318

KENNCO EXPLORATIONS, (WESTERN) LIMITED

REPORT

ON THE

GEOLOGICAL, GEOCHEMICAL AND GEOPHYSICAL SURVEYS

ON THE

F.M. GROUP

Princeton Area, British Columbia

49° 120° SE
49° 121° SW

by

J.M. Anderson & J.A. Gower

June 12 - November 9, 1959

INDEX

LIST OF CLAIMS AND WORK DISTRIBUTION

Claim No.		Claim Group	Tag. No.	Geology	Geochem. Soil Survey	Induced Polariz.	Magnetometer Survey	Seismic Survey	Aeromag. Survey	Diamond Drilling	Bulldoz-ing	Total	Amount Claimed	Years Applied
F.H.	1	KX-5	390901						$100.00			$ 100.00	$ 100.00	1
	2	"	390902						100.00			100.00	100.00	1
	3	"	390903						100.00			100.00	100.00	1
	4	"	390904						100.00			100.00	100.00	1
	6	"	390906						100.00			100.00	100.00	1
	8	"	390908						100.00			100.00	100.00	1
	10	"	390910			$ 73.50			26.50			100.00	100.00	1
	11	"	390911						100.00			100.00	100.00	1
	12	"	390912						100.00			100.00	100.00	1
	13	"	390913						100.00			100.00	100.00	1
	14	"	390914						100.00			100.00	100.00	1
	15	"	390915						100.00			100.00	100.00	1
	16	"	390916						100.00			100.00	100.00	1
	17	"	390917						100.00			100.00	100.00	1
	18	"	390918						100.00			100.00	100.00	1
	20	"	390920						100.00			100.00	100.00	1
	22	"	390922			74.00			26.00			100.00	100.00	1
	24	"	390924			79.00		$ 74.00	47.00			200.00	200.00	2
	32	"	390932						100.00			100.00	100.00	1
	81	"	390981						100.00			100.00	100.00	1
		Group Total				$226.50		$ 74.00	$1799.50			$2100.00	$2100.00	

<u>LIST OF CLAIMS A AND WORK DISTRIBUTION</u>

Claim No.	Claim Group	Tag No.	Geology	Geochem. Soil Survey	Induced Polariz.	Magnetometer Survey	Seismic Survey
[illegible].H. 5	KX-3	390905					
7	"	390907					
9	"	390909					
19	"	390919			$ 17.50		
21	"	390921			104.00		$ 46.00
23	"	390923			40.00		
25	"	390925					
26	"	390926			17.50	$ 4.00	52.00
27	"	390927					
28	"	390928			97.50	16.00	
31	"	390931					
33	"	390933			49.00	11.50	103.00
34	"	390934					
35	"	390935			121.50	23.00	285.00
36	"	390936			98.00	18.00	
37	"	390937					
38	"	390938		$ 101.00	137.50	39.00	
87	"	390987		220.00	294.50	65.00	
88	"	390988	$ 115.00	214.00	334.50	59.50	
90	"	390990	115.00	220.00	402.50	71.00	
	Group Total		$ 230.00	$ 755.00	$1714.00	$ 307.00	$ 486.00

LIST OF CLAIMS AND WORK DISTRIBUTION

Claim No.	Claim Group	Tag. No.	Geology	Geochem. Soil Survey	Induced Polariz.	Magnetometer Survey	Seismic Survey	Aeromag. Survey	Diamond Drilling	Bulldoz-ing	Total	Amount Claimed	Years Applied
F.H. 29	KX-1	390929			$ 37.00	$ 6.50					$ 43.50	$ 300.00	3
30	"	390930			15.00	3.00					18.00	300.00	3
39	"	390939		$ 15.00	53.50	28.50					97.00	300.00	3
40	"	390940		158.00	150.50	62.00					370.50	300.00	3
41	"	390941									0.00	300.00	3
42	"	390942				1.00					1.00	300.00	3
43	"	390943									0.00	300.00	3
44	"	390944									0.00	300.00	3
45	"	390945									0.00	300.00	3
46	"	390946									0.00	300.00	3
51	"	390951			6.00	12.50					18.50	300.00	3
53	"	390953			13.00	4.00					17.00	300.00	3
55	"	390955									0.00	300.00	3
56	"	390956									0.00	300.00	3
89	"	390989		215.00	233.50	58.50					507.00	400.00	4
91	"	390991	$ 115.00	178.00	268.00	54.50					615.50	300.00	3
92	"	390992	115.00	238.00	344.00	59.50			$2625.00	$ 269.00	3650.50	400.00	4
			$ 230.00	$ 804.00	$1120.50	$290.00			$2625.00	$ 269.00	$5338.50	$5300.00	
F.H. 52	KX-2	390952		94.00	95.50	40.00					229.50	200.00	2
54	"	390954		2.50	35.50	11.50					49.50	200.00	2
93	"	390993	115.00	47.00	143.50	23.00				487.00	815.50	200.00	2
94	"	390994	115.00	49.50	108.00	26.00				254.00	552.50	200.00	2
95	"	390995								96.50	96.50	200.00	2
96	"	390996								74.50	74.50	200.00	2
108	"	330708	115.00	151.00	131.50	22.00					419.50	200.00	2
110	"	330710	115.00	27.00	45.00	1.00				291.00	479.00	200.00	2
111	"	330711	115.00	82.00	167.00	23.00					387.00	200.00	2
112	"	330712		79.00	39.00						118.00	200.00	2
113	"	330713		15.00							15.00	200.00	2
123	"	330723			31.00						31.00	200.00	2
124	"	330724									0.00	200.00	2
125	"	330725									0.00	200.00	2
127	"	330727									0.00	200.00	2
128	"	330728									0.00	200.00	2
			$ 575.00	$ 547.00	$ 796.00	$146.50				$1203.00	$3267.50	$3200.00	

LIST OF CLAIMS AND WORK DISTRIBUTION

Claim No.	Claim Group	Tag. No.	Geology	Geochem. Soil Survey	Induced Polariz.	Magnetometer Survey	Seismic Survey	Aeromag. Survey	Diamond Drilling	Bulldoz-ing	Total	Amount Claimed	Years Applied
F.H. 82	KX-4	390982				$ 15.50					$ 15.50	$ 200.00	2
83	"	390983		$ 10.00		7.50					17.50	200.00	2
84	"	390984		123.50	$ 38.50	29.50					191.50	200.00	2
85	"	390985		111.00	36.00	32.50					179.50	200.00	2
86	"	390986		220.00	124.00	51.50					395.50	200.00	2
101	"	330701				2.00					2.00	200.00	2
102	"	330702									0.00	200.00	2
103	"	330703		37.00	36.00	14.50					87.50	200.00	2
104	"	330704									0.00	200.00	2
105	"	330705		153.00	135.50	34.50					323.00	200.00	2
106	"	330706		49.50	21.50	12.50					83.50	200.00	2
107	"	330707	$ 115.00	163.00	214.50	40.00				$ 107.00	639.50	300.00	3
109	"	330709	115.00	153.00	269.00	37.00			$1347.00	345.00	2266.00	300.00	3
119	"	330719									0.00	200.00	2
120	"	330720									0.00	200.00	2
121	"	330721									0.00	200.00	2
122	"	330722									0.00	200.00	2
149	"	330749									0.00	200.00	2
150	"	330750									0.00	200.00	2
164	"	330764				7.50					7.50	200.00	2
	Group Total		$230.00	$1020.00	$ 875.00	$ 284.50			$1347.00	$ 452.00	$4208.50	$4200.00	

LIST OF CLAIMS AND WORK DISTRIBUTION

Claim No.	Claim Group	Tag No.	Geology	Geochem. Soil Survey	Induced Polariz.	Magnetometer Survey	Seismic Survey	Aeromag. Survey	Diamond Drilling	Bulldoz-ing	Total	Amount Claimed	Years Applied
F.H. 117	KX-6	330717						$ 100.00			$ 100.00	$ 100.00	1
151	"	330751						100.00			100.00	100.00	1
152	"	330752						200.00			200.00	200.00	2
153	"	330753						100.00			100.00	100.00	1
154	"	330754						200.00			200.00	200.00	2
155	"	330755						100.00			100.00	100.00	1
156	"	330756						100.00			100.00	100.00	1
157	"	330757						100.00			100.00	100.00	1
158	"	330758						100.00			100.00	100.00	1
163	"	330763						100.00			100.00	100.00	1
165	"	330765						100.00			100.00	100.00	1
166	"	330766						100.00			100.00	100.00	1
167	"	330767						100.00			100.00	100.00	1
168	"	330768						100.00			100.00	100.00	1
169	"	330769						100.00			100.00	100.00	1
170	"	330770						100.00			100.00	100.00	1
182	"	330782						100.00			100.00	100.00	1
184	"	330784						100.00			100.00	100.00	1
186	"	330786						100.00			100.00	100.00	1
188	"	330788						100.00			100.00	100.00	1
	Group Total							$2200.00			$2200.00	$2200.00	

LIST OF CLAIMS AND WORK DISTRIBUTION

Claim No.	Claim Group	Tag. No.	Geology	Geochem. Soil Survey	Induced Polariz.	Magnetometer Survey	Seismic Survey
F. H. 159	KX-7	330759					
160	"	330760					
161	"	330761					
1629	"	330762					
171	"	330771					
172	"	330772					
173	"	330773					
174	"	330774					
175	"	330775					
176	"	330776					
177	"	330777					
178	"	330778					
179	"	330779					
180	"	330780					
190	"	330790					
192	"	330792					
194	"	330794					
195	"	330795					
196	"	330796					
198	"	330798					
	Group Total						
	GRAND TOTAL		$1265.00	$3126.00	$4732.00	$1028.00	$ 560.00

FINANCIAL STATEMENT

	Total	Geology	Geochem.	I.P.	Mag.	Seismic	Aeromag.	D.D.	Bull-dozing
Wages & Salaries	$ 6331.00	$ 611.00	$1009.00	$ 3526.00	$ 441.00			$744.00	
Costs Directly Applicable	4269.00	409.00	640.00	1171.00	447.00			1352.00	$250.00
Geochem. Sample Analysis	1267.00		1267.00						
Contractors Fees:									
T. Connors D.D. Co.	4570.00							4570.00	
T. Stout (Bulldozing)	1995.00								1995.00
Burrows Geophysical Co.	560.00					560.00			
Hunting Surveys Corp.	6000.00						6000.00*		
Supervision:									
Dr. J.A. Gower (Geology)	140.00	140.00							
C.J. Sullivan (Geology)	105.00	105.00							
D. Hansen (Mag.)	140.00				140.00				
Consultants:									
F.F. Clark (Geochem.)	70.00		70.00						
H.E. Hawkes: (Geochem.)	140.00		140.00						
R. Holmer (Geophys.)	35.00			35.00					
TOTAL	$25622.00	$1265.00	$3126.00	$4732.00	$1028.00	$560.00	$6000.00	$6666.00	$2245.

* $6000.00 of Aeromag Costs Applied

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DIVISION OF $25,622.00 BETWEEN 7 KX CLAIM GROUPS

Claim Group	No. of Claims in Group	Total	Geology	Geochem. Soil Survey	Induced Polariz.	Magnetometer Survey	Seismic Survey	Aeromag. Survey	Diamond Drilling	Bulldozer Cutting
KX-1	17	$ 5338.50	$ 230.00	$ 804.00	$ 1120.50	$ 290.00	0.00	0.00	$ 2625.00	$ 269.00
KX-2	16	3267.50	575.00	547.00	796.00	146.50	0.00	0.00	0.00	1203.00
KX-3	20	6507.00	230.00	755.00	1714.00	307.00	486.00	0.00	2694.00	321.00
KX-4	20	4208.50	230.00	1020.00	875.00	284.50	0.00	0.00	1347.00	452.00
KX-5	20	2100.00	0.00	0.00	226.50	0.00	74.00	1799.50	0.00	0.00
KX-6	20	2200.50	0.00	0.00	0.00	0.00	0.00	2200.50	0.00	0.00
KX-7	20	2000.00	0.00	0.00	0.00	0.00	0.00	2000.00	0.00	0.00
TOTAL	133	$25622.00	$1265.00	$3126.00	$4732.00	$1028.00	$560.00	$6000.00	$ 6666.00	$2245.00

KENNCO EXPLORATIONS, (WESTERN) LIMITED

Report on the

Geological, Geochemical and Geophysical Surveys

on the F. H. Group

INTRODUCTION

This report deals with work done on the F.H. claims situated approximately 6 miles N.N.E. of Princeton, B.C., by Kennco Explorations, (Western) Limited during the period June 12, 1959 to November 9, 1959. Work included geological, geochemical, geophysical surveys, diamond drilling and bulldozer cutting.

Geological mapping was done by C.S. Ney, E.A. Lawrence and J.M. Anderson with occasional assistance by W. Christian, G. Davies and T. Carpenter. Geochemical surveys were done by H. Goddard and B. Gorgenyi with occasional assistance by L. DeBriske, G. Davies, W. Christian, D. Roadhouse and G. Rayner. Induced Polarization surveys were done by D. Hansen, R. Roadhouse, F. Bara, H. McGladdery and N.R. Wright. Line cutting and chaining was done by J. Barakso, D. Roadhouse, G. Delane, G. Antenbring, A. Drummond and G. Bara as well as some of those mentioned above. As work progressed the number of men and variety of duties necessarily changed. All work, except geophysical surveys, was under the supervision of C.S. Ney and J.M. Anderson. D.A. Hansen supervised all geophysical work and personally conducted the induced polarization survey.

Consultation on geological work was by Dr. J.A. Gower and C. J. Sullivan; on geochemical work by Dr. H.E. Hawkes and F. F. Clark; and on the geophysical work by R. Holmer.

Diamond drilling was conducted by T. Connors Diamond Drilling Company with a helper (F. Bara) provided by Kennco. Bulldozing was done by T. Stout of Princeton, B.C. with swampers and flagmen provided by Kennco. Seismic refraction surveys were done by Burrows Geophysical Company of Spokane, Washington.

Aeromagnetic Surveys were conducted by Hunting Surveys Corporation.

LOCATION AND ACCESS

The property is centered at about latitude 49°32′N, longitude 120°27′W, near Jura Station on the C.P.R. about 6 miles N.N.E. of Princeton, B.C. Elevations range from about 2500′ to 4100′ a.s.l. with topography mainly gently rolling. Most of the area in the southwest is fairly open rangeland while the area to the northwest is steeper and more heavily wooded with pine and fir.

A good gravel road from Princeton through Osprey Lake to Summerland passes through the property and this combined with ranch and logging roads gives good access to most of the area.

CONTROL LINES

To provide control for all subsequent detailed surveys a grid system of lines was cut and picketed by chain and compass at 400-foot intervals in a north-south and east-west direction. Stations were placed at 100-foot intervals along these lines. The total cost of line cutting was $1191.00 This amount was proportioned equally to geology, soil sampling, induced polarization and magnetometer surveys and thus $298.00 was applied to the cost of these surveys and is contained under the heading 'Direct Costs Applicable'. (See financial statement, page 7.)

GEOLOGICAL SURVEY

Method:

The entire claim group was mapped geologically and some mapping was done outside of the group boundary. Grid lines were utilized where possible but a general paucity of outcrop necessitated much reconnaissance type mapping. A 1000 scale topographic map was compiled covering most of the claim area by Photographic Surveys Corporation and this was used in conjunction with air photos for mapping. A 400 scale map was produced from the 1000 scale map for mapping areas of more abundant outcrop.

In mapping, attention was given to rock type, structure, alteration, brecciation and type and grade of mineralization. A thin-section study was made of several rock specimens.

Rock Types:

Rock types encountered in the mapping included the following:

Princeton Sediments - generally shales, arkoses and sandstones of probable Miocene age
Princeton Basalts - associated with the above sediments and noted northwest of the claim group.
Coast Intrusions - which include the following types:

Osprey Lake Granodiorite - composed largely of quartz plagioclase and orthoclase. Generally coarse grained and of Jurassic age.
Granite Porphyry Dykes - probably a finer-grained equivalent of the Osprey Lake granodiorite.
Summers Creek Intrusives - medium grained monzonite, diorite and gabbro of uncertain age.

Nicola Volcanics - andesites, dacites and tuffs of Upper Triassic age.

General Geology and Structure:

The general trend of the rocks in the area is from southeast to northwest with a slight bulging to the northeast. Attitudes in Nicola volcanics suggest a gradual swing from northeasterly to northwesterly strikes probably conforming to the Osprey Lake granodiorite contact.

The central part of the claim area is underlain by a band of Nicola Group rocks (dacites and andesites). These are in contact with the Osprey Lake intrusive body which lies to the northeast. The contact follows the lower part of Hayes Creek and swings northwest crossing Christian Creek near the railroad. Rocks to the southwest of the volcanics are the overlying Princeton sediments which, in this area, form the north-eastern rim of the Princeton sedimentary basin.

Shearing directions are generally northeasterly and northwesterly. Minor granite porphyry dykes were noted in Nicola rocks near the main granodiorite contact and some small basic dykes with minor secondary copper mineralization, striking northeasterly to northwesterly, were seen to cut both Nicola volcanics and Osprey Lake granodiorite.

A small area of intrusives ranging from monzonite through diorite to gabbro are in evidence along the railroad cut northeast of Christian Creek, lying between the volcanics and the granodiorite. These are termed Summers Creek intrusives(1) and their age or ages are questionable.

Because a large portion of the claim area is devoid of outcrop approximately one-half of the total cost of the geological survey was applied for assessment credit, and this amount ($1,265.00) was applied to 11 claims containing the highest concentration of outcrop. (Plate 3).

GEOCHEMICAL SURVEY

Method:

Soil samples were taken over the grid area at 100-foot intervals by means of iron bar and soil auger. Samples were placed in paper bags and sent out for total copper analysis. Soils encountered included boulder filled glacial till, black loam, sandy loam and weathered broken bed rock material. Samplers attempted to sample a common soil horizon and kept fairly detailed notes on the type of material collected. In heavy boulder-ridden areas considerable difficulty was encountered. A pilot hole made by iron bar prior to augering was often found necessary. On the average samples were collected from a depth of about 2 1/2 feet or more.

Samples were analyzed in Vancouver using the Hot Nitric Acid Extraction method for total copper content. A total of about 1267 samples were taken and analyzed.

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(1) G.S.C. Memoir No. 243 by H.M.A. Rice, 1947.

Purpose:

Soil sampling was undertaken to outline areas of anomalous copper in soils and help delimit target areas.

Interpretation:

Soil sample analysis gave values ranging from about 10 to 2200 p.p.m. total copper. Values greater than 100 p.p.m. were considered anomalous. No distinctly anomalous area was outlined but several discontinuous anomalies with peaks of greater than 1000 p.p.m. were found to lie near the dacite-andesite contact. (Plate 4)

GEOPHYSICAL SURVEYS

Induced Polarization: - Method

Induced Polarization effects occur when there is a change in the method of electrical conduction in the ground. In ordinary earth materials conduction is by ions. Sulfides, native metals, graphite, magnetite, and other minerals with metallic lusters exhibit metallic conduction or conduction by electrons. If conduction paths through the earth involve both types of conduction and direct current is used, the metallic conductors become blocked or polarized just as the electrodes in an electrolytic cell become polarized. This effect is known as interfacial polarization, overvoltage, or double-layer charging. Polarization does not occur with alternating current and the resistance of paths involving electronic conductors is accordingly less with alternating current than with direct current.

This effect is utilized in prospecting by making standard Resistivity measurements first using direct current and then using alternating current. A decrease in apparent resistivity with the alternating current measurement is an indication of the presence of metallic conductors.

Two quantities are obtained from field measurements—the DC apparent resistivity designated PDC and the AC apparent resistivity designated ρAC. The units of both of these quantities are ohm-feet divided by 2π. From ρDC and ρAC two additional quantities are computed. These are the Percent Frequency Effect, PFE, and the Metallic Conduction Factor, MCF.

$$PFE = \frac{\rho DC - \rho AC}{\rho AC}$$

and

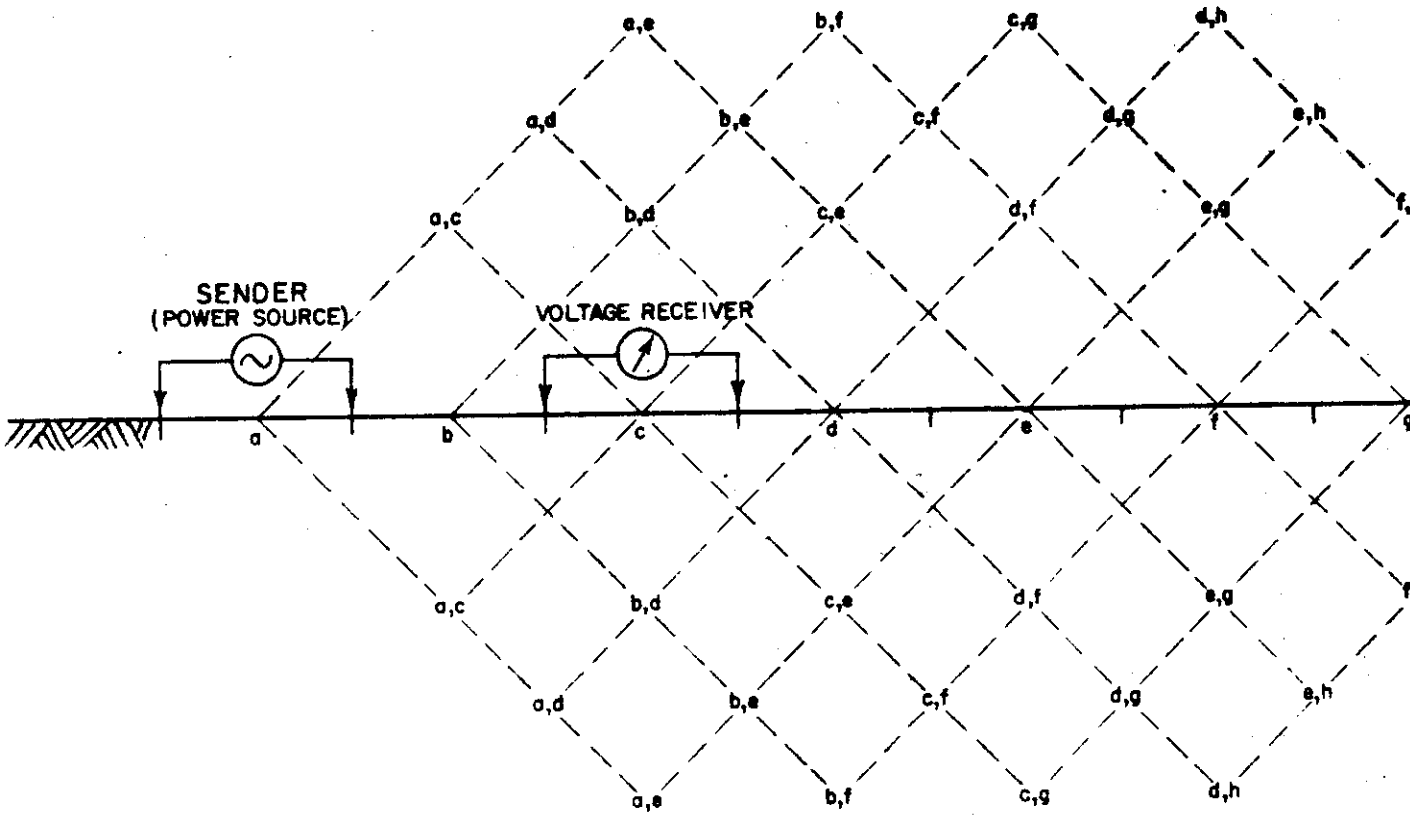
$$MCF = \frac{PFE}{\rho DC} \times 10^5$$

These two quantities are studied with the DC resistivity in arriving at an interpretation. The Percent Frequency Effect must be significantly greater than (a) instrumental precision and (b) background frequency effects of the area in order to be considered as indicative of metallic conduction. In some cases only ρDC and the MCF are presented in the data. It must then be established that the values given for the MCF are based upon significant frequency effects. Anomalous values of the MCF are considered to indicate metallic conduction, which may or may not consist of economic mineralization.

The method of presenting data is illustrated on the attached drawing. The end-on electrode arrangement is used with current applied to the earth through a long wire grounded at both ends of interval "a". The receiver consists of a suitable voltmeter grounded at both ends of interval "c". In practice the intervals a, b, c, ... etc. are equal and vary from 100 to 1000 feet, depending on the problem at hand. With the Sender across interval "a" and the Receiver across interval "c", the values of the MCF are plotted at the point "a,c" below the reference line and ρDC is plotted at point "a,c" above the reference line. Points "a,c" are determined by the intersection of 45° diagonals drawn from the mid-points of Sender and Receiver intervals. The next reading would be taken with the same Sender position but with the receiver advanced to interval "d". The data for this arrangement is plotted at points "a,d". The Receiver is stepped outward until the observed voltage is too small for a reliable reading. The Sender is then advanced to interval "b" and the procedure with the Receiver is repeated.

The values plotted at the various points are then contoured. Percent Frequency Effects, if shown, appear as superscripts to ρDC and are not contoured. The reference line on the drawing represents the line of electrodes on the ground. Electrical changes in the ground at increasingly greater distances away from the electrode line are indicated by the behavior of contours parallel to and away from the reference line. Lateral electrical changes along the line of electrodes are indicated by contours along the direction of a 45° diagonal.

As with other geophysical methods, experience is an important factor in the deduction of a valid interpretation.


SENDER
(POWER SOURCE)
VOLTAGE RECEIVER
a
b
c
d
e
f
a,e
b,f
c,g
d,h
a,d
b,e
c,f
d,g
e,h
a,c
b,d
c,e
d,f
e,g
a,c
b,d
c,e
d,f
e,g
a,d
b,e
c,f
d,g
e,h
a,e
b,f
c,g
d,h

FIGURE

Field Equipment:

The equipment used was designed and constructed by the Geophysics Division of Bear Creek Mining Company in Denver, Colorado.

Purpose:

The purpose of the induced polarization work on the F.H. claims was two-fold. Part of the work was to define the extent of sulphide mineralization. For this purpose 200-foot dipole spreads were used for a higher degree of target resolution. Additional lines run with 400 and 500-foot dipole spreads were carried out to rapidly examine the ground adjacent to the mineralized area.

Interpretation:

Interpretation of I.P. data is necessarily subjective and based, therefore, on past observations and experience of known mineralization. By these standards, then, the anomalies noted on the F.H. claims are classified as weak-questionable, weak, and moderate. The induced polarization data are presented on Plate 6 and on line profiles. Weak-questionable anomalies are indicated by a dashed line and interrogation mark, weak anomalies by a dashed line, and moderate anomalies by a solid line. The M.C.F. values partially enclosed by a heavy line represent values derived from P.F.E.'s of 5 to 8 inclusive, up to about twice the background noise. M.C.F. values, derived from P.F.E.'s of 9 and above are completely enclosed. The results of an interpretation of the induced polarization data are tabulated in Table 1 and summarized on Plate 6.

On the profiles a dash in the M.C.F. number field indicates that a DC reading was unobtainable because of a low signal to noise ratio. The corresponding resistivities are computed from AC signals assuming a zero PFE.

A total of 92,200 feet of line was covered by I.P. survey at a cost of $4732.00. This amount was applied proportionately to those claims involved. (Plate No. 6).

MAGNETOMETER SURVEY

Method:

The main grid area was surveyed by the Askania torsion magnetometer which measures the vertical component of the earth's magnetic field. Lines 16N and 12E were established as control base lines and base station values were determined by repetition, every 400 feet along these two lines, at their intersection with other grid lines. Readings were then taken at 100-foot intervals over most of the grid. (Plate 5)

Purpose:

The magnetometer survey was conducted as part of the integrated exploration program and to determine whether or not the mineralized zone had a distinct magnetic expression and if so, to further determine its extent and intensity.

Interpretation:

The gridded area of interest gave no definite diagnostic indications but an area of higher intensity was indicated between about 24N-20W and Christian Creek, and a second and somewhat broader "high" area was noted to commence immediately north of Christian Creek and centered roughly on the northern end of line 8W. These are believed due to basic, magnetite-rich volcanics and basic intrusive rock types. (Plate 3)

SEISMIC SURVEY

Method:

The seismic method for determining thickness of overburden and depth of bedrock is based on the measurement of the velocity of a seismic wave front passing through the earth. Ordinarily, such a wave front is generated by exploding a small dynamite charge.

After the explosion, the arrival of a refracted wave front is picked up by the seismometer. The mechanical earth-motion is changed to an electrical impulse or signal, which is transmitted by means of a cable to an amplifier. The signal is amplified and transmitted to the galvanometer, where it is recorded.

Figures 1, 2 and 3 illustrate a typical seismograph set-up or "spread", showing the seismometers placed in progression at predetermined intervals away from the point of explosion, or shot-point. The recording aparatus is usually set up near the shot-point. A small charge of dynamite is placed in a shallow bored hole and tamped with dirt. When the charge is exploded, the exact instant of the explosion is recorded on the oscillogram (Figure 2) as "shot time" or "Time Break". The energy from the explosion radiates in all directions. Figure 3 shows the direct and refracted paths of the energy or wave front. The direct or horizontal wave reaches the seismometers nearest the shot-point immediately through the low velocity overburden because of the short travel path. As the wave front progresses downward, it soon reaches bedrock which is much more dense in its composition and has a much higher velocity. This change in media causes some of the energy to be refracted along and through the bedrock. Because of the higher velocity the travel time is greatly accelerated and, consequently, the refracted wave will soon overtake and pass the horizontal wave. It may be noted in Figure 3 that this occurs at Station 4. Until this time, all that has been recorded is the travel time of the wave through the overburden. Now that the refracted wave has passed the horizontal wave, Stations 5 through 12 will record only the refracted wave from the bedrock.

Figure 2 represents an actual oscillogram, or record. The vertical lines are for timing and each division is .01 second. The heavy horizontal lines are the galvanometer traces. When the wave front arrives at the various stations, it is recorded instantaneously and shown as a break in the continuity of the galvanometer trace. The traces still continue, but they are of such amplitude that they cannot be seen on the record for approximately .5 second. This amplitude is the result of the arrival of secondary waves. The first arrival information is all that is necessary for the computation of bedrock depth.

The record is developed in a few seconds after the recording, and is available for immediate study. The "first arrivals" are measured in time from the "shot time". These times are then plotted on graph paper to form a TIME-DISTANCE Curve, as illustrated in Figure 1. With this curve, the velocities can be accurately determined by x/t, with "X" as the Distance and "t" as the Time. Also, the exact point where the refracted wave overtakes the horizontal wave may easily be measured. This is commonly referred to as the critical distance, and is measured in feet.

When these factors are known, the thickness of the overburden or depth to bedrock may be determined by the formula:

$$Z = \frac{Xc}{2} \sqrt{\frac{V1 - Vo}{V1 + Vo}}$$

Z is the thickness of the overburden in feet; Xc is the critical distance in feet; V_1 is the velocity of the bedrock in feet per second; and Vo is the velocity of the overburden in feet per second.

By a similar line of reasoning, thickness of deeper layers can be computed. For example, if an additional layer was present between the overburden and bedrock, the time-distance curve would consist of three straight lines, each indicative of the velocity of the material the wave passed through.

Stated briefly, the assumptions on which refraction calculations are based are:

1. The velocities in successive strata increase as the depth increases.
2. The materials of the strata are such that the velocities in any direction are the same, i.e., the velocities are constant throughout each stratum.
3. The strata are sufficiently thick.
4. The boundaries between the strata are planes.

If these conditions are satisfied, the travel-time curve will consist of straight line segments having successively decreasing slopes. In practice, these conditions are rarely, if ever, satisfied.

Fig. 1.

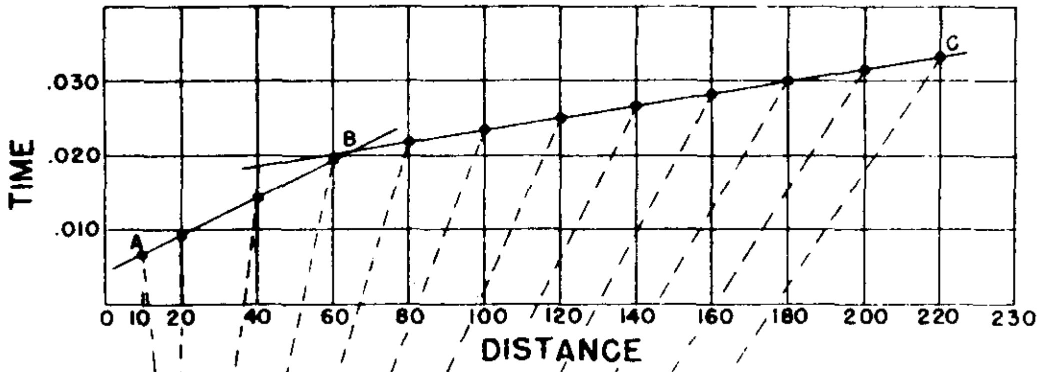


Fig. 2.

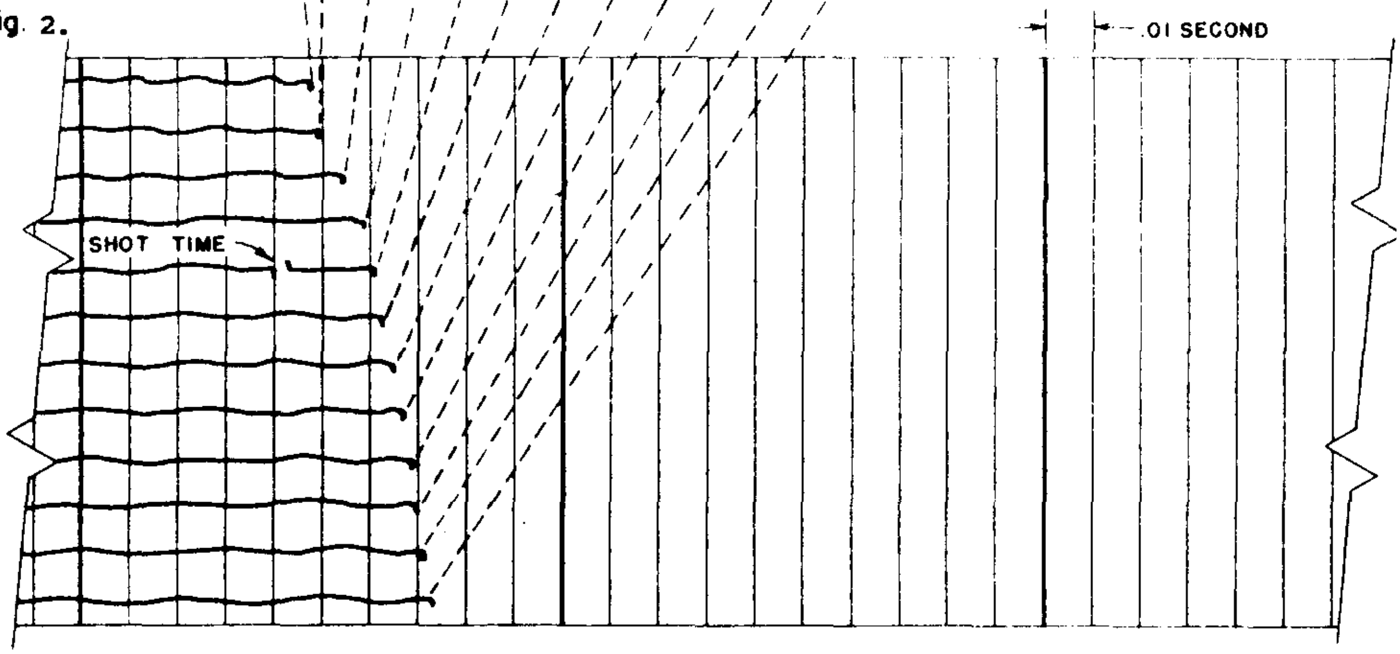
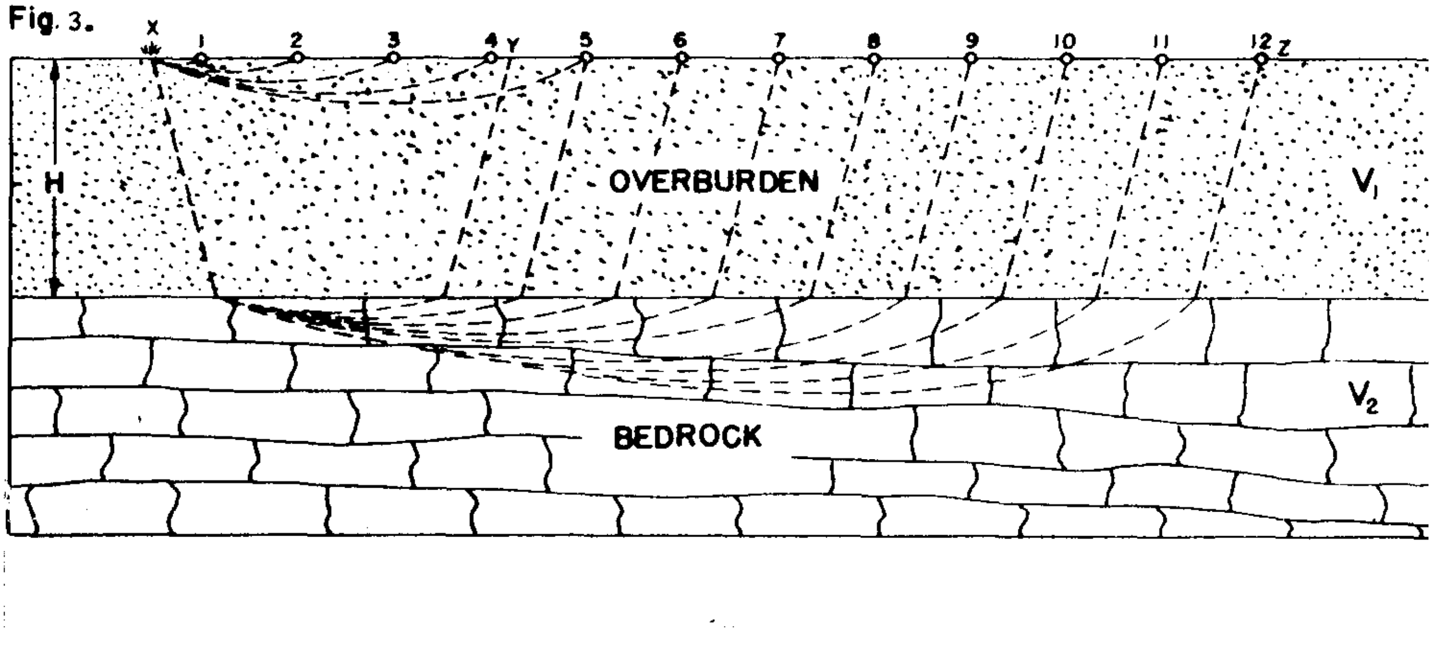


Fig. 3.



Field Equipment:

The equipment used for this survey was a Twelve Channel Portable Refraction Seismic Unit.

Purpose:

A seismic refraction survey was performed over a relatively small portion of the F.H. claims near the west end of Line 8N to try and determine the thickness of the Princeton sedimentary rocks thought to overly Nicola volcanics in this area.

Interpretation:

Preliminary testing indicated that the Princeton sediments had a variable velocity of from 4,100 to 8,500 feet per second. Tests over Nicola volcanics indicated a velocity of about 10,400 feet per second, and the indicated velocity of the alluvium was 2000 feet per second.

Interpretation of the seismic data indicated a small thickness of Princeton sediments and contrasted greatly with the interpretation from induced polarization work. Very low resistivities by later induced polarization work indicated a much greater depth. It is possible that the seismic spreads were not great enough to sample the Nicola contact and that the interpreted contact may have been the water table or the top of the Princeton sediments under the alluvium. (Plate 7)

AIRBORNE GEOPHYSICAL SURVEY

Method:

The survey was conducted by Hunting Survey Corporation Ltd. in March 1960 for Kennco Explorations, (Western) Limited using an Anson aircraft equipped with magnetometer. Mean terrain clearance was 500feet with flight lines spaced at 1/4 mile intervals. In order to cross major geological structures at as large an angle as possible, flight lines were oriented approximately 060°-240° true. The area flown comprised 83 square miles with 356 miles of flight lines.

Purpose:

This survey was flown in order to obtain the magnetic expression of the F.H. claim area and of the area between the F.H. claims and Copper Mountain to the southwest.

Interpretation:

The resulting aeromagnetic map outlined the northeastern end of the Princeton sedimentary basin and showed a marked correlation between Princeton sediments and Nicola volcanics as mapped geologically near the southeastern edge of the claims. Several areas of prominent magnetic anomalies were outlined in the area flown with one particular "high" area lying partly on the most northwesterly claims. This anomaly was previously indicated by the ground magnetometer survey. Good correlation between intrusive rocks and Nicola volcanics was obtained in the Copper Mountain area. (Plate 8)

DIAMOND DRILLING

Diamond Drilling was carried out to test type and grade of primary mineralization by T. Connors Diamond Drilling Company using AX diameter equipment. Four holes were drilled aggregating 743.75 feet for a total cost of $6,666.00. This amount was proportioned between three claims on a footage basis.

DDH #	Location	Claim No.	BRG & Angle	Depth	Cost
1	14+20N; 17+50E	F.H. 92	-90°	211.0′	$ 1890.00
2	8+90N; 14+00E	F.H. 90	030°-65°	300.5′	2694.00
3	22+00N; 25+00E	F.H. 92	-90°	82.0′	735.00
4	1+00S; 12+00E	F.H.109	-90°	150.25′	1347.00
				743.75′	$ 6666.00

(Plate 3)

BULLDOZER TRENCHING

Bulldozer work was done on some parts of the F.H. claims to expose bedrock for mapping and sampling. The work was done by T. Stout of Princeton, B.C. using D-8, D-7 and D-4 Caterpillar bulldozers. Cuts were made along sidehills at right-angles to the slope to be as near as possible to outcrop. Because this work was done in a ranching area care was taken to make the cuts so they could be used by the ranchers concerned for rough wagon roads, as well as for geological mapping and sampling.

Claim No.	Amount of Trenching	Cost
F. H. 88	850′	$ 155.00
90	910′	166.00
92	1480′	269.00
93	2680′	487.00
94	1400′	254.00
95	530′	96.50
96	410′	74.50
107	590′	107.00
109	1900′	345.00
110	1600′	291.00
	12,350′	$ 2245.00

(Plate 3)

J. M. Anderson.

[illegible signature]

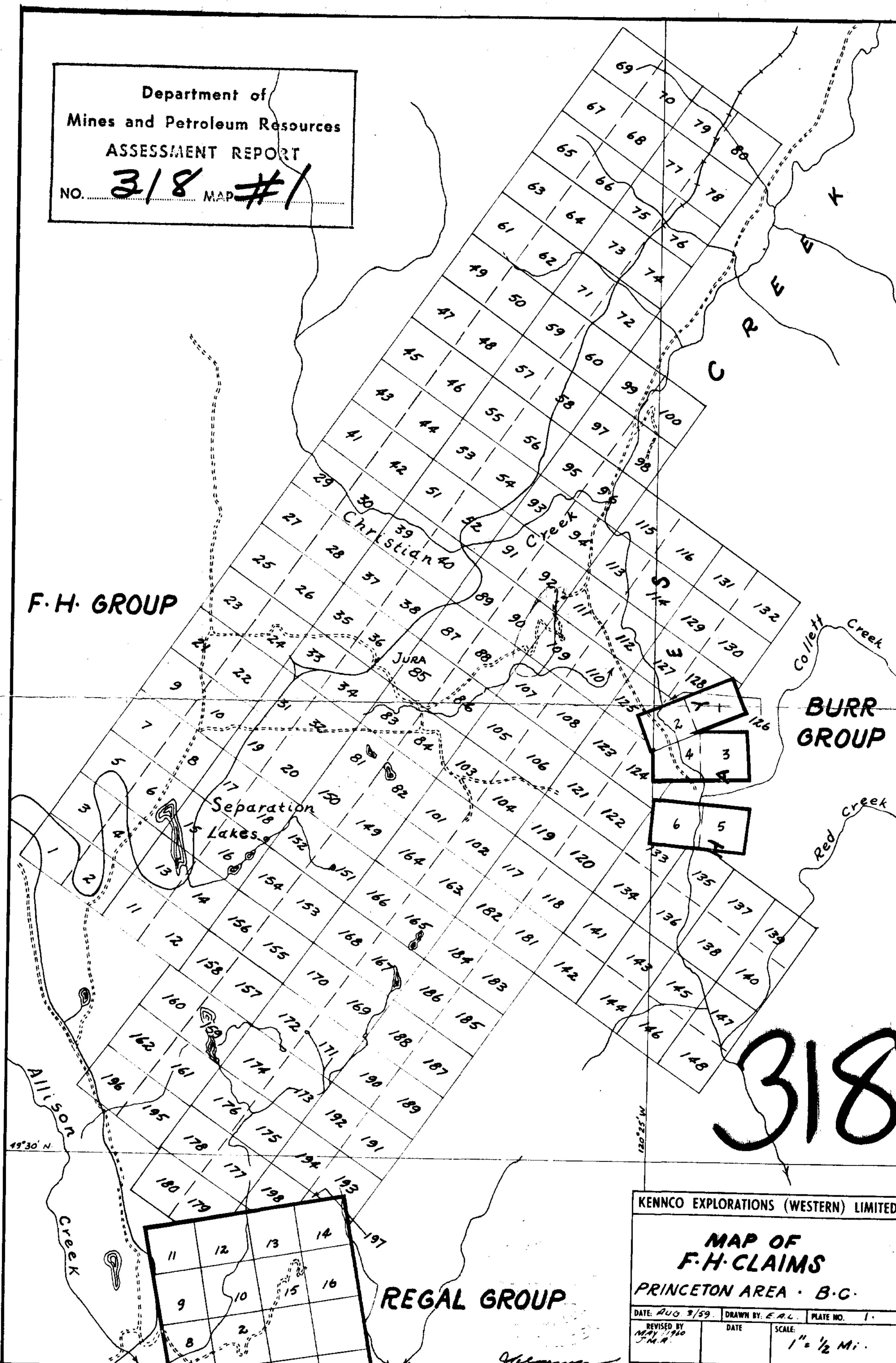
Vancouver, B. C.

TABLE 1

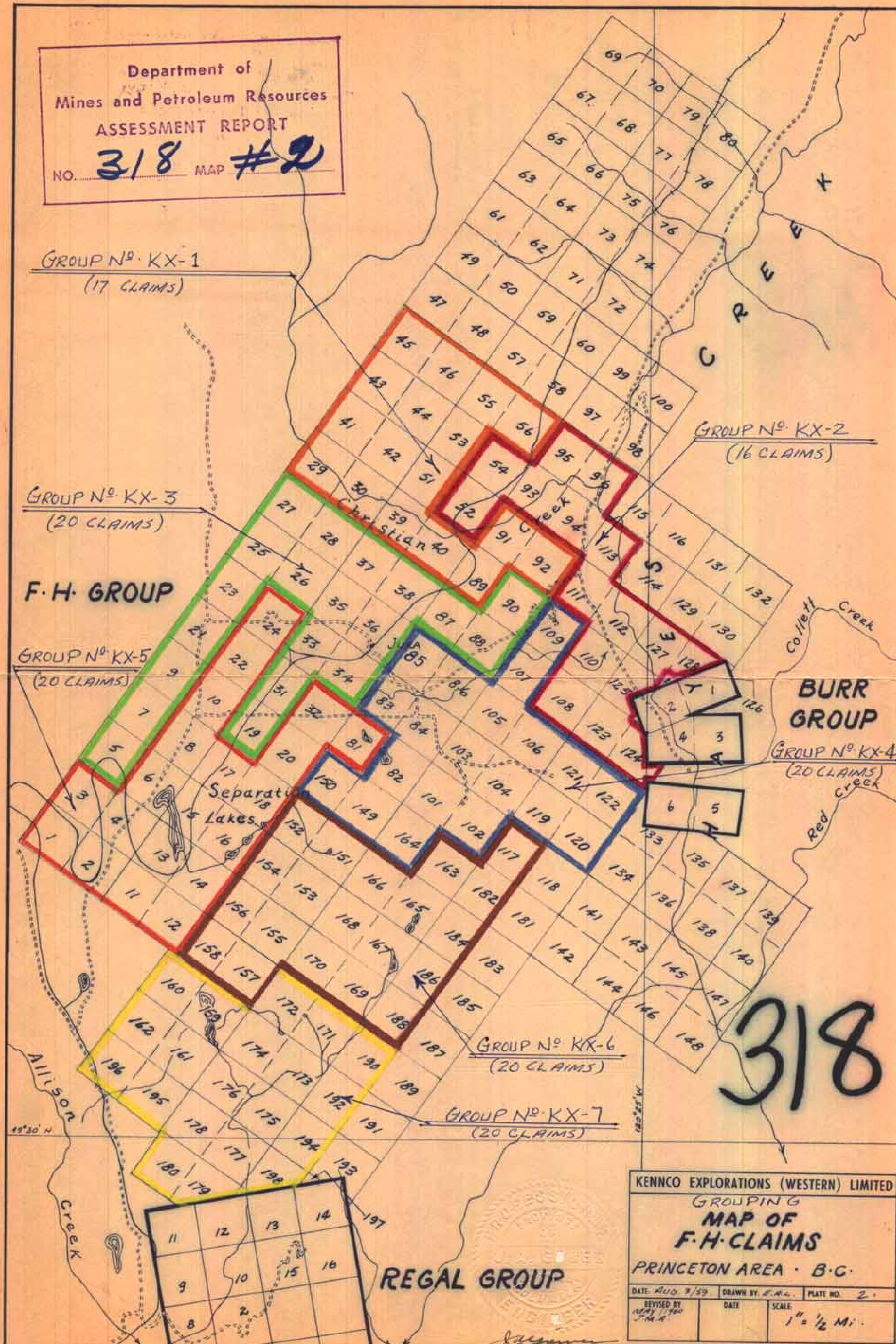
Induced Polarization Anomalies, F.H. Group, Princeton Area

Line	Interval	Anomaly Class	Total Line Surveyed, Feet Dipoles 500′	400′	200′
16N	16E–18E	Weak?			3,800
10N	–	None			2,000
8N	2W–18E	Weak			4,600
8N	–	None	7,500		
00N	4E–6E	Weak?			5,600
	6E–8E	Weak			
20S	–	None	5,500		
24E	26N–28N	Weak?			2,200
20E	22N–24N	Weak?			5,000
	24N–26N	Weak			
	26N–28N	Moderate			
	42N–44N	Weak?			
16E	14S–12S	Weak?			6,400
	12S–6S	Weak			
	6S–12N	Moderate			
	18N–22N	Weak?			
	22N–24N	Moderate			
	24N–28N	Weak			
12E	6S–ON	Weak			6,000
	ON–2N	Moderate			
	2N–24N	Weak			
	24N–26N	Moderate			
	26N–28N	Weak			
8E	6S–4S	Moderate			6,400
	2N–4N	Weak?			
	4N–6N	Weak			
	6N–8N	Weak?			
	18N–20N	Moderate			
	20N–30N	Weak			
4E	ON–2N	Weak?			5,600
	22N–24N	Weak			
	24N–28N	Moderate			
	28N–32N	Weak			
2E	4N–6N	Weak?			2,200
	6N–8N	Weak			
00E	2N–4N	Weak?			4,800
	20N–22N	Weak?			
	22N–24N	Weak			
	26N–28N	Weak?			
8W	30N–35N	Weak	8,500		
16W	–	None	3,500		
24W	–	None	3,500		
48W	–	None	4,700		
80W	–	None		4,400	
			33,200	4,400	54,600

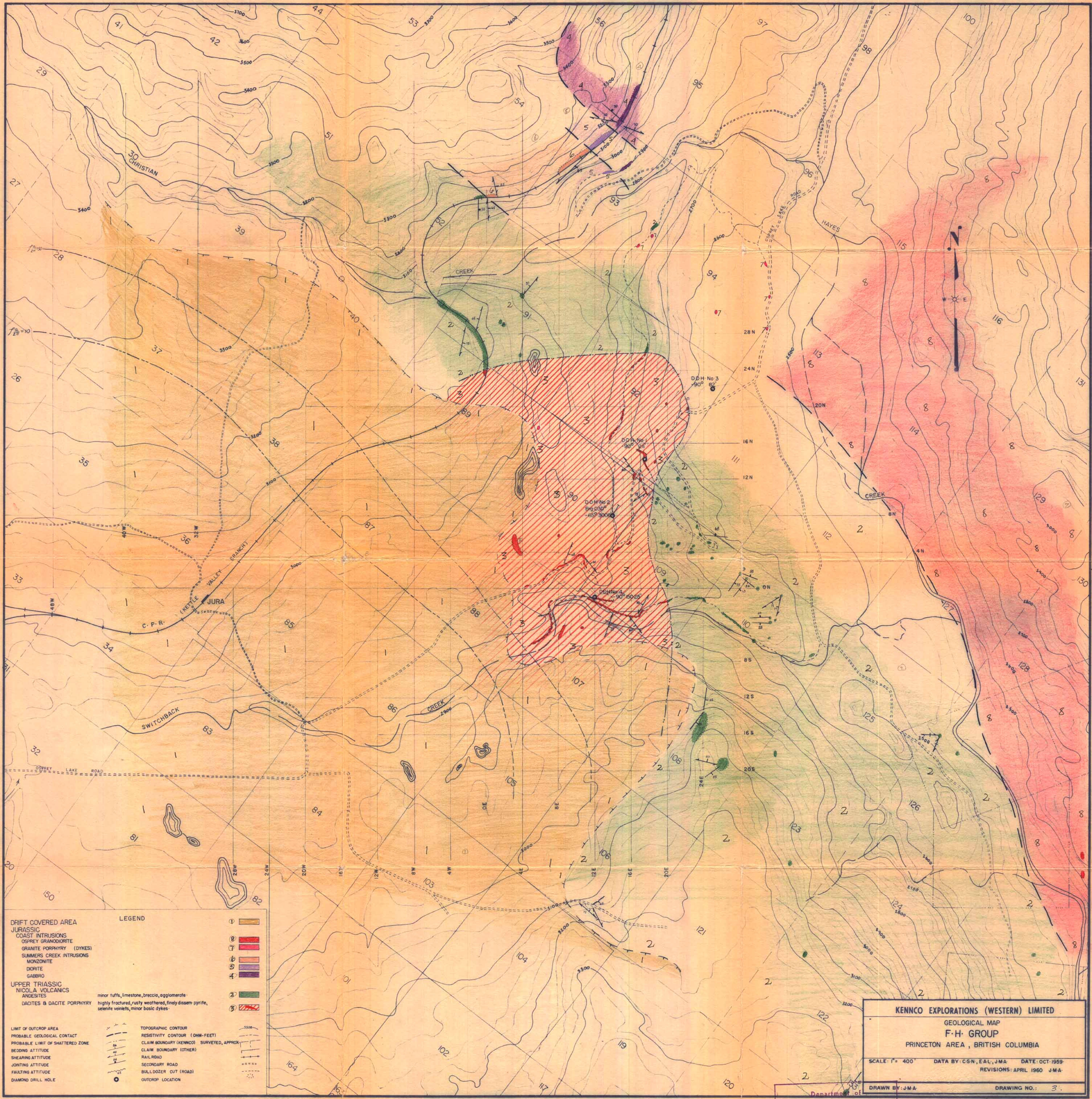
Total 92,200′ = 17.5 miles



Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 318 MAP #1
F·H· GROUP
BURR GROUP
REGAL GROUP
Christian Creek
Separation Lakes
JURA
Collett Creek
Red Creek
Allison Creek
CREEK
49°30' N
120°25' W
318
KENNCO EXPLORATIONS (WESTERN) LIMITED
MAP OF F·H·CLAIMS
PRINCETON AREA · B·C·
DATE: AUG 3/59
DRAWN BY: E.A.L.
PLATE NO. 1·
REVISED BY MAY 1960 J.M.A.
DATE
SCALE: 1" = 1/2 Mi.


Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 318 MAP #2
GROUP Nº KX-1
(17 CLAIMS)
GROUP Nº KX-2
(16 CLAIMS)
GROUP Nº KX-3
(20 CLAIMS)
F·H· GROUP
GROUP Nº KX-5
(20 CLAIMS)
BURR
GROUP
GROUP Nº KX-4
(20 CLAIMS)
GROUP Nº KX-6
(20 CLAIMS)
GROUP Nº KX-7
(20 CLAIMS)
CREEK
Christian Creek
Collett Creek
Red Creek
Separation Lakes
Allison Creek
REGAL GROUP
49°30' N.
120°25' W.
318
KENNCO EXPLORATIONS (WESTERN) LIMITED
GROUPING
MAP OF
F·H·CLAIMS
PRINCETON AREA · B·C·
DATE AUG 3/59
DRAWN BY E.R.L.
PLATE NO. 2.
REVISED BY MAY/1960 J.M.A.
DATE
SCALE: 1" = 1/2 Mi.

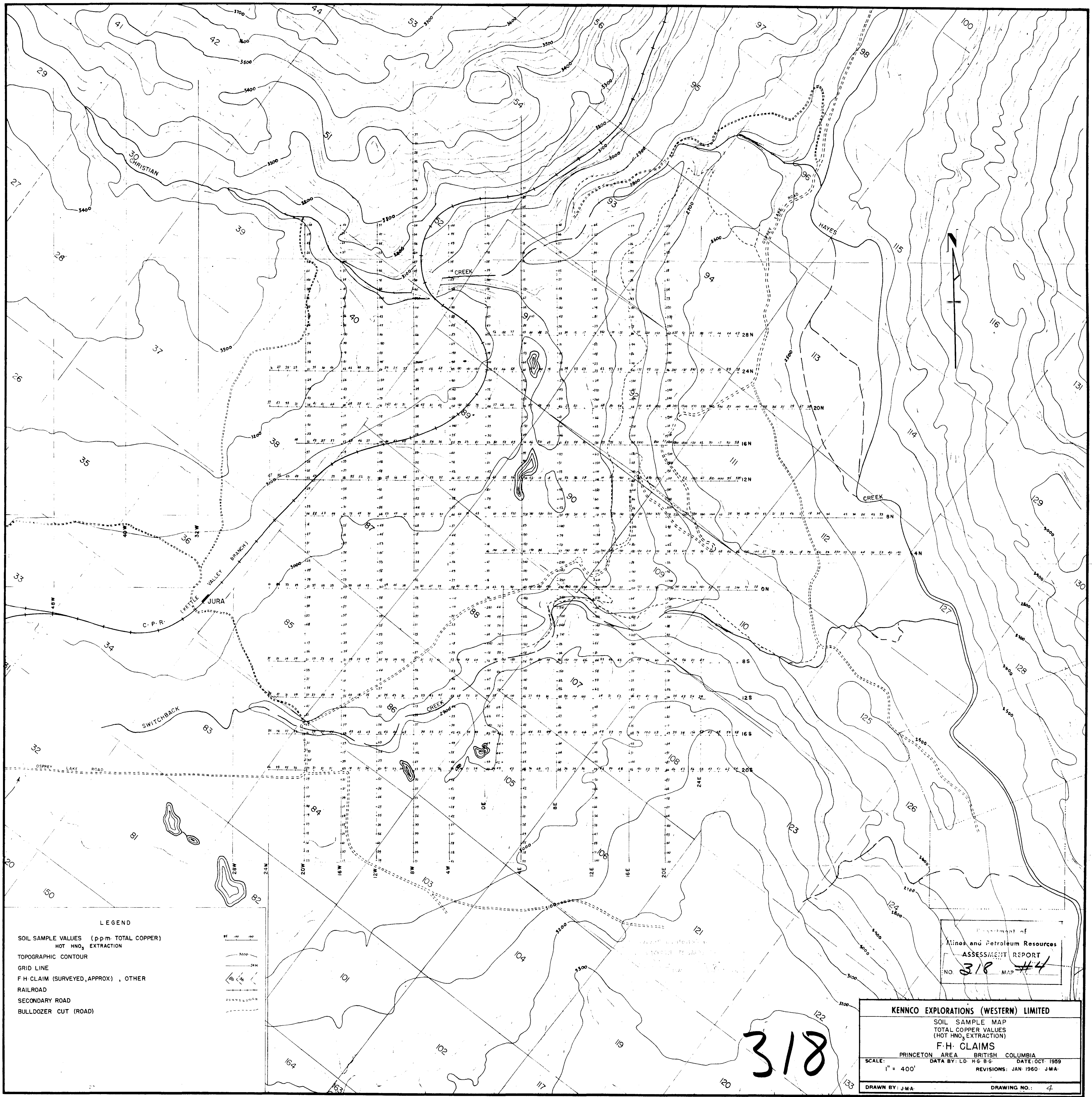
318



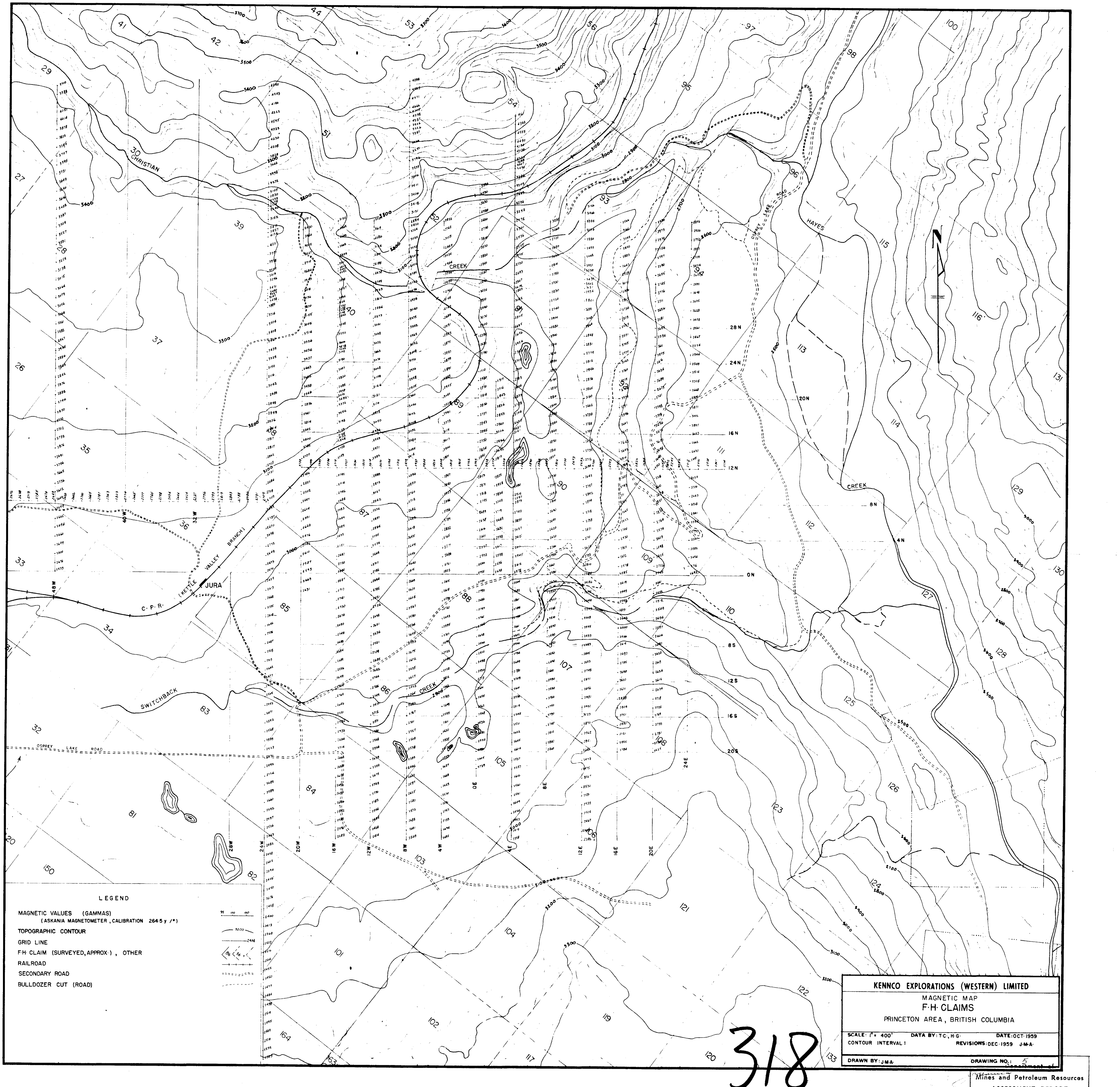
Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 318 MAP #3

318

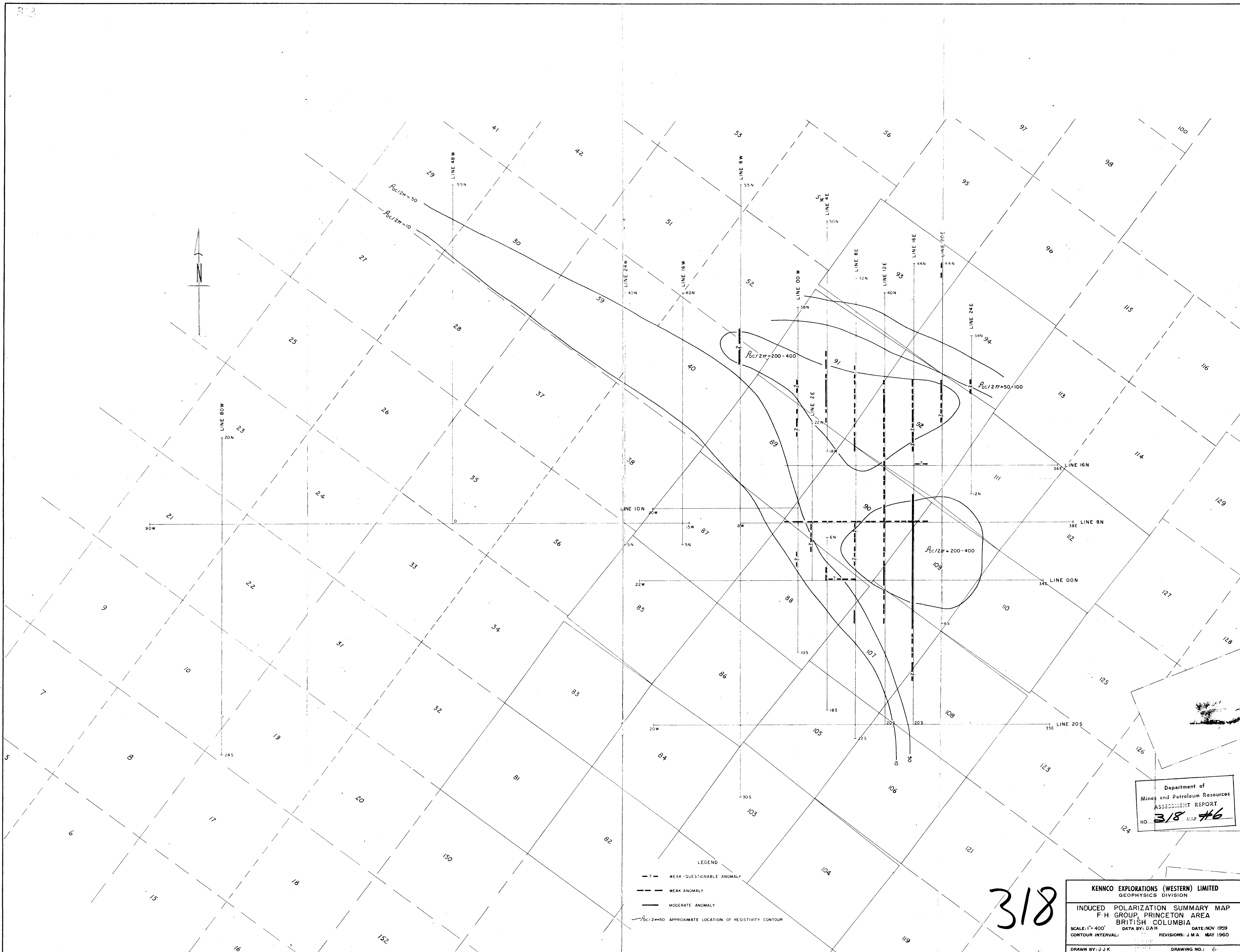
318

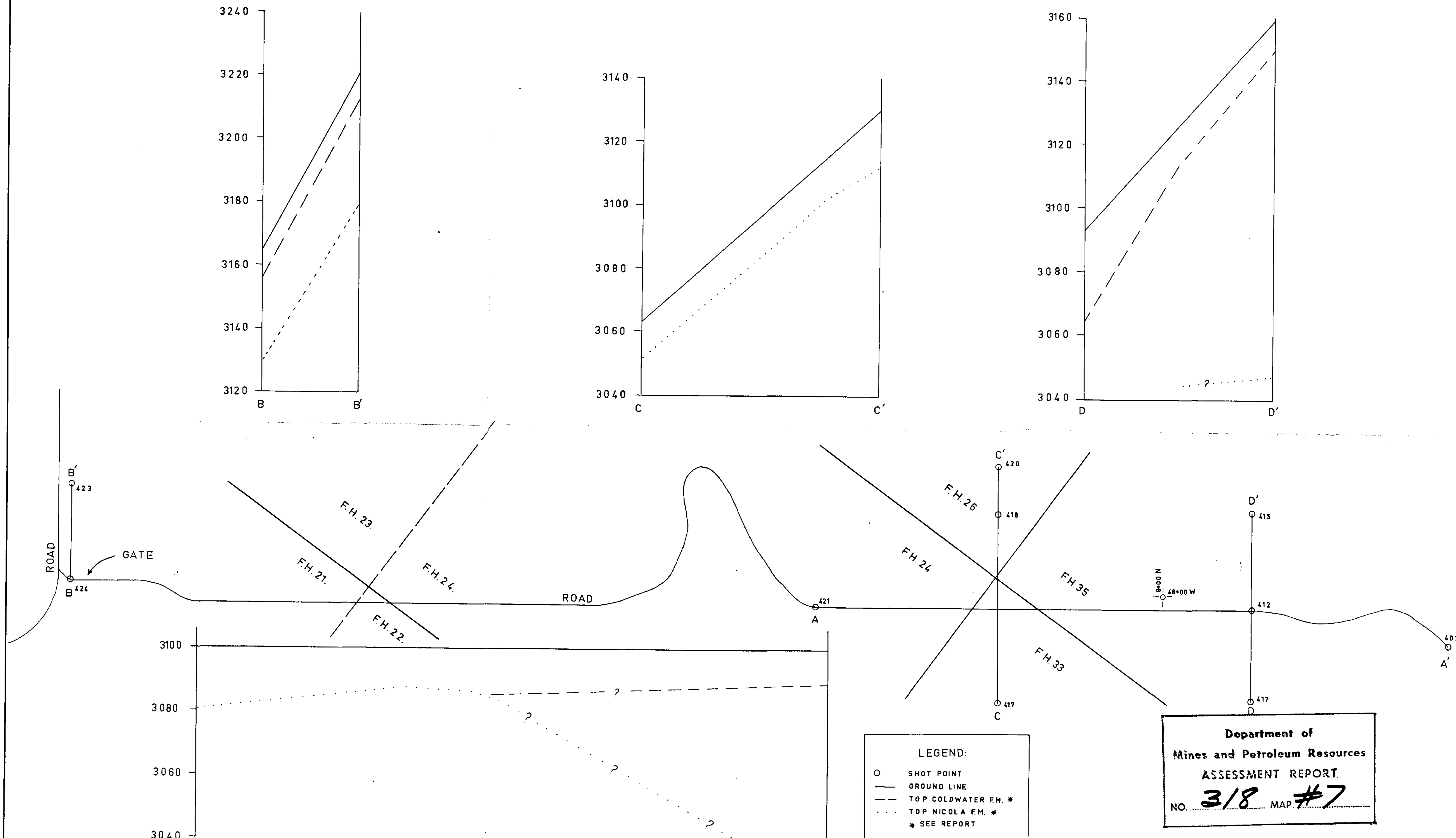

LEGEND
SOIL SAMPLE VALUES (p·p·m· TOTAL COPPER) HOT HNO3 EXTRACTION
TOPOGRAPHIC CONTOUR
GRID LINE
F·H· CLAIM (SURVEYED, APPROX·) , OTHER
RAILROAD
SECONDARY ROAD
BULLDOZER CUT (ROAD)
CHRISTIAN
CREEK
HAYES
C·P·R· (KETTLE VALLEY BRANCH)
JURA
SWITCHBACK
OSPREY LAKE ROAD
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 318 MAP #4
KENNCO EXPLORATIONS (WESTERN) LIMITED
SOIL SAMPLE MAP
TOTAL COPPER VALUES
(HOT HNO3 EXTRACTION)
F·H· CLAIMS
PRINCETON AREA BRITISH COLUMBIA
SCALE: 1" = 400'
DATA BY: L·D· H·G· B·G·
DATE: OCT· 1959
REVISIONS: JAN· 1960· J·M·A·
DRAWN BY: J·M·A·
DRAWING NO.: 4
318

Report 318



Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 318 MAP #5

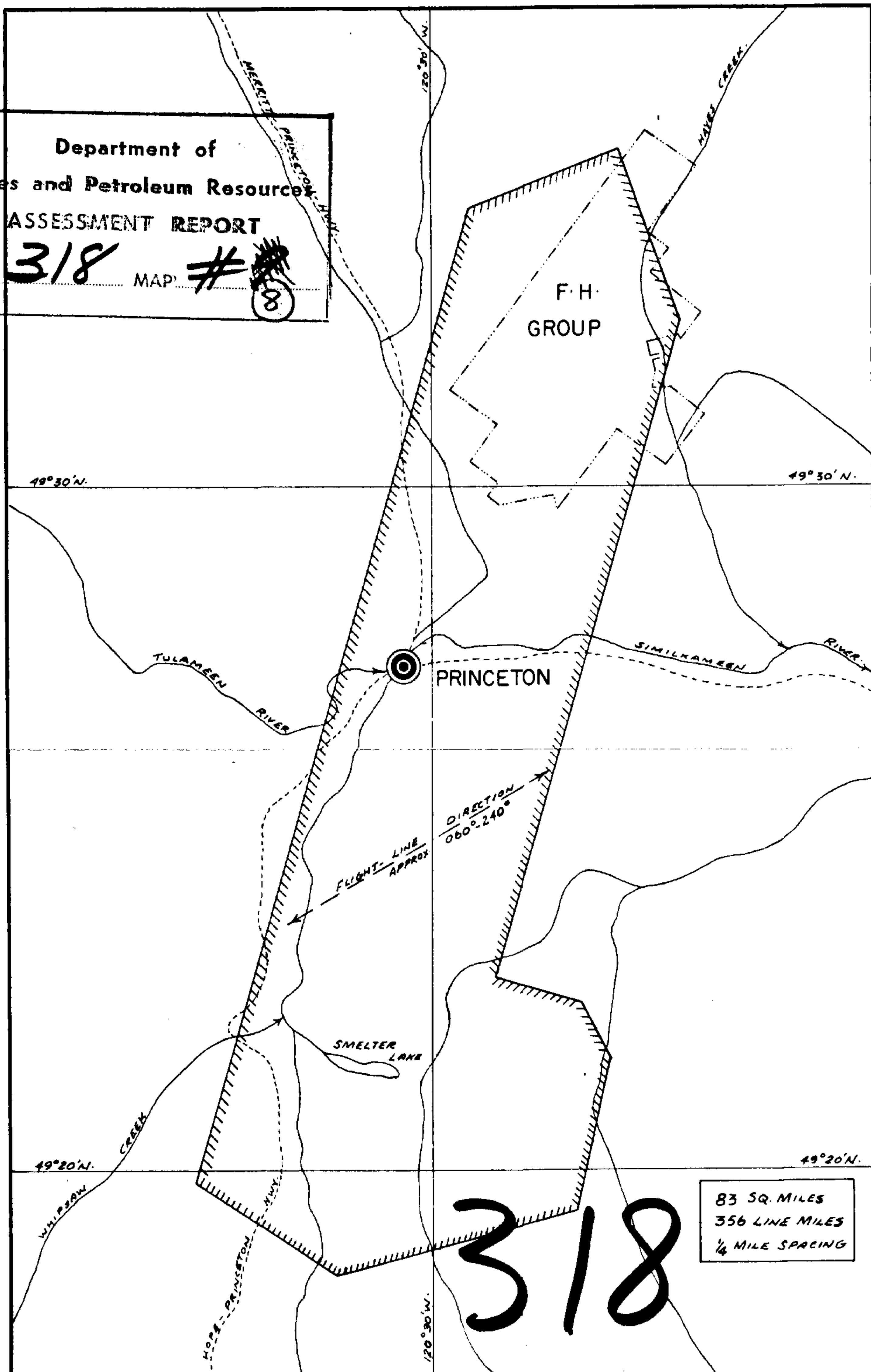

N
LINE 80W
LINE 48W
LINE 24W
LINE 16W
LINE 8W
LINE 00W
LINE 2E
LINE 4E
LINE 8E
LINE 12E
LINE 16E
LINE 20E
LINE 24E
LINE 16N
LINE 10N
LINE 8N
LINE 00N
LINE 20S
$\rho_{DC}/2\pi = 50$
$\rho_{DC}/2\pi = 10$
$\rho_{DC}/2\pi = 200-400$
$\rho_{DC}/2\pi = 50-100$
LEGEND
WEAK-QUESTIONABLE ANOMALY
WEAK ANOMALY
MODERATE ANOMALY
$\rho_{DC}/2\pi = 50$ APPROXIMATE LOCATION OF RESISTIVITY CONTOUR
318
Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 318 MAP #6
KENNCO EXPLORATIONS (WESTERN) LIMITED
GEOPHYSICS DIVISION
INDUCED POLARIZATION SUMMARY MAP
F·H· GROUP, PRINCETON AREA
BRITISH COLUMBIA
SCALE: 1" = 400'
DATA BY: D.A.H.
DATE: NOV 1959
CONTOUR INTERVAL:
REVISIONS: J.M.A. MAY 1960
DRAWN BY: J.J.K.
DRAWING NO.: 6.



Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 318 MAP #7

318

BURROWS GEOPHYSICAL COMPANY.		
PRINCETON AREA	Scale: V 1"= 20' H 1"= 200'	Drawn By: D Revised By: J. M. A.
SEISMIC SECTIONS OF CRISTIAN CREEK PROSPECT.		
Date: 9-30-59.	Approved By:	Drawing Number: 7



DRAWN BY		TRACED BY	
J.M.A.			
REVISED BY	DATE	REVISED BY	DATE

KENNCO EXPLORATIONS LIMITED

PROPERTY: AEROMAGNETIC SURVEY COVERAGE PRINCETON AREA, B·C·
MARCH 1960
SCALE 1" = 2 MILES

AREA PRINCETON, B.C.

PLATE 8


LINE 8N
WEST
1" = 500'
ρ_{DC}^{PFE}
MCF
LINE 20S
(SCHOOL LINE)
WEST
1" = 500'
EAST
LINE 00N
WEST
1" = 200'
EAST
GEOPHYSICS DIVISION
BEAR CREEK MINING COMPANY
INDUCED POLARIZATION SURVEY
F. H. GROUP, PRINCETON AREA
LINES 8N, 20S, 00N
DATA BY: D.A.H.
DATE: NOVEMBER, 1959
SCALE: 1"=500' 1"=200'
CONTOUR INTERVAL: LOG.
REVISIONS:
DRAWN BY: JJK
DRAWING NO.: NW-10,503 F-8,503
Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 318 MAP #9
318

GEOPHYSICS DIVISION
BEAR CREEK MINING COMPANY

INDUCED POLARIZATION SURVEY
F.H. GROUP, PRINCETON AREA
LINES 16N, 10N, 8N

SCALE: 1" = 200'
CONTOUR INTERVAL: LOG.
DATA BY: D.A.H., R.E.M.
DATE: NOVEMBER, 1959
REVISIONS:
DRAWN BY: J.K.
DRAWING NO.: NW-10,507 F-8,507

318

LINE 4E OFFSET
(LINE 2E)
NORTH
ρDC PFE
MCF
LINE 00E
NORTH
SOUTH
ρDC PFE
MCF
GEOPHYSICS DIVISION
BEAR CREEK MINING COMPANY
INDUCED POLARIZATION SURVEY
F.H. GROUP, PRINCETON AREA
LINES 4E OFFSET, 00E
SCALE: 1" = 200'
DATA BY: D.A.M.
DATE: NOVEMBER, 1959
CONTOUR INTERVAL: LOG.
REVISIONS:
DRAWN BY: J.J.K.
DRAWING NO.: NW-10,506
F-8,506
Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 318 MAP #11
318

GEOPHYSICS DIVISION
BEAR CREEK MINING COMPANY

INDUCED POLARIZATION SURVEY
F.H. GROUP, PRINCETON AREA
LINES 8E, 4E

SCALE: 1" = 200'
CONTOUR INTERVAL: LOG.
DATA BY: D.A.H.
DATE: NOVEMBER, 1959
REVISIONS:
DRAWN BY: JJK
DRAWING NO.: NW-10,502 F-8,502

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO 318 MAP #2

GEOPHYSICS DIVISION
BEAR CREEK MINING COMPANY

INDUCED POLARIZATION SURVEY
F.H. GROUP, PRINCETON AREA
LINES 16E, 12E

SCALE: 1" = 200' DATA BY: D.A.H. DATE: NOVEMBER, 1959
CONTOUR INTERVAL: LOG. REVISIONS:
DRAWN BY: J.J.K. DRAWING NO.: NW-10,505 F-8,505

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 318 MAP #13

318

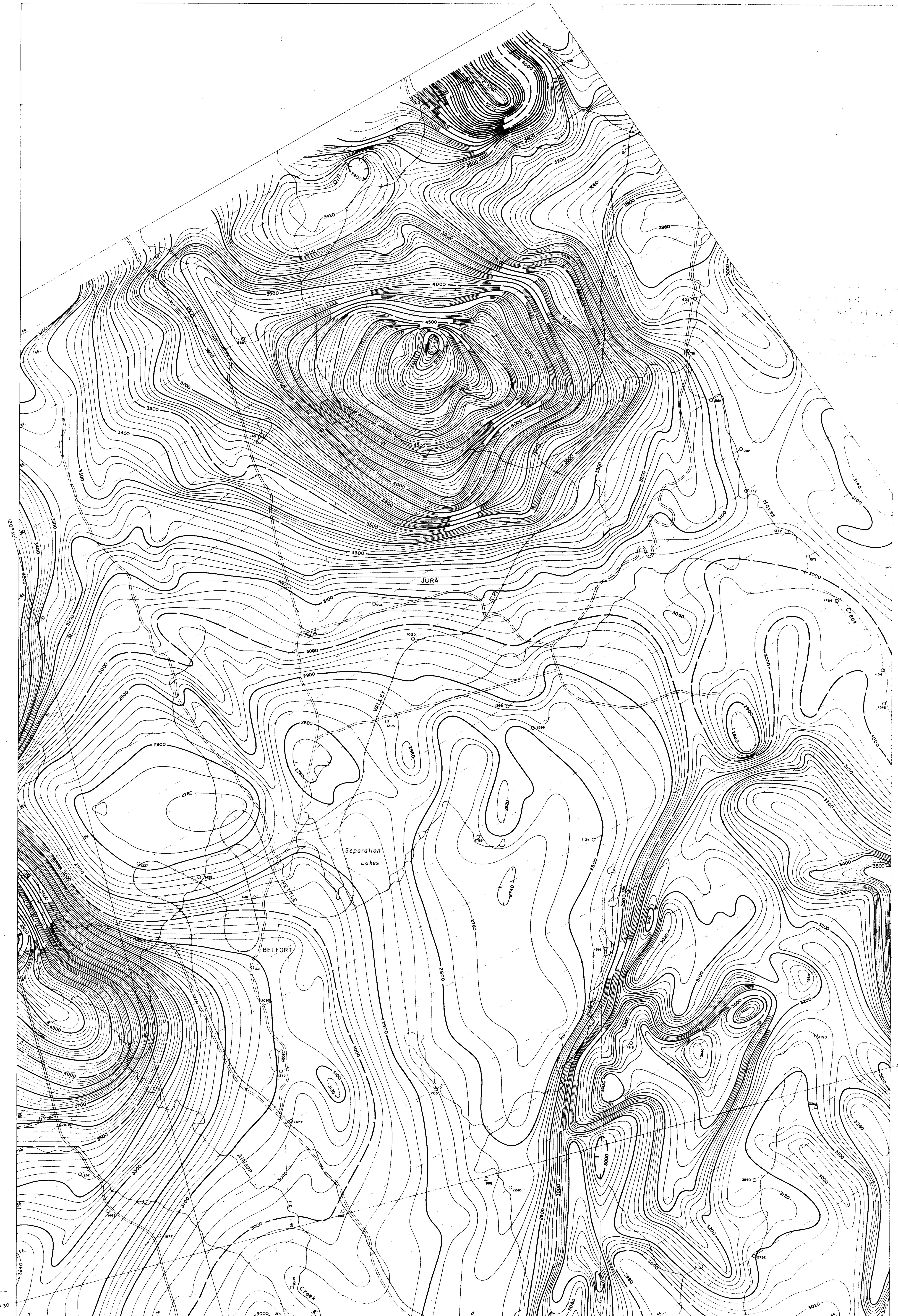
GEOPHYSICS DIVISION
BEAR CREEK MINING COMPANY

INDUCED POLARIZATION SURVEY
F. H. GROUP, PRINCETON AREA
LINES 24E, 20E

SCALE: 1"=200'
DATA BY: D.A.H., R.E.M.
DATE: NOVEMBER, 1959
CONTOUR INTERVAL: LOG.
REVISIONS:
DRAWN BY: JJK
DRAWING NO.: NW-10,504 F-8,504

318


LINE 8W
LINE 16W
LINE 24W
LINE 48W
LINE 80W
NORTH
SOUTH
MCF
ρ_{DC}^{PFE}
GEOPHYSICS DIVISION
BEAR CREEK MINING COMPANY
INDUCED POLARIZATION SURVEY
F.H. GROUP, PRINCETON AREA
LINES 8W, 16W, 24W, 48W, 80W
SCALE: 1"=200', 1"=400', DATA BY: D.A.H. DATE: NOVEMBER, 1959
CONTOUR INTERVAL: LOG. REVISIONS:
DRAWN BY: JJK DRAWING NO.: NW-10.501 F-8.501
Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO 318 MAP #15
318



KENNCO EXPLORATIONS (WESTERN) LIMITED

AIRBORNE GEOPHYSICAL SURVEY

PRINCETON, BRITISH COLUMBIA

Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 318 MAP #16

NORTH HALF

SCALE

1000 500 0 1000 2000 3000 FEET

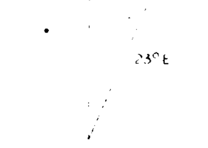
1 Inch to 1000 Feet

MAGNETOMETRIC MAP

LEGEND

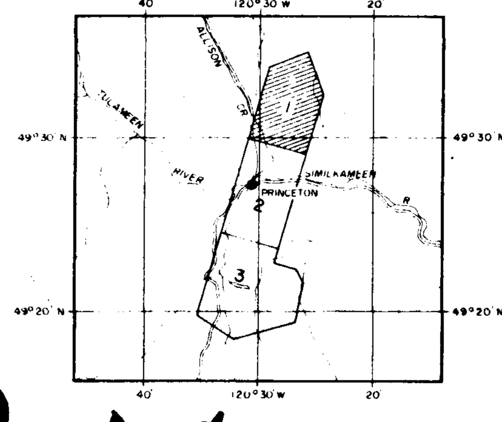
CONTOUR INTERVAL	20 GAMMA
MEAN FLIGHT LINE SPACING	1320 FEET
MEAN TERRAIN CLEARANCE	500 FEET
500 GAMMA CONTOUR	
100 GAMMA CONTOUR	
20 GAMMA CONTOUR	
MAGNETIC LOW	
FIDUCIAL POINTS	3690 O
FLIGHT LINES	44 TO 69

Airborne Geophysics flown and compiled in March - April 1960 by Hunting Survey Corporation Limited, West Coast Division Vancouver, Canada



APPROX MAGNETIC DECLINATION 1960

INDEX



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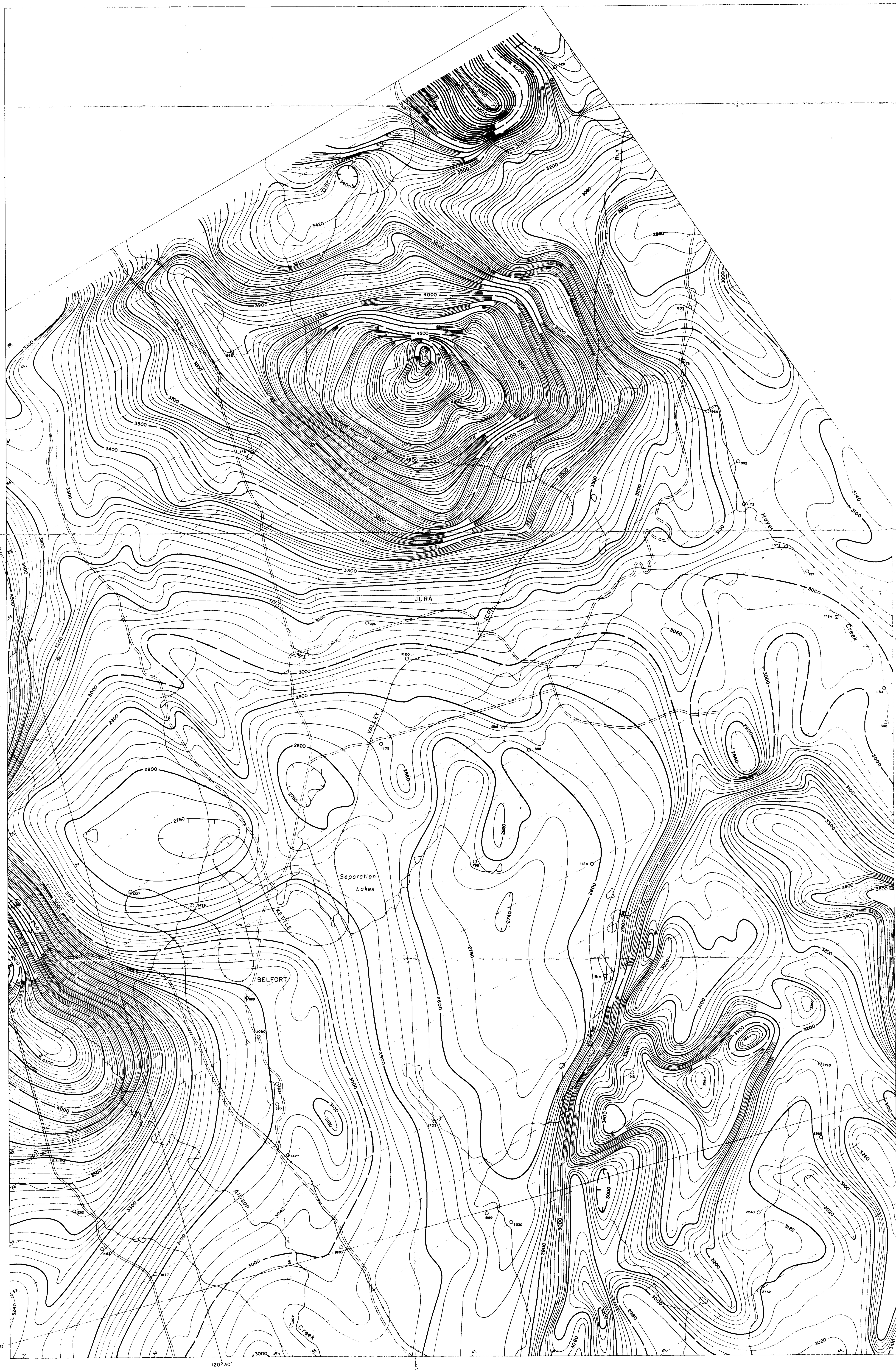


KENNCO EXPLORATIONS (WESTERN) LIMITED

AIRBORNE GEOPHYSICAL SURVEY

PRINCETON, BRITISH COLUMBIA

SCALE

1 Inch to 1000 Feet

MAGNETOMETRIC MAP

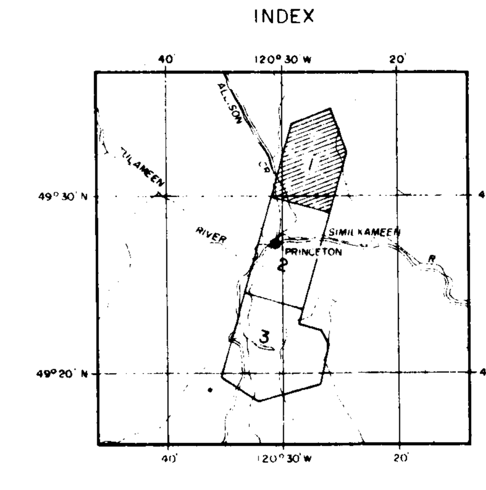
LEGEND

CONTOUR INTERVAL	20 GAMMA
MEAN FLIGHT LINE SPACING	1320 FEET
MEAN TERRAIN CLEARANCE	500 FEET
500 GAMMA CONTOUR	
100 GAMMA CONTOUR	
20 GAMMA CONTOUR	
MAGNETIC LOW	
FIDUCIAL POINTS	3690
FLIGHT LINES	44 TO 69

Airborne Geophysics flown and compiled in March - April 1960 by Hunting Survey Corporation Limited, West Coast Division Vancouver, Canada

APPROX. MAGNETIC DECLINATION 1960

INDEX



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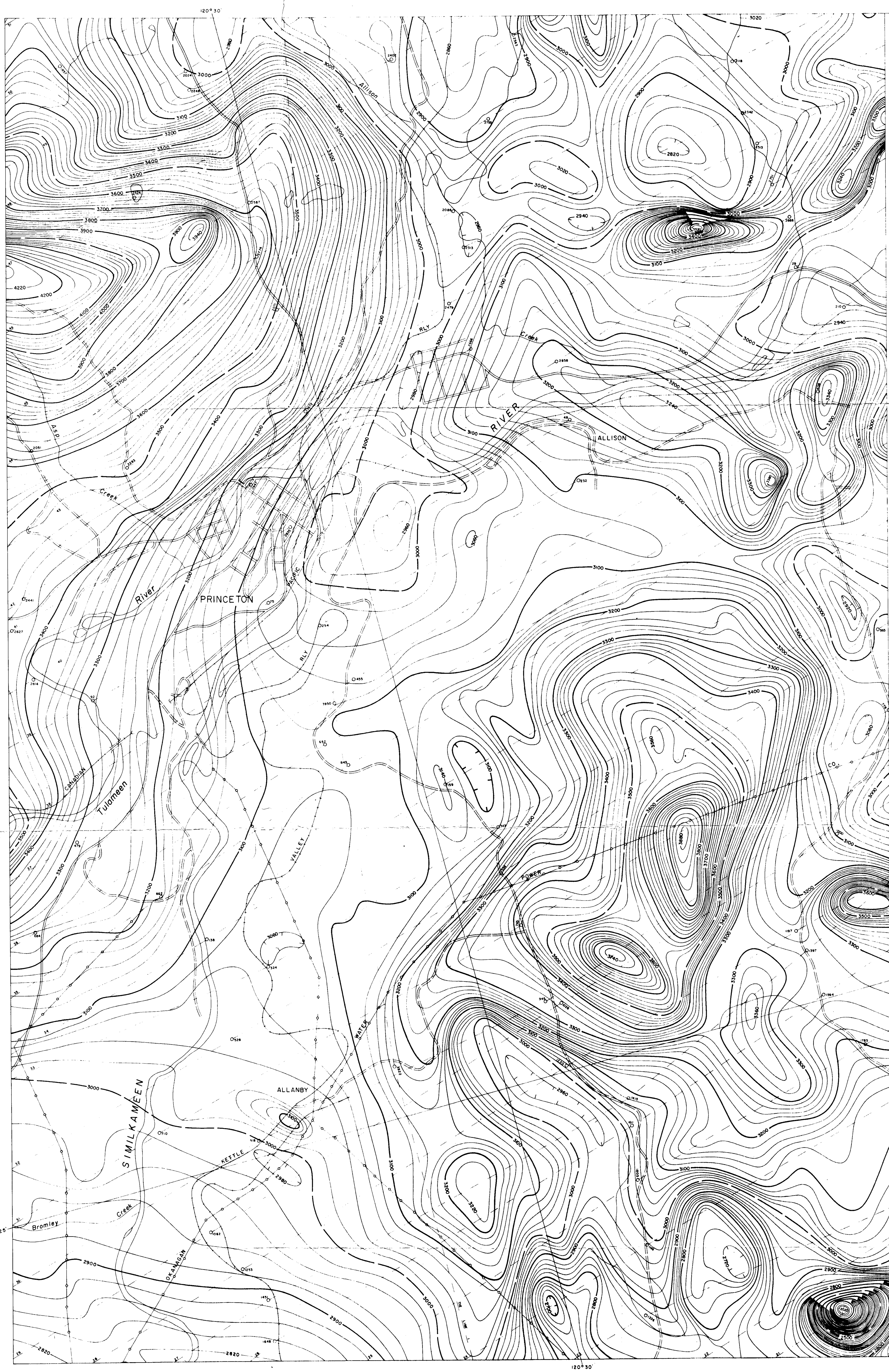


KENNCO EXPLORATIONS (WESTERN) LIMITED

AIRBORNE GEOPHYSICAL SURVEY

PRINCETON, BRITISH COLUMBIA

SOUTH HALF

SCALE

1000 FEET 500 0 1000 2000 3000 FEET

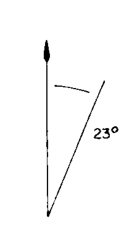
1 Inch to 1000 Feet

MAGNETOMETRIC MAP

LEGEND

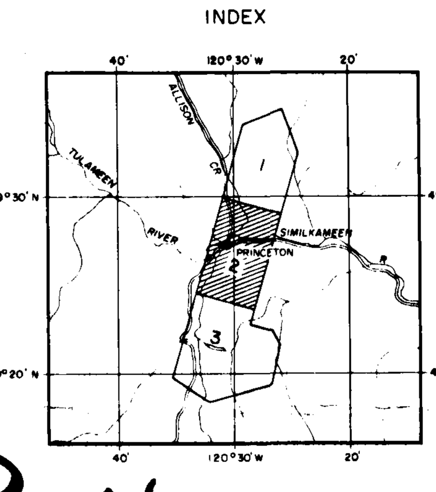
CONTOUR INTERVAL	20 GAMMA
MEAN FLIGHT LINE SPACING	1320 FEET
MEAN TERRAIN CLEARANCE	500 FEET
500 GAMMA CONTOUR	
100 GAMMA CONTOUR	
20 GAMMA CONTOUR	
MAGNETIC LOW	
FIDUCIAL POINTS	3690 O
FLIGHT LINES	20 TO 51

Airborne Geophysics flown and compiled in March-April 1960 by Hunting Survey Corporation Limited, West Coast Division Vancouver, Canada



APPROX MAGNETIC DECLINATION
1960

INDEX



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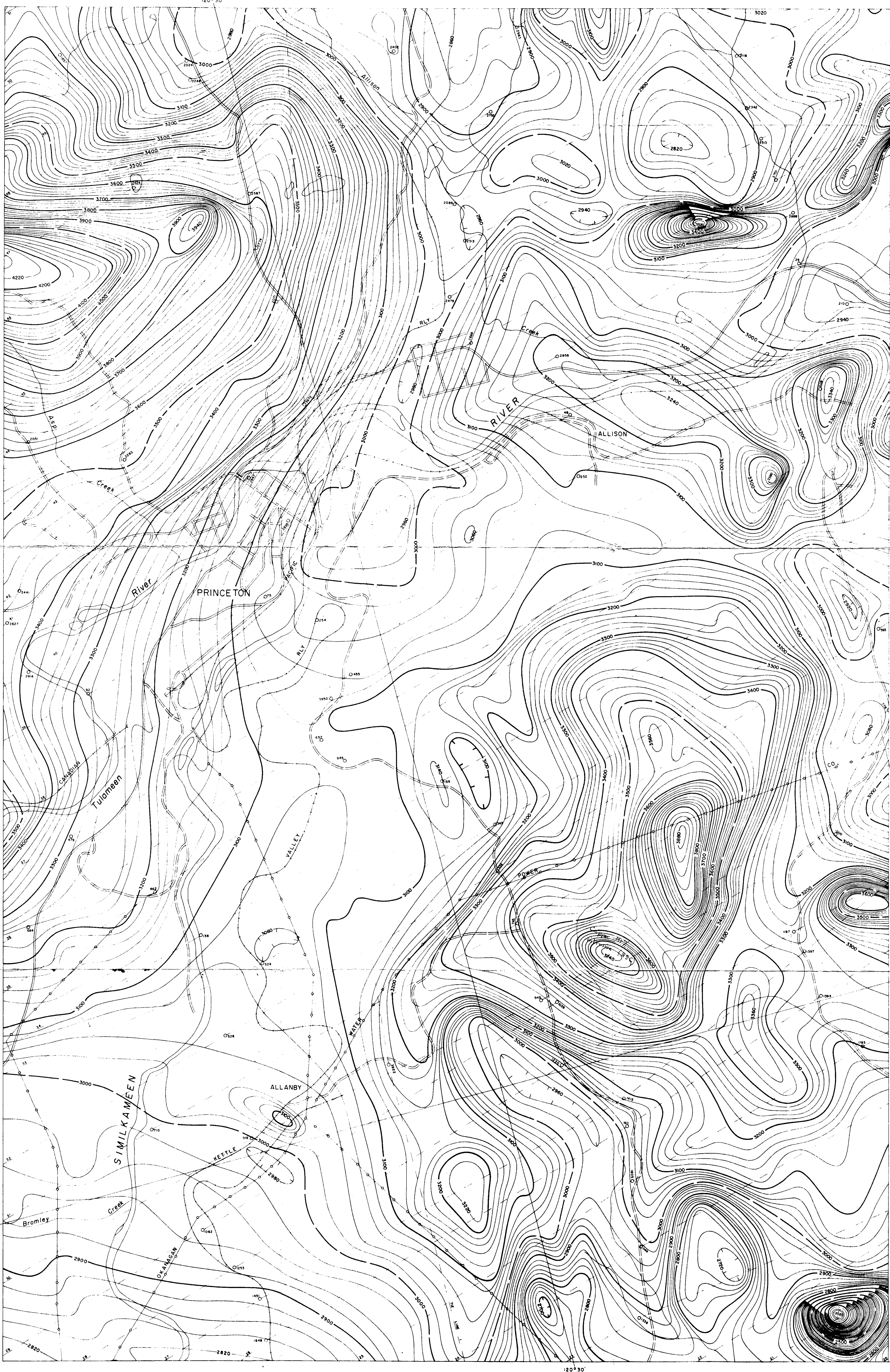


Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 318 MAP #19

KENNCO EXPLORATIONS (WESTERN) LIMITED

AIRBORNE GEOPHYSICAL SURVEY

PRINCETON, BRITISH COLUMBIA

SOUTH HALF

SCALE

1000 FEET 500 0 1000 2000 3000 FEET

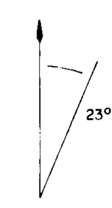
1 Inch to 1000 Feet

MAGNETOMETRIC MAP

LEGEND

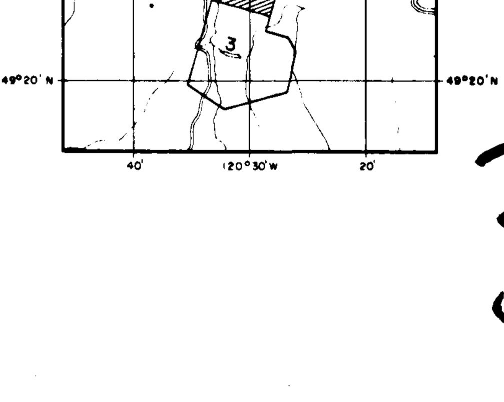
CONTOUR INTERVAL	20 GAMMA
MEAN FLIGHT LINE SPACING	1320 FEET
MEAN TERRAIN CLEARANCE	500 FEET
500 GAMMA CONTOUR	
100 GAMMA CONTOUR	
20 GAMMA CONTOUR	
MAGNETIC LOW	
FIDUCIAL POINTS	3690 O
FLIGHT LINES	20 TO 51

Airborne Geophysics flown and compiled in March - April 1960 by Hunting Survey Corporation Limited, West Coast Division Vancouver, Canada.



APPROX MAGNETIC DECLINATION 1960

INDEX



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