

Sukunka Property

B.P. Exploration Canada

by A. Chowdry

December 31, 1980

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BP EXPLORATION CANADA LIMITED

COAL DIVISION

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B.C. Government Report on the
North East B.C. Thermal Coal Exploration Program
1980

Coal Licence Numbers:

Triangle Area	4029-4032, 5259-5266
Jilg Area	4036-4039, 4043, 4044 5267, 5269-5274, 5277
Merrick Area	5244-5258
Sukunka North	3617, 4034, 4040-4042 4045-4049, 5268, 5275, 5276, 5278

Submitted by: A. Chowdry

December 31, 1980

**GEOLOGICAL BRANCH
ASSESSMENT REPORT**

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TABLE OF CONTENTS

Volume 1

1. INTRODUCTION
2. OBJECTIVES
3. LOCATION-ACCESS-TOPOGRAPHY
4. BASE PLAN AND SURVEYING
5. SERVICING OF PROGRAM
 - 5.1 Accomodation
 - 5.2 Transportation
 - 5.3 Field Equipment
6. FIELD MAPPING
7. DRILL SITE CONSTRUCTION
8. DRILLING
9. GEOPHYSICAL LOGGING
10. COAL SAMPLING AND ANALYSIS
 - 10.1 Outcrop Trenching
 - 10.2 Core Handling and Analysis
11. RECLAMATION
12. REGIONAL SETTING AND GEOLOGY
 - 12.1 Geology of Sukunka North Area
 - 12.1.1 Stratigraphy
 - 12.1.2 Structure
 - 12.1.3 Coal Occurrences
 - 12.2 Geology Merrick, Jilg and Triangle Areas
 - 12.2.1 Stratigraphy
 - 12.2.2 Structure
 - 12.2.3 Coal Occurrences

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12.3 Conclusions and Recommendations

13. FINANCIAL STATEMENT

- APPENDIX A
- (1) N.E. B.C. Thermal Coal Exploration Program Map 1:50,000
 - see:*
PR Sukunka
80(2)A (2) Sukunka North Area, Base Map with Location Points 1:10,000
 - (3) Merrick Map 1:10,000
 - (4) Jilg Area Base Map with Location Points 1:10,000
 - (5) Triangle Area Base Map with Location Points 1:10,000

- APPENDIX B (1) Geological Mapping Field Notes } *see:*
PR-Sukunka 80(3)A
Volume 2

- see:*
PR-Sukunka 80(3)A (2) Core Descriptions - BP 1, 2, 3, 4 and 5
- (3) Geophysical Logs - BP 1, 2, 3, 4 and 5
- (4) Trench Descriptions
- see*
PR-Sukunka 80(4)A (5) Coal Analysis

- APPENDIX C "Notice of Work on a Coal Licence" form
Reclamation Report
Application to Extend Term of Licence

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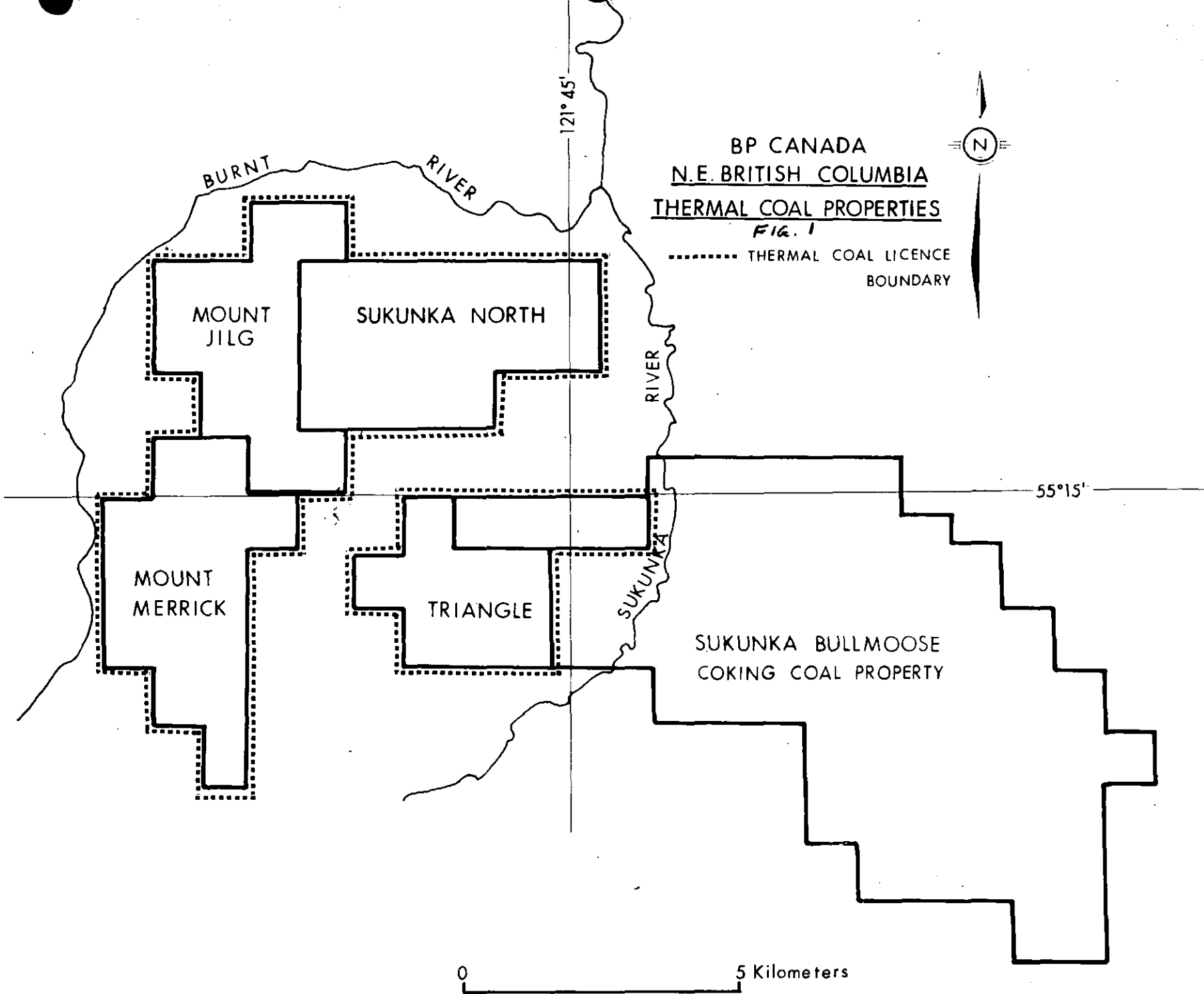
1. INTRODUCTION

This report has been prepared for presentation to the Coal Administrator of the British Columbia Ministry of Energy, Mines & Petroleum Resources, Victoria, British Columbia and in compliance with the Regulations under the Coal Act 1974. It describes the exploration program carried out from May to September, 1980, on BP's optioned Sukunka North property as well as its Merrick, Jilg and Triangle lease blocks.

The North East B.C. Thermal Coal Project consists of 55 coal licences; 20 have been optioned from Master Explorations and the remaining 35 were leased by BP in 1979. All licences have a renewal date of December 31st. For geological reporting purposes this Project has been divided into four areas; Sukunka North, Merrick, Jilg and Triangle Area. For locations see Figure 1.

The 1980 Sukunka North Exploration Program, south of Chetwynd, B.C., was conducted as a helicopter supported mapping and core drilling project. This project employed eight BP personnel and contracts were tendered for helicopter services, drilling, geophysical logging, coal analysis, drill site preparation, reclamation and staff accomodation.

This report should be read in conjunction with BP's application for work credit on the 'Application to Extend the term of Licence' forms for Sukunka North, Merrick, Jilg and Triangle licence blocks, submitted with this report.



BP CANADA
N.E. BRITISH COLUMBIA
THERMAL COAL PROPERTIES
FIG. 1

----- THERMAL COAL LICENCE
BOUNDARY



121° 45'

55° 15'

0 5 Kilometers

2. OBJECTIVES

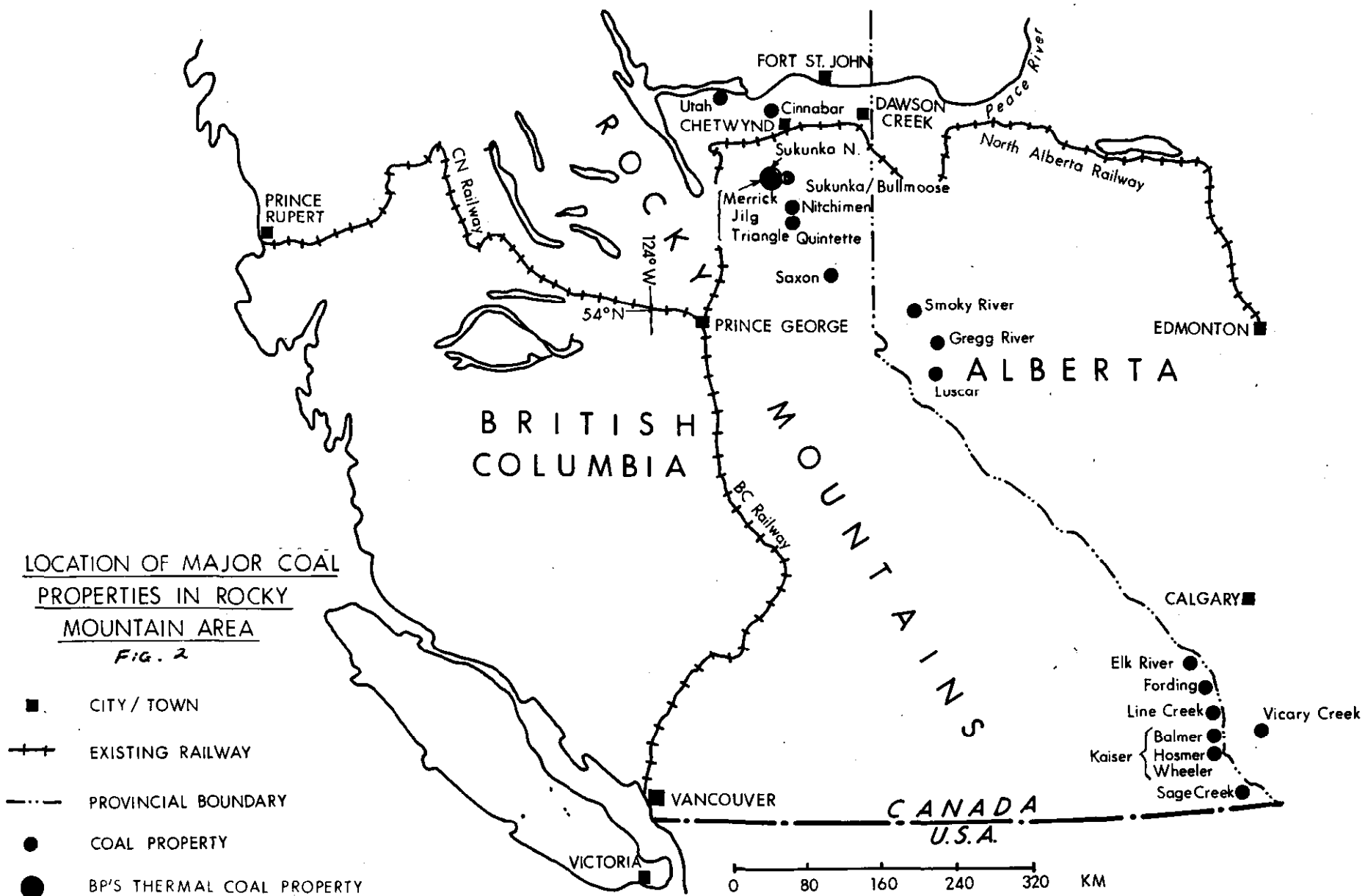
The following objectives were established for the 1980 North East B.C. Thermal Coal Exploration Program.

- 1) To define the formations and locate formation boundaries within the licence areas. Namely, the mapping of Upper, Middle and Lower Gething Formations, the Cadomin Formation and Minnes Group.
- 2) To obtain structural and stratigraphic data on the coal bearing strata, with emphasis on the Lower Gething Formation in the Sukunka North and portions of the Jilg Area and the Minnes Group in the Merrick, Jilg and Triangle.
- 3) To prove coal reserves or the existence of coal by reconnaissance mapping, trenching and/or diamond core drilling.
- 4) To establish the rank and quality of the coal encountered within each formation.

3. LOCATION-ACCESS-TOPOGRAPHY

The North East B.C. Thermal Coal properties, Merrick, Jilg, Triangle and Sukunka North encompass 55 coal licences; 3167, 4029-4032, 4034, 4036-4049, 5244-5278. These licences are illustrated in Figure 1, which also shows the property divisions. The division into four areas has been made to facilitate the large scale at which the area was mapped and due to natural divisions of the property with respect to geology, topography and development potential.

The study area occupies an area of approximately 16.225 ha and is located 50 km south of the town of Chetwynd in



northeastern British Columbia. Figure 2 illustrates the location of the property, its relationship to other proposed coal developments and the existing infrastructure in the region.

Access to the property can only be obtained via helicopter, with the nearest base being at Chetwynd. Access to property is restricted, as there is no bridge crossing the Sukunka River south of the Burnt River into the study area.

The terrain encompassed by the study area varies from rolling mountains, to the less rugged valleys of the Burnt and Sukunka Rivers. The surface elevation varies from 650 to 1500 metres above sea level. Three vegetation zones are present in the area; The Suboreal White Spruce - Alpine Fir Zone; The Subalpine Engelmann Spruce - Alpine Fir Zone; and the Alpine Tundra Zone. A diversity of wildlife is expected on the property, including up to 46 species of mammals and 160 species of birds. The climate of the region is Humid Continental, short summer with a mean annual temperature of 0° and a total annual precipitation of approximately 69 cm.

4. BASE PLANS AND SURVEYING

Prior to commencement of the 1979 Sukunka North Field program, Hardy and Associates produced topographic base maps of the study area. These maps were used again during the 1980 exploration program. The maps, at a scale of

1:10,000 and contoured on 10 m intervals illustrate all streams, roads, clearings and cut lines throughout the area.

In addition, Hardy and Associates supplied air photos of the area with the same 1:10,000 scale.

With the detail afforded on the maps and air photos, drill holes and trenches could be located with little difficulty.

In view of this, and because of the reconnaissance nature of the program, it was decided that detailed legal field surveying was unnecessary. See Appendix A1, A2, A3 and A4 for base maps.

5. SERVICING OF PROGRAM

Major considerations in servicing the drilling and mapping programs were accommodations, transportation and field equipment. Several companies were required to service the drilling and mapping including:

<u>Company</u>	<u>Personnel</u>
BP	8 geologists, technologists and summer student
Maple Leaf Helicopters Ltd.	1 to 2 pilots, partial employment of ground crew (2 men)
Acadia Drilling	5-9 drill crew and supervisor
BPB Instruments Ltd.	2 engineer and helper
North Star Fabricators	2 to 3 slashers
Northland Storage	core shed facilities
Pine Cone Motor Inn	accomodation BP
Chetwynd Court Motel	accomodation, Acadia Drilling
Visa Truck Rentals	2 half ton trucks

5.1 Accomodation

Operations were conducted from field headquarters set up in the Pine Cone Motel in Chetwynd, B.C. Accomodation consisted of 4 to 5 suites being rented for approximately 2½ months with one of the larger suites serving as field office.

The Acadia drill crews stayed at the Chetwynd Court Motel, a couple of blocks from the Pine Cone Motel. The logging contract was shared with Teck Corporation with the engineers being lodged in the Teck camp, 40 km south of Chetwynd.

All other contractors used in the program operations were local and were able to travel to and from their own homes.

A core shed, serviced with electricity and water, was rented in Chetwynd from Northland storage.

5.2 Transportation

Transportation in and around Chetwynd and to the BP Mine Camp, adjacent to the study area, was facilitated by two half ton trucks. They were especially useful in transporting extra helicopter fuel and supplies to the mine camp and hauling the core to town from the camp. Because of its proximity to the study area, the BP Mine Camp became a depot for transporting

equipment supplies and in some cases, crews to and from the field. The half ton trucks were supplied by Visa Truck Rentals through Northern Metallic Ltd. of Chetwynd.

The helicopter transportation of field mapping crews to and from the field from Chetwynd and/or the BP Mine Camp was by a Bell '206' helicopter from Maple Leaf Helicopter Ltd. In some cases, it was necessary to substitute an A-Star helicopter in place of the Bell '206' for large equipment, and/or extra men transportation.

The Bell '206' was also used to transport drill crews to and from the rigs. For drill rig equipment moves, a Bell '204' or '205' was utilized, with an A-Star being used on an occasional basis for lighter equipment. In general, the geophysical logging equipment was moved between the Teck camp and the BP field operation by the A-Star.

5.3 Field Equipment

Communications for the program were handled very well by tying the BP Coal radio system into the BP Oil and Gas shortwave system that utilized a repeater at the summit of Bullmoose Mountain. With this system, communication over 50 km was possible with very few problems. The suite of radios used consisted of a

40 watt base station in Chetwynd, one 40 watt truck mounted radio, two 40 watt units mounted in the rigs and five handheld portable radios for the helicopter dispatched mapping crews. With two frequencies; one relayed through the repeater and the other was for unit to unit communication, the system proved to be very reliable and effective. Field equipment not already on hand was purchased from Ribtor Sales, Caldraft and Petrocraft Ltd., all of Calgary.

6. FIELD MAPPING

The Northeast B.C. coal licences were mapped in detail by three to four field parties supported by helicopter. Each party was made up of an experienced geologist and a summer student. During the two and one half month's project, over 1000 outcrop stations were plotted and described. (See Appendix A2, 3, 4 and 5 for the various base maps and Appendix B (1) for the field notes).

Outcrop stations and other general geological observations were plotted on either the enlarged air photos or 1:10,000 base maps, prepared by Hardy and Associates. Field altimeters and Burnton compasses were used for accurate (± 5 to 10 metres) locations of outcrops and geological features.

Traverses were generally restricted to streams, major ridges and some cutlines. As a result of dense forest cover precluded helicopter landings. 18 helicopter pads

built on the Sukunka North property in 1979 were re-utilized for this year's work, and in addition, it was necessary to build one new pad on the Triangle block. Enough of the Merrick and Jilg study area was above tree line to allow access for helicopter landing.

7. DRILL SITE CONSTRUCTION

Drill site construction was contracted to North Star Fabrication Ltd. of Chetwynd. Six drill sites were constructed with only five being used during the 1980 program. The drill pads, approximately 2400 square metres in size, were often built on or near natural clearings so that timber damage was kept to a minimum.

As the drilling program was helicopter supported, no cat work, ie. road construction or sump preparation, was undertaken. Reclamation was minimal.

8. DRILLING

Acadia Drilling of Kamloops, B.C. was contracted to drill the seven proposed, HQ/NQ diamond core holes on the four licence blocks. Mid-way through the drilling program, because of logistical and geological factors, it was decided that only five of the proposed core holes should be drilled.

Acadia Drilling supplied all of the drilling equipment, and the required supplies and additives.

The equipment and supplies were:

- 1 Longyear 44 rig, helicopter transportable
- 1 Longyear Super 38 rig, helicopter transportable
- Auxiliary water pump and hose
- Mud tanks
- drill stem and core barrels
- drill bits, core boxes, casing and drilling mud

BP was responsible for accomodation, site preparation and transportation of equipment and drill crews to and from drill sites.

The drilling program commenced with the Acadia drilling rigs arriving on June 14, 1980. Hampered by very bad weather, poor drilling conditions and lost time due to poor water supply, the program was completed on August 13.

Drilling commenced on June 16th with the Super 38 drill spudding on BP 80-01 and on June 20th, the 44 rig started drilling BP 80-02. On July 3, after lost circulation and tight hole conditions, BP 80-01 had to be abandoned at a depth of 113 metres with 64 metres of drill stem along with stabilizers, bits, etc. cemented in the hole.

BP 80-02 was completed on July 20th after considerable down hole problems and reducing to NQ core size to complete the hole to a T.D. of 483.71-m.

From July 7 to July 16, BP 80-03 was drilled to a T.D. of 216.97 m with bad weather and some shortage of water being the only major problems encountered.

Acadia's 44 rig was moved from site BP 80-02 to BP 80-04 on the Jilg property on July 22. Although some problems were encountered and coring was reduced to NQ, BP 80-04 was completed by August 4.

The Super 38 rig drilled BP 80-05 on the Merrick licence block. This hole, spudded on August 7, was completed on August 10 (at a depth of 127.11 m). (See Appendix B (2) for Core description and B (3) for Geophysical Logs in regard to the aforementioned drill holes.)

9. GEOPHYSICAL LOGGING

BPB Instruments Ltd. was contracted to run the geophysical logs on the Northeast B.C. Thermal Coal Exploration Program. BPB supplied an engineer and helper, helicopter transportable logging unit, and the necessary logging sondes.

An arrangement was made with Teck Corporation to share the logging contract so that less standby costs would be incurred.

The standard 4 log suite consisting of a Neutron-Neutron Log (Neutron), a Coal Lithology Log (Gamma Ray-Bulk Density-Caliper), a Seam Thickness Log (Caliper-Bed Resolution Density) and a Coal Quality Log (Gamma Ray-Bulk Density) was employed.

The Neutron-Neutron and Coal Lithology Logs record the entire length of the core hole while the Coal Quality and Coal Thickness Logs were only used to record lithology in, and immediately above and below, major coal horizons. The

neutron and lithology logs were recorded at a scale of 1:200 and the coal thickness and quality logs at a 1:20 scale.

All logs were run through the open hole providing they were in a stable condition. Due to down hole problems, much of the geophysical logging was done on holes in which portions were cased.

10. COAL SAMPLING AND ANALYSIS

During the 1980 N.E. B.C. Thermal Coal Exploration Program five core holes and sixty trenches were described in detail. As a result 94 core samples were taken from 16 seams and 132 trench samples were retrieved from 39 trenches for proximate analysis and sulphur, Hardgroves grindability index, specific gravity, calorific value and free swelling index determination. In addition, nine samples taken from boreholes and trenches were sent out for petrographic analysis. (results are pending.) Appendix B (5) contains all of the borehole sections with analysis as well as those trench sections considered to represent mineable thicknesses of coal.

10.1 Outcrop Trenching (See Appendix A for trench locations)

Detailed description and sampling of trenches was one of the major priorities of the 1980 field program. Seams were hand trenched across strike and then described in detail. Sample plys were then taken

with lithological changes in the coal and associated partings, roof and floor being the ply limit parameters.

On the Sukunka North licence block, coal seams could be extrapolated and trenched from existing data (eg. field mapping and boreholes). All trenches were on seams within the Lower Gething Formation.

On the Jilg property, only two significant seams were located; one within the Lower Gething Formation and the other in the Upper Minnes Group.

The Triangle property, like the Jilg, produced very few thick seams in outcrop. Three trenches were made on Gething coal seams with five trenches made on Minnes coals. Two trenches were also dug into, what has been interpreted as, Lower Gething coals in the Rocky Creek area between the Sukunka North and Triangle licence areas.

The Merrick block containing a considerable amount of steeply dipping exposure resulted in 27 trenches being dug. All the Merrick coal trenches were made in Minnes Group.

Upon completion of the trenching program, representative seams were selected and sent to Birtley Coal for analysis. The analysis was completed with the

results illustrated on the detailed Coal Section Sheets provided in Appendix B (5).

10.2 Core Handling and Sampling

The drilling phase of the N.E. B.C. Exploration Program produced approximately 1385 metres of core and 94 core samples (plys). Poor recovery rates made description and sampling difficult, with recovery being especially bad through the coal horizons.

Core was taken by helicopter from the drill site to the BP Mine Camp, where it was loaded onto a half ton truck and transported to the core facilities in Chetwynd. At the core shed it was measured, described in detail and coal samples were taken. The geophysical logs were used to make adjustments to drillers depths and recorded thicknesses. These corrections were generally due to core loss. (See Appendix B (2) for the geologist's core description.)

Coal samples were taken on the basis of the lithological variations within the seam depicted on the geophysical logs described by the geologist. (For analytical and detailed coal sections see Appendix B (5).) All core not sampled was sent to Charlie Lake for storage.

11. RECLAMATION

Due to the minimal amount of surface disturbance, very

little reclamation work was required. In drill site preparation, all damaged and cut timber was "bucked up" and limbed. Since access road construction, leveling of drill sites, and pump preparation was not required, no erosion control or backfilling work was necessary. All drilling additives were biodegradable so no extra site clean up was required other than removal of mud and cement bags, etc. All garbage and refuse was flown from the licence area and properly disposed of.

No bulldozer work or backhoe trenching was done on the licence areas. All trenches were hand dug and in many cases, consisted of reopening of old hand trenches so their reclamation only meant backfilling the small amount of material removed. Not all trenches have been backfilled with the study area as work is to be continued on these licence areas in 1981.

The only costs incurred for reclamation was in the form of man hours and helicopter time.

12. REGIONAL SETTING AND GEOLOGY

The study area is situated on the west side of the Sukunka River, within the Rocky Mountain Foothills, and trending northwesterly along the front ranges of the Rocky Mountains in northeastern British Columbia. The Lower Cretaceous coal-bearing rock successions are sporadically exposed over large areas and special attention was paid to locating

economically viable coal seams within these measures.

Regional stratigraphic studies have been carried out by the Geological Survey of Canada (eg. Stott 1968, 1971). In addition, localized stratigraphic mapping projects are currently being undertaken by the British Columbia Department of Mines.

It is generally known that the Cretaceous sediments were deformed during the Laramide Orogeny. The strata were moulded into a series of en echelon anticlines and synclines and locally punctuated by west dipping thrust faulting. The major fold structures constitute a regional northwesterly trend.

For the convenience of description, the area is divided into two parts: Sukunka North area; and Merrick, Triangle and Jilg area.

12.1 Geology of Sukunka North Area

During 1979 the prospect was mapped on a reconnaissance basis and this led to the understanding of its general rock sequence and structure. However, during 1980 additional information was obtained from several cored boreholes and this enabled the formulation of detailed stratigraphy and the recognition of the various coal zones.

TABLE OF FORMATIONS

	GROUP/FORMATION	THICKNESS (meters)	LITHOLOGY
LOWER CRETACEOUS	Sediments belonging to Fort St. John Group (Moosebar, Commotion and Hasler Formations) are entirely denuded from the west bank area.		
	Bullhead Group	Gething Formation 400-450	Sandstone, calcareous quartzose, cherty; brackish/marine siltstone/mudstone; carbonaceous mudstone coal seams; minor conglomerate.
		Cadomin Formation 25-35	Massive conglomerate, coarse-grained, sandstone minor carbonaceous mudstone.
JURASSIC	Strong regional unconformity bevelling strata of succeedingly older age northward and eastward.		
		Minnes Group 800-1100	Marine and nonmarine sequence comprising sandstone, siltstone and mudstone, carbonaceous mudstone/ coals and minor conglomerates.

12.1.1 Stratigraphy

Minnes Group

The rocks range in age from Jurassic to Lower Cretaceous and are shown on the "Table of Formations".

The oldest rocks belonging to the Minnes Group have very limited exposures and are essentially confined to the valleys of Rocky Creek and Burnt River. As well, some beds of the Minnes are seen in the eroded core of the tight Jilg anticline.

The Cadomin/Minnes contact is rather abrupt. However, there is no evidence of scouring or channeling, although regionally this contact marks a profound level of erosion.

The topmost succession of the Minnes invariably comprises dark grey mudstone/siltstone with an interbedding of carbonaceous shales and thin coal intervals. These are followed by a thick cyclic sequence of sandstone, siltstone and mudstone with or without coal zones. The total thickness of the Minnes exposed in this region may not exceed 100 - 150 m.

Cadomin Formation

The Cadomin Formation commonly consists of two or more conglomerate beds containing well-rounded pebbles, cobbles and boulders (dominantly of multi-colored cherts and quartzites) probably representing piedmont/alluvial plain environment. Interbeds of fine-grained sandstone, siltstone and carbonaceous mudstone often comprise the middle section of the assemblage. The Cadomin invariably provides an excellent lithologic marker horizon for field geology and varies in thickness from 25 - 35 m.

Gething Formation

This formation is readily divisible into three parts:

- a) Upper Gething: This essentially comprises fine- to medium-grained, buff weathering calcareous sandstones, often with large-scale low-angle cross-bedding and cross-laminations. There are two very distinct thin (3-6 m) marine to fresh water siltstone/mudstone units which help to delineate rock sequences. The Upper Gething rocks (8 m thick) are found only around borehole BP-2 area, as elsewhere these beds

have been entirely eroded.

- b) Middle Gething: The contact of the Upper and Middle Gething is invariably heavily scoured and marked by abundant large mudstone intraclasts. The Middle Gething is extremely distinctive and constitutes an excellent marker lithology of (brackish/marine condition) very fine-grained sandstone/siltstone and strongly calcareous mudstone. Certain horizons are intensely bioturbated, have pelecypod shells and usually pyritized fish scales. At least one glauconite band (0.30 m thick) occurs within the sequence and can be easily recognized in the core. It also constitutes a distinctive signature on gamma ray logs. These rocks are rarely exposed; their gross lithological characteristics are synthesized entirely from borehole BP-2 where a total of 100 m sequence has been intersected.
- c) Lower Gething: The contact of Middle and Lower Gething is always marked by gritty/conglomeratic sandstone, 3-6 m thick. Rocks of the Lower Gething range in thickness from 290 - 300 m and are composed of sandstones (slight overall dominance)

siltstone, mudstones, carbonaceous mudstone coals, and conglomerates. The latter often are lenticular and highly variable in lithology. The sediments in general are dark grey, siliceous to richly argillaceous and embody a variety of current structures such as planar and trough cross-bedding, wedge-shaped, and low- to medium-angle cross-stratification, ripple-drifting cross-lamination. There are numerous horizons incorporating medium- to coarse-grained sandstones with abundant plant debris (sometimes large chunks of 'woody' material leaving casts on the under-surfaces of sandstone). These sandstones are often ill-sorted, thick- to poorly-bedded and generally contain abundant coal spar. Such deposits can be favourably compared with modern day channel-lag sediments.

12.1.2 Structure

The Sukunka North block is essentially a synclorium within which the strata are undulating with dips commonly ranging from 5° to 20° . The overall synclinal axis trends in northwest/southeast direction along which

maximum thickness of strata are preserved. On the whole it would appear that folding is more common than faulting. This view is further supported by the cored borehole information wherein only minor sections of the strata are occasionally disturbed suggesting little or no displacement. The only exception being the borehole DDH 1 which shows 6 - 7 m thick badly sheared and brecciated strata. However, here the surface exposures exhibit structural dips in the region of 45° - 50° and the area has been mapped to encompass a significant thrust faulting.

12.1.3 Coal Occurrences

Within the Sukunka North block, coal is restricted to the Lower Gething sequence within which several coal zones are recognized. It is very difficult to establish a correlation between these coals and those of the east bank. Only the topmost zone of the present area can be equated (with a degree of certainty) with the 'B' zone of the eastern region. Therefore the remainder of the coal occurrences have been given local names and these imply no regional correlation. Of the total coal zones of the Lower Gething, there

are four significant coal intervals that can be traced through most of the area. The lowest zone is about 30 - 35 m above the Cadomin (Cadomin Seam) and its maximum thickness is 2.2 m (average 1.5 m) in the Mt. Jilg area from where it appears to thin out gradually to the northwest and southeast. It has an abrupt sandstone roof and this factor might in part be responsible for its thinning. Floor sediments comprise carbonaceous mudstone and siltstone. The seam has been exposed in numerous trenches.

The next coal zone occurs about 115 - 120 m above the Cadomin and is designated as "Grizzly" Seam. It has been intersected in boreholes BP-1 and BP-2 and appears to have been washed out in the region of BP-3. Though the total coal zone may be 10 - 12 m thick, the total coal intervals seldom exceed 4 m. The zone has also been located in two trench sections. However, there are significant lithological variations between the trench and borehole intersections. Immediate roof and floor measures comprise highly carbonaceous mudstones.

About 30 - 35 m stratigraphically above the Grizzly zone lies the "Pump" zone. It has been intersected in boreholes BP-1, BP-2 and BP-3 and the zone thickness varies from 4 - 6 m, of which about 3 m might be coal. The zone was exposed in a trench and it also exhibits wide variation of lithologies and thickness between its trench and borehole sequence. The roof and floor sediments comprise mudstone. The topmost sizeable coal zone "B" lies about 215 - 220 m above the Cadomin or about 60 m below the Middel/Lower Gething contact. The zone is split into "B" Upper (BU) and "B" Lower (BL), the two components being separated by about 10 - 12 m thick interseam sediments comprising mudstone and argillaceous siltstone. The total coal content of the zone varies from 1.5 to 2.5 m and the top zone appears to be more consistent though the lower zone may be considerably thicker. The zone B has been intersected only in boreholes BP-2 and BP-3 and was not exposed in trench section. Immediate roof and floor strata comprise mudstone.

For coal quality data, reference should be made to the relevant information contained in the Appendices.

12.2 Geology of Merrick, Jilg and Triangle Area

These licences were mapped during 1980 on a reconnaissance basis, the vast majority of which are underlain by the Minnes strata with occasional remnants of the Post-Minnes sediments being preserved within the cores of narrow synclines. The structural grain of the area broadly conforms with the regional northwest/southeast trend though some local accentuations of the structure are evidenced (eg. Merrick block because of its juxtaposition with Front Ranges has overturned structures).

12.2.1 Stratigraphy

Although regionally the Minnes Group comprises the Monteith (oldest), Beattie Peaks, Monach and 'Un-named'(youngest; Stott is presently proposing to assign these beds the formational status - the Bickford Formation) Formations; these stratigraphic subdivisions are not readily identifiable in field within the study area because of the profound facies changes. For example, to the northwest of this area, the Monach is well developed and is represented by clean orthoquartzites but in the study area only two orthoquartzite bands, each about 5 - 6 m thick have been identified and these have been assumed to represent the lateral

equivalents of the Monach Formation.

It was previously held by some workers that the only coal-bearing succession of the Minnes included the Bickford Formation. However, the present study shows unequivocally that coal occurrence is more widespread within the Minnes strata (including the Beattie Peaks), thereby increasing the stratigraphic range and areal distribution of potential coal-bearing sediments in the areas of British Columbia Foothills.

Borehole BP-4 intersected about 285 m of undisturbed Bickford strata and these rocks compare favourably with the surface exposures. For detailed sedimentary features of the Minnes, reference should be made to the relevant field notes in the Appendices.

12.2.2 Structure

The Western licences of the Merrick block have very severe structures because of their proximity to the major tectonic event as manifested by the thrusting of Palaeozoic limestones against the Minnes strata. This resulted in the overturning of the west limb of a tight syncline (enclosing the Cadomin and some

Gething) where dips of 50° - 65° are quite common. Away from this zone to the northeast the Bickford strata continue dipping steeply to the southwest until this regime is replaced by another west dipping thrust throwing the Bickford against Bickford, the precise magnitude of the displacement is not known. To the east side of this thrust is a significantly large synclinal fold with dips seldom exceeding 20° . The area between this syncline and Mt. Eric is dominated essentially by steeply dipping folds with dips varying from 15° and 55° .

The Jilg block is dominated by tight anticlinal and synclinal folding with dips locally approaching 70° . These tectonic styles are best exemplified by the top of Mt. Jilg, from thence this structural pattern can be followed to the northwest, ie. around Hill 1507. Following the sequence to the southwest of Mt. Jilg along the ridge connecting Mt. Jilg and Mt. Eric, the rocks dip to the southwest. The central notch of this ridge is associated with dip reversal suggesting the presence of a thrust fault at this point, throwing the Beattie Peaks strata of Mt. Eric over the Bickford Formation.

The central portion of the Triangle block consists of synclinal structure embodying the Cadomin and a veneer of Gething sequence in core section. Dips in this region commonly range from 15° - 30° . Along its northeastern limb, there is ample evidence of structural dislocation of strata and this disturbance is most probably related to a sizeable thrust (in excess of 50 m). Further eastward another thrust fault occurs registering a much greater displacement of strata involving the Lower Bickford against the Upper Bickford successions. From then on the dips are rather gentle (5° - 10°) and there is a gradual gaining of stratigraphic section - perhaps as much as 100 m thick Lower Gething may be preserved.

To the southwest of the major syncline, the strata are largely Bickford and older and are involved in a series of anticlinal and synclinal tight (30° - 80° dips) style of folding, punctuated perhaps by numerous west dipping thrust faults.

12.2.3 Coal Occurrences

There is a very limited scope for the Gething coals within the Jilg, Triangle and Merrick blocks as the Gething sediments are confined

to small tight folds. As far as the Jilg licences are concerned, only the lowermost barren Gething is preserved and inclined at steep angles and truncated off by a thrust fault.

Within the Triangle syncline, only 30 - 40 m thick lower Gething rocks have survived erosion. These rocks contain about 0.5 m thick coal seam and this coal is probably the lateral equivalent of the much thicker Cadomin Seam.

The Lower Gething sequence also outcrops to the east (area previously held under West Bank licences) and although no coal outcrops were located during surface mapping, sufficient thickness of the coal-bearing sediment are believed to be preserved.

Within the Merrick block, the Lower Gething is entirely restricted to the core of an overturned syncline. Here, at least two coal zones, each 0.5 - 1.5 m thick have been recorded. However, these were very difficult to trace laterally due to structural complexity.

Minnes Coals

The Minnes coals occur throughout the Bickford

Formation and possibly within the Beattie Peaks. However, the sizeable coal zones appear to be confined to the uppermost 50 m of the Bickford Formation. Two coal seams named Merrick and Rusty, occur within 30 m of the Cadomin base. These are about 8 to 10 m apart, and are each, on average, 2 m thick. These seams have been traced over considerable distances but are inclined at 45° - 60° . It appears these coals deteriorate and thin out across the depositional strike, ie. within the Jilg/Triangle regions. Similar situation prevails within the Sukunka North licences, as evidenced by the Bickford intersections found in borehole BP-4.

It has been previously held that the Beattie Peaks strata are entirely composed of marine sediments. However, during these investigations, it has been found to contain thick non-marine sequences including coal zones. These coals are generally thin and uneconomic. A notable exception here being the Hill Seam which is over 2.5 m thick and occurs within an isolated high terrain. However, it appears to have been washed out (upper half) by a conglomerate channel in the environs of borehole BP-5.

A notable feature of these coals is the needle-like fabric of the constituent elements - this preservation suggesting insufficient "induration" of the vegetal matter.

For the location of various seam trenches and quality information, reference should be made to the relevant maps and Appendices.

12.3 Conclusions and Recommendations

The Sukunka North block, over all, has large segments of gently undulating Lower Gething strata in which two coal zones, each 3 to 4 m thick of suitable thermal coal quality have been established. Some of these coals may be amenable to surface mining methods. However, considerable variations in seam thickness and quality are exhibited over short distances. Therefore further drilling is imperative to substantiate the continuity, quality and quantity of the coals involved.

The majority of strata encompassed by the Jilg block are steeply inclined. Area of low dips is restricted to a syncline located northwest of borehole BP-1 where sufficient thickness of the Lower Gething rocks exists to enclose the Grizzly/Pump zones. A borehole is required to test this structure.

The Triangle block is complexly folded and faulted and since no major coal seams have been unearthed, it

does not appear to rank among the priority areas.

One borehole may be necessary to evaluate the gentler Gething rocks.

The Merrick is known to contain sizeable coal seams within the uppermost segment of its Bickford sequence. There are several structurally favourable areas within the Bickford as well as the Beattie Peaks and these should be tested by a suitably located drilling program.

13. FINANCIAL STATEMENT

For expenditures as they apply to specific licence blocks, see "Application to Extend a Term of Licence" forms in Appendix C. The following list illustrates expense category, principal contractors and amount expended. Note: actual cost figures are subject to minor changes due to updates, especially in the salary and coal analysis categories.

Accommodation & Catering	Pine Cone & Chetwynd Court Motels	\$ 24,148.59
Field Equipment	Ribtor Sales, Petrocraft	3,112.32
Communications	Canadian Marconi	2,140.26
Helicopter Services	Maple Leaf Helicopters	139,923.57
Transportation	Visa Rentals, Pacific Western	12,058.14
Core Drilling	Acadia Drilling Ltd.	186,517.38
Geophysical Logging	BPB Instruments Ltd.	14,226.95
Drill Site Preparation	North Star Fabricators	5,680.00
Coal Analysis	Birtley Coal & Minerals	20,132.00
Contract Personnel	Summer Students, Draftsman	7,814.78
BP Salaries, 'Field'	BP Employees	46,247.00
BP Salaries, 'Back up'	BP Employees	11,915.00
Reporting, Printing etc.	Riley's Reprographics	655.80
Total Program Expenditures		<u>\$474,571.79</u>

Do not
film
Appendix C

APPENDIX C

Ministry of Energy, Mines and Petroleum Resources
Ministry of Energy, Mines and Petroleum Resources

667

Province of British Columbia
Ministry of Energy, Mines and Petroleum Resources

NOTICE OF WORK ON A COAL LICENCE
MINERAL RESOURCES BRANCH
INSPECTION AND ENGINEERING DIVISION

NOTICE OF WORK ON A COAL LICENCE
(Section 7 of the Coal Mines Regulation Act)

This notice is to be completed by all companies or individuals carrying out exploration work prior to commencement of work and of cessation of work and forwarded to the Chief Inspector of Mines with a copy to the District Inspector of Mines. If mechanical equipment is used in surface work, Form 8 overleaf must be completed.

1. NAME OF PROPERTY MERRICK/JILG
Coal Licence Numbers 5244 to 5258, 5267 to 5278
2. LOCATION Prince George, B.C. NTS map sheet no. 93 D4
OWNERS NAME
Long. T21 S 8 S 6 Access Via Between Burnt and Sukunka Rivers, approximately 6.0 km. south of Chetwynd; Access by helicopter.
3. OWNER'S NAME BP Exploration Canada, as
Address 333 - 5th Avenue S.W. Calgary, Alta. Telephone No. 237-1234
4. OPERATOR'S NAME As above
Address Telephone No.

5. ESTIMATED DURATION OF WORK: From to
OR: ACTUAL DATE WORK COMPLETED: From June 14, 1980... to August 10, 1980..

6. DESCRIPTION OF WORK (Use metric measure - 1 metre = 3.3 feet.) (Show on 1:50 000 scale map.)
Linecutting (distance, width, method) Nil
Distance, width, method) Nil

(Requires approval of Ministry of Forests, 'Licence to Cut' or 'Fire Use Permit' may be withheld until reclamation program is approved.)

(a) Road Construction: Total length Nil m Approximate width m Area m²

(b) Test Pits: No. Nil. Maximum dimensions: Width m Length m Depth m
Total disturbed area of test pits m²

(c) Drilling: No. of holes 2 Type: Core Size: HQ, NQ Maximum hole length 4.30 m
Approximate size of drill pads 30 x 40 m Total disturbed area of drillsites 2400 m²

(d) Adits: (d) Adits: No. rising at Nil m No. level No. dipping at is
Maximum length adit m Total disturbed area of adits m²

(e) Trenches: No. 29 Maximum dimensions: Width 5 m Length 4 m Depth 5 m
Total disturbed area of trenches 58 m²

(f) Other (for example, please specify underground work) Nil

GRAND TOTAL OF AREA DISTURBED 2458 m²

7. APPROXIMATE NUMBER OF MEN EMPLOYED 9

8. DATE FOREST SERVICE ADVISED BY OPERATOR April 10, 1980
Name of Official Mr. Lorne McQueen Title Chief Forest Ranger
Address Chetwynd, British Columbia

SIGNATURE OF APPLICANT R.J. Melin TITLE Senior Technologist
PRINT NAME R.J. Melin DATE Sept 15, 1980

NOTE: Owner, agent or manager is responsible for ensuring the Contractor complies with pertinent regulations (see section 27(6), Coal Mines Regulation Act). Pursuant to section 8, subsection 2(a) of the Coal Mines Regulation Act, where the employment of mechanical equipment is likely to disturb the surface of the land in digging, stripping, trenching, the reclamation program on the reverse side, also to be submitted.

Province of British Columbia
Ministry of Energy, Mines and Petroleum Resources

MINERAL RESOURCES BRANCH
INSPECTION AND ENGINEERING DIVISION

RECLAMATION PROGRAM NOTICE

(Section 8 of the Coal Mines Regulation Act)

This form is to be completed when exploration work is done with mechanical equipment. Submission is required prior to commencement of work and at completion of work. One copy is sent to each of the following:

- Senior Reclamation Inspector, Victoria
- District Inspector of Mines
- Regional Reclamation Inspector, Technician
- Regional Manager, Fish and Wildlife Branch
- District Forester or Ranger
- Regional Manager, Water Resources Branch
- Regional Manager, Lands Branch
- Ministry of Agriculture, ATTN:

For advice on procedure and reclamation methods, see booklet entitled, 'Handbook of Environmental Protection and Reclamation in Coal Exploration.'

1. THIS IS: A proposed reclamation program or a completed reclamation program

2. PRESENT STATE OF LAND ON WHICH EXPLORATION WILL BE DONE IS:

Canada Land Inventory (where possible): T2, R2, and L

Present Land Use (ranching, timber, etc.): Vacant Crown Land

Type of Vegetation: Climax, Alpine/Sub-Alpine, Alpine Fir, Englemann Spruce

Access Road (present use, condition): Nil

Other: Nil

3. EQUIPMENT TO BE USED FOR EXPLORATION (List size, capacity, and number.)

(a) 1) 206 Helicopter (d)

(b) 1) Diamond Core Drilling Rig (e)

(c) 1) 205 Helicopter (occasional) (f)

basis

4. RECLAMATION EQUIPMENT TO BE USED (for example, resploping, harrowing, or specialty equipment):

(a) (b) (c)

5. GENERAL DESCRIPTION OF PROTECTIVE MEASURES PURSUANT TO SECTION 8

(Show work and reclamation on 1:50,000 scale map and include with full distribution noted above.) (For proposed work programs include with submissions to Ministry of Energy, Mines and Petroleum Resources documentation on 1:10,000 scale (map scale) air photograph or map background overlay.)

Drillsite Reclamation: All timber cut down during drillsite construction was limbed and bucked up. All garbage, including mud and cement, was removed from the drillsite and disposed of at the BP camp dumping site.

Trench Reclamation: All trenches were small, hand-dug coal trenches and in many cases consisted of reopening trenches from previous exploration work either by the BC Government or other coal licence holders. Since more exploration work is planned for the area, not all trenches were filled in and reclaimed.

6. SUMMARY OF AREA DISTURBANCE AND RECLAMATION

Area disturbed current year	2458	Previous years		Total to date	2458
Area reclaimed current year	2400	Previous years (final)		Total to date	2400

7. RECLAMATION MANAGER'S NAME: R. M. Redgate

Address: 333 5th Avenue S.W., Calgary, Alta.

DATE: September 15, 1980 SIGNATURE: R. M. Redgate

When geotechnical and reclamation work have been completed for the calendar year a final reclamation report should be submitted to the three Ministry of Energy, Mines and Petroleum Resources personnel noted at the top of this form. For details see the booklet entitled, 'Handbook of Environmental Protection and Reclamation in Coal Exploration.'



Province of British Columbia
 Ministry of Energy, Mines and Petroleum Resources

MINERAL RESOURCES BRANCH
 INSPECTION AND ENGINEERING DIVISION

NOTICE OF WORK ON A COAL LICENCE

(Section 7 of the Coal Mines Regulation Act)

This notice is to be completed by all companies or individuals carrying out exploration work prior to commencement of work and at cessation of work and forwarded to the Chief Inspector of Mines with a copy to the District Inspector of Mines. If mechanical equipment is used in surface work, Form 8 overleaf must be completed.

1. NAME OF PROPERTY: **SUKUNKA NORTH**
 Coal Licence Numbers: **3617, 4029, 4032, 4034, 4036 to 4049**
2. LOCATION: **PRINCE GEORGE, B.C.** (NTS map sheet **93P4.5**)
 Lat. **55° 18'** Long. **121° 48'** Access via **located between Burnt and Sukunka Rivers on either side of Rocky Creek 60 km south of Chetwynd. Access via helicopter.**
3. OWNER'S NAME: **Masiars Exploration Ltd.**
 Address: **320 7th Avenue S.E. Calgary, Alta.** Telephone No.
4. OPERATOR'S NAME: **BP Exploration Canada**
 Address: **333 - 5th Avenue S.W. Calgary, Alta.** Telephone No. **(403) 237-1234**
5. ESTIMATED DURATION OF WORK: From
 OR: ACTUAL DATE WORK COMPLETED: From **June 1980** to **August 24, 1980**
6. DESCRIPTION OF WORK (Use metric measure - 1 metre = 3.3 feet.) (Show on 1:50 000 scale map.)
 Linecutting (distance, width, method) ... **Nil**
 (Requires approval of Ministry of Forests. Licence to Cut or Free Use Permit may be withheld until reclamation program is approved.)
 (a) Road Construction: Total length: **Nil** Approximate width: Area: m²
 (b) Test Pits: No. **Nil** Maximum dimensions: Width: Length: m Depth: m
 Total disturbed area of test pits: m²
 (c) Drilling: No. of holes: **3** Type **Core** Size **HQ, NQ** Maximum hole length: **482** m
 Approximate size of drill pads: **30 x 40** m Total disturbed area of drillsites: **3600** m²
 (d) Adits: No. rising at: **Nil** No. level: No. dipping at: is
 Maximum length adit: m Total disturbed area of adits: m²
 Hand
 (e) Trenches: No. **2** Maximum dimensions: Width: **5** m Length: **4** m Depth: **5** m
 Total disturbed area of trenches: **42** m²
 (f) Other (for example, please specify underground work): **Nil**
GRAND TOTAL OF AREA DISTURBED: 3600 m²
7. APPROXIMATE NUMBER OF MEN EMPLOYED: **9**
8. DATE FOREST SERVICE ADVISED BY OPERATOR: **April 10, 1980**
 Name of Official: **Lorne McQueen** Title: **Chief Forest Ranger**
 Address: **Chetwynd, British Columbia**

SIGNATURE OF APPLICANT: *R.J. Melin* TITLE: **Senior Technologist**
 PRINT NAME: **R.J. Melin** DATE: **Sept. 15, 1980**

NOTE: Owner, agent, or manager is responsible for ensuring the Contractor complies with pertinent regulations (see section 27(6), Coal Mines Regulation Act). Pursuant to section 8, subsection 2(a) of the Coal Mines Regulation Act, where the employment of mechanical equipment is likely to disturb the surface of the land in clearing, stripping, trenching, the reclamation program on the reverse side is also to be submitted.



Province of British Columbia
Ministry of Energy, Mines and Petroleum Resources

MINERAL RESOURCES BRANCH
INSPECTION AND ENGINEERING DIVISION

RECLAMATION PROGRAM

(Section 8 of the Coal Mines Regulation Act)

This form is to be completed when exploration work is done with mechanical equipment. Submission is required prior to commencement of work and at completion of work. One copy is sent to each of the following:

- Senior Reclamation Inspector, Victoria
- District Inspector of Mines
- Regional Reclamation Inspector-Technician
- Regional Manager, Fish and Wildlife Branch
- District Forester or Ranger
- Regional Manager, Water Resources Branch
- Regional Manager, Lands Branch
- Ministry of Agriculture, ATTN:

For advice on procedure and reclamation methods, see booklet entitled: "Handbook of Environmental Protection and Reclamation in Coal Exploration."

1. THIS IS: A proposed reclamation program or a completed reclamation program .

2. PRESENT STATE OF LAND ON WHICH EXPLORATION WILL BE DONE IS:

Canada Land Inventory (where possible) T2, U2, and L...

Present Land Use (ranching, timber, etc.) Vacant Crown Land

Type of Vegetation Climax, Sub-Alpine Fir and Englemann Spruce

Access Road (present use, condition) Nil

Other Nil

3. EQUIPMENT TO BE USED FOR EXPLORATION (List size, capacity, and number):

(a) 1) 206 Helicopter (d) ...

(b) 1) Diamond Core Drilling Rig (e) ...

(c) 1) 205 Helicopter (occasional basis) (f) ...

4. RECLAMATION EQUIPMENT TO BE USED (for example, resloping, harrowing, or specialty equipment):

(a) ... (b) ... (c) ...

5. GENERAL DESCRIPTION OF PROTECTIVE MEASURES PURSUANT TO SECTION 8

(Show work and reclamation on 1:50 000 scale map and include with full distribution noted above.) For proposed work programs include with submissions to Ministry of Energy, Mines and Petroleum Resources documentation on 1:10 000 (approximate scale) air photograph or air photograph overlay.)

Drillsite Reclamation: All timber cut down during drillsite construction was limbed and bucked up. All garbage, including mud and cement, was removed from the drillsite and disposed of at the BP camp dumping site.

Trench Reclamation: All trenches were small, hand-dug coal trenches and in many cases consisted of reopening trenches from previous exploration either by the B.C. Dept. of Mines and Petroleum Resources, the Geological Survey of Canada, or previous coal leases holders in the area. Since more exploration is planned for this area, not all of the hand trenches were filled in and reclaimed.

6. SUMMARY OF AREA DISTURBANCE AND RECLAMATION

Area disturbed current year	3642 m ²	Previous years		Total to date	3642 m ²
Area reclaimed current year	3600 m ²	Previous years (final)		Total to date	3600 m ²

7. RECLAMATION MANAGER'S NAME: R.M. Redgate

Address: 353 5th Avenue S.W., Calgary, Alberta

DATE: September 15, 1980 SIGNATURE: [Signature]

*When geotechnical and reclamation work have been completed for the calendar year a final reclamation report should be submitted to the three Ministry of Energy, Mines and Petroleum Resources personnel noted at the top of this form. For details see the booklet entitled, "Handbook of Environmental Protection and Reclamation in Coal Exploration."



Province of British Columbia
 Ministry of Energy Mines and Petroleum Resources

MINERAL RESOURCES BRANCH
 INSPECTION AND ENGINEERING DIVISION

NOTICE OF WORK ON A COAL LICENCE

(Section 7 of the Coal Mines Regulation Act)

This notice is to be completed by all companies or individuals carrying out exploration work prior to commencement of work and at cessation of work and forwarded to the Chief Inspector of Mines with a copy to the District Inspector of Mines. If mechanical equipment is used in surface work, Form 8 overleaf must be completed.

1. NAME OF PROPERTY: TRIANGLE

Coal Licence Numbers: 5259 - 5266

2. LOCATION: 9 Prince George, B.C. NTS map sheet no. 93 P4

Lat. 55° 13' 21" N Long. 121° 48' 48" W Access Via: Between Rocky Creek and the Sukunka Rivers, approx. 60 km south of Chetwynd. Access by helicopter.

3. OWNER'S NAME: BP Exploration, Canada

Address: 333 - 5th Avenue S.W., Calgary, Alta. Telephone No. 237-1234

4. OPERATOR'S NAME: As above

Address: Telephone No.

5. ESTIMATED DURATION OF WORK: From

OR: ACTUAL DATE WORK COMPLETED: From June 14, 1980 to August 10, 1980

6. DESCRIPTION OF WORK (Use metric measure - 1 metre = 3.3 feet) (Show on 1:50,000 scale map.)

Linecutting (distance, width, method) Nil

(Requires approval of Ministry of Forests, 'Licence to Cut' or 'Free Use Permit' may be withheld until reclamation program is approved.)

(a) Road Construction: Total length Nil m Approximate width m Area m²

(b) Test Pits: Nil Maximum dimensions: Width m Length m Depth m

Total disturbed area of test pits m²

(c) Drilling: No. of holes Nil Type Size Maximum hole length m

Approximate size of drill pads m Total disturbed area of drill pads m²

(d) Adits: No. rising at Nil No. level No. dipping at

Maximum length adit m Total disturbed area of adits m²

(e) Trenches: No. 10 Maximum dimensions: Width m Length m Depth m

Total disturbed area of trenches m²

(f) Other (for example, please specify underground work) Nil

GRAND TOTAL OF AREA DISTURBED 10 m²

7. APPROXIMATE NUMBER OF MEN EMPLOYED 10

8. DATE FOREST SERVICE ADVISED BY OPERATOR April 10, 1980

Name of Official: Lorne McQueen Title: Chief Forest Ranger

Address: Chetwynd, British Columbia

SIGNATURE OF APPLICANT: R.J. Melin TITLE: Senior Technologist

PRINT NAME: R.J. Melin DATE: September 15, 1980

NOTE: Owner, operator or manager is responsible for ensuring the Contractor complies with pertinent regulations (see section 27(6), Coal Mines Regulation Act). Pursuant to section 8, subsection 2(a) of the Coal Mines Regulation Act, where the employment of mechanical equipment is likely to disturb the surface of the land in clearing, stripping, trenching, the reclamation program on the rocky side is also to be submitted.



Province of British Columbia
Ministry of Energy, Mines and Petroleum Resources

MINERAL RESOURCES BRANCH
INSPECTION AND ENGINEERING DIVISION

RECLAMATION PROGRAM

(Section 8 of the Coal Mines Regulation Act)

This form is to be completed when exploration work is done with mechanical equipment. Submission is required prior to commencement of work and at completion of work. One copy is sent to each of the following:

- Senior Reclamation Inspector, Victoria
District Inspector of Mines
Regional Reclamation Inspector-Technician
Regional Manager, Fish and Wildlife Branch
District Forester or Ranger
Regional Manager, Water Resources Branch
Regional Manager, Lands Branch
Ministry of Agriculture, ATTN:

For advice on procedure and reclamation methods, see booklet entitled: Handbook of Environmental Protection and Reclamation in Coal Exploration.

1. THIS IS: A proposed reclamation program [] a completed reclamation program [X]

2. PRESENT STATE OF LAND ON WHICH EXPLORATION WILL BE DONE IS:

Canada Land Inventory (where possible) T2, U2 and L

Present Land Use (fencing, timber, etc.) Vacant Crown Land

Type of Vegetation Climax: Alpine/Sub-Alpine, Alpine Fir, Englemann Spruce

Access Road (present use, condition) Nil

Other Nil

3. EQUIPMENT TO BE USED FOR EXPLORATION (List size, capacity, and number.)

(a) 206 Helicopter (d)

(b) (e)

(c) (f)

4. RECLAMATION EQUIPMENT TO BE USED (for example, resloping, harrowing, or specialty equipment):

(a) (b) (c)

5. GENERAL DESCRIPTION OF PROTECTIVE MEASURES PURSUANT TO SECTION 8

(Show work and reclamation on 1:50 000 scale map and include with full distribution noted above.) (*For proposed work programs include with submissions to Ministry of Energy, Mines and Petroleum Resources documentation on 1:10 000 (approximate scale) in photograph or air photograph overlay.)

Trenching consisted of small hand-dug trenches or reopening of trenches from previous exploration in the area by the B.C. Dept. of Mines and Petroleum Resources, the Geological Survey of Canada, or other coal licence holders in the area. Since more exploration is planned for this area, not all of the hand trenches were filled in and reclaimed.

6. SUMMARY OF AREA DISTURBANCE AND RECLAMATION

Area disturbed current year 10 m Previous years Total to date 10 m^2

Area reclaimed current year Previous years (final) Total to date

7. RECLAMATION MANAGER'S NAME: R.M. Redgate

Address 333 - 5th Avenue S.W. Calgary, Alberta

DATE September 15, 1980 SIGNATURE R.M. Redgate

*When geotechnical and reclamation work have been completed for the calendar year a final reclamation report should be submitted to the three Ministry of Energy, Mines and Petroleum Resources personnel noted at the top of this form. For details see the booklet entitled: Handbook of Environmental Protection and Reclamation in Coal Exploration.



PR-Sukunka 80(2)A

CONFIDENTIAL
PR-Sukunka 80(2)A

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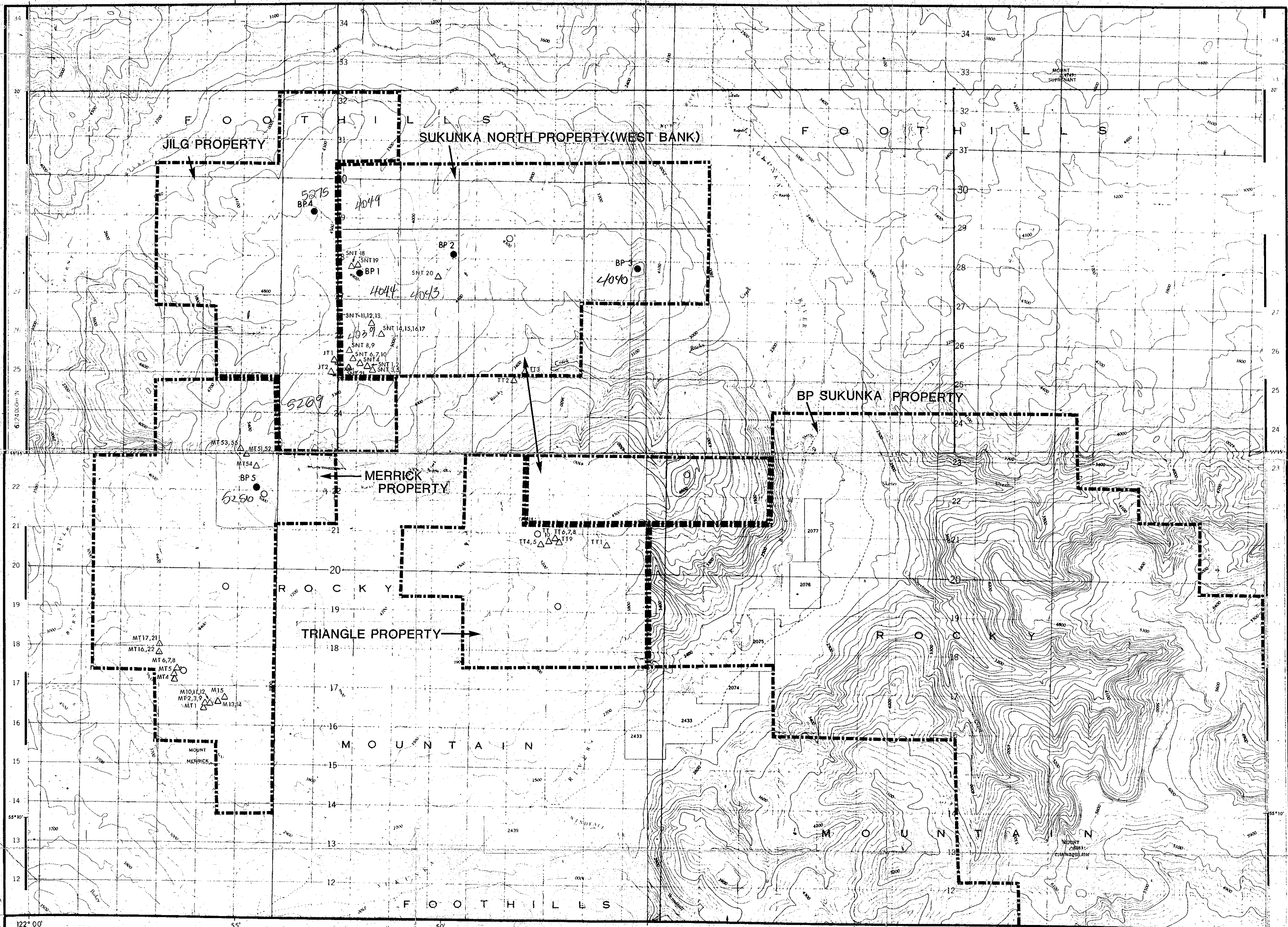
CONFIDENTIAL

OPEN FILE

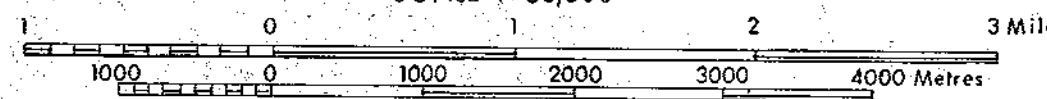
**GEOLOGICAL BRANCH
ASSESSMENT REPORT**

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55'



BRITISH COLUMBIA
SCALE 1: 50,000



LEGEND

- PROPOSED BOREHOLE LOCATION
- COMPLETED BOREHOLE LOCATION
- COAL LEASE OUTLINE
- △ TRENCH LOCATIONS

PR-Sukunka 80(a)A

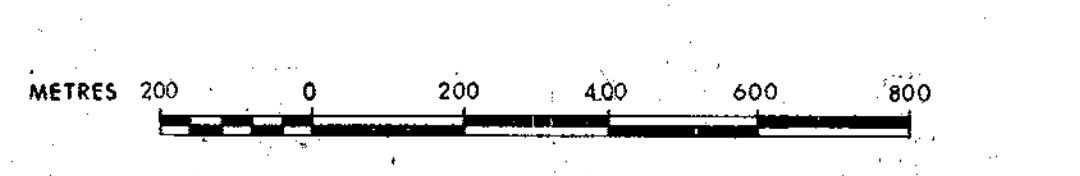
BP Exploration Canada Limited COAL DIVISION	
N.E. BRITISH COLUMBIA 1980 THERMAL COAL EXPLORATION PROGRAM <i>Drillholes</i>	
AUTHOR: R. MELIN	DATE: SEPT. 1980
REVISED:	REPORT:
SCALE: 1: 50,000	DRAWING No. 40277

667



NOTES:
 1. THIS MAP WAS DERIVED FROM A 2:50,000 SCALE PHOTO AERIAL PHOTOGRAPHY.
 2. THIS MAP WAS DERIVED FROM A 2:50,000 SCALE PHOTO AERIAL PHOTOGRAPHY.
 3. THIS MAP WAS DERIVED FROM A 2:50,000 SCALE PHOTO AERIAL PHOTOGRAPHY.

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 BP Exploration Canada Limited
 10000 146th Street, Edmonton, Alberta T5A 0G6, Canada



LEGEND

1979 STATIONS
 1980 STATIONS
 STRIKE & DIP

• S3
 • RA 103
 • WR 20
 • T425

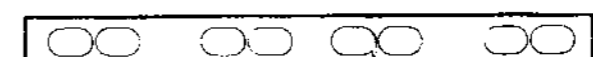
BP Exploration Canada Limited
 COAL DIVISION

SUKUNKA NORTH EXPLORATION PROGRAM 1980
 N.E. British Columbia

SUKUNKA NORTH BLOCK
 BASE MAPS WITH OBSERVATION POINTS

AUTHOR:	DATE:
REVISED:	REPORT:
SCALE: 1:10,000	DRAWING No.: 40,167

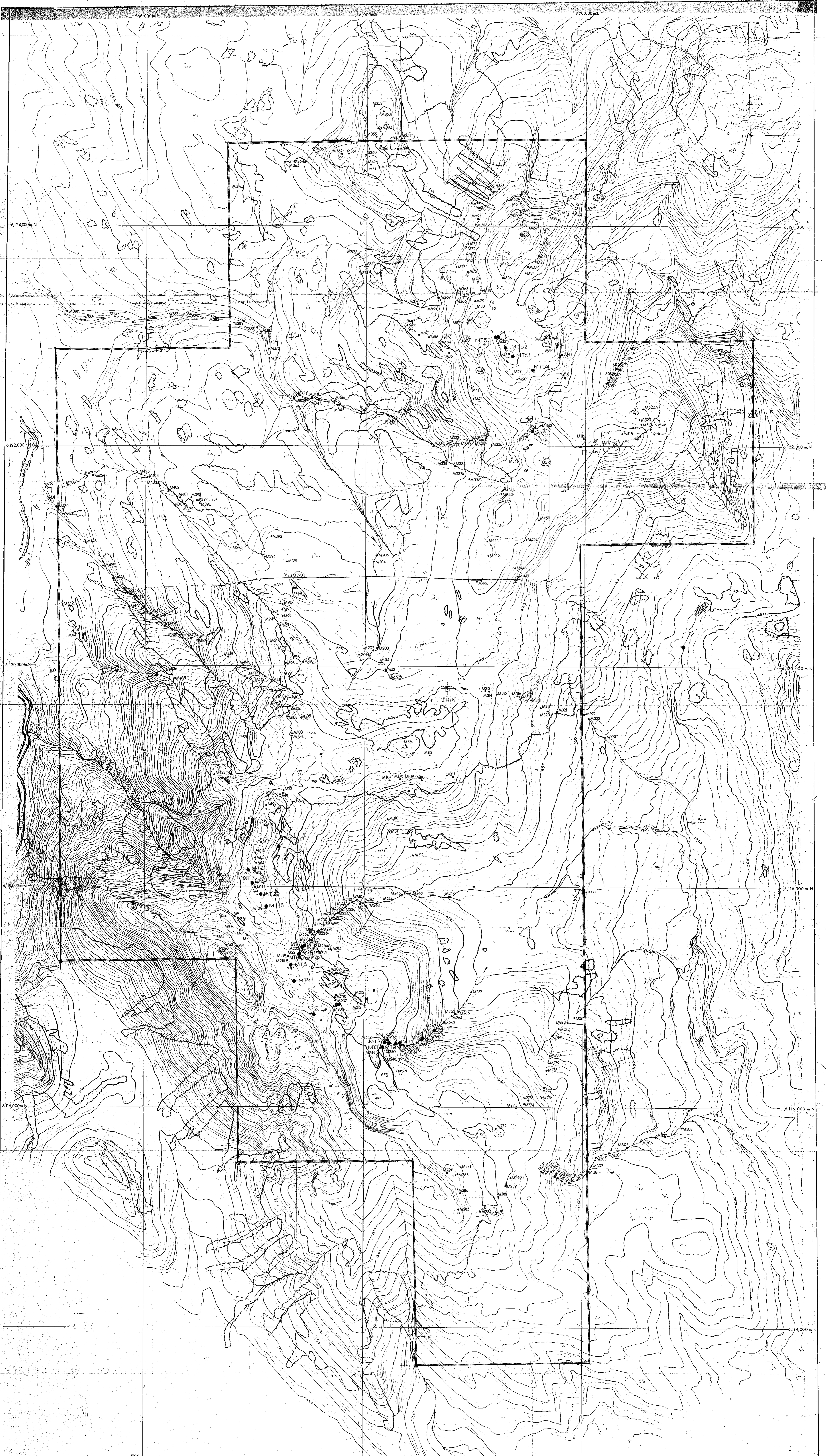
667



U.S.A. PATENT 4139 248 1979
 CANADIAN PATENT PENDING
 OTHER FOREIGN PATENTS PENDING



IRON MAIDEN SYSTEMS LTD CALGARY, ALBERTA, CANADA



PR-Sukunka 80(3)A

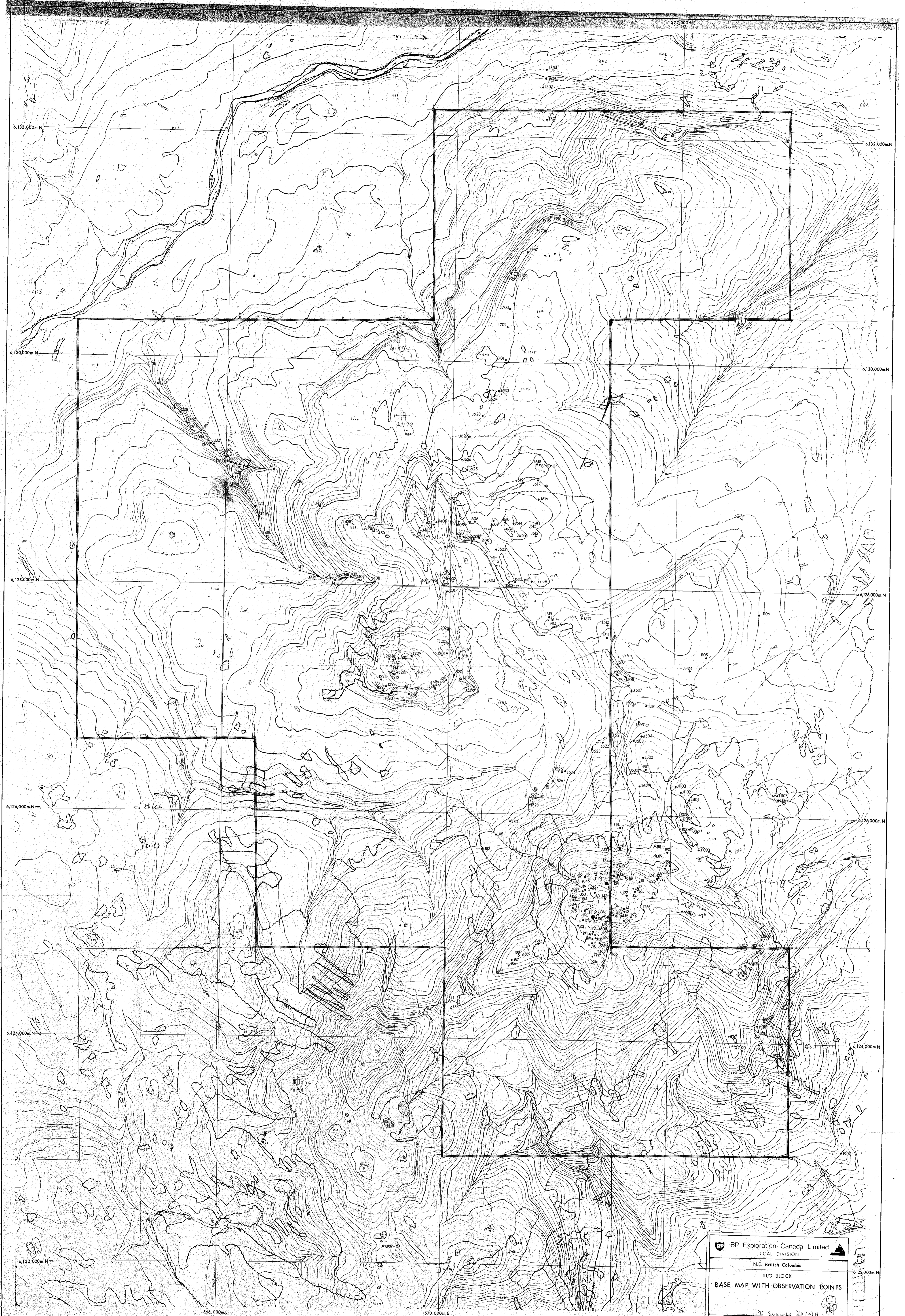
BP Exploration Canada Limited
 COAL DIVISION

NE British Columbia
 MERRICK BLOCK

BASE MAP WITH OBSERVATION POINTS

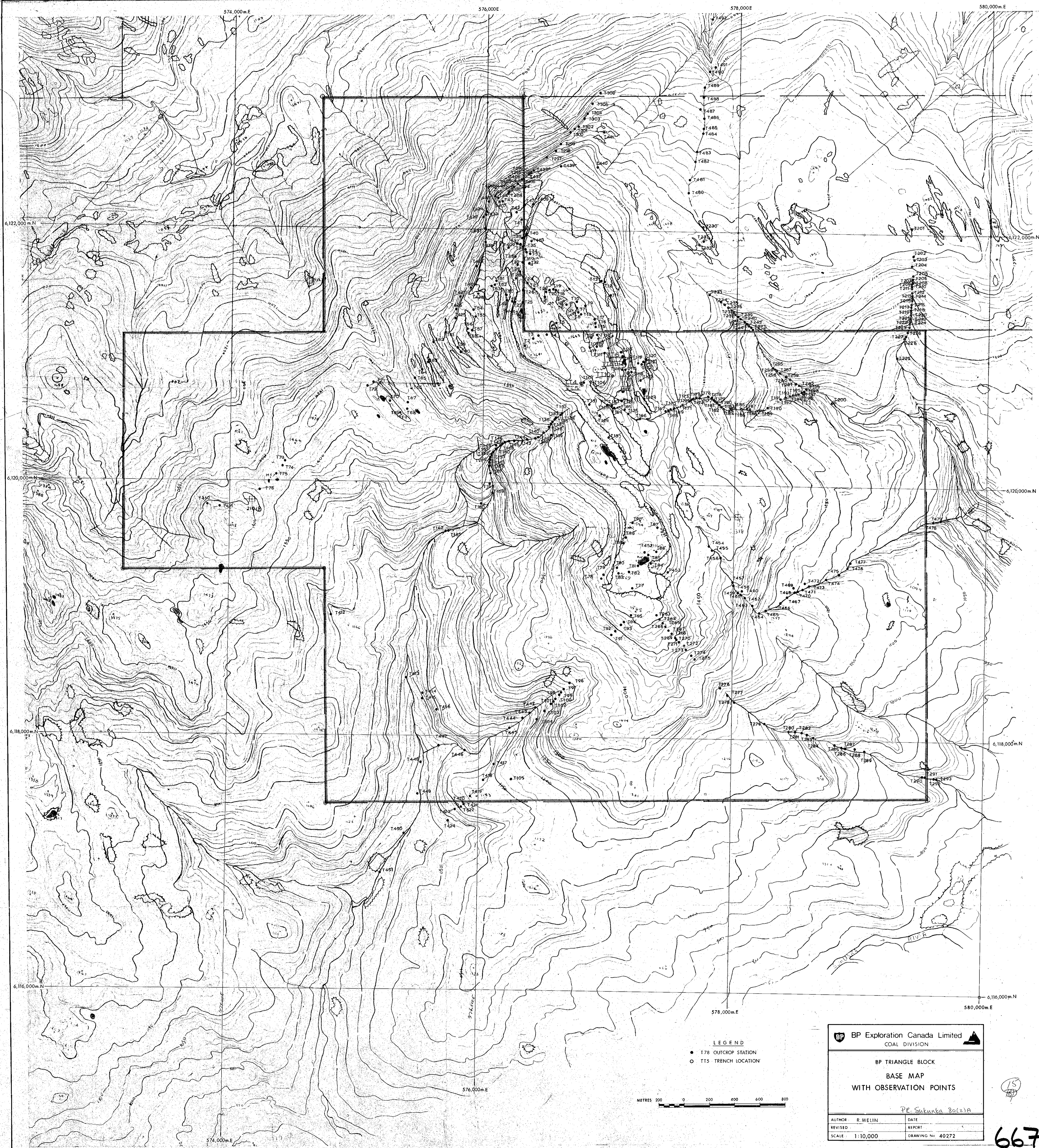
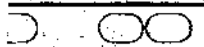
AUTHOR: R. MELIN	DATE:
REVISION:	REASON:
SCALE: 1:110,000	DRAWING NO. 80273

667

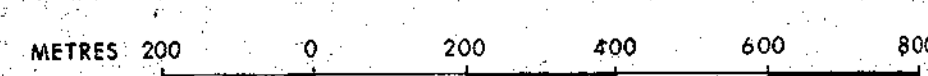


	BP Exploration Canada Limited COAL DIVISION
N.E. British Columbia	
JILG BLOCK	
BASE MAP WITH OBSERVATION POINTS	
PR. Sukumbro 80/23A	
AUTHOR: R. MELIN	DATE: 1981
REV. SEC	REVISION
SCALE: 1:10,000	PLAN NO: 40274

667



LEGEND
● T78 OUTCROP STATION
○ T75 TRENCH LOCATION



BP BP Exploration Canada Limited
COAL DIVISION

BP TRIANGLE BLOCK
BASE MAP
WITH OBSERVATION POINTS

PE-Sakumka 8a(2)A

AUTHOR R.MELIN	DATE
REVISED	REPORT
SCALE 1:10,000	DRAWING No 40272

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