

NORCO RESOURCES LIMITED
Vancouver, B.C.

OPEN FILE

BOWRON RIVER COAL MINE
DEWATERING AND BULK SAMPLING

September, 1976

MINING RECORDER
RECEIVED and RECORDED
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M.R. #
VICTORIA, B.C.



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1. DESCRIPTION OF THE COAL PROPERTY

1.1 Norco Resources Limited are the holders of three British Columbia Coal Licences, Nos. 148, 162 and 163, which are situated in the valley of and adjacent to the Bowron River, some 45 miles south east of Prince George.

The access to the property is south from Prince George on the Quesnel road for 9 miles, then 36 miles east on the Willow-Cale Forest Road.

FIGURE 1 shows the location of the property.

1.2 The underground workings, known as the "Main Slope", driven due west from its portal, dips from the surface at 12 degrees, and is approximately 600 feet long on the gradient, ending in a water sump. At a point just over 500 feet down the Main Slope, a second decline, also at 12 degrees dip, known as the "Coal Slope", was driven on a bearing of S.40° E., or at 50 degrees to the Main Slope. The Coal Slope follows along the Upper Seam of two Seams, whose thicknesses are 11ft. and 8 ft. respectively. The Coal Slope was driven some 520 feet on the gradient. Possibly a third seam is present at this location.

1.3 FIGURE 2 shows the plan layout and sectional views of the Main Slope and the Coal Slope, with indications of level above sea level where these are known. The plan was taken from a plan No. 1139-3 as surveyed by Underhill and Underhill Ltd., Professional Engineers and British Columbia Land and Mine Surveyors, of

continued ... 2.

1. DESCRIPTION OF THE COAL PROPERTY - continued

Vancouver, dated June 21st. 1967. It will be noted that only a short length of the Coal Slope was driven at the time of the Survey, and the additional drivage information, in plan and section, was taken from the notes of Mr. A.J. Garraway, the Colliery Manager during these drivage operations, and dated January 1st. 1969.

1.4 Owing to a lack of a viable coal market after these slopes were driven, the workings were "abandoned" in the mining sense, and with an inflow of water at the bottom of the Main Slope, and spring water evident at the contact of the surface glacial deposits and the coal measure rocks, the mine filled with water.

1.5 It should be noted that the Main Slope, when driven, was very well timbered. Timbers at least 8" x 8" section were used in the construction of the portal, and this type of support for roof and sides continued through the glacial till, where considerable overbreak of roof and sides took place.

On reaching the massive sandstones and shales of the coal measure rocks, heavy peeled props and bars not more than 6 feet apart, and less where necessary, were set. Again considerable overbreaking of the roof took place, and much timber was used to ensure effective roof support.

The sectional area of the roadway generally is not less than 8 ft. and up to 11 ft. in height, and 12 ft. to 14 ft. in width.

1. DESCRIPTION OF THE COAL PROPERTY - continued

1.6 The dip of the strata in the Main Slope is difficult to determine as the sandstones exhibit much false bedding. There are frequent occurrences of coal in bands 1 inch to 3 inches in thickness, not necessarily as continuous seams, but rather as isolated "blobs" of coal crushed between the sandstones by tectonic pressures. It is interesting to note that these coal occurrences are almost all composed of a highly vitrainous coal component, in which small quantities of translucent resin can be detected with the naked eye.

False bedded dips vary from 15 degrees to 70 degrees. One may say that the ruling dip of the coal measure strata is apparently around 30 degrees in the top half of the slope, steepening to 45 degrees in the lower half.

In the Coal Slope, the Upper Coal Seam was followed, and the dip of this seam is of the order of 45 degrees, with local variation of dip up to 60 degrees or so.

2. ASSIGNMENT

- 2.1 Norco Resources Limited, in May 1976, desired to obtain a quantity of soluble resin and of insoluble resin from a coal sample from the Bowron River Coal Mine.
- 2.2 To obtain a sample of some 10 to 12 tons of coal from this mine, it was necessary to remove the water presently in the mine, and, when necessary during this operation to ensure the safe passage of men through the mine roadways, by checking and repairing the roof and sides supports.
- 2.3 Various preparations were put in hand, including notification of regulatory bodies concerned in order to obtain permission from them to proceed with the work.

From previous work in the isolation of resins from this coal, it was determined that some 8% of the coal in situ would represent the resin.

- 2.4 At this time, the two authorities who would be asked to process the coal so as to obtain sample of the resins were:

Dr. J. Visman, Chief Officer of the Western
Research Laboratory, Canada Department of
Energy Mines and Resources, Edmonton, Alberta
and The Battelle Memorial Institute,
Columbus, Ohio, U.S.A.

2. ASSIGNMENT continued

Dr. Visman would be responsible for the cleaning of the coal, to produce a "clean" coal, a "middlings" product and a "refuse" product. It should be noted that these three products each can contain resins.

The Battelle Institute will finally isolate the two types of resin, in sufficient quantity to allow them to make such tests as necessary to establish the commercial use of these resins in the market place.

Other knowledgeable authorities would be called upon as conditions dictated in order to assist in achieving these ends.

2.5 Additional characteristics on which information was sought was the effect of removal of the resins upon the cokeability of the coal, and on its calorific value, and possible on other measurable physical or chemical properties of the coal.

2.6 In order to extract resins on a commercial basis, it was anticipated that the pilot plant scale of the abovementioned tests would lead to the design of a process for a full scale plant, whose capacity would allow feasible operating costs to be experienced within a given market.

Additionally, some market research would be needed to indicate the form in which the remaining coal could best be of benefit to the operation.

3. PERMITS

A number of Permits were found to be required in order to discharge the water pumped from the mine into the Bowron River.

Contacts were made with, and permissions were granted by the following Branches of Governments:

FEDERAL

Fisheries and Marine Services - Prince George

Mr. J. Tuttyens was most cooperative, and visited the property during the dewatering period.

Department of Communications - Vancouver

A high frequency radio telephone was rented from Traeger Distributors Ltd. of Vancouver. This telephone is identical to that used in Australia for the "Flying Doctor" service.

A "Private-Commercial" Radio Station Licence was obtained to operate the telephone through B.C. Telephone Company Limited in Vancouver. Two wavebands were allotted to us, both with the call sign "Bowron River" - VGF 979. The Licence expires in March 1978 (the minimum period allowed). The telephone operated from August 30th. to September 22nd. 1976.

PROVINCIAL

Mines Inspection Branch

- District Inspector, Prince George
- Senior Inspector, Victoria

The Branch indicated that only flameproof electrical gear, such as pumps, would be acceptable for underground use.

3. PERMITS continued

Two forms were required: (Coal Exploration Form 7-8)

"Notice to work on a Coal Licence" and
"Application for a Reclamation Permit on a
Coal Licence".

These were duly completed and copies were forwarded
to all concerned.

We would like to record our appreciation of the
assistance we received from Mr. A.R.C. James, P.Eng.,
the Senior Mines Inspector, of Victoria, and from Mr.
Daniel Tidsbury, P.Eng., District Inspector in
Prince George.

Fish and Wild Life Branch, Prince George

They asked that the mine water be pumped directly
into the Bowron River to eliminate bank erosion,
that any sludge encountered in the mine workings be
first physically removed and dumped on nearby land,
and that water samples from deeper in the workings
be tested for toxic chemicals, the latter at a fre-
quency the Pollution Control Board would determine.

We pumped the water directly into the stream of the
river. No sludge was encountered.

The Regional Water Rights Officer - Prince George

This officer said he would be happy to follow the
decision of the Forestry Service in the matter.

3. PERMITS continued

The Forestry Service - Prince George

Mr. C. Steneker expressed no objections, and said he would follow the matter with the Pollution Control Branch.

The Senior Reclamation Officer - Victoria

Mr. J.D. McDonald, P.Eng. was satisfied there would be no land disturbance, thus a Reclamation Permit would not be necessary.

The Pollution Control Branch

Mr. Terry Roberts, P.Eng., the Assistant Regional Manager, was very helpful. He arranged for a sample of the minewater to be taken in conjunction with Mr. Tuttyens of the Federal Fisheries and Marine Branch. The sample of mine water was found to be non-toxic, the bio-assay was in order, and the water was declared innocuous following official laboratory tests.

He stressed that the water from the mine should be discharged directly into the Bowron River main stream, which was done, and that no settling ponds would be necessary. The Branch was satisfied as to the non-toxic nature of the mine water at the deeper levels.

Termination of Operations

A letter dated October 4th. 1976 was forwarded to all of the above-mentioned authorities notifying them that the work at the mine site was successfully completed on September 23rd. 1976, and thanking them for their kind and timely cooperation.

4. CONTRACT FOR DEWATERING THE MINE
AND FOR OBTAINING BULK COAL SAMPLE

- 4.1 Much discussion took place as to the merits of carrying out this work by direct labour or by the employment of a contractor. On balance, the latter course was deemed the more suitable under the prevailing conditions.
- 4.2 Two bids for the work were obtained - one from White Mine Development Ltd., of Vancouver B.C., and one from R.F. Fry and Associates (Pacific) Ltd., of Surrey, B.C.

A comparison of these two bids was made. Since the work involved so many unknowns, chief of which was the state of the roof and sides supports after some five years under water and the possible occurrence of falls of roof ("caves"), a "cost-plus" basis was quoted by both companies, and an estimate of expenditures over a period of one month's operation was arrived at.

The two bids, as presented, were comparable in total, but both could be regarded only as expenditure estimates, and White Mine Development Ltd. were obviously very high in some of their clauses.

It was decided to award the work to R.F. Fry and Associates (Pacific) Ltd.

It was agreed that supervision of the work on behalf of Norco Resources Ltd. would be provided by H.S. Haslam and Associates Ltd., of West Vancouver B.C.,

4. CONTRACT FOR DEWATERING THE MINE
AND FOR OBTAINING BULK COAL SAMPLE continued

who would also act as "Fireboss" and "Certified Colliery Manager" to ensure compliance with, and under, the Coal Mines Regulations Act of British Columbia.

4.4 Norco would provide materials and supplies such as discharge water pipe and couplings, electric cable, electric switches, haulage rope, and jute bags for transporting the coal from the mine to Edmonton. In addition, they would be responsible for fuels and lubricants.

4.5 R.F. Fry would lease to Norco for this work a 4 x 4 truck, diesel generator, mine ventilation fan and tubing, mine lamps and charger, electric two-drum hoist, four flameproof pumps, and small tools.

A crew of three qualified miners, a cook and a working supervisor were recruited by R.F. Fry, who were accommodated in the existing bunk house and cook house at the mine site.

4.6 A copy of the contract as signed by Norco and R.F. Fry is attached to this Report as APPENDIX "A".

5. THE DEWATERING AND BULK SAMPLE OPERATION

- 5.1 Certain work by R.F. Fry in gathering and preparing equipment and tools was carried out from August 23rd. 1976 onwards, which included fabricating a Slusher "boat". It was known that some of the track in the Main Slope had been removed in 1971, thus the Slusher boat would serve the same purpose as a mine car without rails or wheels. This device proved to be most useful as a means of transport of coal, electric cable, and water pipes.
- 5.2 There was considerable difficulty in obtaining the services of a camp cook, and one was finally hired in Prince George.
- 5.3 R.F. Fry's truck, with small tools, mattresses etc. left Surrey on Friday, August 27th., driven by their supervisor, also the diesel generator, "boat" and water pipes left the same day. This equipment was unloaded and set up at the mine site on Saturday, August 28th. and Sunday the 29th.
- 5.4 The crew arrived in camp late on Monday, August 30th. The high frequency radio telephone was installed and aerials for two wavebands erected. The electrical sub-contractor (Camac Electric Ltd. of Prince George) connected up the diesel generator and installed switches for the pump circuit and for the camp.

THE DEWATERING AND BULK SAMPLE OPERATION - continued

5.5 On Tuesday, August 31st. the electrician coupled up the first submersible pump whilst the crew laid the water discharge pipe from the mine entrance to the River.

Pumping commenced late in the afternoon for a period of 3 hours, after two log rafts had been constructed - one for the pump, which ensured some 5 ft. depth of water always under it, and one for men to reach the pump raft.

At the gradient of 12° , the water level extended over a distance of some 60 ft. along the sloping roadway, thus it was necessary to make sure the pump raft was always as far forward as the discharge hose would allow, and as pipes were added to the discharge line.

5.6 Owing to the frequent interruption to the pumping operation, mainly to add more pipes to the discharge line, and for a time, due to electrical trouble, no record of the number of hours actually occupied with pumping was made.

The electrician from Prince George made a number of trips to the mine during the pumping period as there were four pumps finally at work, three of which required that the main cable be cut and a junction box installed with pump switch. He also connected up the two-drum Slusher hoist at the top of the Main Slope.

5.7 The rate of pumping the water from the mine was severely restricted on account of the fact that

THE DEWATERING AND BULK SAMPLE OPERATION continued

the pumps had to be "flameproof certified", and they were the only pumps (which had to be identical in characteristics) which were available. Their motors were 5.3 KW capacity (5.5 HP).

This meant that pumping was carried on at all possible times when other work preparatory to continued pumping operations had been completed. As a result, longer hours were worked by the crew than originally anticipated, and this was aggravated by the successively reducing rate of water flow experienced at the deeper levels of the mine slopes.

- 5.8 In the Main Slope, only one fall of debris was found - at a point some 40 ft. from where pumping commenced. By keeping the pump raft well forward, it was fortunate that the raft was able to ride over this fall and not become grounded. The fall, which had occurred from the side of the excavation, consisted of boulders, gravel and sand which was later levelled off on the floor of the slope.
- 5.9 In the Coal Slope, the roof and sides were of a much weaker nature mainly due to the roadway being driven adjacent to the Upper Seam with its friable slickensided and fractured hangingwall. The roadway supports had deteriorated to some extent, but it was not until a point 267 feet down this slope was reached that difficulty arose. Probably due to the removal of the water from the weak roof of the Coal Slope, a massive fall of rock

occurred and roof timbers and side props were fractured. The pump raft was outbye the site of this fall, and subsequent inspection revealed a hole above the timbers some 10 ft. to 15 ft. in height and approximately 80 ft. in length.

Within this length, the plan shows three junctions and side entries - one 30 ft. long to the right (S.W.), another 50 ft. long to the right (S.W.) and one 100 ft. long to the left (N.E.). Undoubtedly these three junctions would be responsible for roof instability along the slope length.

After consultation, it was decided that to clear this fall and retimber the slope was too formidable an undertaking, thus the coal bulk sample, originally intended to be taken from the seams exposed at the bottom of the Coal Slope (520 ft. from the Main Slope) would have to be taken from the top of the Coal Slope, where the roof conditions were more favourable. No suitable exposure of the Upper Seam was found in the Coal Slope as the line of the Slope had been deflected into the hangingwall too far from the seam.

- 5.10 By this time, the double-drum slusher had been set up on the surface. A place was chosen on the level portion of the Coal Slope, where the timbers for sides and roof were reliable, for coal to be extracted by hand pick. Some 13 tons of coal were gotten, and after loading into jute sacks, were hauled to the surface in the slusher boat. This took place on September 17th., 18th. and 19th.

THE DEWATERING AND BULK SAMPLE OPERATION continued

5.11 As soon as the coal bulk sample was extracted, the pump, electric cable and water discharge line were withdrawn, and the mine was allowed to fill with water. This was completed on Tuesday, September 21st.

5.12 On Wednesday, September 22nd. the coal (22,500 lbs.) was loaded onto a low loader, along with the double drum hoist, both enroute to Edmonton after transfer to Canadian Freightways Ltd. at Prince George.

The remaining bagged coal (about 2 tons), also the electric cable, wire rope, electric switches and 4" diameter water discharge pipe and couplings were stored at the mine.

5.13 The items of equipment belonging to R.F. Fry left by low loader and truck on Tuesday, September 23rd., arriving in Surrey the following day.

5.14 During the period of dewatering and taking the coal bulk sample, regular "Fireboss" inspections of the mine were carried out and reports made out, in accordance with the British Columbia Coal Mines Regulations Act.

On no occasion was any noxious gas found by the safety lamp test.

The miners set an adequate quantity of safety props during the coal getting operations in line with good practice. No accidents to personnel or equipment occurred. Retimbering of the mine roadways

THE DEWATERING AND BULK SAMPLE OPERATION continued

was not found to be necessary, although, as previously noted, beyond the 267 ft. mark in the Coal Slope, the timber had deteriorated so that it was found mostly to be rotten, or had split.

The standard of timbering found in both slopes was good.

It was noted that the Main Slope is not straight about its centre line.

Some 200 ft. of roadway nearest to the surface will require straightening by taking a side slashing on the north side of 6 ft. to 7 ft. if a belt conveyor were to be installed at a future date. For main-and-tail rope and track haulage this would not be so vital a matter.

- 5.15 FIGURE 3 shows a plan and section of each slope with daily progress of pumping indicated. Comparison of the quantity pumped each day cannot be made as the cross-sectional area of the excavation varied considerably from point to point due to over-break of strata in the drivage operation. Our original estimate of the total quantity of water to be pumped was around 2 million gallons - to the 520 ft. mark in the Coal Slope; this would be reduced by 520 ft. less 267 ft. or 253 ft. of slope which was not pumped out. It was estimated that there was a water inflow at the Main Slope sump at the time of this dewatering operation of some 35 gallons per minute, approximately.

5.16 Visitors

During June and July 1976, the property was visited by Mr. John Cossarini, General Superintendent of R.F. Fry and Associates (Pacific) Ltd., and by Mr. Gerald White, of White Mine Developments Ltd., both for the purpose of presenting bids for a contract for dewatering and bulk coal sampling, and both accompanied by H.S. Haslam, representing Norco Resources Ltd.

On August 16th. 1976, Mr. Morris Menzies, President of Norco Resources Ltd., with H.S. Haslam, entertained at the mine a delegation of the Coal Survey Mission, Tokyo, Japan, namely:

Mr. Rokuro Adachi, Head of Mission, Japan Overseas
Coal Development Co. Ltd., of Tokyo, Japan.

Mr. Norio Nanbu, of Nissho-Iwai Canada Ltd., of
Vancouver B.C.

Mr. Kazuo Suzuki, Director of Mine Engineering and
and Planning, Hokkaido Colliery and Steamship
Company

Mr. Hiroshi Satomura, Senior Mining Engineer, Japan
Overseas Coal Development Co. Ltd., Tokyo.

Dr. Makoto Nakazoe, Director, Overseas Coal Department
Taiheiyo Engineering Inc., Tomyo.

Mr. M. Yokoyama, Mining Engineer (Development), Hokkaido
Colliery and Steam Ship Company.

During September 1976, while dewatering and bulk sampling was being carried on, visitors included:

THE DEWATERING AND BULK SAMPLING OPERATION continued

- Mr. Dan Tidsbury, P.Eng.,
District Inspector of Mines, Prince George.
- Mr. J. Tuttyens, Federal Department of Fisheries
and Marine Services - Prince George.
- Mr. John Cossarini, General Superintendent,
R.F. Fry and Associates (Pacific) Ltd.
- Mr. Milo Filgas, President,
R.F. Fry and Associates (Pacific) Ltd.
- Mr. R.H. Robertson, Sales Representative,
Flygt Canada Ltd., Burnaby B.C.
- Dr. and Mrs. Jan Visman, Chief of Laboratories,
Federal Department of Energy Mines and
Resources, Edmonton, Alberta.
- Mr. William Reed, President,
Camor Electric Ltd., Prince George.
- Mr. Morris M. Menzies, President,
Norco Resources Limited, Vancouver B.C.

5.17 Upon termination of the Dewatering and Bulk Sampling operation, Mr. Bert Kary was appointed by Norco Resources Limited as Site Caretaker. He will live at the cook-house adjacent to the mine portal and act as custodian of the stock of materials, water pipe, electric cable etc. now stored in the mine yard and workshop building.

There are also some two (2) tons of coal from the bulk sample, bagged and stored on pallets in the workshop building. This coal is being kept in reserve for any future experimentation or other use as may be required.

6. RECORD OF EXPENDITURES FOR
DEWATERING AND BULK SAMPLING

- 6.1 TABLE 1 gives a breakdown of expenditures incurred in performing this work.
- 6.2 TABLE 2 is a statement which compares actual expenditure with estimated expenditure. It should be noted that the "actual" covers 29 days at the mine site plus 5 days of preparatory work at Fry's yard and shops in Vancouver, whereas the "estimate" covers 30 days at the mine site only.
- 6.3 TABLE 3 gives a list of equipment items, with the prices paid, which were purchased by R.F. Fry on Norco's behalf, and which are stored at present in the surface shop building at the mine site.
- 6.4 TABLE 4 gives an analysis of the accounts for Materials purchased, divided into those which are considered re-usable in Norco's operations and those whose value is considered as non-recoverable. This Table reconciles with Column (3) of Table 1, also with information given in Table 3.

ANALYSIS OF ACCOUNT OF R. F. FRY AND ASSOCIATES (PACIFIC) LTD. Period - August 16th. to September 30th. 1976

TABLE 1.

A/c.- No.	Period	(1) Labour	(2) Wage Levies	(3) Materials	(4) Board Loss	(5) Equipt Opertg	(6) Tranpt Comm'n	(7) H.O. & o/head	(8) Profit	(9) Equipt Rentals	(10) Totals
I	Aug. 16 - 31	\$ 1533.63	369.60	7022.31	290.00	875.15	1422.86	805.92	1847.86	206.04	14372.96
II	Sept. 1 - 15	\$ 8816.45	2124.76	3044.07	1635.00	1229.56	362.52	1204.86	2762.58	726.78	21906.58
III	Sept. 16 - 30	\$ 4274.27	1118.02	5945.22	810.00	170.40	2014.91	1003.23	2300.26	3536.77	21173.08
	Total billed	\$14624.35	3612.38	16011.60	2735.00	2275.11	3799.88	3014.01	6910.70	4469.59	57452.62
	<u>CREDITS</u>										
III	-do-	80.80	19.47	154.72	-	-	-	17.84	40.92	6.00) 817.54
III	-do-	275.00	66.27	-	-	45.00	-	27.03	61.99	22.50	
	Undercharged (add)	45.60	10.99	-	-	-	-	3.96	9.08	-	69.63
IV	<u>CREDITS</u>	568.01	136.65	-	-	-	-	49.32	113.10	272.83	1139.91
Oct. 27.	Cr. 9¢/hr on 761 hrs	68.49	16.50	-	-	-	-	5.95	13.64	-	104.58
	SUB-TOTALS	13677.65	3384.48								
Oct. 27	Cr. 1.9% Labour Wages	259.88	64.31	-	-	-	-	22.69	52.03	-	398.91
	NET TOTALS	\$13417.77	3320.17	15856.88	2735.00	2230.11	3799.88	2895.14	6638.10	4168.26	55061.31

TABLE 2.

NORCO RESOURCES LIMITEDIn account with R. F. Fry and Associates Limited

<u>Item</u>	<u>Para.</u>	<u>Actual Net Expenditure</u>	<u>Estimate</u>	<u>Actual Estimate %</u>
Labour	(1)	\$13,418	\$12,893	104%
Wages Levies	(2)	3,320	3,107	107%
Materials	(3)			
In Stock (estd)		13,673	11,100	123%
Non-recoverable		2,184	-	-
Board Loss	(4)	2,735	3,750	73%
Equipment Oper'g	(5)	2,230	7,350	30%
Transport and Communication	(6)	3,800	3,850	133%
Head Office Chgs and Overheads	(7)	2,895	2,874	100% (+)
Profit (to Fry)	(8)	6,638	6,589	100% (+)
Equipment Rentals	(9)	4,168	5,150	81%
TOTALS		\$55,061	\$55,663	99%

Source: Summary of Account Nos. I, II, III, and IV
(from TABLE 1)

TABLE 3

NORCO RESOURCES LIMITEDLIST OF MATERIALS IN STOCK AT THE MINE SITE

<u>Item</u>	<u>Invoiced Cost excluding delivery charges.</u>
Ventilation Tubing & ftgs.	\$ 1,754.80
Water pipe - 4" - 2500ft. x 450 x .083 with couplings	4,781.89
Wire rope - 3/8in. Light ord'y galv'd 12,200 lbs B.S.- 5,000ft. - some used on reel	1,190.38
Three only check valves (4")	320.20
<u>Electrical Switches, parts etc.</u>	
1 - 200 amp; 1 - 100 amp;)	
1 - 60 amp; 2 - 30 amp;)	95.16
2 - "Square D" starters)	
1 - bus bar box; 1-junction box)	828.39
3 - small 3-way boxes (1½"))	
2 - large 3-way boxes (1½"))	778.79
various small parts and screws)	
<u>Electric Cable</u> (all now USED)	
2 coils - 3-core (1 of 5 laps) (1 of 2 laps)	304.36
Generator house to hoist)	
Odd lengths for switches)	687.00
(3-core & earth))	
1,000ft (when new) Phillips Type SW 600 volts 2A WG 4-cond'r Python cut into lengths for running between tandem connected pumps	2,932.36
TOTAL, as invoiced	<u>\$13,673.33</u>

Norco Resources Limited

TABLE 4.

Sub-Heading (3) - MATERIALS - Analysis

<u>Supplier</u>	<u>Item</u>	<u>In Stock Recoverable</u>	<u>Non-recov- erable</u>	<u>Total & Account No.</u>
Deakin Nelson M/cy	Mattresses 3 chk valves 4"pipe & cpgs 2000ft.wire 2000ft ventn. tube Credit	\$ 154.72 320.20 4781.89 - <u>1754.80</u> \$7011.61 <u>154.72</u>	- - - 10.70 - 10.70 -	Account I <u>\$7022.31</u> <u>154.72</u> <u>\$6867.59</u>
Emco Finning Finning Northern Northern Northern Northern Ackland's Turmac	1000ft.elec cable Reel	- - - - - - - - 2833.36 99.00 <u>2932.36</u>	33.79 18.80 7.13 3.15 11.18 14.87 11.45 11.34 - -	Account II <u>\$3044.07</u>
Turmac Nedco Wesco Can.Propane Camac Elect.	Elec.cable Reel Switches 3/8" rope Part Labour Truckhire M/c Work Elec.cable (a) large parts (a) small parts	265.36 39.00 95.16 1190.38 - - - - 687.00 828.39 778.79 <u>\$3884.08</u>	- - - - 11.24 1732.50 180.00 137.40 - - -	Account III <u>\$5945.22</u>
Totals for Accounts I, II, & III -		\$13,673.33	\$2183.55	\$15,856.88

Note (a) : Estimated breakdown between large and small parts.

7. TREATMENT OF BULK COAL SAMPLE

7.1 Some eleven (11) tons of coal in bags were forwarded from the mine to Edmonton, to the Laboratories of the Federal Department of Energy Mines and Resources (DEMR) on September 22nd.-28th. 1976.

The coal was essentially run-of-mine, although before bagging underground, the more obvious large pieces of shale or rock were removed from the coal pile.

It is thus known that the coal would contain some extraneous ash, yet it is also known from observation that the ash inclusions in the coal contain resins. This means that the ash percentage of the run-of-mine coal need not cause alarm, but can be removed and treated for resin extraction before being discarded.

At the mine we had no means of ensuring that the coal was sent away not greater than 2 inches in size, as requested originally by DEMR, thus the crushing process was carried out by them.

7.2 The plant used for processing the coal sample at DEMR, Edmonton, has a throughput capacity of 10 tons per hour.

FIGURE 4 gives the flow diagram of a commercial plant of larger capacity, the design of which is based on the DEMR Pilot plant.

TREATMENT OF BULK COAL SAMPLE continued

7.3 Dr. Jan Visman, of DEMR, Edmonton, has carried out the following operations in the cleaning of the bulk coal sample, through the pilot plant (10 tons per hour), under his charge:

- (a) Crush to pass 2-inch screen.
- (b) Air-dry, then crush to pass minus $\frac{1}{2}$ -inch screen.
- (c) Screen and weigh each fraction thus:
 $\frac{1}{2}$ -inch x 28 m., 28 m. x 150 m., minus 150 m.
- (d) Float/sink the $\frac{1}{2}$ -inch x 28 m. and the 28 m. x 150 m. separately at Specific Gravities of 1.30; 1.35; 1.40; 1.50; 1.60; 1.80; and 2.00.
- (e) The resin content of the size-density fraction are to be determined by grinding each portion to minus 48 m. and extracting the resin using a mixture of benzene and ethyl alcohol (3:1) in a Soxhlet apparatus for 24 hours.

7.4 The resinous concentrate of coal from this processing will next be sent to the Battelle Memorial Institute for the extraction of the soluble and the insoluble resins.

7.5 Cyclone Engineering Sales Limited, of Edmonton, will carry out the following work to determine the main characteristics of the products obtained from the cleaning the raw coal in the DEMR plant:

TREATMENT OF BULK COAL SAMPLE continued

Part 1. Analysis of Head Sample

Proximate and Ultimate analysis
Mineral Analysis of Ash
Ash Fusion
Calorific Value
Free Swelling Index
Hardgrove grindability

Part 2. Analysis of Products2a. Information regarding Cyclone performance
in producing resin concentrate:

Dry screening of all products at
28 mesh and 150 mesh.
Float-sink tests of all fractions of
3/8in. by 28 mesh, and 28m. by 150m.
at eight (8) specific gravities.
Determination of the true S.G. of the
1.25 and plus 200m. fractions.
Ash determination on all of the 150m.
by 0 fractions.

2b. Information regarding coal quality:

Proximate and Ultimate analysis.
Mineral analysis of the ash
Ash Fusion
Calorific Value and Free Swelling Index
to be run on Clean coal and on the
middling product before and after extraction.
Ash determination on the reject product.

7.6 Dr. Visman's report is given in APPENDIX "B"
of this Report.

8. CERTIFICATION

This Report has been compiled and written by

HUBERT S. HASLAM

Consulting Coal Mining Engineer and President of H.S. Haslam and Associates Limited, following consultations with the President of Norco Resources Limited and examination of existing technical and geological literature and maps relating to the area in question and to surrounding areas. During the operations of dewatering the mine and extraction of a bulk sample of coal, we acted as agents for Norco Resources Limited.

I hereby certify that:

- (a) I hold the degree of Bachelor of Engineering in Mining, First Class, also the degree of Master of Engineering, in the University of Sheffield.
- (b) I hold, through examination, Fellowships in
The Institution of Mining Engineers
The Institution of Mechanical Engineers
The Institution of Civil Engineers
- (c) I am a Registered Member of the Association of Professional Engineers of British Columbia, also of the Consulting Engineers Division of that body, in addition to similar registration in the Provinces of Alberta, Ontario and Quebec.

(d) I am a Member of

The Canadian Institute of Mining and Metallurgy
 The Engineering Institute of Canada
 The American Institute of Mining and
 Metallurgical Engineers

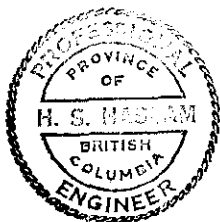
(e) I hold the First Class Certificates of Competency
 in Coal Mine Management under the laws of the
 Provinces of British Columbia and Nova Scotia,
 and of the United Kingdom of Great Britain and
 Northern Ireland.

I hereby certify that I am a practising Consulting
 Coal Mining Engineer and that I reside at 2144 Nelson
 Avenue, West Vancouver B.C.

I hereby certify that

I have no direct or indirect interest whatsoever in
 Norco Resources Limited, nor in the coal licences
 mentioned in this Report, nor do I expect to receive
 any interest, direct or indirect, in the properties
 of Norco Resources Limited or in any affiliate or
 in any security of the Company or affiliate.

Dated at West Vancouver B.C.
 this 29th. day of October 1976



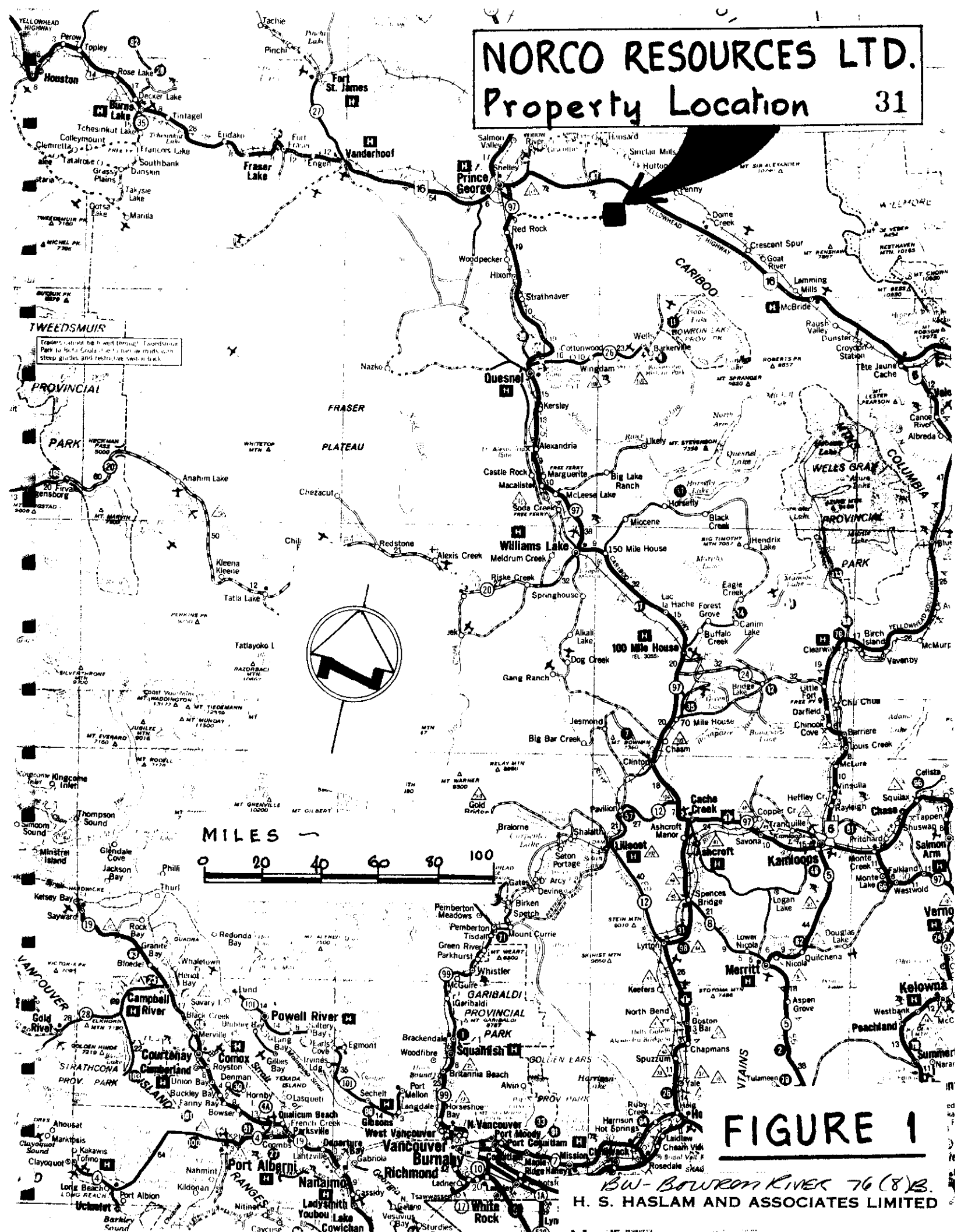
H. S. Haslam

H. S. Haslam, P. Eng.

F I G U R E S

NORCO RESOURCES LTD.

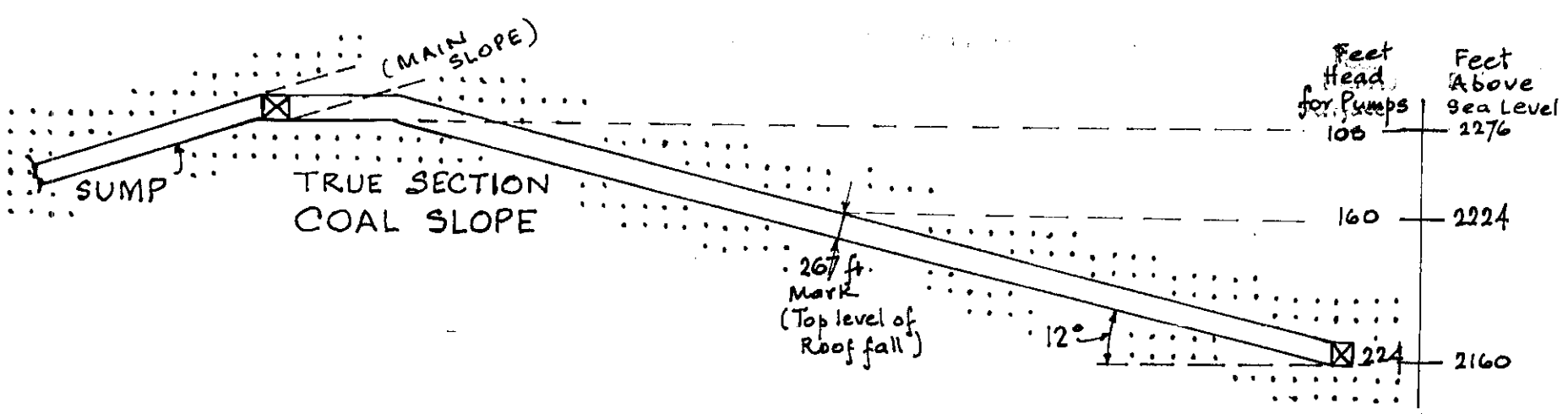
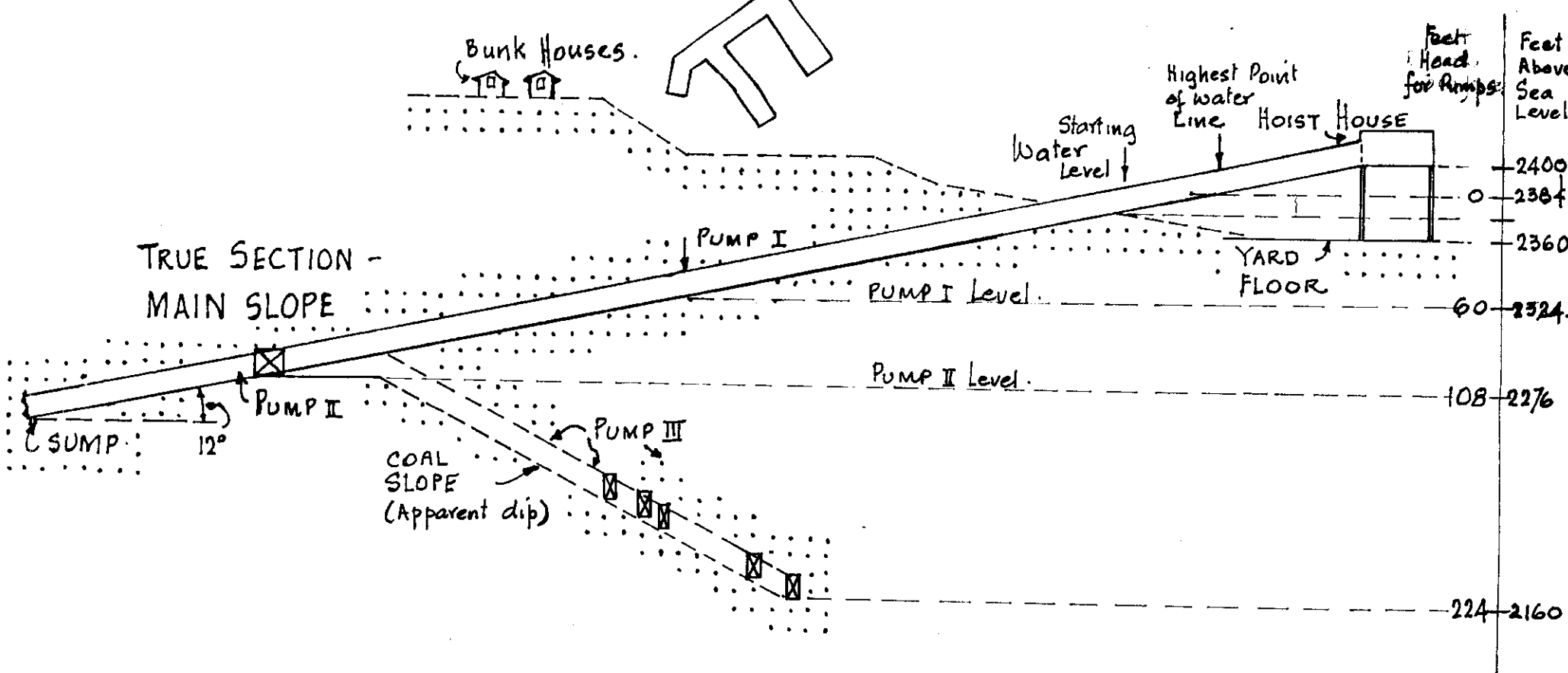
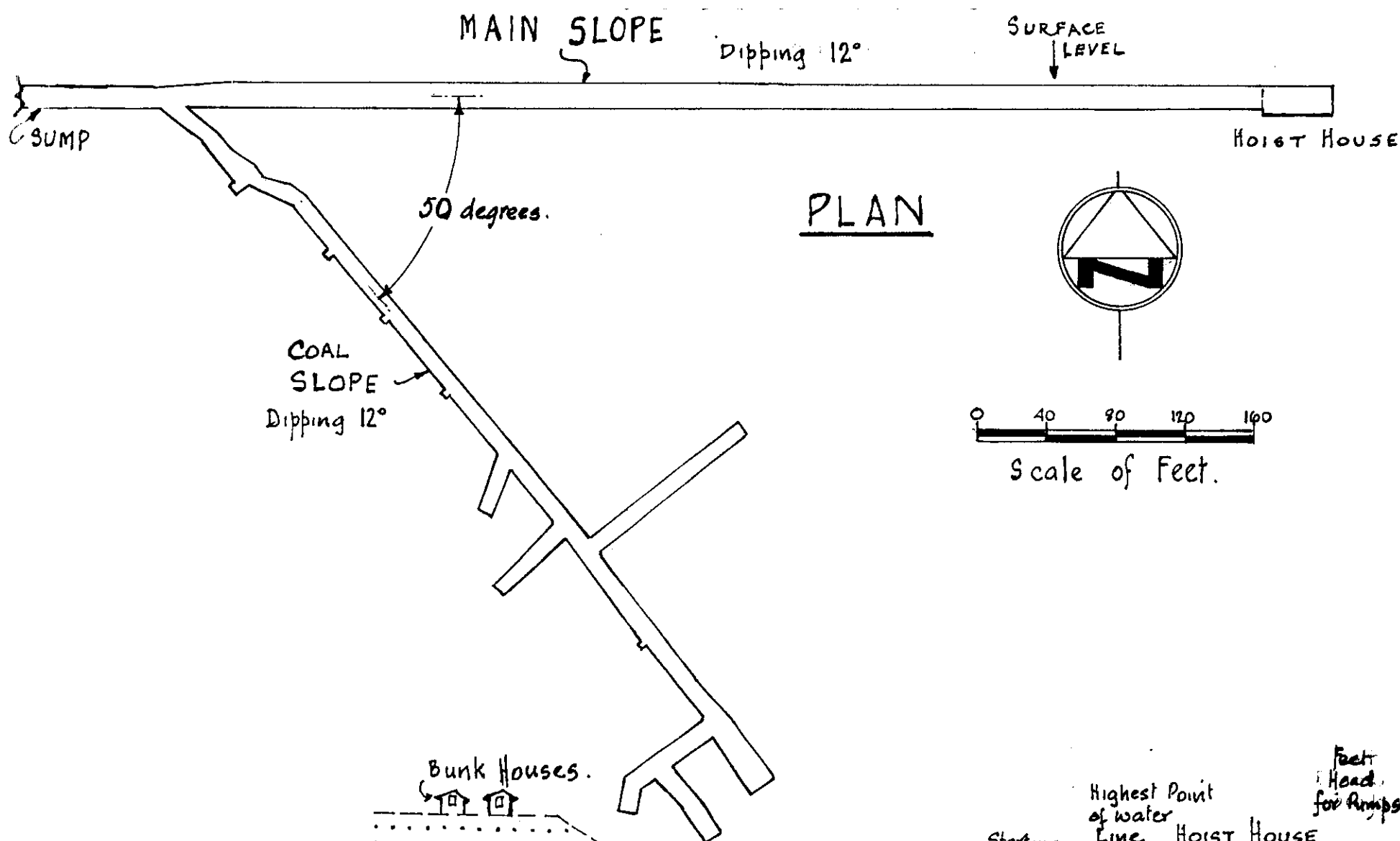
Property Location 31



Traders cannot be traced through... Provincial Park to South... due to... steep grades and... narrow... roads... roads... roads...

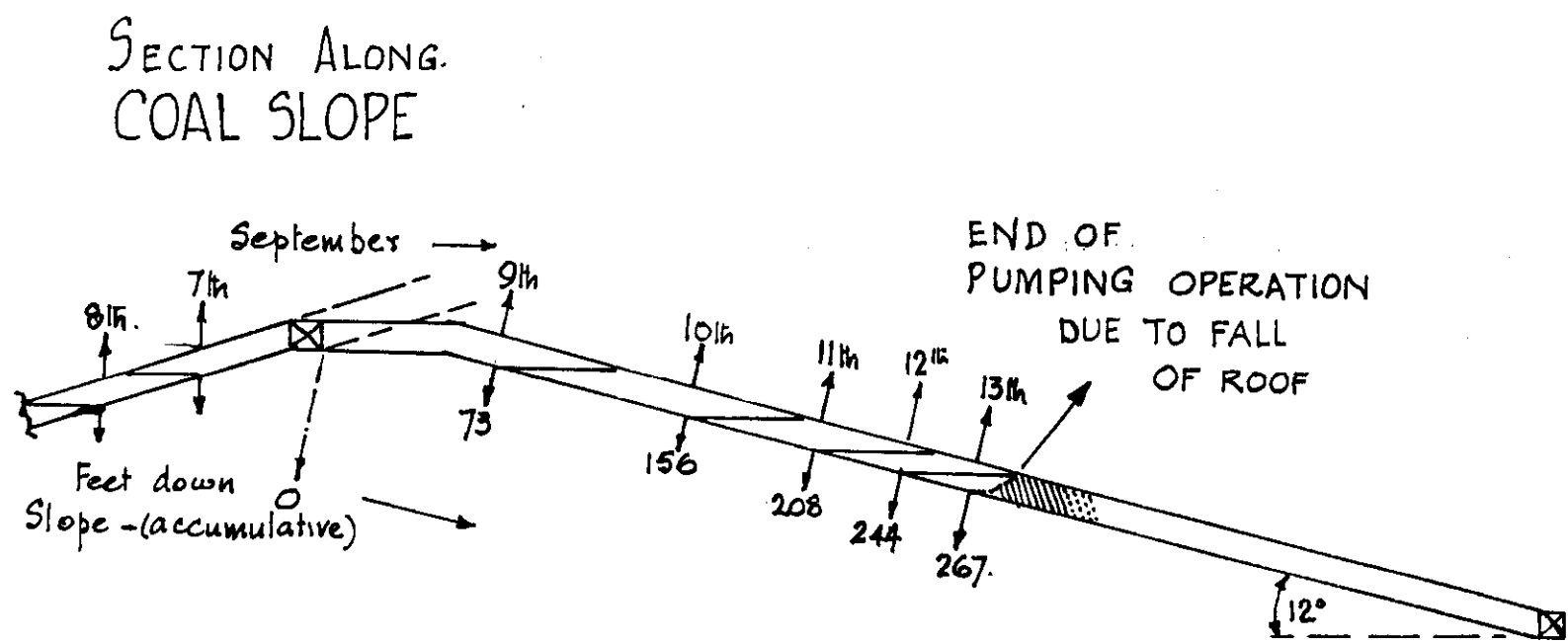
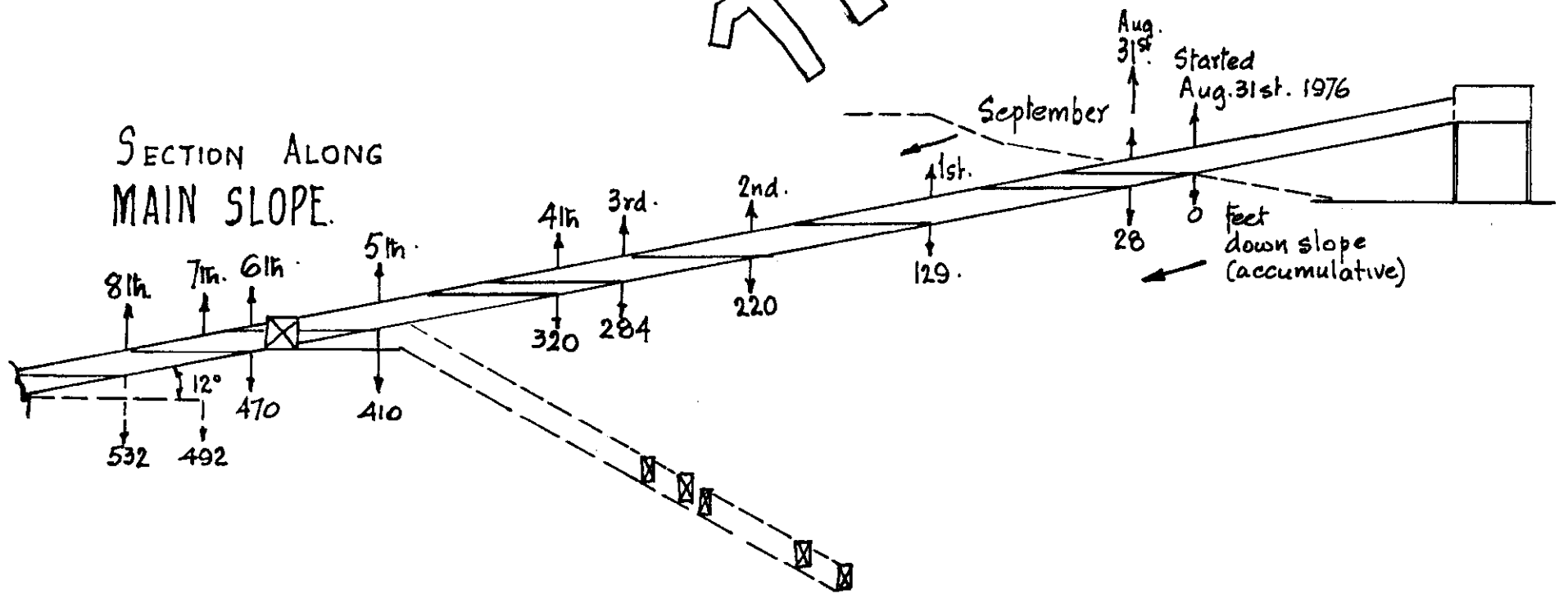
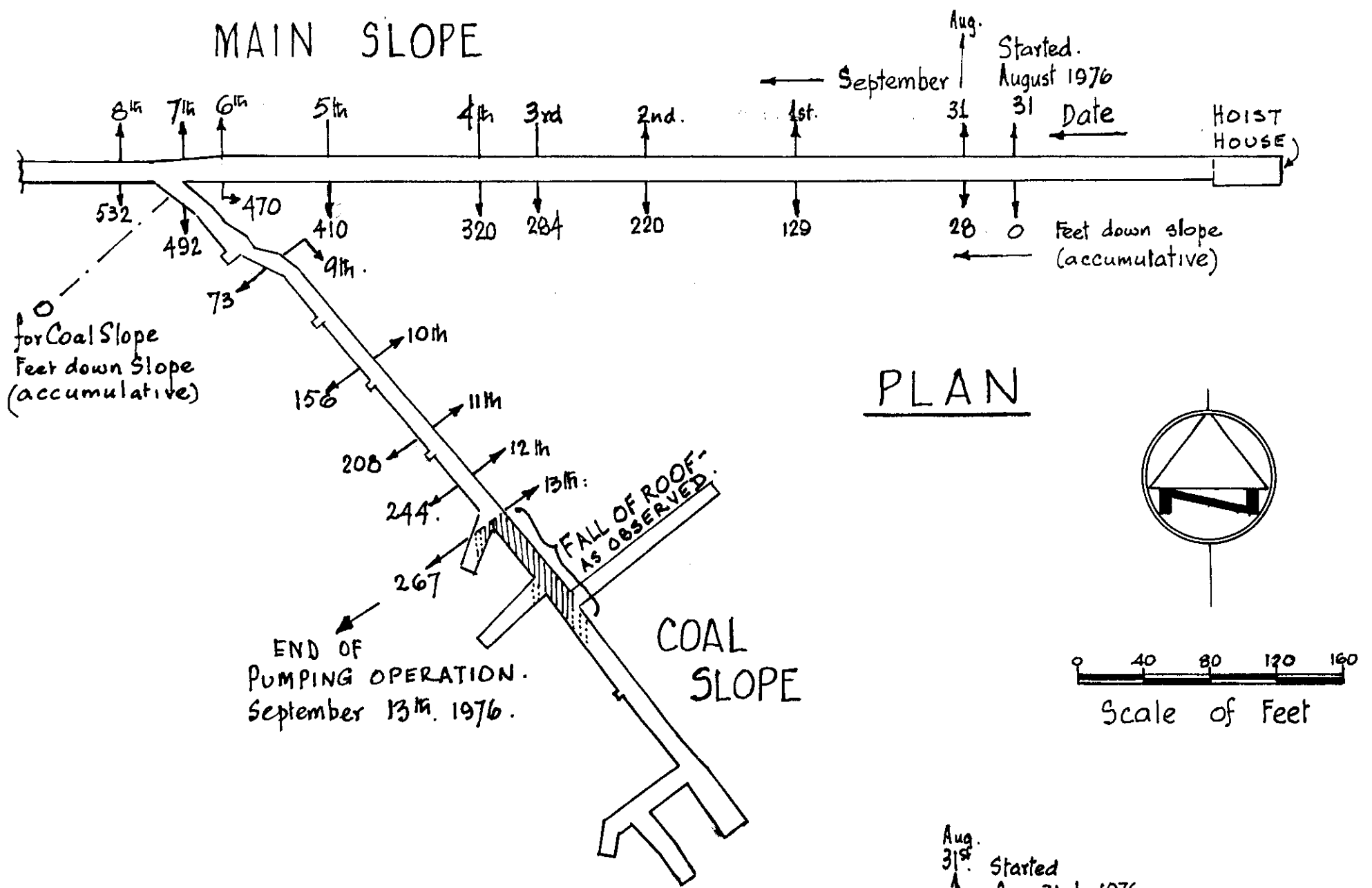
FIGURE 1

BW-Bowron River 76 (8) B.
H. S. HASLAM AND ASSOCIATES LIMITED



NORCO RESOURCES LIMITED
 Bowron River Coal Property
 Plan and Sections of
 MAIN SLOPE and COAL SLOPE.

FIGURE 2.

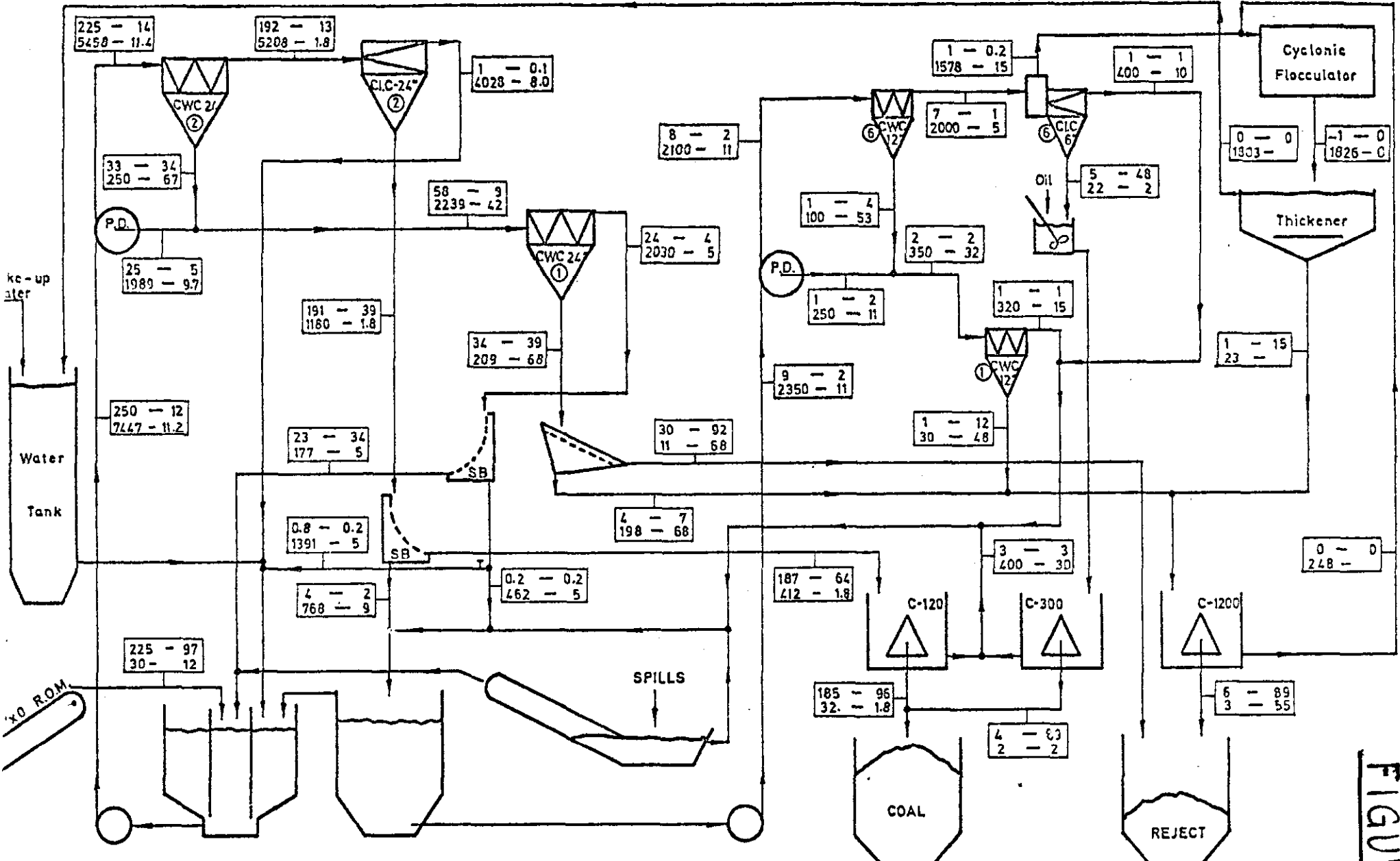


NORCO RESOURCES LIMITED
Bowron River Coal Property

Daily Progress of Pumping Operation
MAIN SLOPE and COAL SLOPE

FIG. 4 DATA FLOWSHEET

MODULAR EMR PLANT (225 tph cap.) for processing mine-run coal (2" x 0)



stph — % solids
usgpm — % ash

- LEGEND
- C = CENTRIFUGE
 - CC = CYLINDRICAL CYCLONE
 - CWC = COMPOUND WATER CYCLONE
 - C.I.C = CLASSIFIER CYCLONE
 - P.D. = PULP DIVIDER
 - W = WATER
 - SB = SIEVE BEND SCREEN

FIGURE 4.

34

BW-BOURN RIVER 76(8)B

A P P E N D I C E S

R. F. FRY & ASSOCIATES (PACIFIC) LIMITED
MINING CONTRACTORS

Telephone:
576-2977
Telex 043-51240

18765 - 96th Avenue
Surrey, B.C.
V3T 4W2

**MINING
CONTRACT**

June 23, 1976.

H. H. Haslam & Associates Ltd.,
2114 Nelson Avenue,
West Vancouver, B.C.

Dear Mr. Haslam:

Please find enclosed a tentative agreement for the Norco Development at Prince George.

Some details would still have to be worked out regarding equipment rentals when the final approved method is okayed by the Mines Dept.

As was previously discussed we would undertake the Project on a "Cost Plus" Basis only.

We look forward to being associated with you on this Project.

Yours sincerely,

R. F. FRY & ASSOCIATES (PACIFIC) LIMITED

J. A. Cossarini
J. A. Cossarini,
General Superintendent.

JAC:sb

Encl.

THIS AGREEMENT is made as of the 6th day of August
1976

BETWEEN: NORCO RESOURCES LTD.
Suite 711, Credit Foncier Building
West Hastings
Vancouver, B.C.
(hereinafter called the "Company")

OF THE FIRST PART

AND: R. F. FRY & ASSOCIATES (PACIFIC) LIMITED
18765 - 96th Avenue,
Surrey, B. C. V3T 4W2
(hereinafter called the "Contractor")

OF THE SECOND PART

WHEREAS the Company desires certain work to be done at its mining property near Prince George (hereinafter called the "Mine"), consisting mainly of Mine Dewatering the details of which and the prices to be paid for the same are as contained in Schedules 1, with any additional work hereunder is hereinafter collectively call the "Work".

AND WHEREAS the Contractor has offered to perform the work on the terms and conditions hereinafter set out, and has represented and warranted to the Company that it is capable to satisfactorily carrying out the work;

WITNESSETH that in consideration of the payments to be made by the Company and of the mutual promises and agreements herein contained, the parties hereto agree as follows:

(A) CONTRACTOR'S COVENANTS

1. THE WORK

The Contractor covenants and agrees:

- (a) to perform the work in a good, safe and workmanlike manner in accordance with the terms and conditions of this Agreement.
- (b) to supply adequate supervision, labour and any materials and equipment which maybe required to complete the work pursuant to this Agreement.
- (c) to provide proper maintenance of all the Contractor's equipment, including any required overhaul, for the duration of this Agreement.
- (d) to provide all transportation required by the Contractor's servants, agents, employees, contractors and sub-contractors from their point of engagement, and daily from their place of accommodation, to the mine and return.

2. SPECIFICATIONS

The Contractor acknowledges that the specifications for the work are contained in certain letters dated June 10, 1976 from Mr. H. S. Haslam and drawings referred to in these letters.

3. THE SITE

The Contractor acknowledges that it has made such inspection of the site of the work as it considers necessary to have a thorough knowledge from its own investigation of the conditions and difficulties that may be encountered in connection with the performance of the work.

4. SHIFT REPORTS

Shift reports in a form acceptable to the Company's Representative and containing the details of the work performed each day shall be signed by the Contractor's Foreman and shall be submitted to the Company's Representative for approval promptly after the completion of each work day and all invoices for payment will be based on and will be in accordance with such shift reports as approved by the Company's Representative.

5. EMPLOYEES

The Contractor shall engage or employ, for the performance of the work, only competent and skilled manpower, and shall immediately remove from the site all persons whom the Company deems, in its sole opinion to be disorderly, intemperate or incompetent at the written request of the Company's Representative and shall not employ such persons again upon any work to be carried out and performed hereunder without the written consent of the Company's Representative and regulations issued from time to time in writing by the Company's Representative governing the conduct of persons engaged at or connected with the mine.

6. PAYMENT OF WAGES

The Contractor shall pay and satisfy as and when they shall become due by the Contractor, all claims for salary, wages or bonus of its employees, servants and agents or payment due to its contractors and all other claims against the Contractor which might constitute a lien upon any property or assets of the Company, and in any event, pay such claims before any such lien shall become effective, and from time to time produce and furnish receipted payrolls to the Company as and when requested by the Company and pay and made whatever assessments, deductions, remittances, check-offs, and returns as are required or proper under any statute or regulation of British Columbia or imposed by any other duly constituted Governmental authority, including without limitation the Mechanics' Lien Act, Workers' Compensation Act, Income Tax Act, and Labour Relations Act of The Province of British Columbia.

7. WORKING CONDITIONS

The Contractor will comply with all provisions respecting the working conditions of the Contractor's employees, servants, agents and contractors contained in any statutes and regulations of the Province of British Columbia.

The Contractor shall make all necessary applications and obtain all necessary permits and registrations and maintain all necessary records required under such statutes, regulations or agreements.

8. SAFETY

The Contractor shall take all precautions against risk to or loss of life or injury to its employees, servants or agents or to those of the Company or to any other persons employed upon or present at or near the Mine or to visitors or strangers thereto and against injury to or loss of property of the Company and to this end shall properly guard and light all work being carried out and performed by the Contractor hereunder and comply with any safety or traffic rules and regulations which may from time to time be issued by the Company's Representative.

9. LAWS, ORDINANCES AND REGULATIONS

The Contractor shall observe and carry out the provisions of all statutes and regulations of the Province of British Columbia, whether elsewhere mentioned herein or not, which may now or hereafter be in force and which in any way relate to any Work to be carried out and performed hereunder and shall bear all costs arising from any violation thereof by the Contractor.

10 INSURANCE

The Contractor shall at its own cost and expense obtain and maintain in force throughout the course of the work:

- (a) Comprehensive general liability insurance against claims arising out of bodily injury and death and from damage to or destruction of property of the Company and/or others, including loss of use thereof and including property of the Company and/or others in the care, custody or control of the Contractor or occupied by it, with limits of not less than \$1,000,000 for any one occurrence:

(b) Motor-vehicle liability policies of insurance in respect of all motor-vehicles owned or operated by the Contractor in the carrying out of the Work and which are by law required to be licensed, with limits of not less than \$1,000,000 for any one accident.

All policies of such insurance shall contain provision for at least fifteen (15) days notice in writing to be given to the Company prior to cancellation, and shall otherwise be subject to the approval of the Company with respect to form, risks, terms and insurers. Prior to commencing the Work and from time to time thereafter when requested by the Company, the Contractor shall furnish to the Company, certified copies of such policies, certificates of insurance or other satisfactory evidence of the obtaining and maintaining in force of such insurance and of the payment of premiums thereon. If the Contractor fails to place or to maintain insurance as required hereunder, or if the Company does not approve any insurance policy or policies submitted to it and the Contractor thereafter does not meet the requirements of the Company, the Company shall have the right to place and/or maintain such insurance itself in the name of the Contractor and the amount of any premiums paid by the Company shall immediately become due and owing from the Contractor to the Company.

II. INDEMNITY

The Contractor shall indemnify and save harmless the Company from and against any and all claims, actions, suits, demands, damages, loss, costs and expenses arising as a consequence of any illness, injury or death, however caused, of any employee, servant or agent of the Contractor or its sub-contractors or arising out of the failure of the Contractor, its sub-contractors, servants, agents or employees fully to comply with any term or condition of this Agreement, or caused by or arising out of or in connection with, whether directly or

indirectly, the Work to be carried out and performed by the Contractor hereunder or by reason of any matter or thing done, permitted or omitted to be done by the Contractor, its sub-contractors, servants, agents or employees, and whether such claim, action, suit, damage, loss, cost or expense is occasioned by the negligence of the Contractor, its sub-contractors, servants, agents or employees, or otherwise, and without limiting the generality of the foregoing, the Contractor shall be liable for all loss and damage suffered by the Company arising out of damage to or destruction of, the property of the Company, including property of the Company in the care, custody or control of the Contractor or any sub-contractors or occupied or used by the Contractor or any sub-contractor caused by or arising out of, directly or indirectly, the negligence of the Contractor, its sub-contractors, agents or employees.

(B) COMPANY'S COVENANTS

12. PAYMENT FOR THE WORK

Except as hereinafter provided, the Company shall pay to the Contractor as full consideration for the Work to be carried out and performed under the provisions of this Agreement and for all expenses and costs incurred by the Contractor, the amounts in Canadian Funds at the rates set out in Schedule 1 hereto for Work completed to the satisfaction of the Company's Representative. Progress payments shall be made to the Contractor by the Company for the periods ending on the 15th and 30th days of each month, if the Contractor shall submit invoices to the Company, based upon shift reports approved pursuant to paragraph 5 hereof, covering Work completed since the preceding invoice date. Within Ten (10) days of receipt of the invoice the Company shall pay the Contractor the total sum invoiced.

13. COMPANY'S EXPENSE

The Company shall, at no charge to the Contractor, furnish the Contractor with:

- (a) Survey and geological control for all Mine Development

- (b) A representative on site with authority to make decisions with respect to any changes that have to be made and authorize all Work.

14. DEDUCTIONS

Notwithstanding the provisions of paragraph 13 (Payment for the Work), the Company shall be at liberty to deduct and withhold from time to time from any amount due or to become due to the Contractor under this Agreement:

- (a) Any amount due or accruing due from the Contractor to the Company for any reason and whether or not arising as a result of this Agreement
- (b) The amount of any claim, demand, penalty or lien made, levied or filed against the Company or any of its properties or assets by the Contractor or anyone employed by it or by any other person whomsoever by reason of the operations of the Contractor in the carrying out or performance of any Work hereunder; and
- (c) Such amounts as may from time to time be specified by the Company's Representative to be sufficient to compensate the Company for any Work which is required to be carried out or performed hereunder which the Contractor has failed to carry out or to perform in accordance with this Agreement; and

that the Company may pay and disburse out of such funds withheld sufficient moneys on behalf of the Contractor so as to satisfy and discharge any of the matters referred to in this paragraph or, in the sole opinion of the Company so as to remove the threat of any claim, demand, penalty or lien referred to in sub-paragraph (b) above and any and all such payments by the Company shall, to the extent of such payments, fully satisfy and discharge any obligations of the Contractor arising pursuant to this Agreement or otherwise howsoever.

15. COMPANY DELAY

The Company will not delay the Contractor's Mining Cycle for surveying, sampling or geology for more than Four (4) hours per week.

(C) MUTUAL COVENANTS

16. FORCE MAJEURE

Neither the Company nor the Contractor shall be liable to the other for any delays or damage or any failure to act, due, occasioned or caused by strikes, acts of God, actions of the elements, or caused beyond the control of the party affected thereby and delays due to any or all of the above causes shall not be deemed to be a breach of or failure to perform this Agreement or any part thereof.

17. DEFAULT AND TERMINATION

If the Contractor should fail promptly to commence the Work or if the Contractor should fail diligently to proceed with the Work or if the Contractor should perform the Work in a negligent or inefficient manner or abandon the Work or any part thereof, or if the Contractor should in any way fail to perform any of the obligations on its part to be performed under the terms of this Agreement, the Company may at any time and from time to time give to the Contractor notice in writing specifying such default or defaults or other matters complained of and requiring the Contractor to remedy the same.

If the Contractor shall fail to remedy the default or defaults or other matters complained of within a period of five (5) days after receipt of any notice specifying the same given pursuant to the preceding paragraph, or should the Contractor become insolvent or make any assignment for the benefit of its creditors generally or make a proposal under the Bankruptcy Act or commit any act of bankruptcy, or should a receiving order be made in respect of the Contractor under the provisions of the Bankruptcy Act, or should A Receiver be appointed or encumbrancer take possession or commence proceedings

for foreclosure or sale of the property of the Contractor or any part thereof, the Company shall have the right if it so elects, to terminate forthwith this Agreement and all of the rights and privileges of the Contractor hereunder by giving notice of the same to the Contractor, and the Contractor shall have no right of action against the Company for or by reason of the same.

In the event of termination of this Agreement and of the rights and privileges of the Contractor hereunder as provided in paragraphs 20 and 21 hereof, the Company shall, subject to the terms of paragraph 21, be under no further obligation whatsoever to the Contractor but nothing herein contained shall operate to release the Contractor from liability for damage to the Company for any breach on the Contractor's part of the Agreement or from any debts or obligations of the Contractor to the Company existing at the date of termination, the procedures herein provided for termination of this Agreement and all of the rights and privileges of the Company hereunder being concurrent with and in addition to and without prejudice to and not in lieu of or in substitution for any other rights herein contained or any and all remedies at law or in equity which the Company may have for the enforcement of its rights under this Agreement and its remedies for any default of the Contractor in the terms and conditions hereof.

18. TERMINATION

Notwithstanding any other term of this Agreement if, in the sole opinion of the Company's Representative the Work contemplated by this Agreement is being performed in a faulty manner or in default of any term thereof, the Company may at any time terminate this Agreement upon written notice to the Contractor given at least one week prior to the date of termination. Subject to the terms of this Agreement, such termination shall not relieve the Company of its obligations to pay the Contractor for Work performed prior to the date of termination.

19. INDEPENDENT CONTRACTOR

The Contractor specifically represents and agrees that, at all times while carrying out the provisions of this Agreement or any Work or operations contemplated hereunder, its status is that of an independent contractor and not the agent or employee of the Company and that its employees and the employees of any sub-contractors are not the employees of the Company for any purpose whatsoever.

20. COMPANY'S REPRESENTATIVE

Wherever used herein the expression "Company's Representative" shall mean such person at the site of the Company's Project as the Company may from time to time by notice in writing to the Contractor appoint, and all instructions, directions, communications and requirements to be given by the Company's Representative hereunder shall be well and sufficiently given if given orally or in writing to the Contractor's crew foreman.

21. TIME OF ESSENCE

Time shall be of the essence of this Agreement.

22. NOTICES

Notices to be given by the parties hereunder shall be in writing and shall be well and sufficiently given if mailed or delivered by either party to the other addressed as specified below or to such other address as may be substituted by written notice from either party to the other:

Address of the Company:

Norco Resources Ltd.,
Suite 711,
Credit Foncier Building,
West Hastings,
Vancouver, B.C.

Address of the Contractor:

R. F. Fry & Associates (Pacific) Limited,
18765 - 96th Avenue,
Surrey, B. C. V3T 4W2

and any such notice shall be deemed to have been given if delivered, when delivered and if mailed, within twenty-four (24) hours after the posting of such notice by prepaid registered mail in any Government Post Office in the Province of British Columbia.

23. SCHEDULES

All Schedules attached to this Agreement shall be deemed to be included in and to form part of the Agreement.

24. ASSIGNMENT

Any assignment, mortgage, charge or pledge of this Agreement or any interest therein or of any amount due or to become due by reason of the terms of this Agreement or any sub-contract made without the written consent of this Company shall be void. This Agreement shall not be deemed to be an asset in bankruptcy of the Contractor.

25. APPLICABLE LAW

This Agreement shall be construed in accordance with the laws of the Province of British Columbia.

26. ENUREMENT

Subject to the provisions of paragraph 25 (Assignment), this Agreement shall enure to the benefit of and be binding upon the parties hereto and their respective successors and assigns.

IN WITNESS WHEREOF the parties have hereunto caused their common seals to be affixed in the presence of their officers duly authorized in that behalf the day and year first above written.

THE CORPORATE SEAL OF NORCO RESOURCES LTD.)
was hereunto affixed in the presence of:)

(Duly signed and sealed)

THE COMMON SEAL OF R. F. FRY & ASSOCIATES)
(PACIFIC) LIMITED was hereunto affixed)
in the presence of:)

(Duly signed and sealed)

APPENDIX "B"

REPORT of Dr. Jan Visman,
Chief of the Western Reserach Laboratories
of the Federal Department of Energy, Mines
and Resources, Edmonton, Alberta.

NOTE:

Up to the time of writing, Dr. Visman's Report had not been received; and in fact the analyses of the products of the coal cleaning process had not been completed by Cyclone Engineering Sales Limited, on which Dr. Visman's Report will be based.

This Report will be made available as soon as possible.