TELKWA COAL PROJECT Report on 1978 Field Work

Report to accompany:

- (a) Application to Extend Term of Licences Coal Licences Nos. 3709, 3710, 3875-3885 inclusive;
- (b) Submission of Technical and Financial Data Required re: Mineral Exploration Incentive Program Contract No. 24.

N.T.S. 93-L-11 (E^{1}_{2}) Lat. 54⁰37' Long. 127⁶08'

Field Work Carried Out in Period June - October, 1978

T. J. Adamson
CYPRUS ANVIL MINING CORPORATION
December 1978

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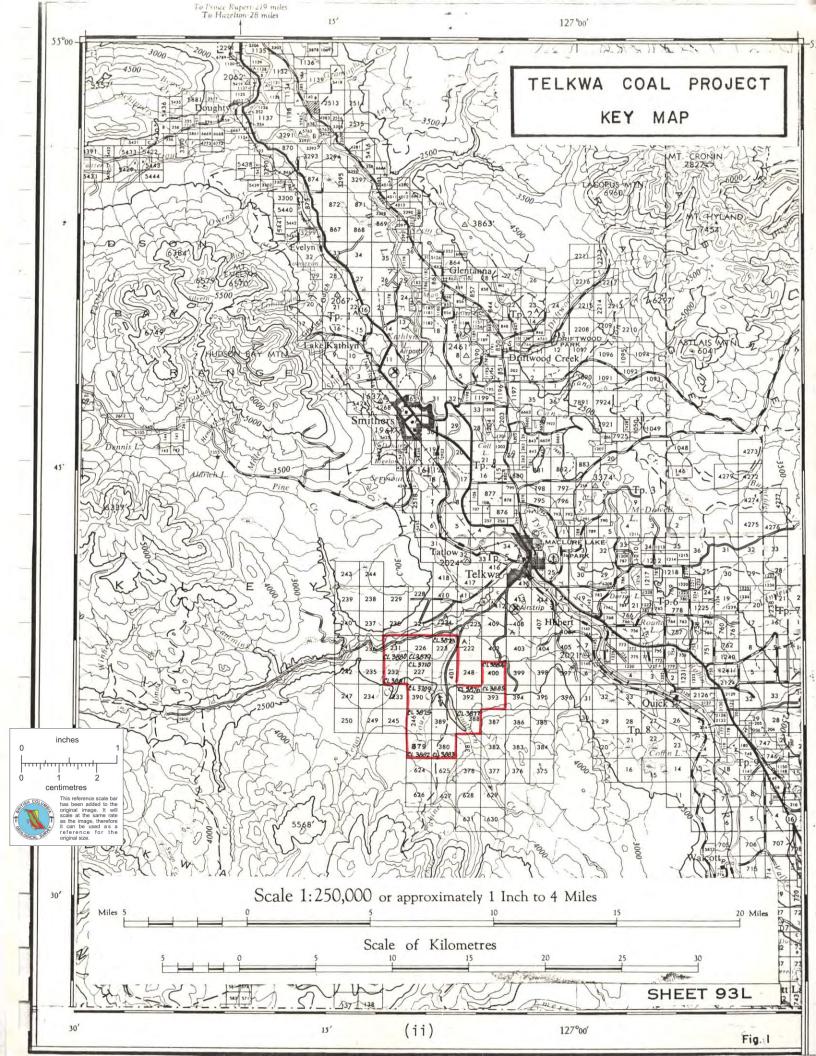
December, 1978

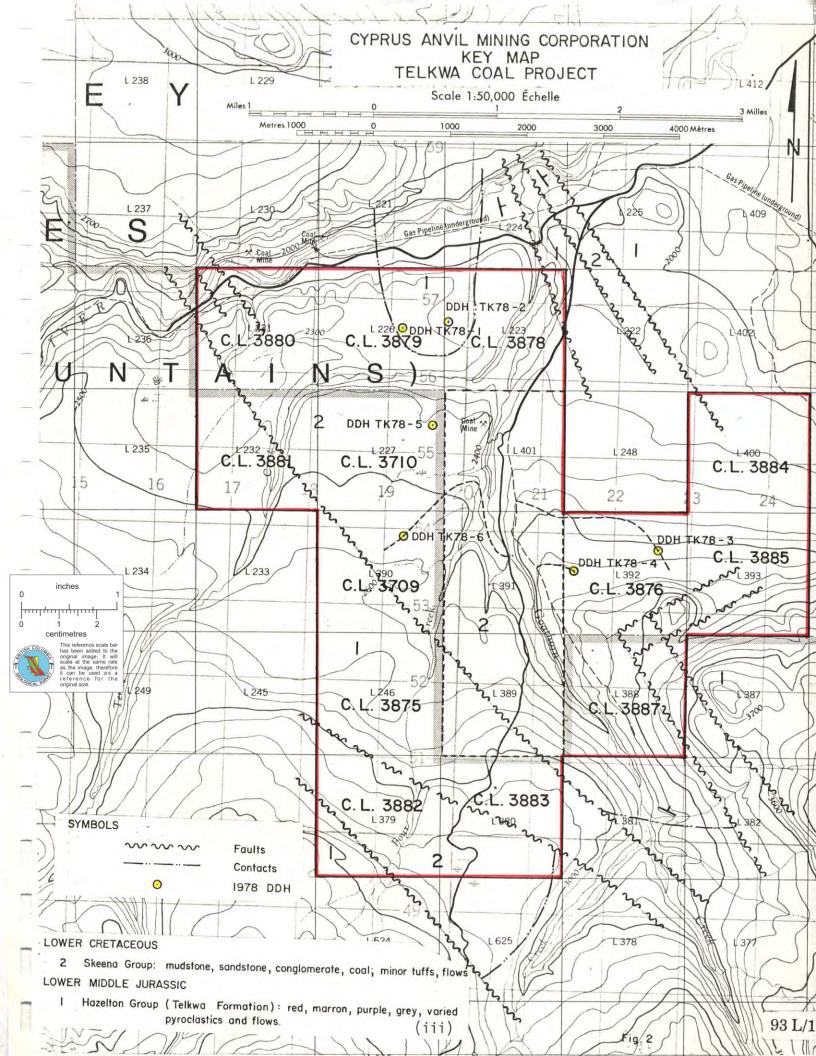
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TELKWA COAL PROJECT

Report on 1978 Field Work

INTRODUCTION

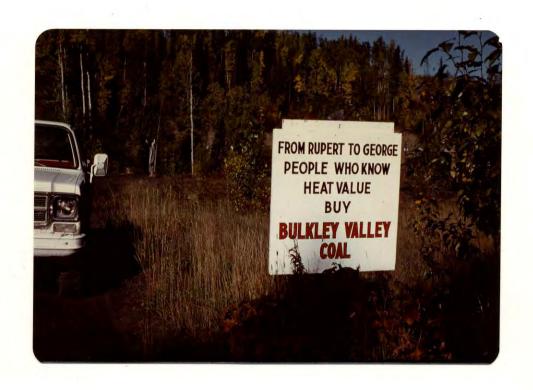
During the 1978 summer field season, Cyprus Anvil Mining Corporation carried out a preliminary exploration program on a number of coal licences in the Telkwa, B.C. coal basin. Work carried out included the following:

- preparation of topographic base maps and orthophotos
 from existing B.C. Government aerial photography;
- geological mapping;
- preliminary diamond drilling;
- analysis of coal samples from drill core and surface exposures.

The results of the 1978 work program are somewhat inconclusive. Because of a general lack of outcrop, areas of very deep overburden cover, and an indicated high density of faulting, more exploration work is required to define the economic potential of this area.

LOCATION AND ACCESS

The Telkwa coal project is located in west-central British Columbia, about 20 km south of the town of Smithers and 9 km south-southwest of the town of Telkwa. The project area is within N.T.S. map sheet 93-L-11 (E½). The property lies south of the Telkwa River, and to the east and west of Goathorn Creek. There is good gravel road access to the property from Telkwa. Both Telkwa and Smithers are on main highway and C.N. Rail routes connecting the port of Prince Rupert, about 370 km to the west, and Prince George, to the east.



LAND STATUS

All previous and current mining operations are within three Crown-granted lots (Lots 389, 391, 401) held by Bulkey Valley Collieries Ltd., on which Bulkley Valley Coal Ltd. is now mining under an operating agreement with Bulkley Valley Collieries Ltd.

Bulkley Valley Coal Ltd. holds directly 13 contiguous Coal Licences surrounding the above Crown-granted lots. These licences are tabulated below:

Coal Licence No.	Date Issued	Area (hectares)
3709	September 19, 1977	259
3710	September 19, 1977	259
3 875	June 23, 1978	259
3876	June 23, 1978	259
3877	June 23, 1978	259
3 878	June 23, 1978	259
3 879	June 23, 1978	259
3 880	June 23, 1978	259
3881	June 23, 1978	259
3882	June 23, 1978	259
3 883	June 23, 1978	259
3884	June 23, 1978	259
3885	June 23, 1978	259

By an option agreement made as of the 19th day of April, 1978 between Bulkley Valley Coal Ltd. and Cyprus Anvil Mining Corporation, Cyprus Anvil may acquire the above coal licences, with a royalty interest to be retained by Bulkley Valley Coal Ltd. With the consent of the Minister, in accordance with Section 9 of the Coal Act, this agreement has been recorded as an endorsement on each licence document.

Field work was carried out under Surface Work Permit No. C-123, issued pursuant to Section 8 of the Coal Mines Regulation Act.

DIAMOND DRILLING

Six diamond drill holes, totalling 651.7 m, were drilled in the period September 12 - September 24, 1978. The drilling was carried out by J. T. Thomas Diamond Drilling Ltd., of Smithers, B.C. All drill holes recovered NQ size core, using a conventional core barrel.

Drill holes are numbered TK 78-1 through TK 78-6 and are plotted on the geology map (Map No. 1, 1:10,000) and the geological sections (Map No. 2, 1:10,000 and 1:5,000). Graphic drill hole logs are plotted on Map No. 3. Written lithologic logs for each hole are included in Appendix II.

Drill core is stored in covered core boxes in a core shed on Lot 401.

Drill hole data is tabulated below:

Hole No.	Bearing	Dip	Commenced	Completed	Ultimate Depth (m)
TK 78-1	-	-90 ⁰	Sept.12/78	Sept.13/78	83.8
TK-78-2	-	-90°	Sept.13/78	Sept.15/78	106.7
TK 78-3	-	-90°	Sept.15/78	Sept.18/78	120.7
TK 78-4	-	-90°	Sept.18/78	Sept.20/78	108.8
TK 78-5	-	-90 ⁰	Sept.21/78	Sept.22/78	111.9
TK 78-6	-	-90 ⁰	Sept.23/78	Sept.24/78	119.8
					651.7 m

Drilling was hampered by very thick overburden cover. Drill holes TK 78-1, TK 78-2 and TK 78-6 did not reach bedrock.

All 1978 drill sites were located along currently maintained logging or power line access roads, or along abandoned logging access roads. Some

bulldozing (Bruce Kerr Contracting Ltd.) was required to clear deadfalls and alders along some stretches of old logging roads. No commercial timber was destroyed in the course of any road work or drill site clearing.

GEOLOGY

During geological mapping, orthophoto and topographic base maps, at a scale of 1:5,000, with 5 m contours, were used for control. Base maps and orthophotos were prepared by McElhanney Surveying and Engineering Ltd., using existing B.C. Government aerial photography. The final geological plan was plotted on a 1:10,000, 5 m contour base map, with geological sections plotted at 1:10,000 or 1:5,000.

Geological mapping and interpretation were severely hampered by thick overburden cover throughout most of the project area, with outcrops occurring, for the most part, only in the beds of and along the immediately adjacent steep banks of Goathorn Creek, Mud Creek, and the Telkwa River. A high fault density, observed in outcrops, described in reports of the abandoned underground mining operations, and interpreted from lineaments visible on air photographs, has broken the area up into a large number of ill-defined, fault-bounded blocks.



View looking south, up Goathorn Creek, from abandoned open pit.

The basement rocks in the project area consist of Lower Jurassic volcanics of the Hazelton Group's Telkwa Formation. This formation is comprised of a varied assemblege of marine and non-marine, reddish, maroon, purple, grey and green pyroclastics and flows.

The Telkwa Formation volcanics are overlain unconformably by the Lower Cretaceous Skeena Group. The Skeena Group consists of interbedded marine and non-marine sedimentary and, within the project area, only minor volcanic strata. The sediments are conglomerate, greywacke, sandstone, mudstone and shale, with common minor or major coal seams. The volcanics are grey to green or vari-coloured basaltic to rhyolitic breccias, tuffs, and flows.

Numerous dykes, usually porphyritic, and of intermediate composition, intrude the sedimentary series. These dykes, where seen in outcrop, often occupy easterly to northeasterly trending fault zones, along which significant displacement has occurred. Some volcanic rocks intersected in drill holes appear sill-like in structure.

with the exception of the Betty Coal Seam, no useful marker beds have been defined. The sedimentary strata are generally very lensy, pinching or swelling, and grading, over short distances, into other lithologies. In numerous, close-spaced, old drill holes, in the vicinity of some of the abandoned underground mines, it was often impossible to correlate coal beds and other sedimentary members across distances often in the order of only a few tens of metres.

TABLE 1

TABLE OF GEOLOGIC FORMATIONS

LOWER CRETACEOUS

- 2 Skeena Group: mudstone, sandstone, conglomerate, coal; minor tuffs and flows.
 - 2b Coal Member: coal seams, mudstone, gritty mudstone (90 m+).
 - 2a Mudstone, sandstone, conglomerate, minor thin coal (± 130 m).

UNCONFORMITY

LOWER-MIDDLE JURASSIC

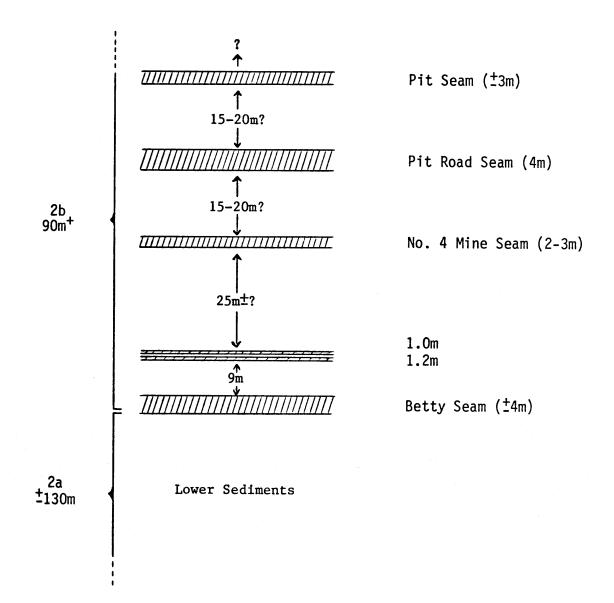
1 Hazelton Group

Telkwa Formation: red, maroon, purple, grey, varied pyroclastics and flows.

In the project area, the rocks are generally gently folded along northerly to northwesterly trending axes, with dips usually not greater than about 20°. Occasional steeper dips, seen in outcrop and in drill core, are probably the result of proximity to fault zones.

The project area is intensely faulted. A set of regional northwesterly trending faults has dissected the area into a number of sub-parallel, linear, northwesterly trending blocks, some of which have Skeena Group sediments overlying the Telkwa Formation volcanics, and others in which the Skeena sediments are absent. All known coal occurrences in the project area and all existing and abandoned mining operations are within a central fault block underlain by Skeena sediments. Within this block, there is a strong, closely-spaced set of near-vertical, easterly to northeasterly trending faults. In the area of old Mines Nos. 1, 2, 3 and 4, and the present No. 4 Extension Mine, the effect of these faults has been to progressively down-drop the coal horizon to the north side of each fault zone. However, a fault forming the south limit of the No. 4 Mine, and another fault between the No. 4 Mine and diamond drill hole TK 78-5 has the south side of the fault as the down-dropped side. Numerous other small, randomly-oriented faults are seen throughout the area. Some degree of fault displacement is apparent within the limits of just about every coal exposure seen on the property.

Because of the lack of geological data, unit 2, on Map No. 1, has not been broken down into sub-units 2a and 2b. The cross-section interpretations, showing this division, are highly conjectural.

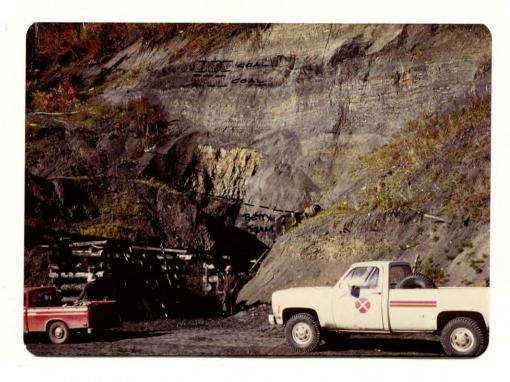


1. Betty Seam

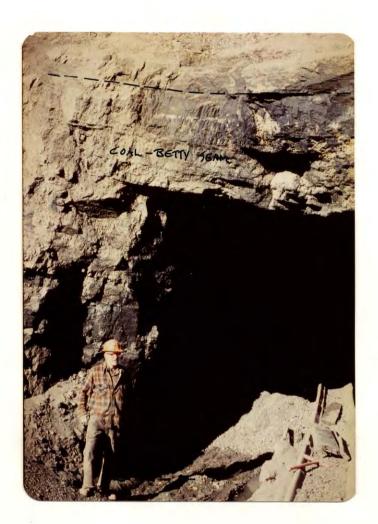
The base of the coal member (2a) is marked by the Betty Seam. The Betty Seam was mined in abandoned underground Mines Nos. 1, 2 and 3, and is presently being mined in the No. 4 Extension Mine. This seam has been correlated between mines on the basis of two thin, continuous, distinctive partings (an upper 10 - 18 cm white clay parting, and a lower 5 - 8 cm mudstone parting) which have been reported in the seam throughout all underground workings.

The lowest coal seam encountered in diamond drill hole TK 78-4 was thinner and did not contain the above partings. It has, however, because of its apparent stratigraphic position, been tentatively designated as the Betty Seam.

The Betty Seam, as sampled in the No. 4 Extension Mine (see Coal Analyses in the following section), showed the upper section of the seam, above the upper dirt parting, to have a significantly higher sulphur content and F.S.I. value. This same pattern is apparent from the analysis of the Betty Seam sample taken from an outcrop exposure near the site of the No. 1 Mine portal. A coal sample taken from an old bulldozer trench located about 600 m south of diamond drill hole TK 78-4, is thought to perhaps also represent The Betty Seam. The base of the seam is not exposed in this location, but a dirt parting near the top of the seam is similar to that seen in the Betty Seam in other locations. This sample, however, did not show the above-noted sulphur - F.S.I. pattern.



Betty Seam and two thin seams above Betty Seam: No. 4 Extension Mine.



Betty Seam at No. 4 Extension Mine Portal.



Betty Seam cut by vertical N.E. fault near No. 4 Extension Mine Portal.



Betty Seam???Bulldozer Trench 600m south of DDH TK 78-4.

The Betty Seam has a low raw ash content (6.6 - 12.6%) and high B.T.U. value (12,070 B.T.U./lb.), with sulphur content in the order of 0.75% (raw dry basis). This sample ranks as high volatile A bituminous coal.

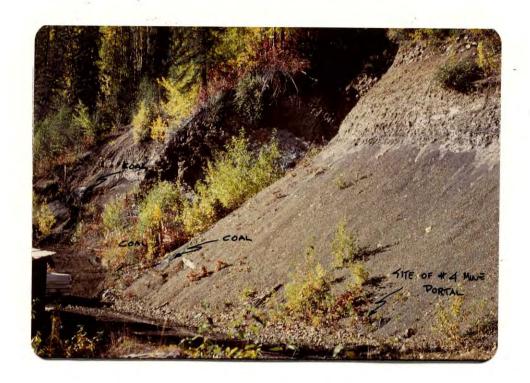
Two closely adjacent thin seams (1.0 m and 1.2 m, separated by about 0.5 m of mudstone) occur about 9 - 10 m above the top of the Betty Seam. These seams are seen, in outcrop, in the cliff face above the No. 4 Extension Mine portal, and in the steep bank above the site of the No. 1 Mine portal. These two seams average 14.2% ash, 0.66% sulphur, and 11,082 B.T.U./lb. on a raw coal dry basis.

2. No. 4 Mine Seam

The No. 4 Mine Seam is exposed for a distance of about 50 m in a number of old bulldozer cuts along the steep bank immediately south of the No. 4 Mine portal. This seam averaged 2 - 3 m thick in the old underground workings, and does not contain any persistent partings.

The proximate analysis of a No. 4 Mine Seam sample shows this coal to have a very low raw ash content (11%), moderately high sulphur (1.67%) and a very high heating value (13,270 B.T.U./lb.). All values are on a raw dry basis.

The complete interval between the Betty Seam and the No. 4 Mine Seam is not exposed in outcrop. In diamond drill hole TK 78-4, the interval between the lowest significant coal seam (Betty Seam, 67.8 - 69.2 m) and next overlying major seam (No. 4 Mine Seam, 31.2 - 33.7 m) is 34.1 m.



Buried Site of No. 4 Mine Portal

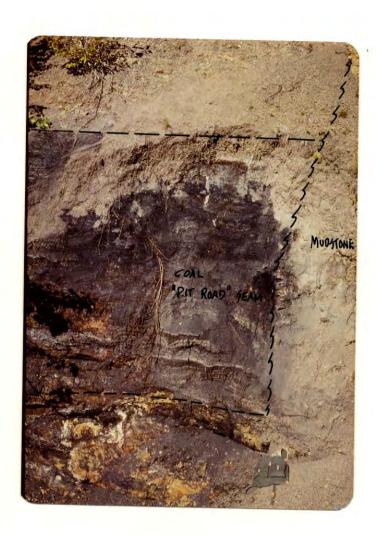
3. "Pit Road" Seam

This seam is seen at only one outcrop and was not encountered in any 1978 drill hole. This outcrop is on the road, midway between the site of the No. 4 Mine portal and the abandoned open pit mine to the north. At this location, 4 m of undisturbed, but highly oxidized, coal is exposed, with a fault zone marking the lower limit of the coal.

The proximate analysis of this oxidized coal indicates, on a raw coal, dry basis, 13.5% ash, 0.74% sulphur and 10,917 B.T.U./lb.

This coal outcrop, on a steep west-facing slope, is bounded, within a few metres to the north and south, by steep, dyke-filled fault zones. As a result, the true stratigraphic position of this seam

is uncertain. Topographically, this outcrop is 15 - 20 m above the projection of the No. 4 Mine Seam, and 15 - 20 m below the overlying Pit Seam.



Pit Road Seam

4. Pit Seam

Because of partial backfilling and reclamation of the abandoned open pit mine, this seam does now not outcrop within the pit area, and was not seen elsewhere on the property in outcrop or core. This seam, within the pit area, was reported to average about 3 m in thickness. No analytical data is available.



N.E. "Nose" of Open Pit Mine

COAL ANALYSES

Coal samples (core, adit, and surface samples) were analysed by Birtley Coal and Mineral Testing Ltd., of Calgary, Alberta.

Each seam component sample was air dried, and subjected to a proximate, sulphur, B.T.U., and F.S.I. analysis. For some samples, equilibrium moisture was determined. Where applicable, a seam composite analysis was calculated. Results are tabulated on an ascreceived, air dried, and dry basis.

Sample locations are identified on Map No. 1 (geology map, 1:10,000).

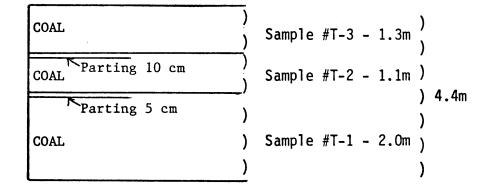
Coal analysis results are as follows:

Seam: - Betty Seam

Location: - No. 4 Extension Mine, face of main adit.

LAB.NO.	ADM%	<u>M%</u>	ASH%	<u>VM.%</u>	FC.%		Per 1b. B.T.U.	<u>FS1</u>	EQUIL. MOIST.	
1374 SAMPLE T-1	2.0	3.3 5.2	14.8 14.5 15.3	27.0 26.5 27.9	54.9 53.8 56.8	0.53 0.52 0.55	12,029 11,788 12,440	1.0	5.7	a.d.b. a.r.b. d.b.
1375 SAMPLE T-2	2.3	3.2 5.4	14.8 14.5 15.3	24.2 23.6 25.0	57.8 56.5 59.7	0.57 0.56 0.59	12,100 11,822 12,500	1.0	5.7	a.d.b. a.r.b. d.b.
1376 SAMPLE T-3	3.2	2.4 5.5	8.5 8.2 8.7	29.1 28.2 29.8	60.0 58.1 61.5	1.55 1.50 1.59	13,190 12,768 13,514	5.0	4.9	a.d.b. a.r.b. d.b.
SEAM COMP. (Calc.) (4.4m)	2.4	3.0 5.3	12.9 12.6 13.3 12.6	26.9 26.3 27.7 26.2	57.1 55.7 58.9 55.6	0.84 0.81 0.86 0.82	12,390 12,086 12,772 12,070	2.2	5.5 5.5	a.d.b. a.r.b. d.b. e.m.b.

Rank Determination - on basis of above analyses, rank falls on the borderline between medium volatile bituminous and high volatile A bituminous coal.



- no name, total thickness 1.2m.

Location: - No. 4 Extension Mine, 9 m above Betty Seam in cliff face

above mine portal.

LAB.NO.	ADM%	<u>M%</u>	ASH%	<u>VM.%</u>	FC.%	_S%_	Per 1b. B.T.U.	<u>FSI</u>	EQUIL. MOIST.	
1377 SAMPLE T-4	7.5	11.4 18.0		23.3			9,827 9,090 11,091	N.A.	16.3	a.d.b. a.r.b. d.b.

Seam: - no name, total thickness 1.0m.

Location: - No. 4 Extension mine, 10.5 m above Betty Seam, in cliff face

above mine portal.

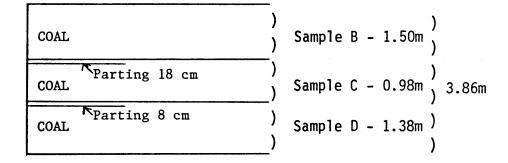
LAB.NO.	ADM%	M%_	ASH%	VM.%	FC.%		Per 1b. <u>B.T.U.</u>	<u>FSI</u>	EQUIL. MOIST.	
1378 SAMPLE T-5	5.9	12.3 17.5	12.0		44.7	0.54	9,711 9,138 11,073	N.A.	17.8	a.d.b. a.r.b. d.b.

SAMP	L	Ι	NG
PLAN	:		

COAL ms 0.3m	_)	Sample #T-5 - 1.0m
COAL)	Sample #T-4 - 1.2m
)	
·)	
)	
M.S.)	9m
)	
)	
)	
		Datty Com at No. 4 Eutonation
COAL)	Betty Seam at No. 4 Extension Mine Portal.
)	4.4m

Seam: - Betty Seam
Location: - Oxidized surface exposure near site of No. 1 Mine Portal.

LAB.NO.	ADM%	<u>M%</u>	ASH%	VM.%	FC.%	_S%_	Per 1b. B.T.U.	<u>FSI</u>	
2133 SAMPLE B 1.5m	3.2	3.4 6.5	9.3 9.0 9.6	27.3 26.4 28.3	60.0 58.1 62.1	1.01 0.98 1.05	10,781 10,436 11,160	1/2	a.d.b. a.r.b. d.b.
2134 SAMPLE C .98m	7.9	5.3 12.8	15.3 14.1 16.2	24.1 22.2 25.4	55.3 50.9 58.4	0.46 0.42 0.49	10,311 9,496 10,888	N.A.	a.d.b. a.r.b. d.b.
2135 SAMPLE D 1.38m	6.6	4.9 11.2	7.2 6.7 7.6	23.0 21.5 24.2	64.9 60.6 68.2	0.44 0.41 0.46	12,170 11,367 12,797	N.A.	a.d.b. a.r.b. d.b.
SEAM COMP. (Calc.) 3.86m	5.6	4.4 9.8	10.1 9.5 10.6	24.9 23.6 26.1	60.6 57.2 63.3	0.67 0.63 0.70	11,158 10,530 11,676	_	a.d.b. a.r.b. d.b.

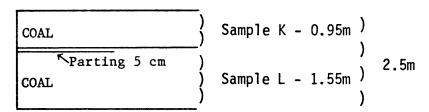


Seam: - ??, may be Betty Seam; footwall not exposed.Location: - Oxidized coal, old bulldozer trench 600m south of diamond

drill hole TK 78-4.

LAB.NO.	ADM%	_M%_	ASH%	<u>VM.%</u>	FC.%	_S%	Per 1b. B.T.U.	FSI	
2142 SAMPLE K .95m	4.6	6.7 11.0	6.1 5.8 6.5	30.3 28.9 32.5	56.9 54.3 61.0	0.61 0.58 0.65	10,785 10,289 11,559	N.A.	a.d.b. a.r.b. d.b.
2143 SAMPLE L 1.55m	7.2	7.5 14.2	6.2 5.8 6.7	29.1 27.0 31.5	57.2 53.0 61.8	0.63 0.58 0.68	10,607 9,843 11,467	N.A.	a.d.b. a.r.b. d.b.
SEAM COMP. (Calc.) 2.5m	6.2	7.2 13.0	6.2 5.8 6.6	29.6 27.7 31.9	57.1 53.5 61.5	0.62 0.58 0.67	10,675 10,012 11,502	N.A.	a.d.b. a.r.b. d.b.

SAMPLING PLAN:



Seam footwall not exposed.

Seam: - ?

Location: - Drill Core Sample, DDH TK 78-4, 31.24-33.68m (2.44m)

LAB.NO.	ADM%	<u>M%</u>	ASH%	<u>VM.%</u>	<u>FC.%</u>	<u>S%</u>	Per 1b. <u>B.T.U.</u>	
2132 SAMPLE A DDH TK 78-4	3.7		11.8	28.3	54.9	0.53	12,754 12,282 12,935	a.d.b. a.r.b. d.b.

Seam: - No. 4 Mine Seam
Location: - Oxidized surface exposure 40m SSW of caved No. 4 Mine Portal.

LAB.NO.	ADM%	M%	ASH%	<u>vm.%</u>	FC.%	<u>S%</u>	Per 1b. B.T.U.	<u>FSI</u>	
2140 SAMPLE I 1.0m	2.2	1.5 3.7	11.9 11.6 12.1	26.0 25.4 26.4	60.6 59.3 61.5	1.77 1.73 1.80	12,913 12,629 13,110	1.0	a.d.b. a.r.b. d.b.
2141 SAMPLE J 1.0m	2.9	1.5 4.4	10.0 9.7 10.2	28.7 27.9 29.1	59.8 58.0 60.7	1.52 1.48 1.54	13,229 12,845 13,430	3.5	a.d.b. a.r.b. d.b.
SEAM COMP. (Calc.) 2.0m	2.6	1.5 4.1	11.0 10.7 11.0	27.4 26.7 27.8	60.2 58.7 61.1	1.65 1.61 1.67	13,071 12,737 13,270	2.3	a.d.b. a.r.b. d.b.

COAL	Sample I - 1.0m)) 2.0m
COAL	Sample J - 1.0m)

Seam: - "Pit Road" seam.
 Location: - Small fault-bounded, weathered exposure of coal seam seen along the west margin of road-cut between No. 4 Mine Portal and Luscar open pit mine.

LAB.NO.	ADM%	<u>M%</u>	ASH%	<u>VM.%</u>	<u>FC.%</u>	<u>S%</u>	Per 1b. B.T.U.	FSI	
2136 SAMPLE E 1.0m	9.1	9.2 17.5	10.3 9.4 11.3	27.2 24.7 30.0	53.3 48.4 58.7	0.72 0.65 0.79	10,395 9,449 11,448	N.A.	a.d.b. a.r.b. d.b.
2137 SAMPLE F 1.0m	8.9	3.9 12.5	10.4 9.5 10.8	36.3 33.1 37.8	49.4 44.9 51.4	0.55 0.50 0.57	9,559 8,708 9,947	N.A.	a.d.b. a.r.b. d.b.
2138 SAMPLE G 1.0m	2.2	7.9 9.9	7.3 7.1 7.9	26.9 26.3 29.2	57.9 56.7 62.9	0.76 0.74 0.83	11,093 10,849 12,045	N.A.	a.d.b. a.r.b. d.b.
2139 SAMPLE H 1.0m	4.2	5.3 9.3	22.8 21.8 24.1	25.2 24.1 26.6	46.7 44.8 49.3	0.72 0.69 0.76	9,685 9,278 10,227	N.A.	a.d.b. a.r.b. d.b.
SEAM COMP. (Calc.) 4.0m	6.1	6.6 12.3	12.7 12.0 13.5	28.9 27.1 30.9	51.8 48.7 55.6	0.69 0.65 0.74	10,183 9,571 10,917	N.A.	a.d.b. a.r.b. d.b.

COAL	Sample E - 1.0m
COAL) Sample F - 1.0m 4.0m
COAL	Sample G - 1.0m
COAL Parting 20 cm	Sample H - 1.0m)

Seam: - ?, may be seam mined in McNeil Mine.
Location: - Weathered surface exposure, east bank of Goathorn Creek,

along Lot 401 north boundary line, immediately south of site of McNeil Mine.

LAB.NO.	ADM%	<u>M%</u>	ASH%	<u>VM.%</u>	<u>FC.%</u>	<u>S%</u>	Per 1b. B.T.U.	<u>FSI</u>	EQUIL. MOIST.	
1379 SAMPLE T-6	1.5	2.3 3.8	25.0 24.6 25.6	27.4 27.0 28.0	45.3 44.6 46.4	0.51 0.50 0.52	10,439 10,282 10,685	0.5	9.0	a.d.b. a.r.b d.b.
1380 SAMPLE T-7	2.4	2.1 4.4	13.6 13.3 13.9	30.5 29.8 31.2	53.8 52.5 23.6	0.92 0.90 0.94	12,744 12,438 13,017	1.5	4.3	a.d.b. a.r.b. d.b.

COAL)	Sample #T-6 - 1.2m
M.S.)	0.6m
COAL) ₁	Sample #T-7 - 1.5m

CONCLUSIONS AND RECOMMENDATIONS

The preliminary exploration that was carried out on the Telkwa Coal Licences in 1978 has shown both a higher density of faulting and deeper overburden cover over much of the project area than had been earlier anticipated.

As a result, geological interpretations in much of the area are, to some degree, conjectural and stratigraphic relationships between the known coal seams are still somewhat uncertain.

Before carrying out the 1978 program, it had been speculated that individual, fault-bounded blocks of possible reserves of Betty Seam coal could contain up to 10,000,000 tonnes each. It now appears unlikely, because of the fault density, that unfaulted blocks of Betty Seam coal would contain more than, say, 3,000,000 - 4,000,000 tonnes each. However, there is the potential for the occurrence of a significant number of these smaller reserve blocks.

Further exploration drilling is warranted in a number of areas on the coal licences, as follows:

- west half of C.L. 3876;
- unexplored area underlain by sediments on C.L. 3882 and 3883;
- synclinal structure in northeast quarter of C.L. 3880.

If a more favourable agreement can be negotiated on the central three Crown-granted lots, then drilling is recommended in that area, as follows:

- to define the limits of the Betty Seam in the block now being mined in the No. 4 Extension Mine;

- exploration drilling, in an area of no bedrock exposure, to the west of Goathorn Creek, in the southwest quarter of Lot 391 and the northeast half of Lot 389.

Respectfully submitted,

T. J. Adamson

December, 1978

330, 355 Burrard Street Vancouver, British Columbia V6C 2G8 Telephone (604) 687-2586

APPENDIX I

Statement of Qualifications

(As required by Regulations under the Coal Act, 1974, Part II, Sec. 9 [2])

- I, Thomas J. Adamson, geologist, with business address at 330 355 Burrard Street, Vancouver, British Columbia, and residential address at 3842 West 23rd Avenue, Vancouver, British Columbia, hereby state that:
- 1. I graduated from the University of British Columbia in 1967 with a B.Sc., majoring in geology.
- 2. From 1967 to the present, I have been actively engaged as a geologist on mineral and coal exploration programs in British Columbia, Alberta, and the Yukon Territory.
- 3. From 1972 to the present, I have been employed by Cyprus Anvil Mining Corporation, of Vancouver, British Columbia.
- 4. I personally participated in and supervised all 1978 field work on the Telkwa Coal Project and have compiled and interpreted all data resulting from this work.

1 Adamson

December, 1978



APPENDIX II

Lithologic Logs

DDH TK 78-1 through TK 78-6

DIAMOND DRILL LOG

TELKWA PROJECT - (Coal Licence No. 3879)

Hole No. TK-78-1

Page 1 of 1

Bearing: -90°
Commenced: September 12, 1978
Completed: September 13, 1978
Ultimate Depth: 275' (83.8m)
Collar Elev'n: 717 m

INT Feet	ERVAL Metres	CORE REC. %	UNIT	DESCRIPTION
0 - 275	0.0 - 83.8	0	0.B.	Overburden. Gravel, sand, bouldery clay. Casing broke at sub at 275'. Hole caved on

TELKWA PROJECT - (Coal Licence No. 3879)

Hole No. TK-78-2

Page 1 of 1

Bearing:
Dip:
Commenced:
Completed:
Ultimate Depth:
Collar Elev'n:

-90
September 13, 1978
September 15, 1978
(106.7m)
677 m

INTE	ERVAL	CORE REC.	UNIT	DESCRIPTION			
<u>Feet</u>	Metres	%					
0 - 350	0.0 - 106.7	0	0.B.	Overburden. Bouldery sand and clay. (Could not penetrate an interval		

TELKWA PROJECT - (Coal Licence No. 3876)

Bearing: Dip:

-90°

Commenced: Completed:

September 15, 1978 September 18, 1978

Ultimate Depth: 396' (120.7m)

Collar Elev'n: 826 m

	INTERVAL	·	CORE REC.	UNIT
Feet	Metro	es	- %	
0 - 90	0.0 -	27.4		0.B.
90 - 117	27.4 -	35.7	95+	2a
117 - 128	35.7 -	39.0		
128 - 132	39.0 -	40.2		Ĵ

DESCRIPTION

Overburden. Triconed and cased.

Quartz eye rhyolite (felsite); colour very light, whitish grey; quartz eyes to 5 mm; scattered small white feldspar lathes; very minor, very fine-grained, disseminated pyrite.

Medium to dark grey, fine-grained andesitic volcanic; massive to slightly porphyritic (small lathes white feldspar); very minor, fine-grained, disseminated pyrite; sharp irregular contact with unit above, i.e.

Contact with unit below at about $15^{\rm O}$ to core axis.

Thinly interbedded, very lensy black mudstone, grey mudstone, fine-grained grey sandstone; beds hairline to 6 mm thick; minor scattered pyritic lenses to 4 mm thick; planar breaking; C.A. 70°.



Hole No. TK-78-3

Page 1 of 4

TELKWA PROJECT

Hole No. TK-78-3

Page 2 of 4

INTI Feet	ERVAL Metres	CORE REC.	UNIT	DESCRIPTION
132 - 135	40.2 - 41.1	95+	2a	Medium grey to black, massive, irregularly breaking mudstone.
135 - 140	41.1 - 42.7			Medium grey, acid-intermediate quartz eye porphyritic volcanic; slightly crumbly matrix; encloses, with shows very irregular contacts, scattered fragments of pyritic coal to 10 cm in longest observed dimension.
			İ	Contacts appear nearly conformable.
140 - 152	42.7 - 46.3			Medium to dark grey, soft, irregular breaking mudstone; indistinct "soft" bedding at 44.5m - 15 cm coal seam. Gradational contact with unit below.
152 - 162	46.3 - 49.4			Finely laminated, fine-grained muddy sandstone to gritty mudstone; medium grey; thin interbeds (hairline to 5 mm), usually lensy, of grey to black mudstone to carbonaceous mudstone; C.A. 70°.
162 - 166	49.4 - 50.6			Grey-brown to black mudstone; a few coaly beds 5 mm - 10 mm thick.
166 - 167	50.6 - 50.9			Quartz eye rhyolite; very fine-grained; sharp irregular conformable? contacts above; lower contact angle uncertain.
167 - 168.5	50.9 - 51.4			Dark grey mudstone; minor lensy pyrite nodules to 2 cm longest dimension.
168.5-171	51.4 - 52.1			Coaly mudstone (50%) to coal (50%); core very broken and slickensided.
171 - 184	52.1 - 56.1	V	\downarrow	Dark brownish grey to black mudstone, some coaly mudstone; all very broken, very slickensided.

INTE Feet	ERVAL Metres	CORE REC. %	UNIT	DESCRIPTION
184 - 196	56.1 - 59.7	95 +	2a 	Dark grey, fine-grained andesitic volcanic. Irregular conformable contact above, lower contact angle appears very convoluted, but uncertain because of broken core.
196 - 202	59.7 - 61.6			Interbedded black coal-streaked mudstone (70%) and dirty, broken, highly pyritic coal (30%).
202 - 215	61.6 - 65.5			Very broken, irregular breaking, medium-grained mudstone, scattered thin carbonaceous streaks; C.A. variable $20^{\rm o}$ - $70^{\rm o}$.
215 - 217	65.5 - 66.1	. :		Coaly mudstone; very slickensided; C.A. indistinct, variable.
217 - 219.5	66.1 - 66.9			Fine-grained, massive light grey volcanic; contact angles?, close to conformable?
219.5-227	66.9 - 69.2			Black coaly mudstone; very broken, very slickensided.
227 - 245	69.2 - 74.7			Mudstone to gritty mudstone; medium to light grey; medium to thinly, indistinctly laminated; C.A. increasing with depth 20° to 50°. - at 71.3 - 15 cm clean, dull coal. - 72.85-73.26 - fairly clean dull coal, very broken and slickensided.
245 - 311	74.7 - 94.8			Medium to dark, brownish grey mudstone; gradational with above; medium laminated to massive; scattered, very fine-grained brownish, muddy sandstone beds to 15 cm thick (5% of interval). C.A. $0.76 \text{ m} - 75^{\circ}$. C.A. $0.82 \text{ m} - 60^{\circ}$. C.A. $0.87 \text{ m} - 70^{\circ}$.
311 - 323	94.8 - 98.5			Gradational contact with above; medium to fine-grained muddy sandstone, beds 3m - 15 cm thick; thin (hairline to 6 mm) interbeds of grey to black mudstone, interbeds often "wispy" or lensy; a few very fine-grained, hard siliceous, brownish grey beds to 10 cm thick; entire interval very similar to 46.3m - 49.4m.
323 - 327	98.5 - 99.67	\checkmark	\downarrow	Massive, medium grey mudstone.

Hole No. TK-78-3

Page 4 of 4

	ERVAL	CORE REC.	UNIT	<u>DESCRIPTION</u>
<u>Feet</u>	Metres	%		
327 - 329	99.67-100.28	95+	2a	Clean, bright, banded coal.
329 - 336.5	100.28-102.57			Massive grey mudstone; scattered thin hairline carbonaceous streaks; C.A. 85°. - @ 102.3 - 10 cm very fine-grained, very hard siliceous, brownish-grey bed.
336.5-337.5	102.57-102.87			Coal to very coaly mudstone.
337.5-362	102.87-110.30			Grey, finely laminated mudstone; thin (1m - 5m) sandier, lighter grey, lensy interbeds; C.A. 80° .
362 - 367	110.3 - 111.9			Interbedded, very broken, slickensided, brownish-grey mudstone, black mudstone, coaly mudstone, and minor coal beds (to 7 cm thick).
367 - 372	111.9 - 113.4			Dark grey mudstone.
372 - 389.5	113.4 - 118.7			Very fine-grained, very light grey, "quartz eye" felsite; slightly porphyritic (scattered, small, white feldspar lathes). Flat contact above, uncertain below because of broken core.
389.5-396	118.7 - 120.7	\downarrow	\bigvee	Medium grey, coarsely laminated, slightly gritty mudstone.

TELKWA PROJECT - (Coal Licence No. 3876)

Bearing: Dip:

-90°

Commenced:
Completed:
Ultimate Depth:
Collar Elev'n:

September 18, 1978 September 20, 1978 357' (108.8m) 833m

INTE Feet	RVAL Metres	CORE REC.	UNIT	DESCRIPTION
0 - 101	0.0 - 30.80	0	OB	Overburden; triconed and cased.
101 - 102.5	30.80 - 31.24	95+	2b	Finely laminated, grey mudstone; C.A. 80°.
102.5-110.5	31.24 - 33.68			Clean coal; no dirt partings. (No. 4 Mine Seam???)
110.5-112	33.68 - 34.14			Massive, medium-grey mudstone.
112 - 112.5	34.14 - 34.29			Coal.
112.5-113	34.29 - 34.44			Coaly mudstone; pyritic nodules.
113 - 115	34.44 - 35.05			Clean, bright coal; C.A. 70 ⁰ .
115 - 123	35.05 - 37.49			Light to medium-grey, massive mudstone; scattered paper thin, irregular, carbonaceous "wisps".
123 - 125	37.49 - 38.10			Clean coal.
125 - 129	38.10 - 39.30			Grey to black mudstone; C.A. 70^{0} ; grading from massive at 38.1m to finely laminated at 39.3m.
129 - 209.5	39.30 - 63.86	\downarrow	\bigvee	Light to medium-grey, fine-grained, muddy sandstone to gritty mudstone, finely to coarsely laminated; thin interbeds (1 - 5mm) of grey to black mudstone, and interbeds to 2mm of coaly mudstone; C.A. 75° ; interval very similar to TK-78-3, 46.3m to 49.4m and TK-78-3, 94.8m to 98.5m.

Hole No. TK-78-4

Page 1 of 2

TELKWA PROJECT

Hole No. TK-78-4

Page 2 of 2

INT Feet	ERVAL Metres	CORE REC.	UNIT	DESCRIPTION
209.5-211	63.86- 64.3	95+	2р	Coal, very pyritic.
211 - 214	64.3 - 65.2			Massive, medium grey-brown mudstone.
214 - 216.5	65.2 - 66.0			Coal; <u>very</u> broken, very slickensided; good overall recovery.
216.5-222.5	66.0 - 67.8	50		Grey mudstone; very broken; poor core recovery but driller reports no coal in interval.
222.5-227	67.8 - 69.2	85		Coal; core very broken. (Betty Seam???)
227 - 228.5	69.2 - 69.6	95+	V 2a	Grey mudstone.
228.5-231	69.6 - 70.4	85		Coal to coaly mudstone; very broken and slickensided.
231 - 262	70.4 - 79.9	95 + 		Medium grey, gritty mudstone; medium to thinly laminated, with numerous lenticular interbeds (to 10mm) of light grey, cross-bedded sandstone; C.A. 75°.
262 - 329	79.9 - 100.3			Medium to dark, brownish grey, massive mudstone; C.A. 75 ⁰ .
329 - 331.5	100.3 - 101.0			Fine-grained, medium-grey sandstone.
331.5-357	101.0 - 108.8	· •	\downarrow	Medium, brownish-grey, massive gritty mudstone; C.A. 80 ⁰ .

TELKWA PROJECT - (Coal Licence No. 3710)

Bearing: Dip:

Commenced: Completed:

September 21, 1978 September 22, 1978 367' (111.9m)

Ultimate Depth: Collar Elev'n:

735m

Hole No. TK-78-5

Page 1 of 2

INTERVAL		CORE REC. UNI	UNIT	DESCRIPTION
Feet	Metres	REC.		
0 - 130	0 - 39.6	0	ОВ	Overburden.
130 - 146	39.6 - 44.5	95+ I	2a 1	Medium to coarse-grained, slightly conglomeratic sandstone; light grey; white muddy matrix; very soft, weathered, rotten; C.A. 85-90°.
146 - 146.5	44.5 - 44.7			Black coaly mudstone.
146.5-153	44.7 - 46.6			Soft, light brownish grey mudstone, small carbonaceous fragments and lenses throughout. - at 46.2m - 5 cm black coaly mudstone.
153 - 154	46.6 - 46.9			Bright coal.
154 - 155.5	46.9 - 47.4			Brownish-grey mudstone with carbonaceous fragments. Same as 44.7 - 46.6m.
155.5-156.5	47.4 - 47.7			Dark grey to black coaly mudstone.
156.5-197	47.7 - 60.0			Massive, medium brownish-grey mudstone to gritty mudstone; scattered thin (to 6mm) lensy coaly beds; C.A. 85° - 90° at 57.6m - 8 cm coarse-grained sandstone.
197 - 202	60.0 - 61.6			Medium-grey, coarse-grained sandstone; gradational contact with above interval.
202 - 239	61.6 - 72.8			Fine-grained, muddy sandstone to gritty mudstone; C.A. 85 ⁰ . - at 68.9m - 3 cm coal.
239 - 245.5	72.8 - 74.8	\downarrow	\downarrow	Gradational contact with above; very coarse-grained sandstone to pebble-cobble conglomerate (pebbles of quartz and felsic volcanics predominate).

TELKWA PROJECT

Hole No. TK-78-5

Page 2 of 2

INTERVAL Feet Metres		CORE REC.	UNIT	DESCRIPTION	
245.5-262	74.8 - 79.9	95+ I	2a	Medium to dark grey, massive mudstone; scattered small, randomly oriented organic fragments in medium-grey mudstone.	
262 - 291	79.9 - 88.7			Gradationally interbedded, fine to medium-grained, muddy sandstone, medium to coarse-grained clean sandstone, and pebble conglomerate; C.A. 85°.	
291 - 308.5	88.7 - 94.0			Brownish-grey mudstone; some with scattered organic fragments; sharp contact with overlying unit.	
308.5-309.5	94.0 - 94.3			Very coarse-grained sandstone.	
309.5-316	94.3 - 96.3			Gradationally interbedded mudstone to muddy sandstone to conglomerate.	
316 - 317.5	96.3 - 96.8			Conglomerate.	
317.5-324.5	96.8 - 98.9			Dark brownish-grey, slightly gritty mudstone.	
324.5-360	98.9 - 109.7		\downarrow	Pebble to cobble conglomerate; increasingly coarse-grained with increasing depth; pebbles of a wide variety of volcanics predominate.	
360 - 363	109.7 - 110.6		1	Very soft, rotten, "weathered" volcanic.	
363 - 367	110.6 - 111.9	Ŷ	1	Maroon porphyritic andesite; typical of Hazelton volcanics as seen along Telkwa River, upper Goathorn Creek and Cabinet Creek, immediately below Skeena Group conglomerates.	

TELKWA PROJECT - (Coal Licence No. 3709)

Hole No. TK-78-6

Bearing: Dip:

Commenced:

September 23, 1978 September 24, 1978 393' (119.8m)

Completed: Ultimate Depth: Collar Elev'n:

798m

Page 1 of 1

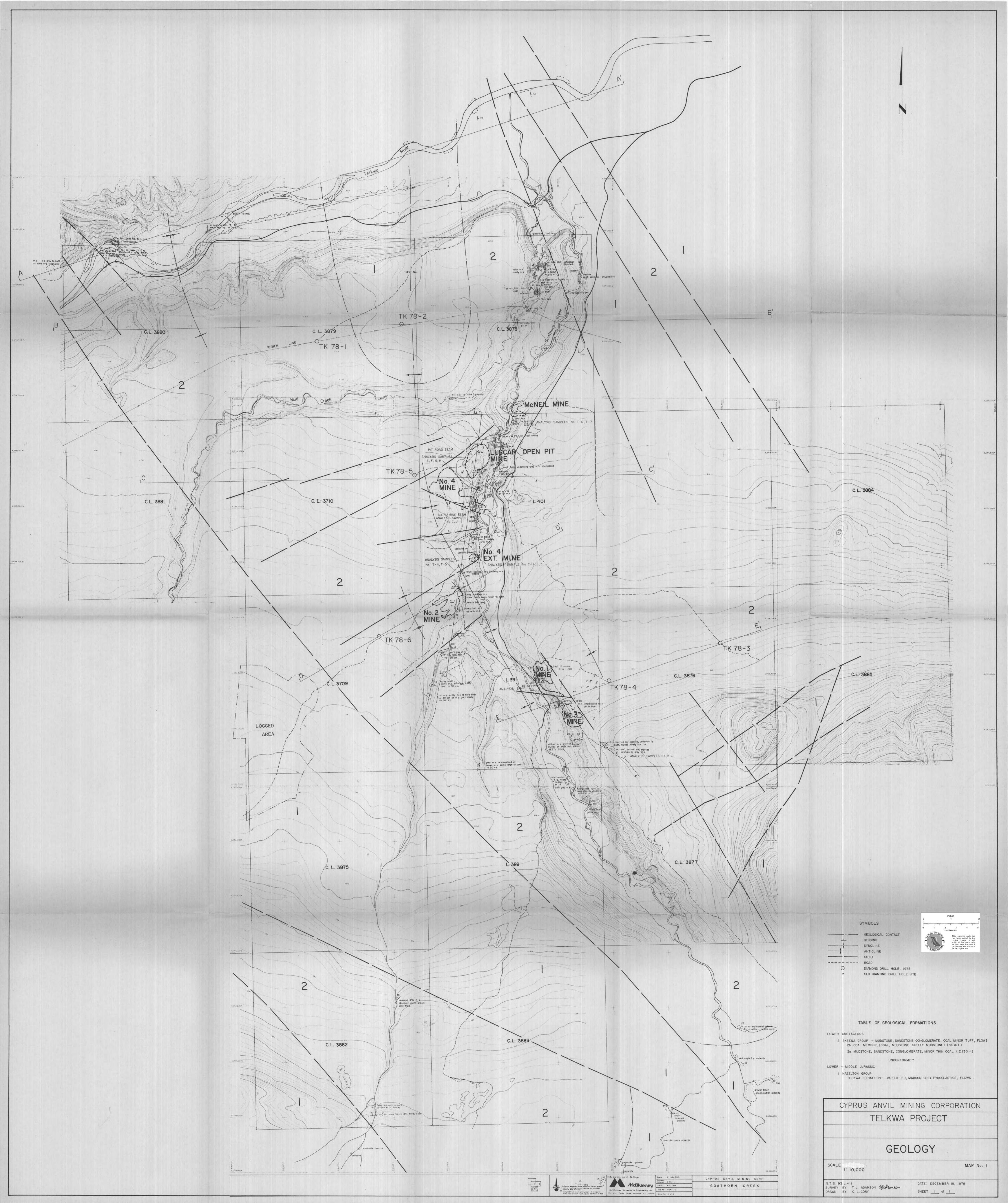
IN Feet	TERVAL Metres	CORE REC. %	UNIT	DESCRIPTION
0 - 100	0 - 30.5	0	ОВ	Overburden; triconed and cased.
100 - 393	30.5 - 119.8	100	OB	Overburden; cored; rods repeatedly getting stuck and unable to penetrate coarse loose gravel interval at 119.8m.

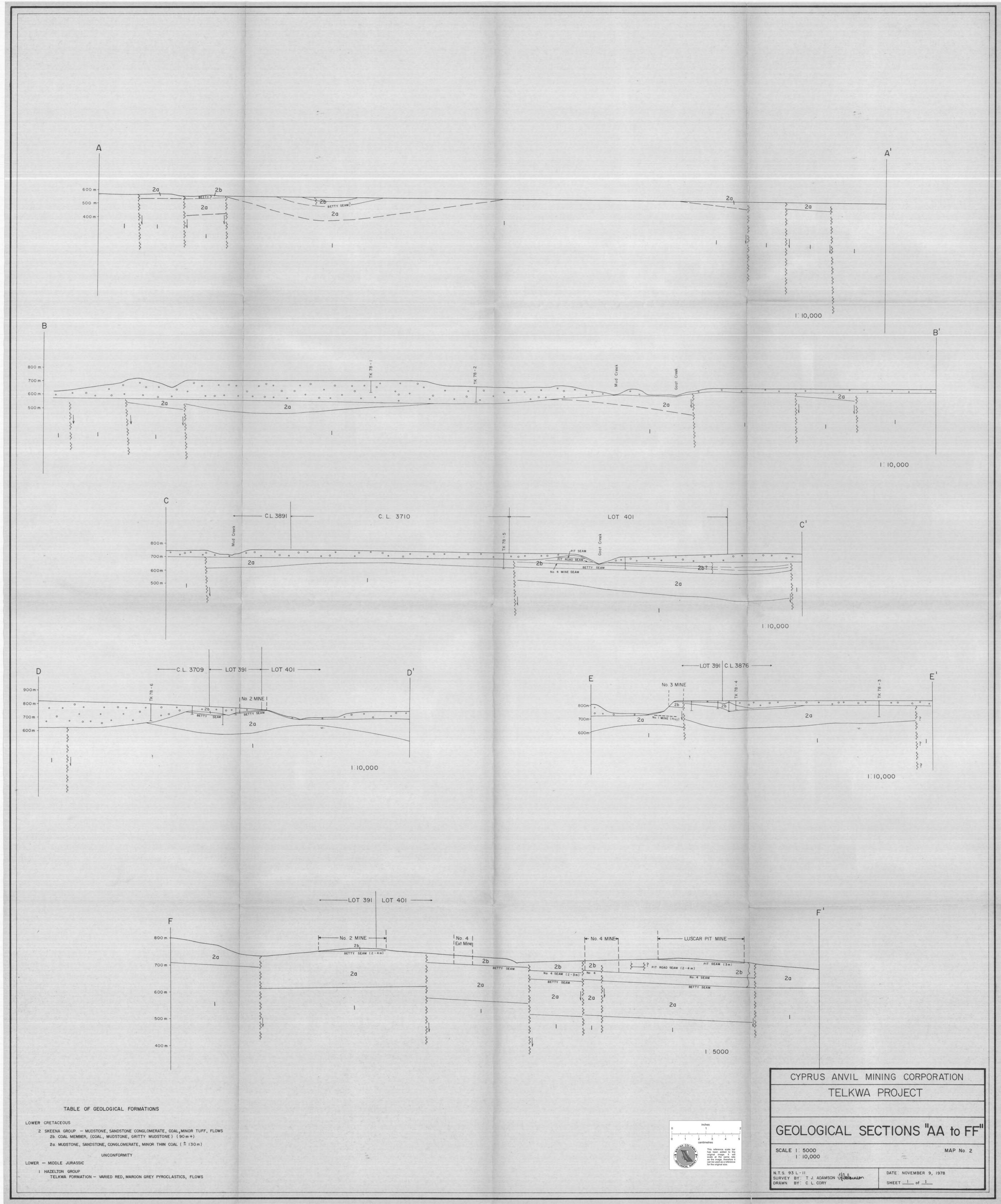
MAP NO. 1

Geology - 1:10,000

MAP NO. 2

Geological Sections 1:5,000; 1:10,000







COAL LICENCE No. 3879

BEARING: -

COAL LICENCE No. 3876

COAL LICENCE No. 3879

N.T.S. 93 L 11

SURVEY BY: T. J. ADAMSON (SHEET _ Of _ I ___ OF _ I __ OF _ I ___ OF _ I __ OF _ I ___ OF _ I