

**GROUNDHOG COAL LTD.
904-675 WEST HASTINGS STREET.
VANCOUVER, B. C. V6B 1N2**

THE GROUNDHOG COALFIELD

by

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Vancouver, B.C.**

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THE GROUNDHOG COALFIELD

The following is a brief evaluation of the Groundhog Coalfield.

The indications are positive: the field is large and the potential rewards are great. The climate politically and economically is favourable.

Further development is warranted therefore a proposed initial exploration programme has been included in this report.

LOCATION

(See Drawing Number 1)

The Groundhog Coalfield is located in the Cassiar Land District of northwestern British Columbia; it is within the area bounded by 56 degrees 47 minutes to 56 degrees 58 minutes latitude and 128 degrees 07 minutes to 128 degrees 30 minutes longitude. The road between Stewart and Dease Lake lies approximately 50 miles to the southwest. A British Columbia Railway (B.C.R.) right-of-way bisects the coalfield; at the present time, railway steel is about 25 miles away. The distance by rail to Prince George is 309 miles and to Vancouver is a further 500 miles. Considerable potential exists for shortening the route to tidewater, especially when Prince Rupert becomes a shipping terminal. A railway route from the existing B.C.R. line via the Skeena River to Hazelton has already received "approval in principle". The development of the Groundhog field could act as a financial catalyst in the provision of that line. This could resolve the financing of a major infrastructural item and eliminate a major constraint.

THE POTENTIAL

At the present time, the world consumption of thermal coal is increasing and will continue to do so in the foreseeable future. It is considered highly probable that within this framework the selling price of thermal coal will escalate at a faster rate than the cost of production. Accepting these basic premises, a sound business concept would be to develop sufficient coal reserves and thereafter produce a competitive coal. The Groundhog coal appears to have the following advantages:

1. Very good heating values (13,000-14,500 Btu./lb.
2. Low sulphur (minus 0.5%).
3. A virtually smokeless fuel.
4. Sufficient reserves of near surface coal to facilitate close control of, and minimize as required, F.O.B. mine cost.

The potential for satisfactory reserves is as follows:

1. An immediate target area with the potential for approximately 60,000,000 tons of surface strippable coal. This covers some 4-1/2 square miles of the ground under licence.
2. An exploration target, at least 110 square miles in extent. This comprises the largest presently known, unexplored coal area in British Columbia. Groundhog Coal Ltd., have licences on what is considered the prime 77 square miles. (See Drawing Number 2).

THE MARKETS

An outstanding opportunity exists for Western Canadian coal developers. Not only has there been an increase in the tonnage requirements of existing steam coal users, but also the market base has broadened considerably. Consumers are emerging as industry converts from natural gas and oil to the use of coal. Available markets are Japan, South Korea, Europe, Eastern Canada, and the western flank of the American Continent. In addition to the conventional sales areas, Groundhog coal has unique opportunities. Due either to its anthracitic composition, or its location, the following possibilities can be pursued:

1. There are several mineral prospects in Northwest British Columbia that will probably be producing mines within the next decade. The most significant of these is the Stikine Copper prospect. (For its location along with a selection of major projects, refer to Drawing Number 2). One of the constraints to their development is the power supply. The proving of reserves at Groundhog in sufficient quantity to assure a long term thermal power supply would be very attractive to B.C. Hydro. The generation of the required power by hydro methods would be expensive and subject to environmental problems. A possible added benefit of generating power at Groundhog would be the absorption, by B.C. Hydro, of the capital cost.
2. Assuming a portion of the coal can be upgraded to anthracite specifications, the following markets are available:
 - (a) Sale as a smokeless fuel,
 - (b) The steel industry,
 - (c) As a base material for industrial carbon.

THE COALFIELD

History

Outcrops which are exposed in the various creeks in the area that feed the Skeena River have been prospected since 1903. Recent work has been concentrated in the Discovery Creek area, and other drill hole locations as shown on Drawing Number 2. The salient positive factors emerging from an analysis of the pre 1968 history is the reported existence of several thick (plus 6 ft.) seams containing high quality coal.

The Dillingham Corporation completed a surface prospecting survey in 1968 and concluded:

- (a) No coking coal was found,
- (b) The coal is high in ash (before cleaning),
- (c) Coal occurs in several seams from 5-12 ft. in thickness,
- (d) The area is severely contorted and this will result in steeply dipping seams.

In 1970, Placer Development, Quintanna Minerals and the National Coal Corporation also completed a geological survey and since the results were more encouraging than previous workers, drilled six holes in the area (See Drawing Numbers 2, 3, 4A & 4B). As a result of the drilling, they concluded that the "possibility of surface mineable coal should not be discounted". Following this programme, the political climate was negative, no further work was conducted and the licences allowed to lapse.

Seam Thickness and Quality

The available information is very limited for a field of this size, it should therefore be considered judiciously and used as indicative rather than representative. On a general basis, the following would apply:

1. The ash content of "clean coal" ranges from 4.5 percent to 20.0 percent.
2. Volatile matter ranges from 1.8 percent to 18 percent.
3. The total sulphur varies from 0.3 to 1.2 percent with 70 percent of the determinations at less than 0.6 percent.
4. Calorific values vary from 11,800 to 14,700 Btu/lb.
5. A weighted average yield from preliminary and somewhat crude tests is some 51 percent.
6. Core recovery from drill holes was excellent - 95 percent.

7. As seen in diamond drill holes, individual seams are up to 13.7 ft. (The Ross Seam). The average seam thickness encountered is approximately 5 ft.
8. The drill holes 2 and 3, in the Discovery Creek area, have mineable thicknesses of coal of some 22.7 and 23.9 ft., respectively.

The table below shows the seam thickness and quality data as obtained from the recent, in fact, only drilling. The seam groupings have been made in 200 foot vertical intervals to indicate their number and thickness when strip mining to a maximum depth of 200 feet. It will be noted that actual production could be from one to four seams.

GROUNDHOG COALFIELD - SEAM THICKNESS AND QUALITY

Coal Seams in a 200' Vertical Interval		Seam Data Following Preliminary Cleaning (on a dry basis)								
Location	No. of Seams	Seam	Thickness'	S.G. of Cleaning	Ash %	Btu/lb.	Sulphur %	Fixed Carbon %	Yield %	Comments
D.D. 1	1	Scott	5.7	1.75	15.24	12,143	0.47	78.14	28.0	30° dip easterly
D.D. 1	5	Ross A*	7.7	1.75	10.99	12,894	0.46	83.35	58.0	*Could actually be a single seam with a waste parting. Only 2.5' recovered for cleaning from Ross B.
		Ross B*	6.0	1.75	11.11	13,109	0.84	82.45	75.0	
		4	3.5	Not Tested						
		5	3.8	Not Tested						
		6	5.0	Not Tested						
Group Total			26.0							
Total Drill Hole 1			31.7							
D.D. 2	4	Discovery	6.2	1.75	9.43	13,552	0.43	84.87	58.0	Specific area for strip-pable coal. Only the Discovery Creek seam was tested.
		2	2.9							
		3	4.5							
		4	3.5							
Group Total			17.1							
D.D. 2	2	5	2.6							No testing carried out.
		6	3.0							
Group Total			5.6							
Total Drill Hole 2			22.7							
Discovery Ck. Outcrop		Discovery	5.5	1.75	4.91	14,012	0.45	88.89	99%	Selected by hand; more indicative of actual mining practice.
D.D. 3	2	1	6.5	1.75	17.09	11,966	0.97	75.33	24.0	Seams close to surface with No. 21 11 ft. below No. 1
		2	4.8	1.75	13.08	12,645	0.77	80.71	40.0	
Group Total			11.3							
D.D. 3	3	3	4.5							No testing carried out.
		4	4.5							
		5	3.6							
Group Total			12.6							
Total Drill Hole 3			23.9							
D.D. 5	2	1	3.8	1.75	14.01	12,293	0.49	80.27	36.0	
		2	3.4							
Group Total			7.2							
D.D. 5	3	3	4.0							No testing. No. 5 seam is clean hard coal, best seam in drill hole.
		4	6.0							
		5	6.6							
Group Total			16.6							
Total Drill Hole 5			23.8							
D.D. 6	3	1	7.7	1.75	15.85	12,075	0.69	77.85	28.0	May correlate with Discovery Creek holes. Seam No. 1 is a composite from an 11.5' section.
		2	5.1	1.75	19.76	11,746	0.74	70.79	56.0	
		3	5.3	1.75	12.53	12,947	0.88	80.57	70.0	
Total Drill Hole 6			18.1							

- NOTES: 1. Only the recent drill hole information has been shown above.
 2. Many of the samples taken previously by grab sampling and trenching, show much higher quality than the above.

EXPLORATION

EXPLORATION

As stated previously, the exploration potential falls into two main categories.

1. To firmly establish a drill-indicated reserve of coal amenable to surface strip mining.
2. To identify further potential reserves in the area under licence.

Target Number 1 - Surface Strip Coal

The location of this target is shown on Drawing Number 2. It is a strip of ground approximately nine miles long and one to three miles wide. The area lies west of the Skeena River, north of Currier Creek and south of Beirnes Creek. The potential has been based upon the geology available, which indicates a strong possibility of near surface coal; the results shown in diamond drill holes 2 and 3; and the many outcrops in the creeks running to the Skeena. It is considered that the width of the strip of ground containing coal within 200 ft. of surface will be at a minimum, 2,500 ft. With an average in-situ thickness of 13.6 ft. the potential is at least 60,000,000 tons.

Target Number 2

The primary objectives are to determine the presence of surface mineable coal with particular reference to thicker seams and/or higher quality coal. The extent and potential of the deposit, viable via underground extraction, will evolve naturally as the work is carried out. Within this context, and considering surface reserves as being of major importance, three exploration blocks have been selected. These are shown on Drawing Number 2.

EXPLORATION PROGRAMME - PHASE 1 - 1st YEAR

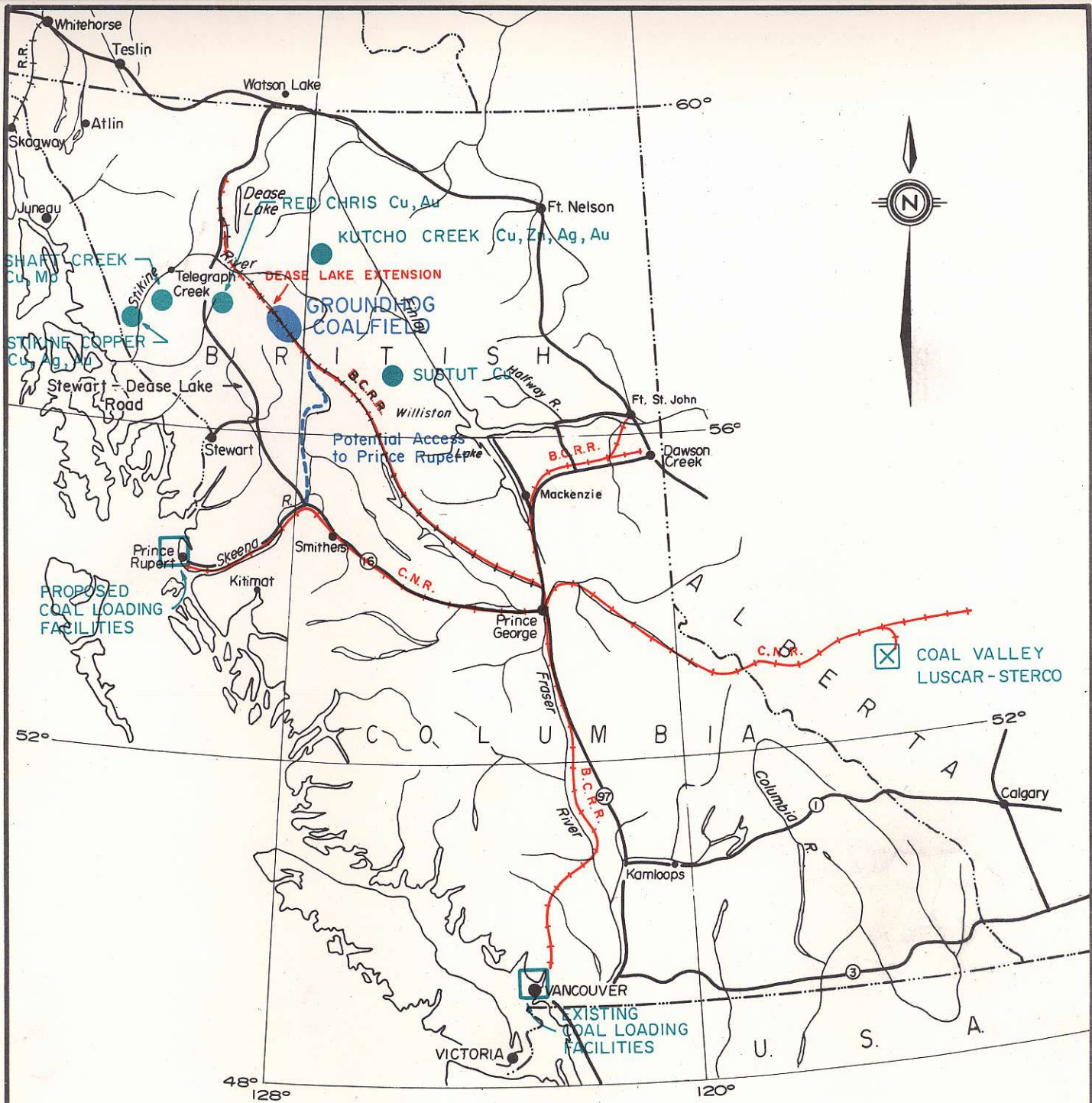
It is proposed to start from a known base of drill holes 2 and 3, and the Discovery Creek outcrops, which are located to the south in Target 1. Detailed geological mapping will precede diamond drilling. Drill holes will be spotted in locations where "surface coal" occurs and are designed to "drill indicate" the strip potential. They will be drilled deep enough to facilitate coal seam correlation. The core will be logged and studied to assess the impact of selective mining. Tests will be carried out to determine washability characteristics and coal quality potential. Additional tests will be conducted to ascertain market possibilities.

This stage will conclude with a detailed report covering the preliminary technical/economic viability of the project, complete with conclusions and recommendations for future

development. Within the Target Number 2 areas, the initial year (Phase 1) would be spent in assimilating the previous work and carrying out a complete geological mapping. A few wildcat holes will be drilled in carefully selected locations.

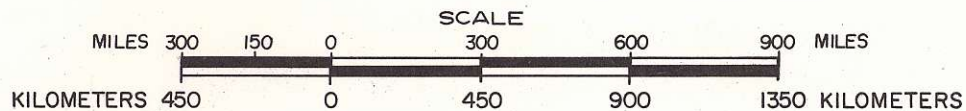
The estimated cost for the overall programme summarized above is \$815,000.

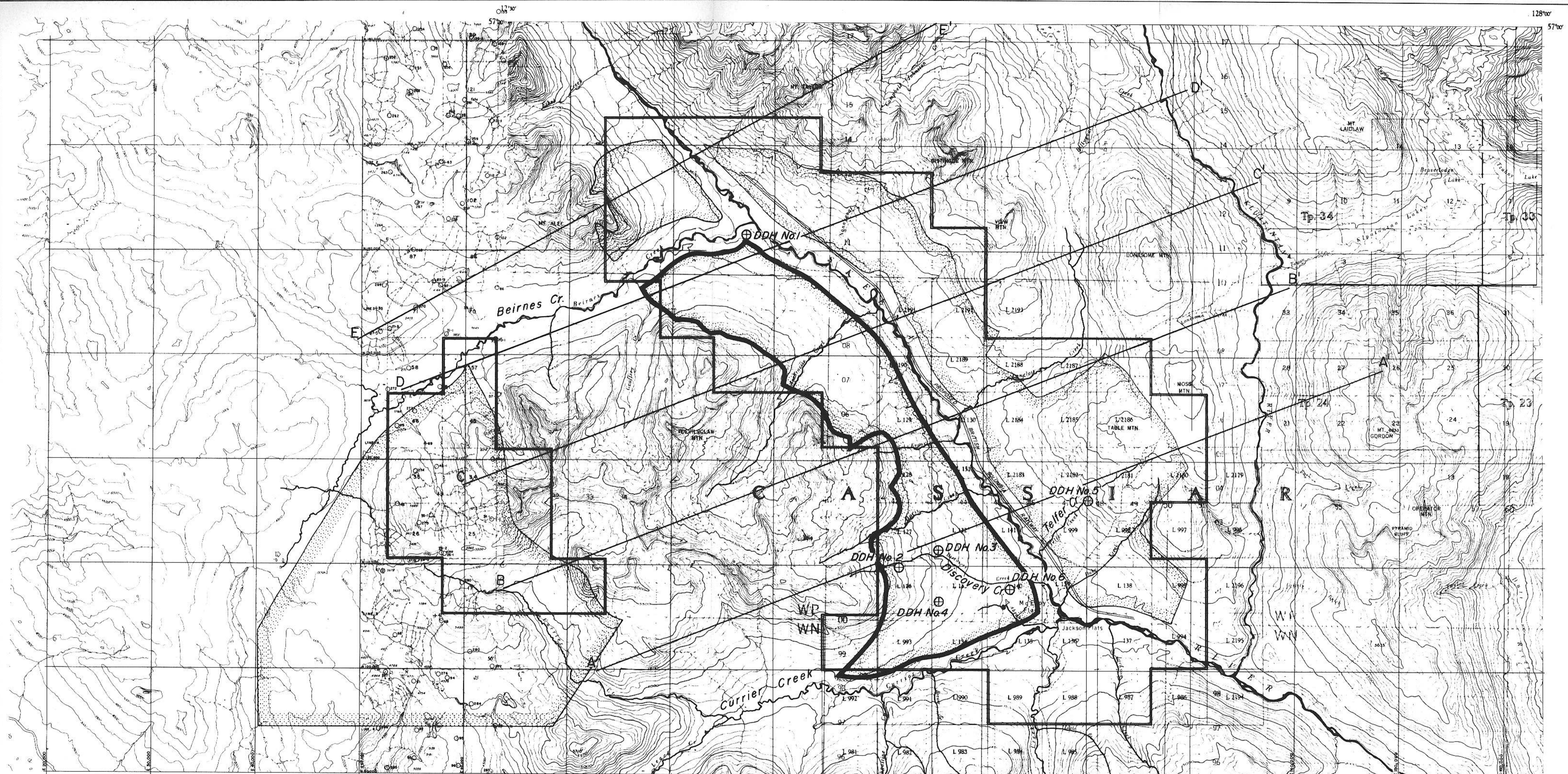
DRAWINGS



GROUNDHOG COAL LTD.

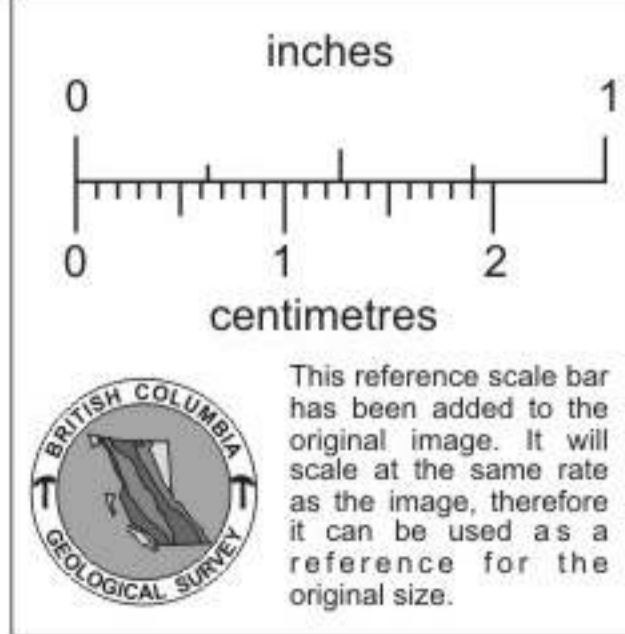
LOCATION AND ACCESS MAP OF THE
GROUNDHOG COALFIELD SHOWING OTHER
ADJACENT MINERAL DEVELOPMENTS THAT REQUIRE POWER.





LEGEND

- ⊕ *DDH No. 1* DIAMOND DRILL HOLE
- TARGET No. 1
- TARGET No. 2
- COAL LICENCE AREA
- A ——— A' SECTION LINE (FOR SECTION SEE DRAWING No. 4A & 4B)



GROUNDHOG COAL LTD.
GROUNDHOG COALFIELD
TOPOGRAPHIC MAP
 SHOWING LOCATION OF DIAMOND DRILL HOLES,
 OUTCROPS, LICENCES, SECTION LINES,
 AND EXPLORATION TARGET AREAS.
 SKEENA RIVER AREA, BRITISH COLUMBIA

0 1 2 3 4 5,000 6 7 8 9 10,000 15,000 20,000 25,000 30,000
 SCALE = 1:50,000

DRAWING No. 2

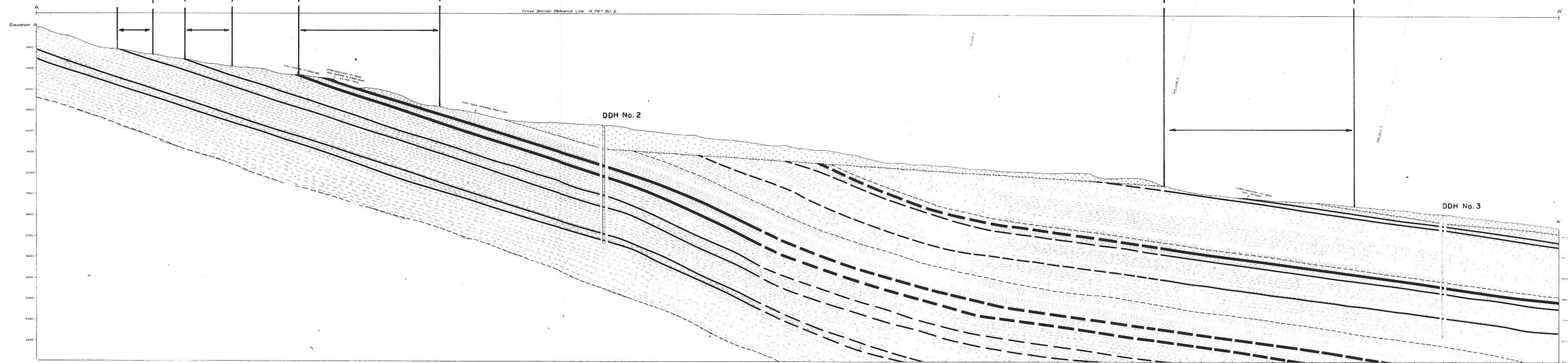
1 1/2 Miles (3.2 Kilometers)

SURFACE MINING POTENTIAL


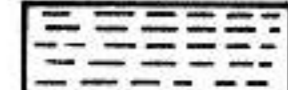
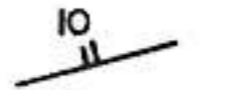
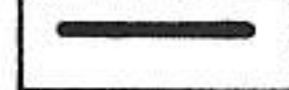
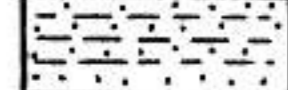
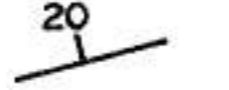




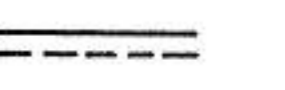

SURFACE MINING POTENTIAL

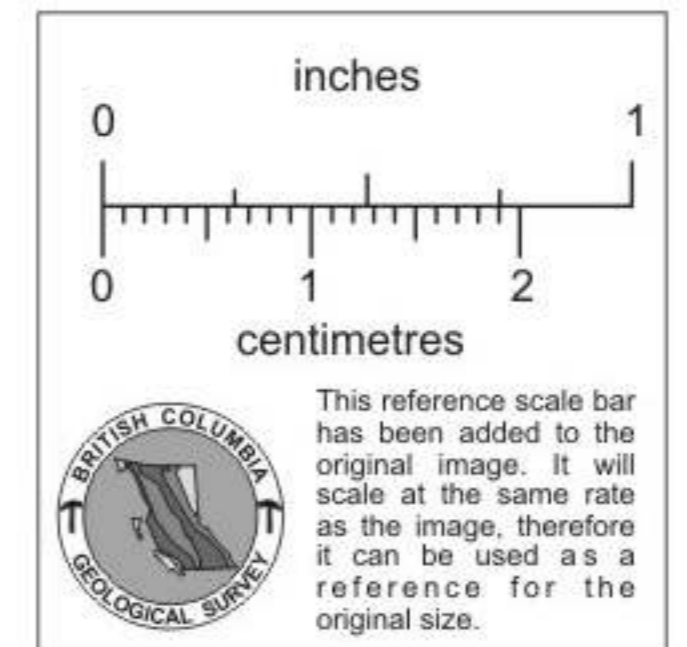
DDH No 3
Vertical 588'

DDH No 2
Vertical 565'
Elevation 4240'

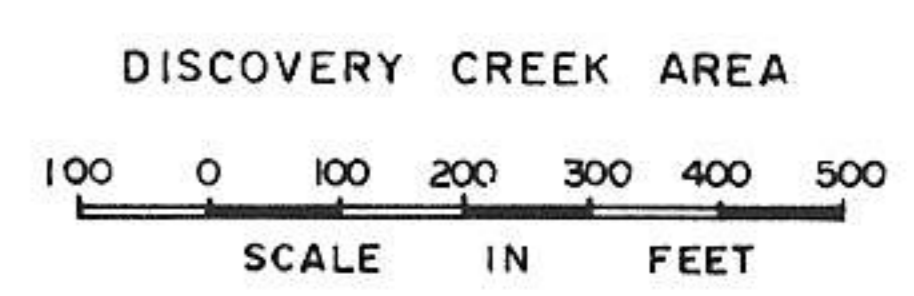


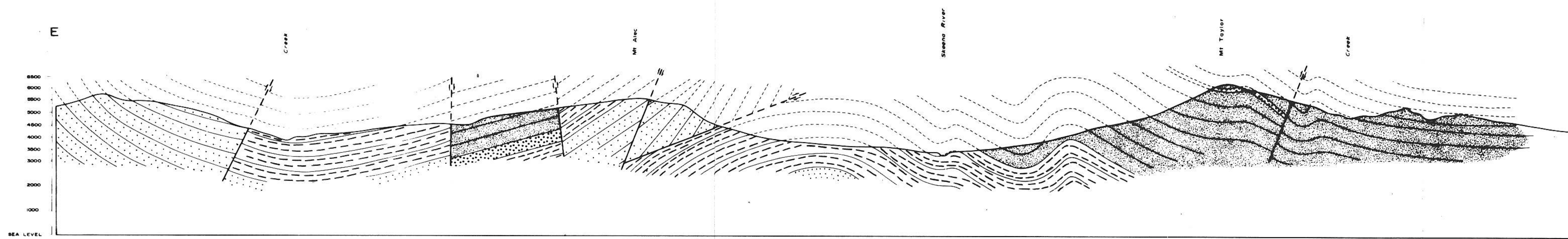
L E G E N D

- | | | |
|--|---|---|
|  OVERBURDEN |  SHALE |  STRIKE AND DIP OF COAL SEAM |
|  COAL SEAM |  INTERBEDDED SANDSTONE AND SHALE |  STRIKE AND DIP OF BEDS |
|  COAL SEAM, INFERRED POSITION |  DIAMOND DRILL HOLE |  ADIT, CAVED |
|  SANDSTONE |  CONTACT, DASHED WHERE INFERRED |  COAL OUTCROP |

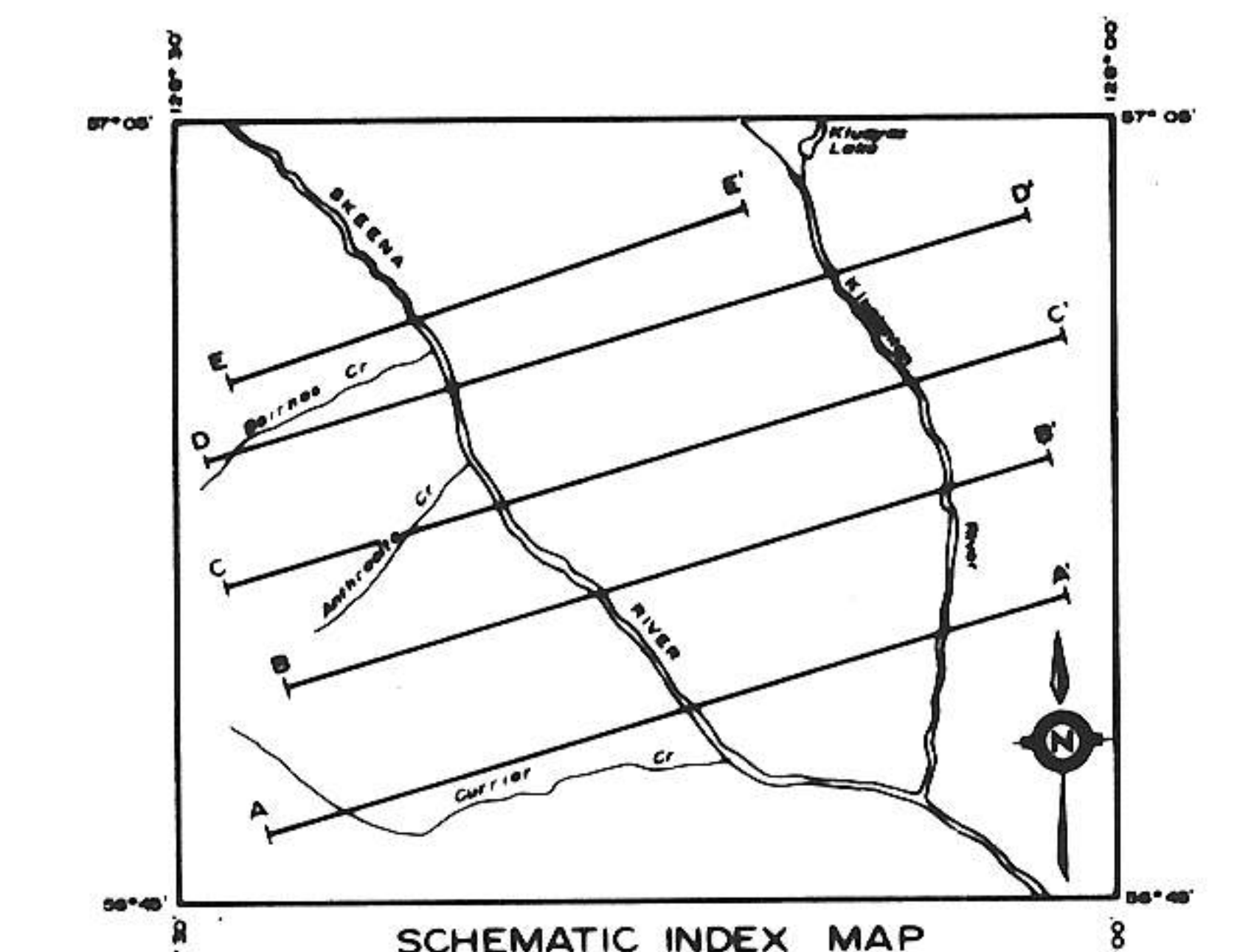


GROUNDHOG COAL LTD.
GROUNDHOG COALFIELD
GEOLOGICAL CROSS SECTION
OF THE DISCO DRILL HOLES 2 AND 3.

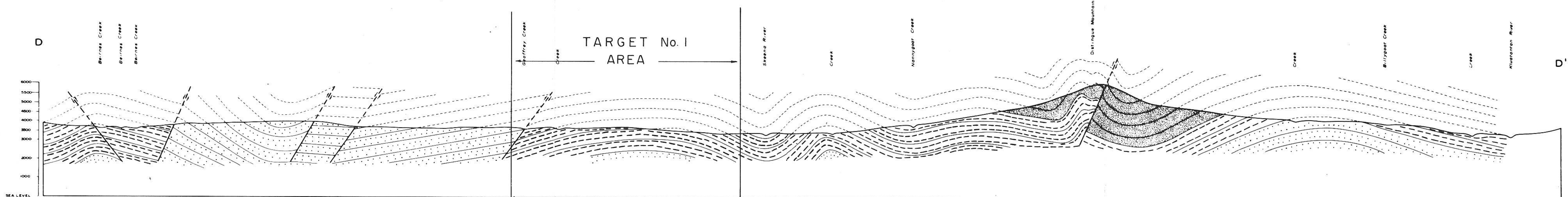




GEOLOGICAL CROSS SECTION E-E'
SECTION LOOKING NNW, PLANE OF SECTION STRIKES N. 61° E.


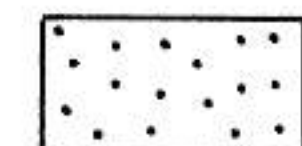
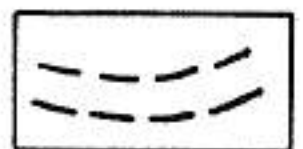
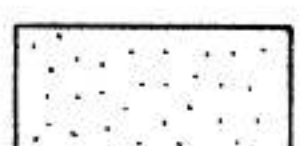


SCHEMATIC INDEX MAP
SHOWING LINE OF SECTIONS

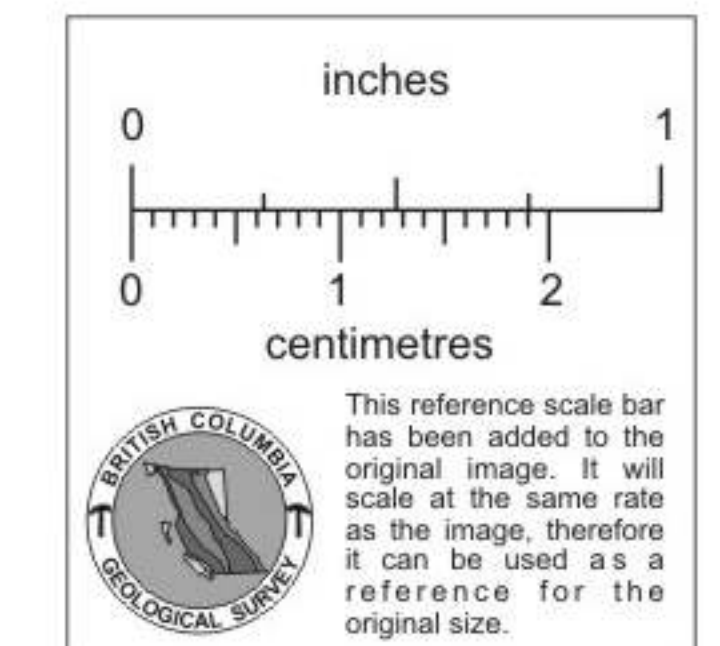


GEOLOGICAL CROSS SECTION D-D'
SECTION LOOKING NNW, PLANE OF SECTION STRIKES N. 70° E.

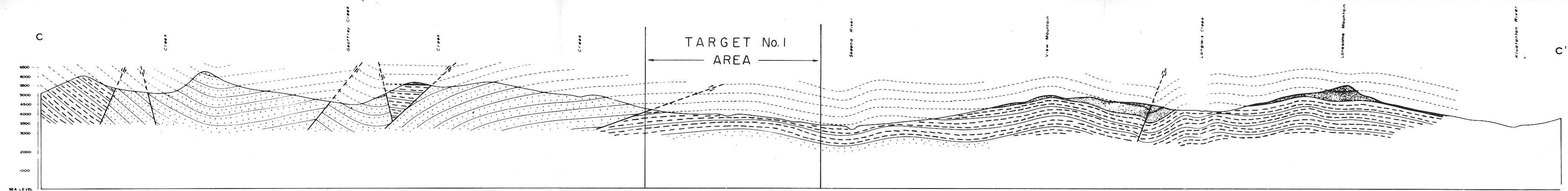
LEGEND

- | | |
|--|---|
| <p> LONESOME MOUNTAIN LITHOSOME
Sombre brown coloured, well indurated, sparsely fossiliferous, conglomeratic sandstones, sandstones, mudstones and thin, rare, discontinuous coal beds.</p> <p> DEVIL'S CLAW CONGLOMERATE LITHOSOME
Thick bedded, coarse grained, chert pebble conglomerate interbedded with mudstone, and minor coal.</p> | <p> COAL BEARING LITHOSOME
Soft, medium to thick bedded mudstones (70-75%), carbonaceous units (15-20%), and grey sandstones (10%) which typically weather brown to orange.</p> <p> McEVROY RIDGE LITHOSOME
Dark coloured, well indurated mudstones predominate, with some fine grained sandstones and some carbonaceous matter. Evenly bedded, 1-5 feet thick.</p> |
|--|---|

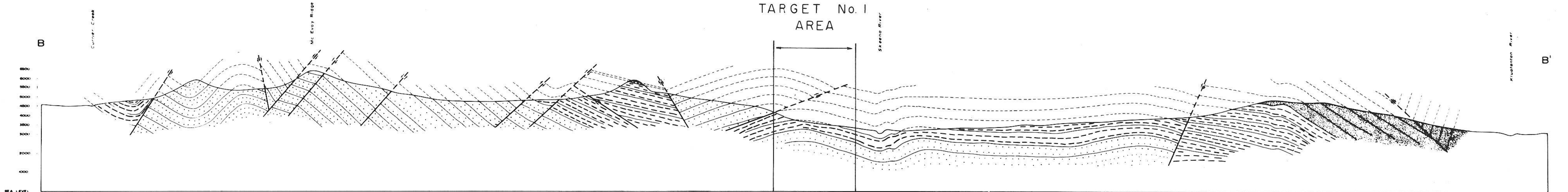
NOTES:
For Map Showing Section Lines
See Drawing No. 2



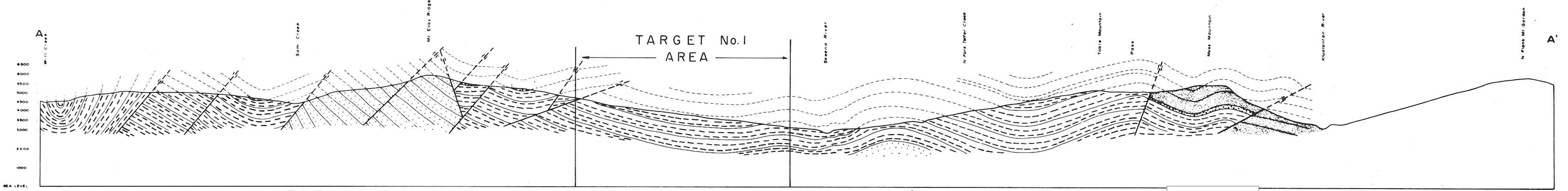
GROUNDHOG COAL LTD.
GROUNDHOG COALFIELD
GEOLOGICAL CROSS SECTIONS
FEET 2000 0 2000 4000 6000 FEET
SCALE



GEOLOGICAL CROSS SECTION C-C'
SECTION LOOKING NNW, PLANE OF SECTION STRIKES N 70° E.

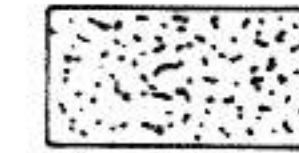
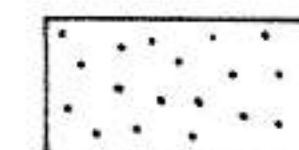
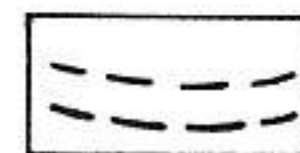
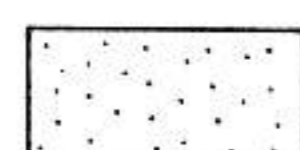


GEOLOGICAL CROSS SECTION B-B'
SECTION LOOKING NNW, PLANE OF SECTION STRIKES N 70° E.

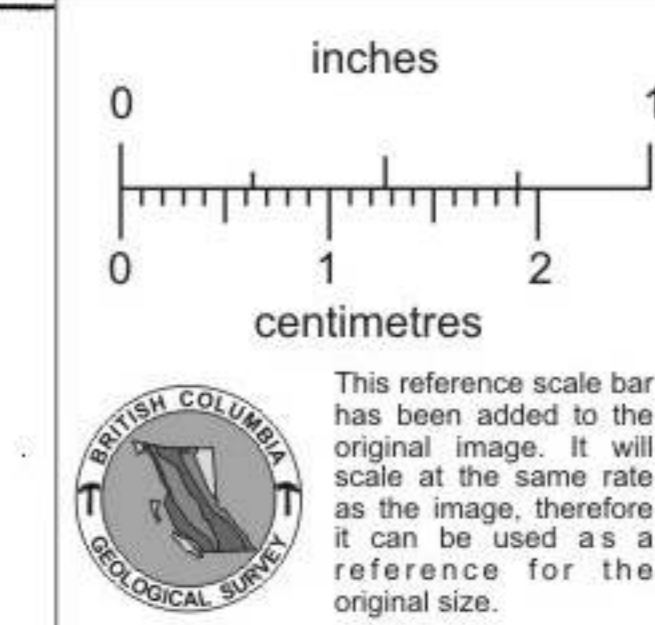


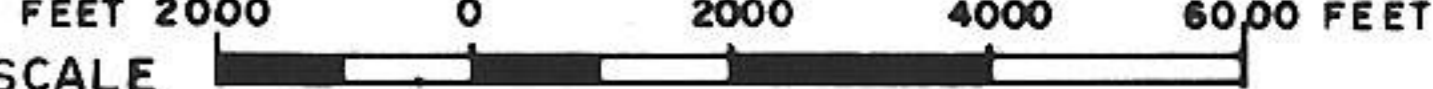
GEOLOGICAL CROSS SECTION A-A'
SECTION LOOKING NNW, PLANE OF SECTION STRIKES N 70° E.

LEGEND

- | | |
|--|---|
| <p> LONESOME MOUNTAIN LITHOSOME
Sombre brown coloured, well indurated, sparsely fossiliferous, conglomeratic sandstones, sandstones, mudstones and thin, rare, discontinuous coal beds</p> <p> DEVIL'S CLAW CONGLOMERATE LITHOSOME
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|--|---|

NOTES:
For Map Showing Section Lines
See Drawing No. 2



GROUNDHOG COAL LTD.
**GROUNDHOG COALFIELD
GEOLOGICAL CROSS SECTIONS**
SCALE  FEET 2000 0 2000 4000 6000 FEET