

REPORT ON THE  
AIRBORNE GEOPHYSICAL SURVEY

MAGNETOMETER - ELECTROMAGNETIC

PERMIT No. 6980  $65^{\circ}40'N$   $134^{\circ}15'W$   
PERMIT No. 6981  $66^{\circ}10'N$   $135^{\circ}00'W$

WIND RIVER AREA  
YUKON TERRITORY

\* \* \* \* \*

PROJECT No. 531-7-6-73-2

GLENDALE DEVELOPMENT CORP. LTD.  
A. B. BRENNER, OPERATOR



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REPORT ON THE  
AIRBORNE GEOPHYSICAL SURVEY  
MAGNETOMETER - ELECTROMAGNETIC

PERMIT NO. 6960 65°40'N 134°15'W

PERMIT NO. 6981 66°10'N 135°00'W

WIND RIVER & TRAIL RIVER AREAS  
YUKON TERRITORY

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INTRODUCTION

SCHEDULE OF PROPERTIES:

PERMIT NO. 6980, consisting of 26,449 acres is designated by coordinates North  $\frac{1}{2}$  65°40' North Latitude and 134°15' West Longitude. The subject Permit was issued January 22, 1970 to Glendale Development Corp. Ltd. The area is shown on Map Sheet 106E, Wind River, Yukon Territory, of the National Topographic Series on a scale of 1:250,000.

PERMIT NO. 6981, consisting of 51,966 acres, is designated by coordinates 66°10' North Latitude and 135°00' West Longitude. The subject Permit was issued January 22, 1970 to Glendale Development Corp. Ltd.



The area is shown on Map Sheet 106L  
"Trail River, Yukon-Northwest Territories"  
of the National Topographic Series on a  
scale of 1:250,000.

Trail River Map Sheet lies immediately to  
the north of the Wind River Map Sheet.

The operator, for the purpose of conducting  
the fieldwork over the subject permit areas is A. B. Brenner  
of Vancouver, British Columbia.

#### DESCRIPTION OF PROPERTIES

PERMIT NO. 6980  
WIND RIVER AREA, Y.T.

The property measures approximately  
36,000 feet wide by 32,000 feet in length (north-south)  
and covers part of the headwaters of Noisy Creek which  
is a tributary of the Bonnet Plume and Wind River. Knorr  
Range of mountains, which trends south to southeast lies to  
the south of the permit area, and is the point of origin of  
Noisy Creek. The general relief is not extreme, with  
elevation between 1500 and 2000 feet above sea level, the  
ground is part of a wide, relatively flat basin. Growth  
on surface is limited to stunted timber growth in patches  
brush and wild grass. Gravel covers most of the surface  
near the creeks, and rock outcrops on surface are  
abundant.

The Wernecke Mountains lie approximately 50 miles to the south of the Permit Area, and provides the headwaters of the Wind and Bonnet Plume which drain northerly into the Peel and on to the Arctic. The service point nearest to the survey area was Norman Wells, a distance of 239 miles east.

Geologically, the surface rocks are classed as Precambrian quartzites and argillites at the southwest part of the permit area, with the remaining area mapped as middle Devonian shales. The demarcation is evident and is described later in this report.

PERMIT NO. 6981  
TRAIL RIVER AREA

Permit No. 6981 measures approximately 36,000 feet in width by 62,000 feet in length (north-south) and covers the westerly slopes of the Richardson Mountains and east of the Peel River and south of the Caribou River. The relief varies between 1500 and 2500 feet above sea level, and covers the valley system of Mountain Creek which flows southerly into the Peel River, as well as a second, unnamed valley system five miles to the east, which parallels Mountain Creek and flows into the Peel. The Peel River is a major water system flowing to the north into the Mackenzie River system to the Arctic. The region is part of the plateau characterized by deeply incised valleys, small lakes and swamps. The conflux of the Peel River and

the Bonnet Plume lies three miles south of the southeast corner of the permit area.

Geologically, the area is mapped as Middle Devonian shales at the southwest part of the permit area, then to the east a band of sandstone and shale, followed by a zone of Triassic sandstone, shale and limestone. The northeast corner of the area is mapped as sandstone and shale, Upper Devonian in age, equivalent to the band mentioned above. The description of the underlying structure follows in this report.

#### GEOPHYSICAL INVESTIGATIONS

##### MAGNETOMETER SURVEY:

The purpose of the Magnetometer Survey was to determine the presence or absence of any magnetic or non magnetic anomalies on the property, these anomalies being caused by the presence or absence of magnetic accessory minerals in the underlying rock formations in detectable quantity. The magnetic field measurements would differentiate between sediments, volcanics, and intrusives, and indicate any possible changes in the basement rock structures. The factors, applicable to this survey, which produce variations in the magnetic field are:

1. A variation in amount of accessory mineral magnetite in granitic, volcanic, or

sedimentary bedrock.

2. A variation in amount of magnetics distributed through or connected with the overburden.
3. A variation in depth of non magnetic overburden on caprock over bedrock having a constant vertical magnetic intensity.
4. Variations in amount of magnetics in adjacent bands of sedimentary or volcanic rocks. These variations are not expected to be great, and they produce elongated highs and lows parallel to the strike of the formation.
5. Any combination between variations in magnetic minerals in the rock and variations in the thickness of the overlying magnetic or non magnetic overburden or caprock.

It will be seen from the above factors, that the geophysical survey employing magnetometer, produces a resulting map showing information that would assist in providing a structural picture of the subsurface geology.

#### ELECTROMAGNETIC SURVEY:

The Electromagnetic Survey, conducted simultaneously with the Magnetometer Survey, measures the change in mutual impedance between a pair of coils as the impedance is affected by nearby conductors of electricity. The instrumentation employed transmits a field through a 65 foot coil mounted beneath the aircraft. Transmission frequency is set at 1000 cycles per second. The receiving coil is housed in a "bird" that is drawn by the aircraft in a manner to produce a  $90^{\circ}$  configuration between the coils. It records any electrical fields induced by the transmitted field.

Instrumentation is continuous during flight, and data is recorded on film at preset intervals of time to produce readings at space intervals of 500 feet. This data includes readings of magnetometer, electromagnetic direction, time, flight line number, reading number (grid north), and elevation. Data recovery and subsequent introduction to processing methods is described under the subsequent heading.

#### PROCEDURE

Permit Areas No. 6980 and 6981 were plotted on Map Sheet Nos. 106E "Wind River" and 106L "Trail River" respectively. Flight lines, spaced at intervals of 2000 feet were marked as a flight line pattern

with the flight lines extended to provide intersections with prominent landmarks or surface features which were used as visual reference during flight. Both permit areas were flown by fixed wing, twin engine aircraft flown in to Norman Wells from Vancouver.

The transmitter coil and instrument package were mounted in the aircraft, recording system and equipment prepared, and the survey flown during periods of extreme calm weather. Both properties lie approximately 240 miles west of Norman Wells, and for the most part, this was used as a base. The fixed wing aircraft employed was a Comanche twin, and a Cessna 337 was used as a backup machine. The fieldwork was completed during June 1973.

Flight lines were flown at an altitude of 500 feet above the surface, and at near constant speed of 113.7 miles per hour. A true heading of  $0^{\circ}$  and  $180^{\circ}$  was maintained using automatic gyro controls in the aircraft. The flight lines on Permit 6980 commenced just to the west of the west boundary, and were flown for a distance of 32,000 feet plus turning and reorienting distance for a total of 20 flight lines. Over Permit 6981, 20 flight lines were flown for a distance of 64,000 feet plus turning and reorienting distances. In all, 364 line miles of survey were recorded and an additional 50% used in calibrating and reorienting.

Instrumentation functioned continuously, but the data recording system, employing a sequence of photos, filmed the instrument panel at a rate of one frame per unit time to provide a record of readings at ground intervals of 500 feet along the flight line.

Data recovery included the editing of the film record, introducing the recorded data to a tape punching procedure for transmission from Vancouver to the facilities of Computer Sciences at Calgary, Alberta, where their Univac 1108 is located. The resulting tapes, the computer output, were introduced with the program to Calcomp for plotting. A statistical analysis was made by the computer to determine the contour interval and the Z Value frequency. The enclosed maps are the results of this procedure.

The Flight Line Pattern, commencing with Flight Line 1 on Permit 6980, and ending with Flight Line 20 on Permit 6981, produced approximately 1,920,000 feet of line on the permit areas. Including overruns, turning and reorienting, periodic rechecks to compensate for variations and calibrations, the total line miles flown over the two permit areas would be in excess of 550.

## Z-VALUE STATISTICS

\*\*\* PERMIT 6440 \*\*\*

MAG DATA

NUMBER OF OBSERVATIONS	:	1800
MINIMUM VALUE	:	3.00
MAXIMUM VALUE	:	22.00
MEAN	:	11.70
STANDARD DEVIATION	:	3.98

## Z-VALUE FREQUENCIES

INTERVAL	SUMMED	X	CUM. %
3.00 TO 4.00	2	.14	.15
4.00 TO 5.00	5	.29	.54
5.00 TO 6.00	6	.45	1.00
6.00 TO 7.00	20	1.48	2.85
7.00 TO 8.00	46	3.48	6.23
8.00 TO 9.00	40	6.15	12.38
9.00 TO 10.00	114	8.45	21.23
10.00 TO 11.00	144	14.42	36.15
11.00 TO 12.00	225	17.38	53.54
12.00 TO 13.00	171	13.15	66.69
13.00 TO 14.00	144	10.31	77.00
14.00 TO 15.00	85	6.54	83.54
15.00 TO 16.00	60	5.31	88.85
16.00 TO 17.00	45	3.45	92.31
17.00 TO 18.00	35	2.53	95.00
18.00 TO 19.00	14	1.54	96.33
19.00 TO 20.00	17	1.31	97.69
20.00 TO 21.00	16	1.23	98.92
21.00 TO 22.00	10	.77	99.69
22.00 TO	4	.21	100.00



## Z-VALUE STATISTICS

\*\*\* PERMIT SUM \*\*\*

MAC DATA

NUMBER OF OBSERVATIONS	=	1200
MINIMUM VALUE	=	3.00
MAXIMUM VALUE	=	16.00
MEAN	=	11.12
STANDARD DEVIATION	=	2.41

## Z-VALUE FREQUENCIES

INTERVAL	NORMAL	CUM. %
3.00 TO 3.49	2	.17
3.50 TO 3.99	0	.17
4.00 TO 4.49	5	.42
4.50 TO 4.99	0	.42
5.00 TO 5.49	6	.50
5.50 TO 5.99	0	.50
6.00 TO 6.49	24	2.00
6.50 TO 6.99	0	2.00
7.00 TO 7.49	44	6.75
7.50 TO 7.99	0	6.75
8.00 TO 8.49	80	13.42
8.50 TO 8.99	0	13.42
9.00 TO 9.49	115	23.00
9.50 TO 9.99	0	23.00
10.00 TO 10.49	154	39.17
10.50 TO 10.99	0	39.17
11.00 TO 11.49	226	58.00
11.50 TO 11.99	0	58.00
12.00 TO 12.49	171	72.25
12.50 TO 12.99	0	72.25
13.00 TO 13.49	134	83.42
13.50 TO 13.99	0	83.42
14.00 TO 14.49	85	90.50
14.50 TO 14.99	0	90.50
15.00 TO 15.49	69	96.25
15.50 TO 15.99	0	96.25
16.00 TO 16.49	45	100.00

## Z-VALUE STATISTICS

... PERMIT 6980 ...

EM DATA

NUMBER OF OBSERVATIONS	=	1300
MINIMUM VALUE	=	.00
MAXIMUM VALUE	=	12.00
MEAN	=	3.96
STANDARD DEVIATION	=	2.57

## Z-VALUE FREQUENCIES

INTERVAL	NUMBER	Z	CUM. %
-.00 TO .49	85	6.54	6.54
.50 TO .99	0	.00	6.54
1.00 TO 1.49	152	11.69	18.23
1.50 TO 1.99	0	.00	18.23
2.00 TO 2.49	185	14.23	32.46
2.50 TO 2.99	0	.00	32.46
3.00 TO 3.49	184	14.46	46.92
3.50 TO 3.99	0	.00	46.92
4.00 TO 4.49	209	16.08	63.00
4.50 TO 4.99	0	.00	63.00
5.00 TO 5.49	154	11.45	74.85
5.50 TO 5.99	0	.00	74.85
6.00 TO 6.49	99	7.62	82.46
6.50 TO 6.99	0	.00	82.46
7.00 TO 7.49	116	8.92	91.38
7.50 TO 7.99	0	.00	91.38
8.00 TO 8.49	27	2.08	93.46
8.50 TO 8.99	0	.00	93.46
9.00 TO 9.49	42	3.23	96.69
9.50 TO 9.99	0	.00	96.69
10.00 TO 10.49	25	1.92	98.62
10.50 TO 10.99	0	.00	98.62
11.00 TO 11.49	14	1.08	99.69
11.50 TO 11.99	0	.00	99.69
12.00 TO 12.49	4	.31	100.00

## Z-VALUE STATISTICS

\*\*\* PERMIT 6980 \*\*\*

EM DATA

NUMBER OF OBSERVATIONS	=	1188
MINIMUM VALUE	=	.00
MAXIMUM VALUE	=	7.00
MEAN	=	3.45
STANDARD DEVIATION	=	2.03

## Z-VALUE FREQUENCIES

INTERVAL	NUMBER	%	CUM. %
-.00 TO .49	85	7.15	7.15
.50 TO .99	0	.00	7.15
1.00 TO 1.49	157	12.79	19.95
1.50 TO 1.99	0	.00	19.95
2.00 TO 2.49	185	15.57	35.52
2.50 TO 2.99	0	.00	35.52
3.00 TO 3.49	188	15.82	51.35
3.50 TO 3.99	0	.00	51.35
4.00 TO 4.49	209	17.59	68.94
4.50 TO 4.99	0	.00	68.94
5.00 TO 5.49	154	12.96	81.90
5.50 TO 5.99	0	.00	81.90
6.00 TO 6.49	99	8.33	90.24
6.50 TO 6.99	0	.00	90.24
7.00 TO 7.49	116	9.76	100.00

## Z-VALUE STATISTICS

\*\*\* PERMIT 6481 \*\*\*

MAG DATA

NUMBER OF OBSERVATIONS	=	2500
MINIMUM VALUE	=	4.00
MAXIMUM VALUE	=	24.00
MEAN	=	12.12
STANDARD DEVIATION	=	4.07

## Z-VALUE FREQUENCIES

INTERVAL	NUMBER	%	CUM. %
4.00 TO	4.99	1	.04
5.00 TO	5.99	6	.28
6.00 TO	6.99	19	1.04
7.00 TO	7.99	78	4.15
8.00 TO	8.99	101	8.20
9.00 TO	9.99	212	16.68
10.00 TO	10.99	382	31.96
11.00 TO	11.99	413	48.48
12.00 TO	12.99	365	63.08
13.00 TO	13.99	240	72.68
14.00 TO	14.99	201	80.72
15.00 TO	15.99	142	86.40
16.00 TO	16.99	91	90.04
17.00 TO	17.99	96	93.88
18.00 TO	18.99	35	95.78
19.00 TO	19.99	49	97.24
20.00 TO	20.99	39	98.80
21.00 TO	21.99	19	99.56
22.00 TO	22.99	5	99.76
23.00 TO	23.99	4	99.92
24.00 TO	24.99	2	100.00

## Z-VALUE STATISTICS

\*\*\* PERMIT 6481 \*\*\*

MAG DATA

NUMBER OF OBSERVATIONS	=	2251
MINIMUM VALUE	=	4.00
MAXIMUM VALUE	=	16.00
MEAN	=	11.41
STANDARD DEVIATION	=	2.25

## Z-VALUE FREQUENCIES

INTERVAL	NUMBER	%	CUM. %
4.00 TO 4.49	1	.04	.04
4.50 TO 4.99	0	.00	.04
5.00 TO 5.49	6	.27	.31
5.50 TO 5.99	0	.00	.31
6.00 TO 6.49	19	.84	1.16
6.50 TO 6.99	0	.00	1.16
7.00 TO 7.49	78	3.47	4.62
7.50 TO 7.99	0	.00	4.62
8.00 TO 8.49	101	4.49	9.11
8.50 TO 8.99	0	.00	9.11
9.00 TO 9.49	212	9.42	18.53
9.50 TO 9.99	0	.00	18.53
10.00 TO 10.49	382	16.97	35.50
10.50 TO 10.99	0	.00	35.50
11.00 TO 11.49	413	18.35	53.84
11.50 TO 11.99	0	.00	53.84
12.00 TO 12.49	365	16.22	70.06
12.50 TO 12.99	0	.00	70.06
13.00 TO 13.49	240	10.66	80.72
13.50 TO 13.99	0	.00	80.72
14.00 TO 14.49	201	8.93	89.65
14.50 TO 14.99	0	.00	89.65
15.00 TO 15.49	142	6.31	95.96
15.50 TO 15.99	0	.00	95.96
16.00 TO 16.49	91	4.04	100.00

## Z-VALUE STATISTICS

\*\*\* PERMIT 6441 \*\*\*

EM DATA

NUMBER OF OBSERVATIONS	:	2500
MINIMUM VALUE	:	0.00
MAXIMUM VALUE	:	12.00
MEAN	:	6.51
STANDARD DEVIATION	:	2.75

## Z-VALUE FREQUENCIES

INTERVAL	NUMBER	CUM. %
0.00 TO .49	14.4	5.96
.50 TO .99	0	5.96
1.00 TO 1.49	26.7	17.44
1.50 TO 1.99	0	17.44
2.00 TO 2.49	30.0	29.44
2.50 TO 2.99	0	29.44
3.00 TO 3.49	75.6	43.68
3.50 TO 3.99	0	43.68
4.00 TO 4.49	51.1	56.12
4.50 TO 4.99	0	56.12
5.00 TO 5.49	20.0	58.08
5.50 TO 5.99	0	58.08
6.00 TO 6.49	23.5	77.48
6.50 TO 6.99	0	77.48
7.00 TO 7.49	27.2	86.76
7.50 TO 7.99	0	86.76
8.00 TO 8.49	8.4	90.12
8.50 TO 8.99	0	90.12
9.00 TO 9.49	14.0	95.72
9.50 TO 9.99	0	95.72
10.00 TO 10.49	2.75	98.48
10.50 TO 10.99	0	98.48
11.00 TO 11.49	1.72	99.80
11.50 TO 11.99	0	99.80
12.00 TO 12.49	0	100.00

## Z-VALUE STATISTICS

\*\*\* COMMIT 4441 \*\*\*

EM DATA

NUMBER OF OBSERVATIONS	2254
MINIMUM VALUE	0.10
MAXIMUM VALUE	9.10
MEAN	4.77
STANDARD DEVIATION	2.21

## Z-VALUE PERCENTILES

DATA VALUE	COMPUTED	Z	CUMUL.
0.10 TD	0.47	1.40	5.41
0.50 TD	0.49	0.70	5.41
1.00 TD	1.49	0.77	13.74
1.50 TD	1.49	0.75	19.75
2.00 TD	2.49	0.70	52.57
2.50 TD	2.49	0.70	52.57
3.00 TD	3.49	0.54	64.47
3.50 TD	3.49	0.54	64.47
4.00 TD	4.49	0.11	67.87
4.50 TD	4.49	0.11	67.87
5.00 TD	5.49	0.02	75.54
5.50 TD	5.49	0.02	75.54
6.00 TD	6.49	0.00	85.07
6.50 TD	6.49	0.00	85.07
7.00 TD	7.49	0.00	86.27
7.50 TD	7.49	0.00	86.27
8.00 TD	8.49	0.00	100.00

RESULTS AND CONCLUSIONS

PERMIT 6980  
WIND RIVER AREA, YT

The field strength of dolomitic limestone (515 gammas) is approximately twice that of shale (245-355 gammas), and in field measurements would contour the crystalline basement as well as intrusive bodies.

With the instrument set at 10 scale, negative readings were avoided, and those minus 10 were contoured positive. After eliminating any erratics and extremes, the mean value obtained was 1112 gammas for the vertical component of magnetic field. The standard deviation was calculated to be 241 gammas. A distinct change occurs at the southwest corner of the map area, an arc shaped contact zone extending from Flight Line 1 North 18,000 in a southeasterly direction to Flight Line 11 North 0. The ground within the arc has the characteristics of quartzitic masses, more resistant to weathering processes and in fact having a surface representation of much higher ground than the surrounding terrain. The magnetic field was less than normal background while to the east and north, the magnetic field measurements are indicative of shales, the latter probably being younger in age than the quartzite mass or body with those characteristics.



Other highs and lows that appear on the map are of lesser significance, and are due to variation in depth of overburden in the lower regions along Noisy Creek and the surrounding swampland. Generally, the structural trends follow the arc sketched on the map No.182K-4, and the strike of the sediments to the north and the altered mass to the south conform to this trend.

There appears to be a line of demarkation along North 14,000 from Flight Line 12 to 20 which is caused by some displacement in the underlying rock structure. The intensity is not of great magnitude, and the underlying rock is of shale composition.

The electromagnetic results revealed a mean value of .345 microamps with a standard deviation of .203 microamps. The intensity is indicative of the absence of highly conductive elements in the underlying rocks, absence of intrusive masses with greater than average sulphide content and confirms the contact zone described above. The displacement is evident along North 14,000, and appears as a long parallel zone of elongated contours showing the distinct change in conductivity.

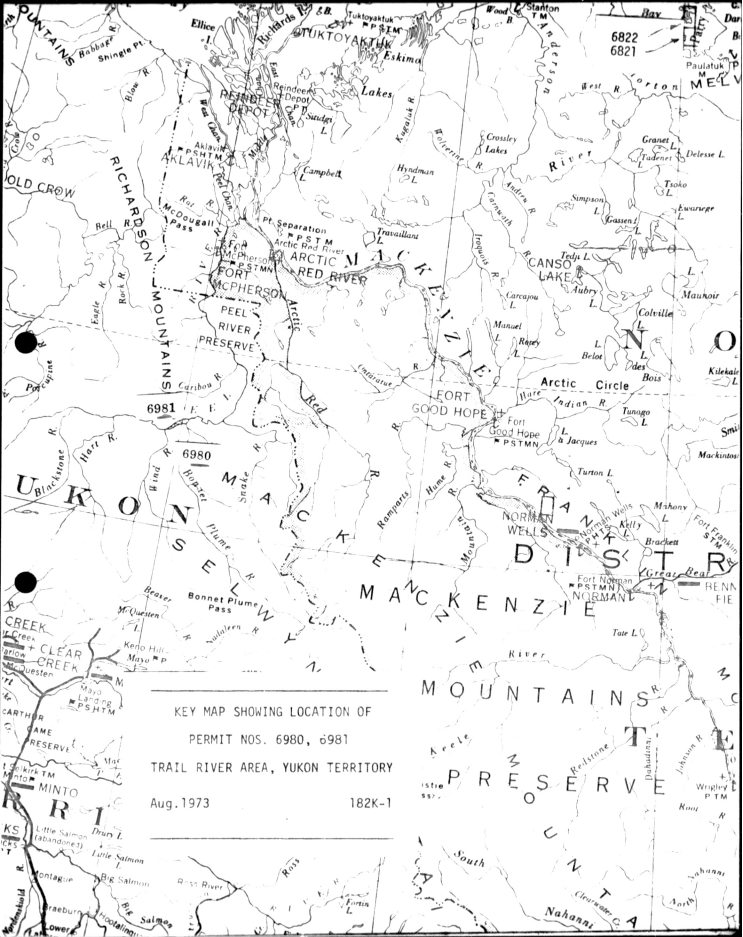
PERMIT NO. 6981  
TRAIL RIVER AREA, YT.

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The average value of the magnetic field measurements was calculated to be 1141 gammas (using a background of 1000 gammas as zero) with a standard deviation of 225 gammas. Several structural trends have been outlined, all trending to strike northwesterly to form a large synclinal trough. The lines or contacts have been sketched over the contour map 182K-6 and 7 and indicate two zones of rocks having characteristics of sandstone or shale. These zone occupy the central part of the map area, while the zone south of this appears to be of shale and probaly underlies the sandstone in the central part of the map.

The slightly higher readings along a line from FL 8 N 62000 to FL 20 N 34000 would be due in part to a long ridge of ground higher than the average height of land on the permit, and again, conforms to the general structural trend.

Conductivity measurements averaged .373 microamps with a standard deviation of .221 microamps. in general, the contact zones were distictly outlined with minor highs also classed as low in conductivity, caused by shears and folding of the underlying rocks. No disturbances of major consequence had been recorded.

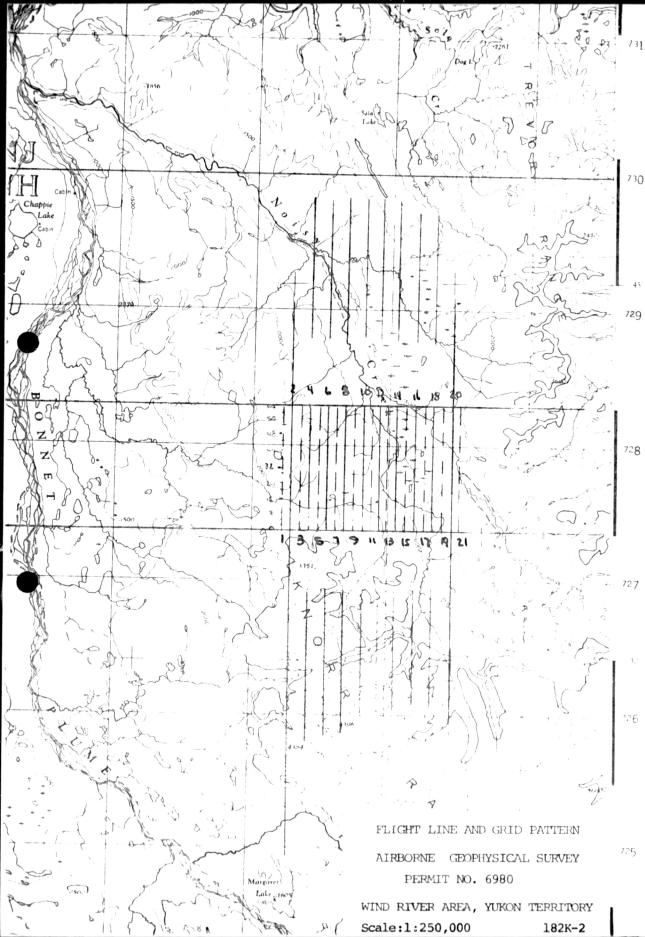


KEY MAP SHOWING LOCATION OF  
PERMIT NOS. 6980, 6981

TRAIL RIVER AREA, YUKON TERRITORY

Aug. 1973

182K-1



FLIGHT LINE AND GRID PATTERN

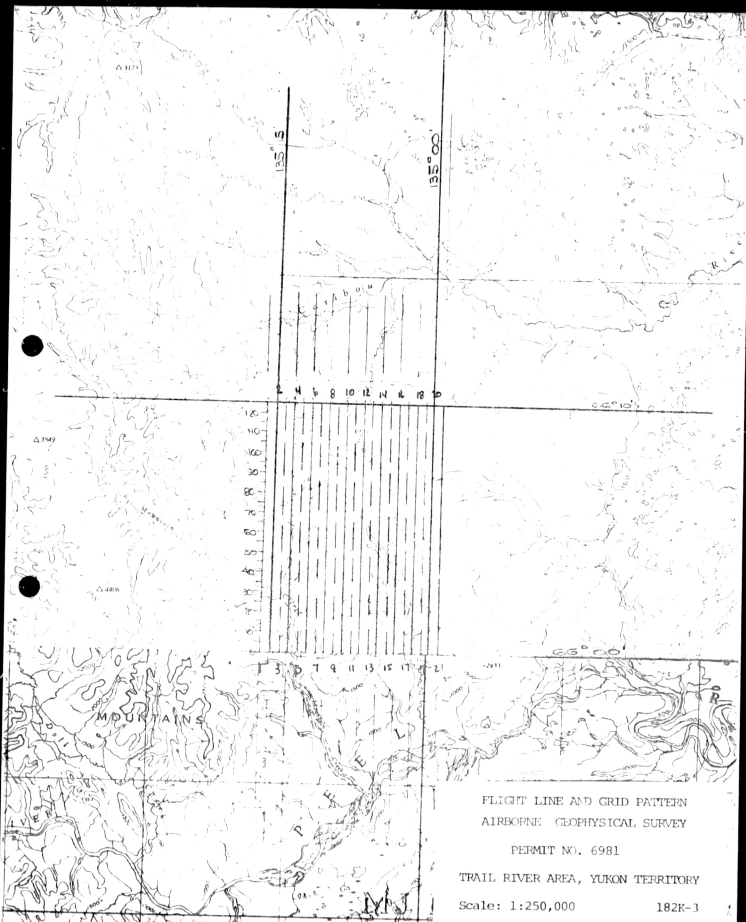
AIRBORNE GEOPHYSICAL SURVEY

PERMIT NO. 6980

WIND RIVER AREA, YUKON TERRITORY

Scale: 1:250,000

182K-2



FLIGHT LINE AND GRID PATTERN  
AIREBORNE GEOPHYSICAL SURVEY

PERMIT NO. 6981

TRAIL RIVER AREA, YUKON TERRITORY

Scale: 1:250,000

182K-3