PINE PASS COAL PROJECT

1979

N.E. BRITISH COLUMBIA

VOLUME I

NORCEN ENERGY RESOURCES LTD.

COAL EXPLORATION DEPARTMENT

JANUARY, 1980

A.C. NEWSON, P. GEOL.

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CONTENTS, VOLUME I

INTRODUCTION

BIBLIOGRAPHY

FIGURES - SEE PR-PINE PASS 79 (2)B

CONTENTS, VOLUME II, APPENDIX I

TRENCH DESCRIPTIONS SEE: PR-PINE PASS 79 (3)B

TRENCH 1-3

LITHOLOGICAL CORE DESCRIPTIONS SEE: PR-PINE PASS 79 (3)B

H1 to H5

75-2 to 75-10

79-1 to 79-7

* Refer to: PR. Pine Pass 79 (4)B

SEAM DETAIL, 1:20 SCALE
WITH SAMPLE INTERVALS
AND QUALITY INFORMATION

SEE PR-PINE PASS 79(4)B

H1
75 - 10
75 - 8
79 - 1
79 - 6
79 - 7
77 - 2
77 - 1
75 - 7

CONTENTS, VOLUME III, APPENDIX 2

STRATIGRAPHIC AND GEOPHYSICAL LOGS SEE: PR-PINE PASS 79(3)B

H1 to H5

74-1 to 76-11

77-1 to 77-2 ✓

79-1 to 79-2

INTRODUCTION

The Pine Pass Coal Prospect consists of 33 coal licences (9695 hectares) in northeast British Columbia. Under a joint venture agreement with Pan Ocean Oil Ltd., Norcen Energy Resources Ltd. carried out an exploration program in the summer of 1979.

The prospect lies in the foothills of the Rocky Mountains, 35 kilometres southwest of Chetwynd (Figure 1). The only road access to the property is by the Hasler Creek logging road. This gravel road provides direct communication to the Hart Highway, 16 kilometres to the north. At this point it also intersects power transmission lines and the British Columbia railway. The junction between these two roads is 24 kilometres west of Chetwynd.

SUMMARY

The Pine Pass coal project's field program for 1979 was made up of a field mapping program and some 1700 m of diamond drilling spread over seven holes. The results of this work defined an "area of most mining potential" (Figure 8). The rest of the licence area is either barren of coal or structurally too disturbed.

The coal seams with most economic potential lie in the top 200 m of the Gething Formation. Eight seams in total were identified varying in thickness from 0.5 m to 4.8 m in thickness. Of these, two seams, E and F with thicknesses of 3.0 m to 4.5 m can be seen to have the most lateral continuity. The true thickness between seams E and F vary from 7 m to 12 m. The rest of the coal seams have not been proved to underlie a wide enough area to provide any mining potential.

A tentative reserve calculation gives a total of 33 X 10^6 metric tons of inferred, in place coal reserves. These calculations were based on two areas, A and B (Figure 5).

Area A has an area of 2.54 x $10^6 m^2$ underlain by two seams; E and F, 4.86 m and 3.00 m thick respectively. The reserves in this area total 30 X 10^6 metric tons.

Area B has an area of 0.75 X $10^6 m^2$ underlain by one seam F, 3.00 m thick. This gave reserves of 3 X 10^6 metric tons.

The depth of cover to the top of these reserves varies from 50 m to 450 m.

The quality of reserves has been discussed in previous years by Birtley Engineering (Canada) Ltd. (Birtley, 1975). The coal was then described as an extremely good blend coal. The 1979 quality results showed the coal to be a low - medium volatile bituminous coal with;

Residual Moisture	0.4 - 0.6%
Ash	5.2 - 11.5%
Volatile Matter	15.9 - 21.3%
Sulphur	0.47 - 0.83%
B.T.U.	13673 - 14673
Yield	55.2 - 68.6% at 1.60 S.G.

The results of the metallurgical coal property tests were poor. The G figure calculated for the dilatometer tests was only calculable on one sample and gave a reading of 0.6109. (Drill Hole 79-6, Seam E). The Gieseler Fluidity never exceeded 10 DDPM. The F.S.I.'s run, varied from 1-7 1/2 but were generally found to be in the 1-2 1/2 range.

Generally speaking the limited number of samples taken in 1979 do little to alter Birtley's conclusion that this is a blend coal.

PAN OCEAN'S 1979
COAL LICENCES

587

FIGURE – 1

PR. PINE PASS 79(2)8

NORCEN

PINE PASS COAL PROJECT - 1979

COAL LICENCE LOCATIONS

26-D-3

SCALE 1 INCH = 8 MILES

RECOMMENDATIONS

Coal Licences: (Figure 8)

1.) By December 15th 1979 the following licences should be dropped:

3572
3571
3565

By the same date one extra licence should be acquired. This licence is adjacent to and East of 2944 and adjacent to and North of 2941.

2.) By December 15th 1980 the work requirement should be fulfilled to keep the following licences in good standing.

2949	2950
2948	2946
2945	3579
2944	2942
2941	3712
3711	3570
2930	2929

The following licences should be allowed to lapse:

2928	2923	2916
2927	2922	2912
2926	2971	2911
2925	2918	2910
2924	2917	

Geological Assessment:

The aim of the field work and drilling on the remaining licences in 1980 will be three fold.

1.) Improve the assessment of the reserves potential from seams E and F between 79-1 and 75-10 (Figure 8). Special emphasis should be placed on the area of least cover around 75-10.

2.) Assess the continuity between the seam in 75-8 and the area outlined in 1.) above. On the basis of the reserve possibility in this area, coal licence numbers 3579, 2946 and 2950 should be either dropped or kept in good standing.

3.) Investigate the possible reserve potential of seams G and H within the Area of most mining potential.

HISTORY

Apart from a small scale mining operation in 1944 and 1945, the earliest work done on this property was carried out by the British Columbia Government between 1946 and 1951. (McKechnie, 1955)

Some time then elapsed before Paul Dyson Consultants Ltd. did exploration work for the Pine Pass Development Corporation in 1973. (Dyson, 1973) This program consisted of field mapping and approximately 900 m of diamond drilling, drill holes H-1 to H-5. (Figure 2)

In 1974 only one hole was drilled, drill hole 74-1, due to problems in obtaining government approvals. (Dyson, 1975)

The following year drill holes 75-2 to 75-10 were drilled over a wide area. These holes were cored and the samples analysed extensively. (Dyson, 1975)

Drill hole 76-11 was drilled in the summer of 1976 in an attempt to locate a suitable adit site. This aim was defeated by the thickness of overburden that was found in the area. (Dyson, 1977)

Two more holes were drilled in the winter of 1976-1977, in a further attempt to find a suitable adit site. The holes intersected two good seams, however, the trenching by bulldozer exposed a lot of faulting and folding. This second location was therefore rejected as an adit site. (Dyson, 1977)

No work was done in 1978. However, in 1979 a field mapping and drilling program was carried out culminating in this report.

EXPLORATION - 1979

The exploration program consisted of field mapping, on a 1:10,000 scale, and 1700 metres of diamond drilling (drill holes 79-1 to 79-7; Figure 2). Each hole was cored from bedrock to T.D. using an HQ 3 core barrel. The hole was then logged through the rods with a Gamma Ray, Neutron Density and sidewall Densilog suite of logs. All of the drill moves and daily services to the rig were carried out by helicopter to minimize environmental impact. Three small backhoe trenchs were dug out on the Hasler Creek road. (Trench 1, 2 and 3; Figure 3)

Aim:

The aims of the 1979 program were set out as:

1.) Check stratigraphic position, thickness and quality of coals in the top 200 m of the Gething Formation, with special emphasis on the two seams identified in previous drilling 80 - 100 m into the Gething.

2.) Check stratigraphic position, thickness and quality of coals in the basal 200 m of the Gething Formation for equivalent of the thick seam found on the Brameda Resources Ltd. property to the southeast.

3.) Check stratigraphic position, thickness and quality of coals in the Gates Formation.

4.) Provide stratigraphic information on the Gething Formation.

Results:

Most of the work was carried out in the area to the southeast of the Hasler Creek road. This was due to the fact that this area had received relatively little attention in the past. As noticed in previous years the field mapping below the tree line was extremely difficult. Lack of continuity of outcrop between creeks, timber cover, and lack of good markers within the Gething Formation, all contributed to this. The best mapping was on the Alpine areas above the tree line, unfortunately, this made up less than 10 percent of the total property and it is underlaid by either the Gates Member or Boulder Creek Member. This field mapping did, however, provide a regional picture of the structure and gave some help in locating drill holes in the unexplored areas.

For drill hole location see figure 2, and for details see the stratigraphic and geophysical logs for each hole. (Appendix 2)

Drill hole 79-1 was drilled to provide continuity between 75-10 and 75-9. It succeeded in this to a point. The stratagraphic information it provided was useful in identifying the seams A to H in the top 200 m of the Gething Formation. (Figure 6) However, the two seams previously identified in the top 80 - 100 m of Gething appeared to be faulted out. These seams are identified as E and F in later holes.

Drill hole 79-2 was drilled on the lowest stratigraphic position of the Moosebar Formation in the High Hat

Creek area. This hole cut approximately 160 m of Moosebar Formation before intersecting a major thrust fault. The hole then intersected a lithology typical of the Upper Moosebar formation/Commotion Formation transition. The hole was then abandoned without intersecting any coal.

Drill hole 79-3 was drilled on a mountain, approximately 475 m stratigraphically higher in the formation than 79-2. This hole was intended to check the 40 m of exposed Boulder Creek Member and the Gates Member for coals. Two seams were intersected at the base of the Boulder Creek, but they were both less than 0.6 m in thickness. The five coal seams intersected within the Gates Formation were all less than 0.5 m in thickness, and were as such of no economic significance. In total 140 m of Gates was cut, the hole was shut down when it reached a lithology typical of the Upper Moosebar Formation/Gates Member transition.

Drill hole 79-4 was drilled just below the Moosebar Formation boundary. Its intention was to prove seams E & F in the southern end of the licences. Although it intersected a coal seam the formation was dipping at such a steep angle as to give a greatly exaggerated thickness. The beds started to flatten out with depth, however they were still dipping at 45° at 160 m and so the hole was abandoned.

At this point it was felt that the first aim of the project, namely to check the top 200 m of Gething, had proved nothing of economic significance. The Gates

and Boulder Creek Members had also proven barren. It was decided to fulfill the second aim and to drill as near upstrike from the Brameda property as possible.

Drill hole 79-5 was drilled at the extreme west of the property on a strike position to 75-5. Some structure had been seen in this area but a uniformly dipping block was picked by field mapping. After penetrating some 35 m of overburden, bedrock was intersected. The hole cut 220 m of Gething with only one minor coal seam. The hole was then abandoned at 260 m. On retrospect, it seems likely that the hole ended within 20 - 30 m of Cadomin. (Figure 7)

With the completion of this hole it was decided to drill a location back on the Hasler Creek road near the relatively well proven Upper Gething.

Drill hole 79-6 was located near the site of an old hole drilled by the British Columbia Government in 1947. It proved very successful in locating the coal seams A through H in the top 200 m of Gething. Some faulting was proven but seams E and F looked promising. Seam H looked very interesting, however, when it was exposed in a trench (Trench 3), it proved to be 2.5 - 3.0 m of coal standing vertically.

Drill hole 79-7 was located near the old drill hole location 76-11. The new hole went considerably deeper in an attempt to prove the rest of the seams. It did prove seams C, D, E, F, but seams A and B were missing. Furthermore, seam E appeared to be faulted.

With the completion of 79-7 the drilling program and field mapping program ended for 1979.

STRATIGRAPHY

	GROUP	FORMATION	MEMBER	DESCRIPTION
Lower Cretaceous	Fort St. John	Commotion Formation	Boulder Creek Member (122 - 140 m)	Fine grained, well sorted sandstone, massive conglomerate, non-marine sandstone & mudstone
			Hulcross Member (75 - 145 m)	Dark grey marine shales with sideritic concretion
			Gates Member (100 - 145 m)	Fine grained, marine & non-marine sandstone, conglomerate, coal, shale & mudstone
		Moosebar (120 - 300 m)		Dark grey marine shale, glauconite, sandstone & pebbles at base
	Bullhead	Gething (450 m+)		Fine - coarse grained, brown, calcareous, carbonaceous, sandstone, coal, carbonaceous, shale and conglomerate
		Cadomin Formation (45+)		Massive conglomerate containing chert & quartzite pebbles

Table 1
Based on Stott 1973

GEOLOGY

The geological information contained in this report has been based on compiled information from 25 bore holes and some five summers of field mapping. The information gathered in previous years is contained in three reports. (Dyson, 1973; 1975; and 1977)

Most of the regional geology has been acquired by reading various G. S. C. and British Columbia Department of Mines publications. (Stott, 1968; 1973; Hughes, 1964; 1967; McKechnie, 1955)

Stratigraphy:

The lithology and thickness of the units are summarized in Table 1. For details of the lithology in each hole, a stratigraphic log is provided. (Appendix 2)

The Boulder Creek Member is well exposed in outcrop on the east flank of the property. (Figure 3 & 4) It is also seen in drill hole 79-3. The formation is made up of fine grained, well sorted sandstone, massive conglomerants, non-marine sandstones and mudstone. Field mapping had proved some coal just above the lowest conglomerate. In drilling this coal turned out to be two small seams less than 1.0 m thick.

The Hulcross Member being recessive shales, is less well exposed, some outcropping of it does occur beneath the ridge forming Boulder Creek Member. In drill hole 79-3, 131.5 m of Hulcross Formation was

cored, this was considered to be the total undisturbed section. Essentially it was seen to be a marine shale, dark grey with sideritic concretions. In weathered outcrop it had a very typical red-purple colour.

The lower part of drill hole 79-3 consisted of 138.5 m of Gates Member with about 4.0 m of the Upper Moosebar Formation at the bottom. The ending of the hole at this point was somewhat unsatisfactory, but due to technical problems it had to be completed. Ideally a further 20 or 30 metres should have been drilled to confirm the existence of the Upper Moosebar. The Gates Member is typically a fine grained marine and non-marine sandstone, with conglomerate, coal, shale, and mudstone. The reason for hole 79-3 had been to check for economical coals in the Gates Member. Four separate coal seams were proved scattered throughout the formation but were all less than 0.5m thick.

The Moosebar Formation is typically a dark grey marine shale, with sideritic concretions, bentonite claybands, glauconitic sandstone, and pebbles at the base. On the property one feature in particular stands out. To the south end the upper half of the Moosebar has a higher percentage of coarser clastic material than the lower half. It is typified by a large amount of bioturbation and penecontemporaneous deformation. This part of the formation is highly typical and is seen at the base of drill hole 79-3 and towards the base of drill hole 79-2.

To the north end of the property the Upper Moosebar/Lower Moosebar junction was not drilled, but a marked break

in slope is identifiable on the air photographs. This junction is marked on the geology map, (Figure 3), and can be seen to be discontinuous as it goes west and south. Whether this break in slope marks the same point as the Upper Moosebar/Lower Moosebar junction has yet to be proven. It certainly lies approximately the same stratigraphic distance above the top of Gething.

The true thickness of the Moosebar Formation on this property is nearly impossible to prove. It has very few drill holes in it and none going all the way through it. The incompetent nature of the formation results in its thinning and swelling in response to tectonic pressures.

Probably the main feature of the Moosebar is the glauconitic conglomerate that forms its base. This gives a good marker in the core, it is easily picked from geophysical logs, and frequently lies at a break in slope between the softer Moosebar shales and the harder, sandier units beneath. In fact the main aim of any drilling is to intersect this junction as near to the top of the hole as possible so that the Upper Gething coals have a good marker to be "hung from". The Moosebar Formation was drilled in drill holes 79-5, 75-6, 75-10, 79-2, and 79-3. Hole 79-2 cuts the most Moosebar. In total a 148.0 m of lower Moosebar was drilled before hitting a major thrust fault which repeated the section by putting Lower Moosebar on the top of Upper Moosebar.

Because of its economic significance the Upper Gething is well drilled on this licence block and surrounding areas. In past years private and government

sponsored exploration has drilled more than 100 holes between Norman Creek and Hasler Creek, mostly in the Upper Gething. (McKechnie, 1955; Dyson, 1973, 1975, 1977)

The Gething is well exposed in outcrop but due to the complex faulting throughout most of it and the lack of suitable markers, a stratigraphic location for the various outcrops is hard to ascertain. Generally the Upper Gething is typified by fine to coarse grained, brown, calcareous, carbonaceous sandstone. Some coals and carbonaceous shales form varying proportions of this section.

The holes that best illustrate the character of the Upper Gething can be seen in Correlation Section I (Figure 6). Here the correlation between drill hole H-1 in the north west and drill hole 75-9 in the south east is illustrated. The Gething/Moosebar boundary is not intersected in all the holes, but by using the geophysical logs a fair correlation can be made.

The seams A - G, plus one unknown seam, lie within the top 250.0 m of the Gething. They vary considerably in thickness and character across the section. Some of the points on the section do not actually indicate a seam but indicate an equivalent position on the geophysical logs. These seam equivalents are marked by an asterisk on the correlation section. The seams E and F are the ones that exhibit the most stratigraphic consistency and continuity on the property.

The Correlation Section II (Figure 7), shows some 200.0 m of the base of the Gething. The prime marker here is the top of the Cadomin Formation which provides a good geophysical and lithological marker. In holes 74-1, 75-7, and 75-5, the intersection of the Cadomin is easily proved. The Cadomin in 75-3 is not so obvious. Hole 79-5 does not even reach the Cadomin but two geophysical markers, A & B, seem to indicate that it is not far off. The interest in this part of the formation was to check for the existence of a thick coal seam, equivalent to that found on Brameda Teck's property to the south. After looking at these holes it would appear that the basal 200.0 m of the Gething Formation is devoid of any well developed coal seams. Certainly there does not appear to be anything that can be correlated with Brameda Teck's thick seam.

Unfortunately there is no overlap between the two correlation sections. It can only be concluded, that there is an unknown thickness of Gething not covered by either series of holes.

The Cadomin Formation was not drilled in any of the 1979 drill holes. It does form a good marker in the geophysical logs, in the core, and in the field. However, the trick to differentiating it from other conglomerates in the Lower Cretaceous are considerable. (McLean, 1977) Certainly it is much easier to identify when taken in the overall stratigraphic package in the field than as isolated pieces of rock.

Structure:

The property lies within the disturbed belt of the Rocky Mountain foothills. The bulk of the faulting has been interpreted as low angle thrusts, originating in the southwest from one or more basal 'sole' faults. The dip of the thrusts to the west increase in an easterly direction until it appears as a high angle reverse fault at the surface. The drag faulting associated with the thrusting accounts for some of the folded structures, while the rest is a direct result of lateral pressure giving repeated anticline, syncline structure. These fold structures tend to have a smaller wave length to the west side of the property than those of the east side of the property. The 'foothills structural model' as developed for the oil and gas industry has been used to interpret the bulk of the structures of this property. (Bally, Gordy, & Stewart, 1966)

The western side of the property is bounded by a major thrust fault, (Figure 3 & 4), which essentially puts Cadomin and older formation on top of the younger rocks of the Gething. This thrust is well indicated by a string of high angled dips that run along the front of it. Furthermore the existence of westerly dipping Cadomin with no sign of an easterly dipping limb tends to support the evidence for the existence of this major structure.

The eastern side of the property is also affected by thrusting but it is only apparent at the south eastern end. This thrust was first suggested in drill hole 79-2, and later confirmed by mapping in the Highhat River.

Between these two thrusts lies the bulk of the property. As can be seen from the geology map and cross sections (Figures 3 & 4), the tightness of the folding in the Gething really limits the potential for coal development over the greater part of the property.

In section A (Figure 4), the structure is quite severe. The western half of this section is written off as an 'area of major structural distrubance'. This area continues north through all four of the sections. In section C the exposure is good enough to give more detailed information on the type of structure. Generally, however, the structure has to be inferred from the outcrops in creek beds often somewhat removed from the section line.

These sections all support the conclusion that a major part of the property is tectonically too disturbed to provide any conventional mining potential.

The structure that does seem to provide the best mining potential is the anticline in which the old Hasler Creek mine is situated. (Figure 5) This structure is cut in half by Hasler Creek and lies on the eastern edge of the property. It has been drilled in some detail which has proved considerable faulting on the south and east end of the anticline.

On the west side of this structure a fault can be seen between hole 77-1 and 77-2 in the geophysical logs. The same fault is seen in hole 79-7 effecting seams E & F.

The fault near 79-6 is inferred by the high angles of dip at the top of this hole and the vertical beds measured in Trench #3. The hole would appear to have been spudded in the drag folding directly beneath the fault plane. The continuation of this fault to the south east is based on air photo interpretation and some field mapping in Hasler Creek.

The most easterly of the faults in this anticlinal structure is based on the field mapping done on Grizzly Creek. This mapping indicates a variety of dips and some minor structures. This fault may not in fact be a major structure and as such the 'throws' on it have been interpreted to be relatively small.

Within the anticline that lies across Hasler Creek the drill holes all exhibit faulting. It would appear that further to the north west near Johnson Creek the structure is less disturbed. This area would therefore make a suitable site for future exploration.

RESERVES

These reserve calculations are limited to the area outlined as having the "Area of most mining potential".

In this area the main factor limiting potential coal reserves was structure. The seams A to H were moderately well proven, with seams E and F having the most stratigraphic continuity. (See Appendix 1 for seam thickness and quality data)

Generally the structure is not very favourable for underground mining potential. In fact the area to the southeast of the Hasler Creek is so badly faulted that it has not been considered for underground reserve calculation at all. There may in fact, be some strip coal available around the outcrop, but it would probably only be useful as a supplement to production from another mine.

The area to the north east, up to drill hole 79-1, also falls into this category. There may be some strip potential around a possible mine mouth, but that is all.

From drill hole 79-1 to 75-10 the coal may be sufficiently undisturbed to allow for some underground mining potential.

The reserve boundaries were defined by several different parameters. (Figure 5) The northwest end was terminated just beyound drill hole 75-10 due to the deterioration of seam quality seen in drill holes H1 - H5

(Dyson, 1973, Page 4). At the southeast end the reserve block terminated against the structural disturbed area around 79-1, 79-6, and 79-7. The flanks of the reserve were cut off where depths appeared to becoming excessive for present mining potential in the foothills. The coal is at its shallowest (50.0 m) at 75-10 and at its deepest (450.0 m) about half way between drill hole 75-10 and 79-1. This change in overburden is more a function of topographic change than fluctuation in seam elevation.

The seam thickness for E and F were based mainly on drill hole 75-10. Drill hole 79-1 also played a part in determining how far to include seam E in the reserve calculations. As there holes were about 4.0 km apart on strike these reserves would have to be classified as "inferred".

Reserve Area 'A' = 2.54×10^6 m^2

Seam E Thickness = 4.86 m

Seam F Thickness = 3.00 m

Total metric tons available in reserve area 'A':

Seam E - 2.54×10^6 m^2 X 4.86 m X 1.5 tons/m^3 = 18.52×10^6 metric tons

Seam F - 2.54×10^6 m^2 X 3.00 m X 1.5 tons/m^3 = 11.43×10^6 metric tons

Reserve Area 'B" = 0.75×10^6 m^2

Seam F Thickness = 3.00 m

Total metric tons available in reserve area 'B'

Seam F - 0.75×10^6 m^2 X 3.00 m X 1.5 tons/m^3 = 3.37×10^6 metric tons

Inferred Total Reserves.....= 33.32 X 10^6 metric tons

The figure of 1.5 tons/m^3 was used as an average specific gravity figure for conversion of cubic metres of coal to metric tons.

At this time these are all the reserves that can be inferred from available information. Before these can be moved to a "probable" or "proven" category, considerable extra drilling would be required.

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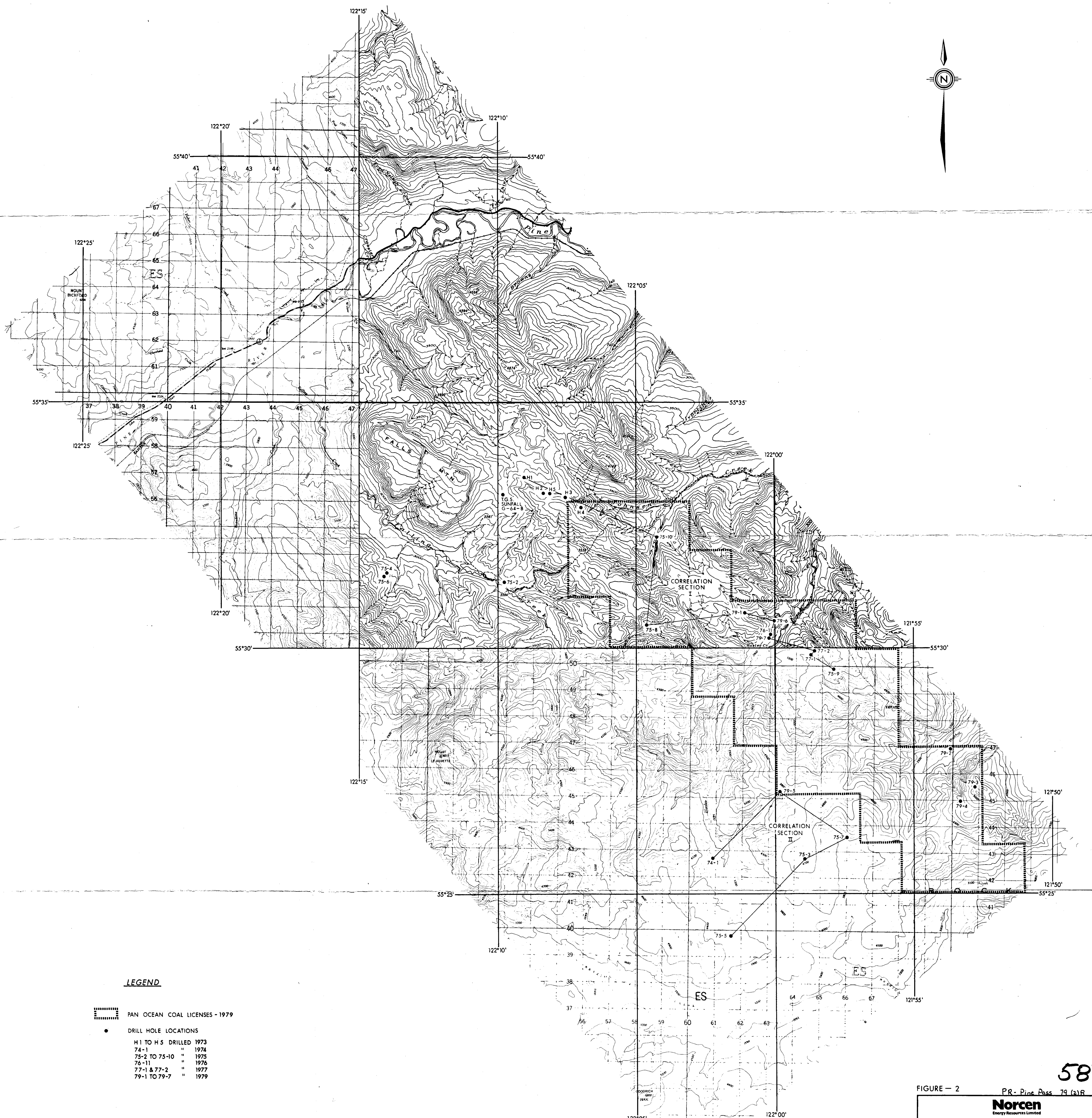
AK - Pine Pass 79(2)B

Maps & Cross Sections 2/3

587



LEGEND

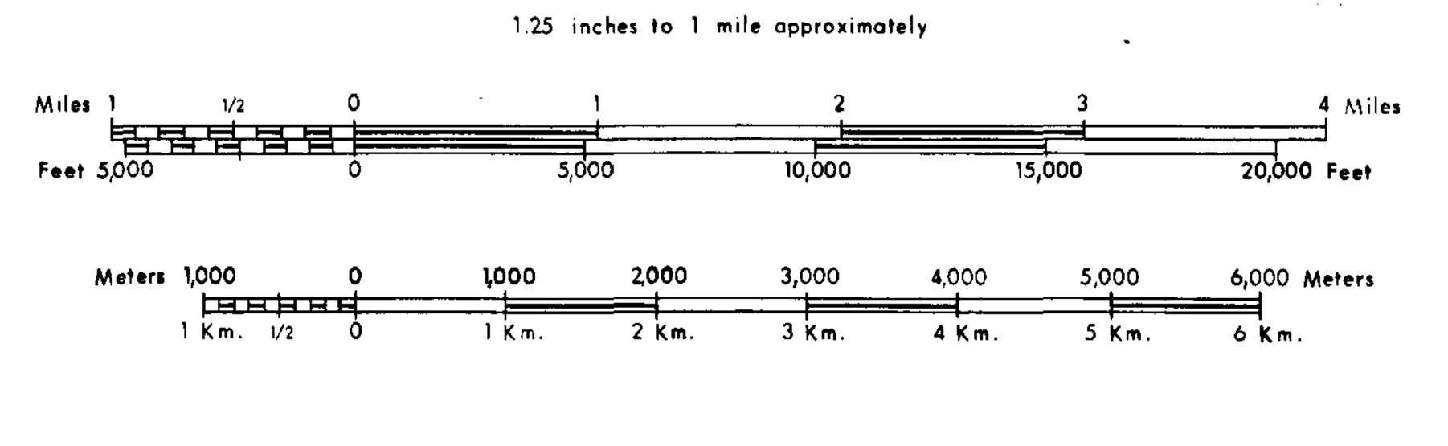
PAN OCEAN COAL LICENSES - 1979

DRILL HOLE LOCATIONS

H 1 TO H 5	DRILLED	1973
74-1	"	1974
75-2 TO 75-10	"	1975
76-11	"	1976
77-1 & 77-2	"	1977
79-1 TO 79-7	"	1979

SCALE 1 : 50,000

1.25 inches to 1 mile approximately



587 2/3

FIGURE — 2

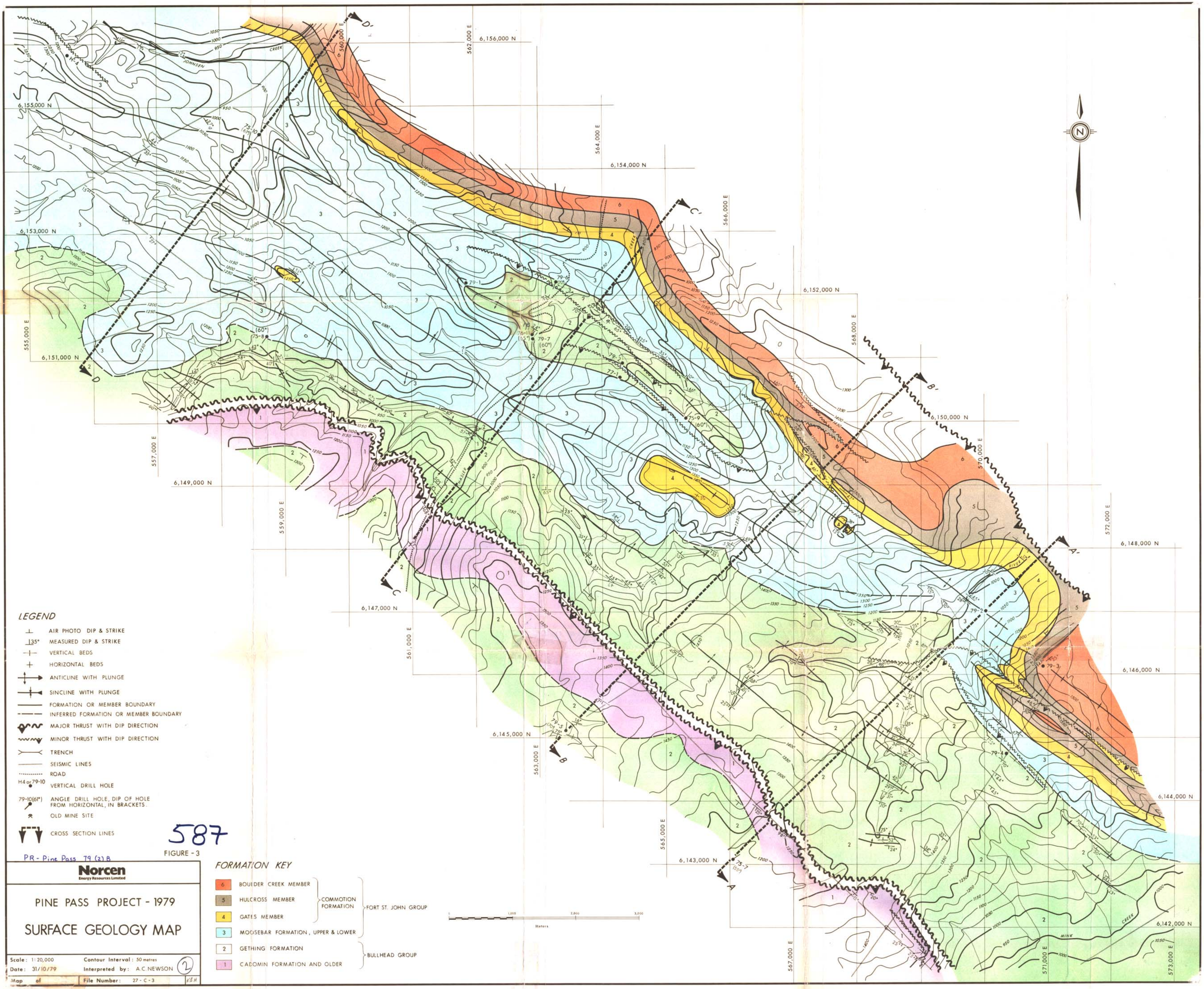
PR- Pine Pass 79 (2)B

Norcen
Energy Resources Limited

PINE PASS COAL PROJECT-1979

DRILL HOLE LOCATIONS 1973 - 1979

Scale: 1 : 50,000	Contour Interval: 100 ft.
Date: 4/11/79	Interpreted by: A.C. NEWSON (1)
Map 2 of 8	File Number: 26 - D - 3 K.B.H.



LEGEND

- AIR PHOTO DIP & STRIKE
- 35° MEASURED DIP & STRIKE
- VERTICAL BEDS
- HORIZONTAL BEDS
- ANTICLINE WITH PLUNGE
- SINCLINE WITH PLUNGE
- FORMATION OR MEMBER BOUNDARY
- INFERRED FORMATION OR MEMBER BOUNDARY
- MAJOR THRUST WITH DIP DIRECTION
- MINOR THRUST WITH DIP DIRECTION
- TRENCH
- SEISMIC LINES
- ROAD
- H4 or 79-10 VERTICAL DRILL HOLE
- 79-10(61°) ANGLE DRILL HOLE, DIP OF HOLE FROM HORIZONTAL, IN BRACKETS.
- OLD MINE SITE
- CROSS SECTION LINES

587

FIGURE - 3

PR - Pine Pass 79 (2) B

FORMATION KEY

6	BOULDER CREEK MEMBER	COMMOTION FORMATION → FORT ST. JOHN GROUP
5	HULCROSS MEMBER	
4	GATES MEMBER	
3	MOOSEBAR FORMATION, UPPER & LOWER	FORT ST. JOHN GROUP
2	GETHING FORMATION	BULLHEAD GROUP
1	CADOMIN FORMATION AND OLDER	BULLHEAD GROUP

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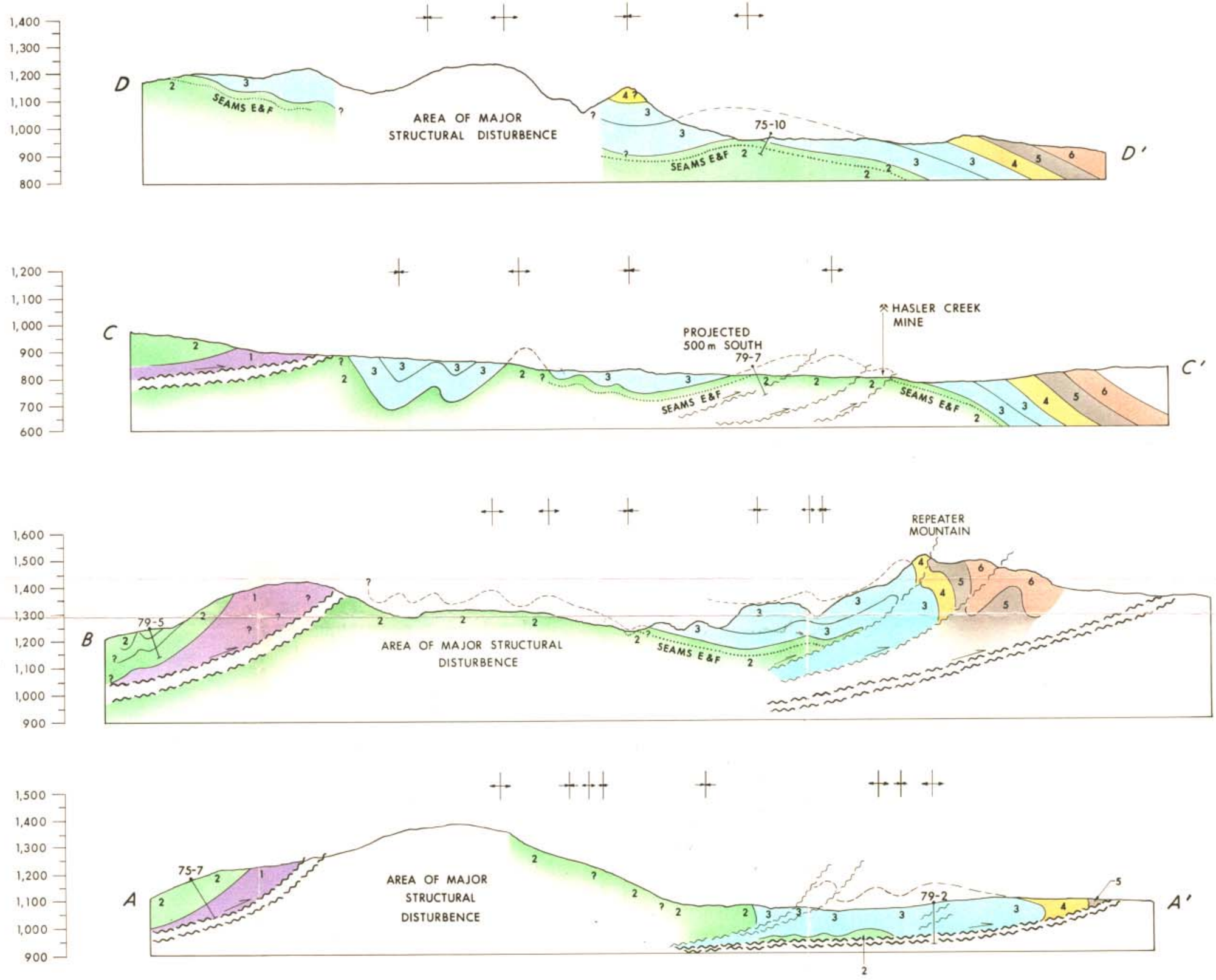
PINE PASS PROJECT - 1979

SURFACE GEOLOGY MAP

Scale: 1:20,000 Contour Interval: 50 metres

Date: 31/10/79 Interpreted by: A.C. NEWSON (2)

Map of File Number: 27 - C - 3 K&H



587

PR- Pine Pass 79(2)B

FIGURE - 4

Thickness (m) *FORMATION KEY*

122 - 140 m	6	BOULDER CREEK MEMBER	COMMOTION FORMATION	FORT ST. JOHN GROUP
75 - 145 m	5	HULCROSS MEMBER		
100 - 145 m	4	GATES MEMBER		
120 - 300 m	3	MOOSEBAR FORMATION, UPPER & LOWER		
450 + m	2	GETHING FORMATION		BULLHEAD GROUP
45 + m	1	CADOMIN FORMATION AND OLDER		

0 1,000 2,000 3,000
Meters

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PINE PASS PROJECT - 1979

CROSS SECTIONS A, B, C AND D

(3)

Scale: 1:20,000	Contour Interval:
Date: 5/11/79	Interpreted by: A.C. NEWSON
Map of	File Number: 27-C-3

KGH

RESERVE AREA A

RESERVE AREA B

CREEK

75-10 (61°)
SEAM METERS
F — 3.00
E — 4.86
35° Az 135° N.E.

79-1
SEAM METERS
H — 2.80
G — 3.88
F — 0.85
E — 1.18
D — 0.75
C — 4.20
B — 1.88
A,U — 1.85
A,L — 2.90
15° Az 135° S.W.

60° Trench #3
79-6 (70°)
SEAM METERS
H — 4.70
G — 4.21
F — 6.40
E — 1.81
D — 1.81
C — 1.42
B — 1.15
A — 0.92
60° Az 110° N.E.

76-11 (65°)
79-7(60°)
SEAM METERS
G — 3.75
F — 1.10
E — 1.73
D — 4.05
C — 5.10
30° Az 135° S.W.

77-2
SEAM METERS
F — 2.13
E — 1.71
D — 1.52
ROTARY HOLE

77-1
SEAM METERS
G — 3.05
F — 3.67
E — 2.44
ROTARY HOLE

75-9 (60°)
SEAM METERS
F — 1.98
E — 4.09
D — 2.40
40° Az 135° S.W.

LEGEND

- AIR PHOTO DIP & STRIKE
- 35° MEASURED DIP & STRIKE
- VERTICAL BEDS
- HORIZONTAL BEDS
- ANTICLINE WITH PLUNGE
- SINCLINE WITH PLUNGE
- FORMATION OR MEMBER BOUNDARY
- INFERRED FORMATION OR MEMBER BOUNDARY
- MAJOR THRUST WITH DIP DIRECTION
- MINOR THRUST WITH DIP DIRECTION
- SEISMIC LINES
- ROAD
- H4 or 79-10 — VERTICAL DRILL HOLE
- 79-10(61°) — ANGLE DRILL HOLE, DIP OF HOLE FROM HORIZONTAL, IN BRACKETS.
- OLD MINE SITE
- TRENCH

RESERVE CALCULATIONS KEY

- ..... — INTERPRETED LOCATION OF OUTCROP FOR SEAMS E & F.
- — AREA USED IN RESERVE CALCULATION.
- ⊕ ≈ 350 m — APPROXIMATE DEPTH TO TOP OF SEAM F.

FORMATION KEY

- 6 BOULDER CREEK MEMBER
- 5 HULCROSS MEMBER
- 4 GATES MEMBER
  - } COMMOTION FORMATION
- 3 MOOSEBAR FORMATION, UPPER & LOWER
  - } FORT ST. JOHN GROUP
- 2 GETHING FORMATION
- 1 CADOMIN FORMATION AND OLDER
  - } BULLHEAD GROUP

0 500 1000 1500 Meters

PR- Pine Pass 79(2)8 587

FIGURE - 5

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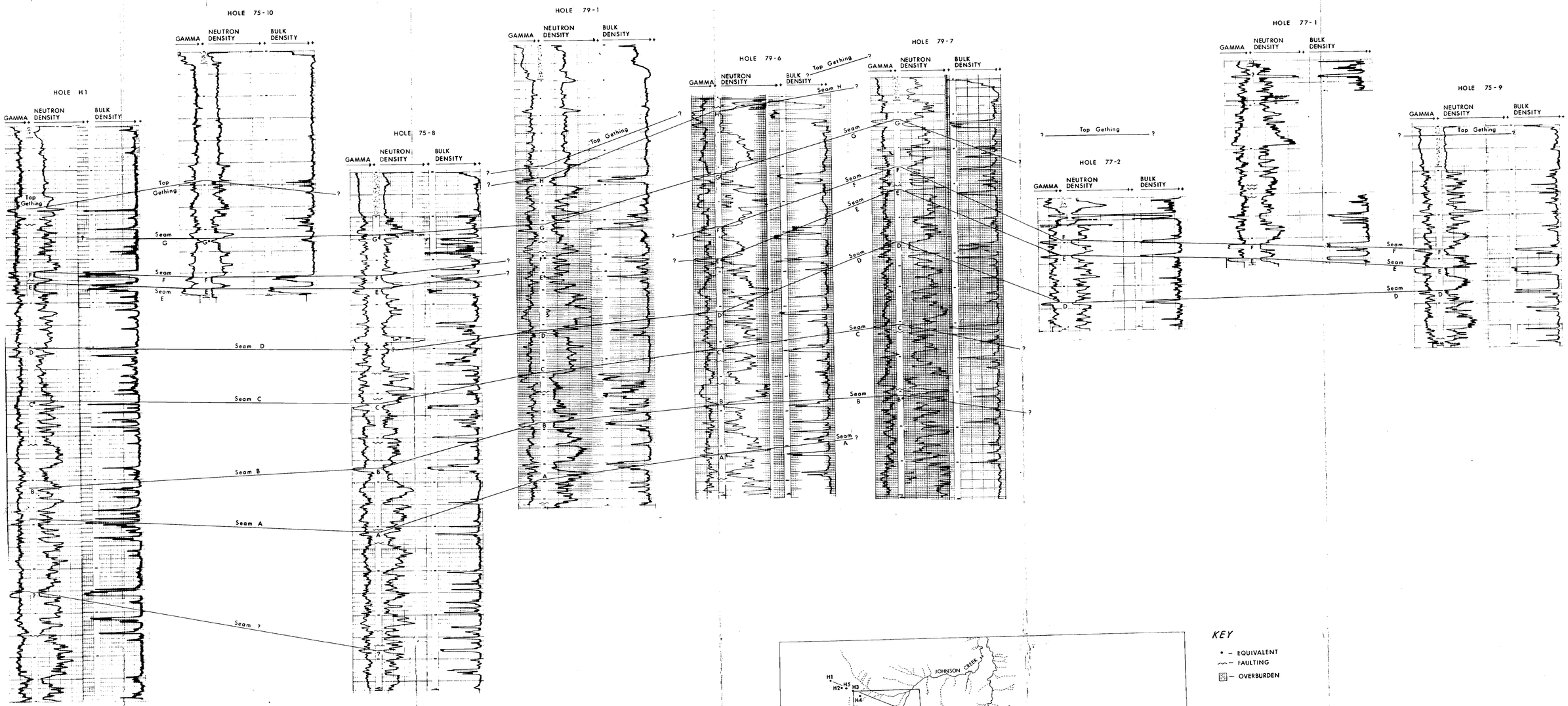
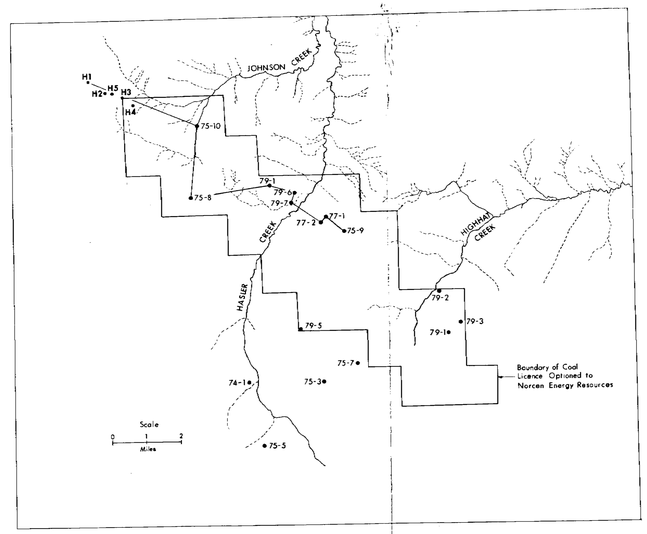
PINE PASS PROJECT - 1979

POTENTIAL COAL RESERVES

Scale: 1:10,000	Contour Interval: 50 metres	(4)
Date: 16 11 79	Interpreted by: A.C. NEWSON	
Map of	File Number: 27-C-3	K.G.H.

5.4 Kilometers — 3.4 Kilometers — 3.8 Kilometers — 1.3 Kilometers — 0.6 Kilometers — 1.8 Kilometers — 0.5 Kilometers — 1.1 Kilometers





KEY

- • – EQUIVALENT
- ~ – FAULTING
- OB – OVERBURDEN

587 9/3

PR- Pine Pass 79 (2)B

FIGURE - 6

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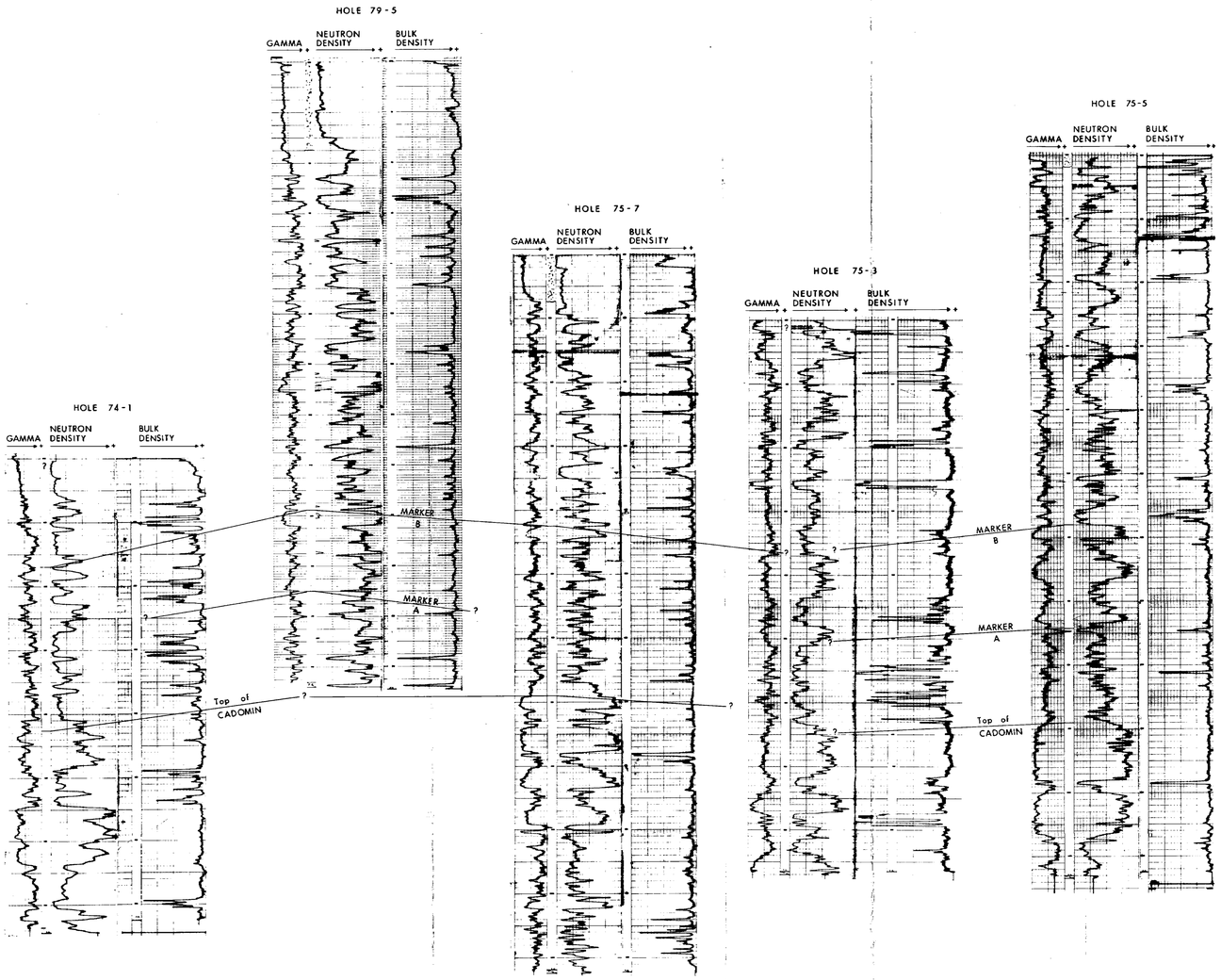
PINE PASS PROJECT- 1979 (4)

CORRELATION SECTION – I

Scale:	Contour Interval:	
Date: 23/11/79	Interpreted by: A.C. NEWSON (5)	
Map 6 of 8	File Number: 26-D-3	K.G.H

3.6 Kilometers — 3.15 Kilometers — 1.9 Kilometers — 4.0 Kilometers



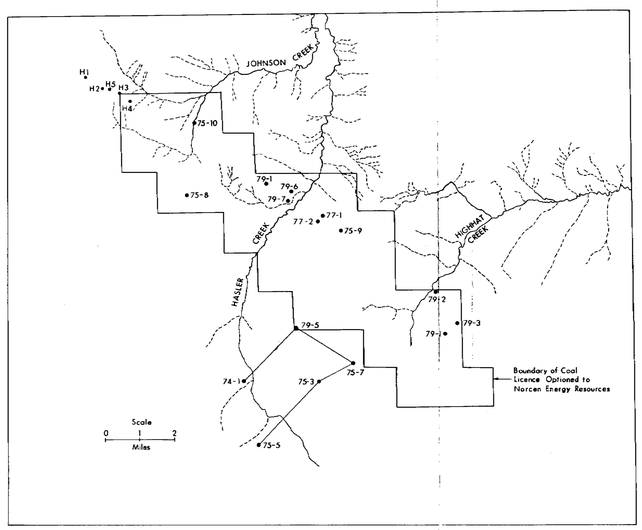


FIGURE - 7

PR- Pine Pass 79 (2)8

587

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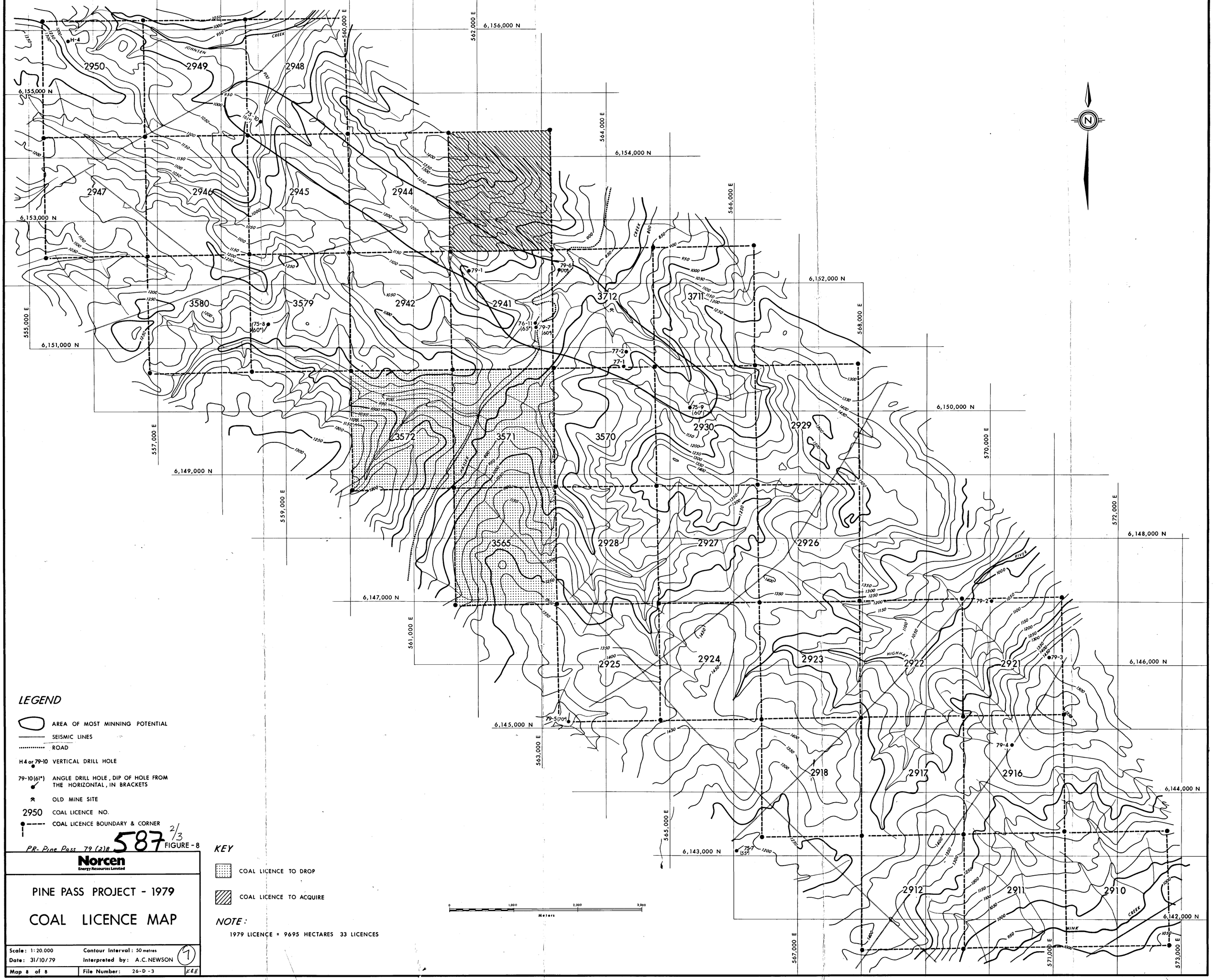
PINE PASS PROJECT - 1979

CORRELATION SECTION - II

Scale:	Contour Interval:
Date: 23/11/79	Interpreted by: A.C. NEWSON
Map 7 of 8	File Number: 26 - D - 3

K.G.H.



LEGEND

- AREA OF MOST MINNING POTENTIAL
- SEISMIC LINES
- ROAD
- H4 or 79-10 VERTICAL DRILL HOLE
- 79-10 (61°) ANGLE DRILL HOLE, DIP OF HOLE FROM THE HORIZONTAL, IN BRACKETS
- OLD MINE SITE
- 2950 COAL LICENCE NO.
- COAL LICENCE BOUNDARY & CORNER

PR- Pine Pass 79 (2)8 587 2/3 FIGURE - 8

KEY

- COAL LICENCE TO DROP
- COAL LICENCE TO ACQUIRE

NOTE:

1979 LICENCE = 9695 HECTARES 33 LICENCES

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PINE PASS PROJECT - 1979

COAL LICENCE MAP

Scale: 1:20.000	Contour Interval: 50 metres
Date: 31/10/79	Interpreted by: A.C. NEWSON
Map 8 of 8	File Number: 26-D-3

7

K.E.H.