980
November 1980
DRAFTED BY
P. Hall
APPROVED BY
I. Borovic
SCALE 1:2000
DRAWING NO.
BRJ-Bowron River 80(2)78*1

NORCO RESOURCES LTD.
BOWRON COALFIELD
DRILLHOLE LOCATIONS CENTRAL LICENCE AREA
Consulting Firm: IGNA Engineering & Consulting Ltd.
Drawn by: P. Hall
N.T.S. Grid: 93H/13 (W)
Scale: 1:10,000
Date: 23 June 1981
FIG. No. 11
LEGEND
1971 AND EARLIER DRILLING
1977 DRILLING
1980 DRILLING
1981 DRILLING
OLD ADITS
TRACTOR ROAD
C.L. 162 COAL LICENCE NUMBER
0 0.5 1 km
BOWRON RIVER
C.L. 4727
C.L. 4726
C.L. 6043
C.L. 6044
C.L. 6565
C.L. 6564
C.L. 6563
C.L. 148
C.L. 162
C.L. 4463
C.L. 4461
C.L. 6555
C.L. 163
C.L. 4462
C.L. 4460
C.L. 6554
C.L. 4464
C.L. 4459
C.L. 4458
C.L. 6557
C.L. 6553
C.L. 4723
C.L. 4725
C.L. 4724
C.L. 6556
C.L. 6552
CAMPSITE
Bowron Forest Development Road
Buckhorn Forest Development Road
5 968 000 N
5 967 000 N
5 966 000 N
5 965 000 N
5 964 000 N
5 963 000 N
5 962 000 N
5 961 000 N
5 960 000 N
568 000 E
569 000 E
570 000 E
571 000 E
572 000 E
573 000 E
574 000 E
575 000 E
576 000 E
577 000 E
578 000 E
579 000 E

568 000 E | 569 000 E | 570 000 E | 571 000 E | 572 000 E | 573 000 E | 574 000 E | 575 000 E | 576 000 E | 577 000 E | 578 000 E | 579 000 E

5 968 000 N | 5 967 000 N | 5 966 000 N | 5 965 000 N | 5 964 000 N | 5 963 000 N | 5 962 000 N | 5 961 000 N | 5 960 000 N

Grid Baseline

L 57+00 N | L 54+00 N | L 51+00 N | L 48+00 N | L 45+00 N | L 42+00 N | L 39+00 N | L 36+00 N | L 33+00 N | L 30+00 | L 27+00 N | L 24+ | L 21+00 N | L 18+00 N | L 15+00 N | L 12+00 N | L 9+00 N | L 6+00 N | L 3+00 N | L 0+00 | L 3+00 S | L 6+00 S | L 9+00 S | L 12+00 S | L 15+00 S | L 18+00 S | L 21+00 S | L 24+00 S | L 27+00 S | L 30+00 S | L 33+00 S | L 36+00 S | L 39+00 S

C.L. 4727 | C.L. 4726 | C.L. 6043 | C.L. 6044 | C.L. 148 | C.L. 162 | C.L. 4463 | C.L. 4461 | C.L. 163 | C.L. 4462 | C.L. 4460 | C.L. 4464 | C.L. 4459 | C.L. 4458 | C.L. 4725 | C.L. 4724 | C.L. 4723

BOWRON RIVER

Campsite

WL-4 | WL-3 | WL-2 | WL-1A | WL-7 | WL-6 | WL-5

77-20 | 77-19 | 77-4 | 77-15 | 77-13 | 77-18 | 77-3 | 77-14 | 77-12 | 77-10 | 77-2 | 77-17 | 77-16 | 77-9 | 77-8 | 77-11 | 77-23 | 77-1 | 77-24 | 77-5 | 77-7 | 77-22 | 77-6 | 77-25 | 77-21

71-5 | 71-2 | 71-1 | 71-3 | 71-4

80-2 | 80-1

EX-4 | EX-5

K3

LEGEND

Inst. Drilling
Pre-1980 Drilling
1980 Drilling
Old Mine Adits
Campsite
Seismic Line
Forest Dev. Road
Logging Skid Road
C.L. 162 — Coal Licence No.
5 965 000 N — U.T.M. Grid Co-ord.

0 | 0.5 | 1 km

IGNA engineering & consulting ltd.

NORCO RESOURCES LTD.
BOWRON COALFIELD

EXPLORATION FIELDWORK TO MARCH 28, 1980

6.35 inches = 1 mile

19

Drawn by:	P. Hall
Scale:	1: 10,000
N.T.S. Grid:	93H/13(W)
Date:	12-03-81

Bw-Bowron River 80(a)18

Drawing No. 6