5795

CANEX PLACER LIMITED
EXPLORATION DIVISION

V-14

GEOPHYSICAL REPORT

VLF EM, Magnetometer and I.P. Surveys on the Hag 1 to Hag 4 Claims

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 5795 MAP *

Greenwood Mining Division
49° 06' N, 119° 08'W
N.T.S. - 82E 3

A.S. Saydam
J.M. Thornton
October, 1975
revised December, 1975

700 BURRARD BUILDING • 1030 WEST GEORGIA STREET • VANCOUVER, B.C., CANADA V6E 3A8 • (604) 682-7082

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RICE CREEK PROPERTY

Summary of Expenses for May-June Period

Personnel	Wages & Benefits				
S. Saydqm	May 26th -	June 20	26 days @ $ 70.00	=	$ 1,820
J. Thorton	"	"	26 days @ $100.00	=	2,600
W. McIntosh	"	June 2	8 days @ $ 80.00	=	640
B. Hodgson	"	June 16	22 days @ $ 75.00	=	1,650
P. Druet	"	"	22 days @ $ 55.00	=	1,210
P. Spletzer	June 2	"	15 days @ $ 55.00	=	825
J. Kowalchuk	"	"	15 days @ $100.00	=	1,500
					$10,245

Geophysical Equipment Rental

Magnetometer	@ $250/mo.	1/2 month	=	$ 125
I.P. Equipment	@ $ 75/day	6 days	=	450
Crone E.M.unit	@ $200/mo.	1/2 month	=	100
VLF E.M.	@ $250/mo	1/2 month	=	125
				$ 800

Transportation

1 3/4 ton FWD P.U. Truck	@ $13/day	22 days	=	$ 286
1 1/2 ton P.U. Truck	@ $12/day	26 days	=	312
				$ 598

Camp Operation

Accomodation	134 men days @ $10./day	$ 1,340
Meals	134 men days @ $10./day	1,340
		$ 2,680

Assaying Cost

Soil Samples (Au, Ag, Cu & Pb)	@ $5.95	875 samples	$ 5,206
" " Au	@ $3.00	60 samples	180
			$ 5,386

TOTAL COST MAY-JUNE $19,709

Cost Break-Down

Geochem	$12,376
Geophysic	7,233
	$19,709

RICE CREEK PROPERTY

Summary of Expenses for September-December Period

Personnel	Wages		
S. Sadom	September14-20th, Nov. 25-Dec. 1	14 days @ $ 70.00 =	$ 980.00
J. Thorton	" 14-20th, Nov. 25-Dec. 1	14 days @ $100.00 =	1,400.00
R. Cannon	Nov. 25th - Dec. 1st	7 days @ $125.00 =	875.00
S. Tennant	Nov. 25h- Dec. 1st	7 days @ $150.00 =	1,050.00
			$ 4,305.00

Geophysical Equipment Rental

MP-2 Proton Magnetometer	@ $250/mo.	1/2 month	= $ 125.00
Crone Rad - EM	@ $200/mo.	1/2 month	= 100.00
VLF	@ $250/mo.	1/2 month	= 125.00
			$ 350.00

Transportation

1 3/4 ton FWD PU Truck	@ $13/day	7 days	= $ 91.00
2 3/4 ton FWD PU Truck	@ $13/day	7 days	= 182.00
			$ 273.00

Camp Operations

Accomodation	42 man days @ $10/man day	= $ 420.00
Meals	42 man days @ $10/man day	= 420.00
		$ 840.00

Report Preparation

S. Sadom	24 days @ $ 75/day	= $ 1,800.00
J. Thorton	8 days @ $100/day	= 800.00
Draughtsmen	15 days @ $ 75/day	= 1,125.00
Map Reproduction		= 325.00
		$ 4,050.00

TOTAL COSTS SEPT.-DEC. = $ 9,818.00

TOTAL COST for 1975 = $29,527.00

I certify that the above figures are a true account of the actual expenditure incurred on the Rice Creek Property for exploration carried out in 1975 which can be applied for assessment work.

J. Thorton

SUMMARY

A combined geochem-geophysics program was conducted on the Hag 1 to 4 claims in June, 1975. Reconnaissance Mag and VLF-EM surveys were run on 66 km of line. I.P. was done on three lines Geochem soil samples were taken on approximately 45 km of line.

Soil geochem results were generally disappointing but did reveal 3 zones, 2 of which are relatable to VLF conductors.

Magnetics indicated a very complex nature to both the Anarchist and intrusive rocks.

VLF data showed the most conductive zones to lie in the North Western portion of the property.

I.P. indicated one zone on line 10W which should have further work to delimit the area.

In September, a small follow-up survey of Mag, EM and soil sampling was done to check and extend coverage to line 20W. Results from the last work helped plan a program for the 1976 field season.

INTRODUCTION

In early March, 1975, four-20 unit claims (designated Hag 1 to 4) were staked by Canex Placer Limited. During the period, May 26 to June 20, some 70 Km of line, including 3½ Km of baseline were cut on 200 metre centers with 50 metre station spacing. Soil geochem and VLF-EM (Radem) surveys were conducted using a 50 m. station spacing. Magnetometer data was collected at 25 m. intervals on line using a total field magnetometer. In addition 10 Km of I.P. was done on three lines using 100 m. dipoles. Geological examination was done in areas of outcrop and several rock samples were collected.

In September, 1975, a small followup programme of VLF-EM, and soilgeochem on approximately 6 Km of line was done. Camp McKinney was traversed twice with Mag and VLF. Results were compared to earlier work.

LOCATION AND ACCESS

The four claims totalling 80 units lie immediately southeast of the Camp McKinney claim area. The legal corner post is situated at approximately 49° o5' 40"N and 119° 09' 30"W, just south of a small lake and on the banks of Rice Creek. This post lies 700 metres southwest of the junction of Jolly Creek Road and the Mount Baldy - Canyon Bridge Road.

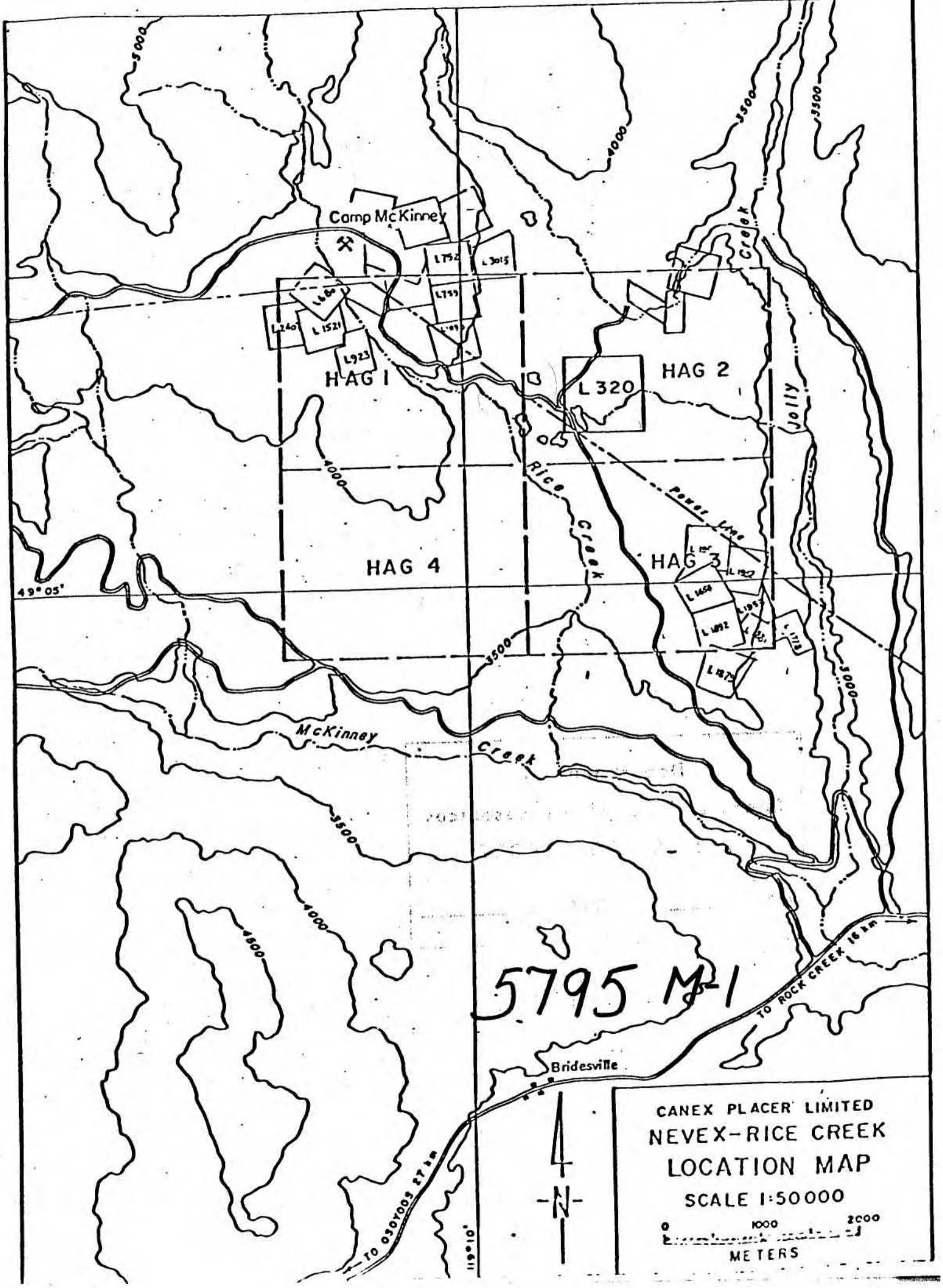
Access to the central part of the claim area is via the above mentioned road, approximately 11 Km from Canyon Bridge. The southern part of the claim area is accessible from the "Eldon" Road which parallels McKinney Creek, south of the property.

PROPERTY

The property consists of four-20 unit claims which cover an area 5 Km E-W, by 4 Km N-S centred on the Legal Corner Post. The claim area overstakes some of the Camp McKinney claims to the northwest and also includes many of the Crown Granted Mineral Claims to the southeast. It also covers ground previously held under the names of Rice 1-6, Baldy 1-12 and David 1-6. These last were abandoned by Nevex and restaked by Canex (as agent) under an option agreement.

In addition on June 6, two claims (designated Hag 5 and 6) were staked within the boundaries of the Hag 1 and 2 claims in order to pick up the Faith claims which had been allowed to lapse. On September 18, 4 claims were staked to acquire the Faith 3 to 6 claims which had lapsed the day before.

Claim Name			Located	Recorded	Tag #
Hag 1	20 units	5W, 4N	March 2-6, 1975	March 19, 1975	07088
2	20 units	5E, 4N	March 2-6, 1975	March 19, 1975	07089
3	20 units	5E, 4S	March 2-6, 1975	March 19, 1975	07090
4	20 units	5W, 4S	March 2-6, 1975	March 19, 1975	07091
5	4 units	2N, 2E	June 10, 1975	June 24, 1975	09130
6	4 units	2N, 2E	June 10, 1975	June 24, 1975	09131
7	4 units	2N, 2E	September 18, 1975	Sept. 22, 1975	09308


Camp McKinney
L752
L3015
L759
L1521
L240
L923
HAG 1
L320
HAG 2
HAG 4
HAG 3
Rice Creek
Jolly Creek
Power Line
McKinney Creek
5000
4000
3500
3000
4500
49° 05'
5795 M-1
Bridesville
TO ROCK CREEK 16 km
TO OSOYOOS 27 km
N
CANEX PLACER LIMITED
NEVEX-RICE CREEK
LOCATION MAP
SCALE 1:50000
0
1000
2000
METERS

GEOLOGIC SETTING & ROCK UNITS

It is difficult to derive a geological picture of the Rice Creek (Hag Claims) area solely from routine geological mapping and outcrop investigations due to the presence of a great deal of glacial debris covering the area. Geophysical surveys can be used satisfactorily as indirect tools to obtain information about the geology under the surface cover. Therefore, in this work, interpretation of the geology of the Rice Creek area was attempted by incorporationg the geophysical data from magnetometer, VLF-EM, IP and Shootback EM surveys with the earlier and present geological information, to come up with a more detailed and clearer geological picture of the area. Full use of the outcrop information which was gathered during the 1975 field season, was made to help the interpretation of the geological boundaries. Comments on economical significance of various geophysical anomalies are made in the interpretation section on the basis of estimated cause of the anomalies and their relationships to various rock types and geological structure. However, interpretations from the geophysical data is mainly qualitative; because it is difficult to make quantitative statements about the targets due to presence of many unknowns, like the overburden thickness and scanty information about the geology underneath.

The property itself is fairly uniform topographically ranging from 3,500 feet in the S.W. to 4,200 feet in the N.W. corner, typically 3,700 feet in the eastern half. Cover is generally light with larch, jackpine and some larger pines. Second growth is quite thick in lower parts, particularly in areas logged about 20 years ago.

Comprehensive information on regional geology, past history and local geology of the Camp McKinney area is available from earlier reports by Cockfield (1935), Cairnes (1937), and Hedley (1940). Various intrusions, rock units and their age relationships, mineralogy and economic geology of the area were described in considerable detail by these authors.

Approximate boundaries of the Hag Claims are superimposed onto a geological map given by Cockfield (1935), and attached to this report. Approximate boundaries of the major rock units within the survey area can be seen on this map.

It becomes evident from the earlier reports that the major portion of the map area is underlain by members of the Anarchist metamorphic series which were originated mostly from sedimentary rocks of late Paleozoic and older age. Members within the Anarchist series vary greatly in character and composition due to variations in the intensity of metamorphism and the original rock types. The rocks within the Anarchist series range from highly contorted gneisses, quartzites and marbles which display evidence of very intense deformation and metamorphism, to schists and even slates at a few localities.

Bordering the Anarchist series to the southwest is an intrusive which falls into the general class of quartz diorite to granodiorite and is referred to as Oliver granite (Cockfield 1935). Cockfield determined, ..."some quartz, abundant plagioclase (andesine) and some microcline or orthoclase, the latter minerals being much less abundant than the plagioclase." During our field work, no definite outcrop of this intrusion was observed within the survey area, and the only surface evidence of this intrusion was from boulders and large blocks which were believed to be erratics. Again, as Cockfield observed, the age relationship between the Oliver intrusive and the Anarchist series is such that,".. .dykes nearly identical in composition with the main mass and believed to be apophyses from it were observed cutting the rocks of the Anarchist series a short distance from the contact." Cairnes (1937), claimed that the age of this intrusion is post-Triassic, having been formed during the time span of Jurassic and Cretaceous.

The youngest rocks in the area are of volcanic origin and located at the southeastern corner of the survey area. They are believed to be Tertiary or younger in age and are described by Cairnes (1937) as being "variously coloured, massive to highly vesicular and amygdaloidal, and in part, porphyritic lavas, mainly dark green to black basalts and andesites, agglomenates, breccias, and tuffs - in part waterlain."

We have noted several volcanic and associated rock outcrops during our field work, and they seem to be closer to the surface than the other rock types in the southern part of the map area. The volcanic rocks which we observed in the field were mostly porphyritic andesites and basalts. Porphyritic andesites contain abundant plagioclase phenocyrists in a gray felsic groundmass consisting largely of feldspar and biotite, and lesser amounts of quartz and hornblende. Basalts are darker green to black in colour, and the porphyritic types contain large phenocyrists of hornblende in a microcrystalline to glassy groundmass. At some of the volcanic outcrops, intercalation of the volcanic material with the freshly laid sediments at the time of volcanism was observed which indicates that these volcanics were, at least in part, waterlain.

Rock hand-specimens from some of the outcrops in the survey area were studied under a binocular microscope, and mineralogy and textural properties are described in Appendix I. The names assigned to the samples should be taken with precaution because no detailed study of the samples was made using thin sections or chemical analysis.

PREVIOUS WORK

Reconnaissance geochem stream sediments taken both by Nevex and Canex personnel indicated the area as anomalous in gold and copper. A more detailed examination with ground magnetometer and soil geochem was done by Nevex over the two claim groups, Rice and Baldy, in early 1974.

An I.P. Survey was done in 1970 by Seigel Associates on the Crown Granted Claims in the S.E. sector of the property. (See Location Map). This work was applied for assessment purposes in 1970.

CURRENT WORK - GEOPHYSICS

LINE CUTTING

A total of 66 Km of line was cut and 3½ Km of baseline. Baseline was cut to the east; as the claim location line to the east did not intersect properly at the legal post. Lines were cut on 200 m. centres with stations flagged at 50 m. intervals.

VLF-EM

All lines were surveyed with the Crone "Radem" unit noting dip angles, residual field strength and, in anomalous areas, field strength. Fifty metre stations were read, occasionally at mid points as well. Seattle (NPG) was used as the infinite source except for line 20E, when Cutler (NAA) was used, due to Seattle regular maintenance shut-down.

MAGNETOMETER

All lines were surveyed with a Scintrex MP-2 total field magnetometer. Initially, 50 m. stations were read, but early results indicated the need for 25 m. stations. The total field was read to an accuracy of ± 2 gammas except in the vicinity of power and gas lines; where readings to ± 5 gammas were noted. Occasionally, readings were unattainable due to high noise levels, immediately under the power line.

I.P.

Thrre lines (10W, 0, and 10E) were surveyed with McPhar Model P-660 equipment using 100 m. dipoles and 3 separations. Frequencies of 0.3 and 5.0Hz were used. Equipment failure caused the loss of ½ day. In all, 10 Km. of line was surveyed.

In the field procedure, measurements on the surface were made in a way that allows the effects of lateral changes in the properties in the properties of the ground to be separated from the effects of vertical changes in the properties of the ground. Current was applied to the ground at two points (X) feet apart. The potentials were measured at two other points also (X) feet apart, in line with the current electrodes. The distance between the nearest current and potential electrodes was an integer number (N) times the basic distance (X).

The measurements were made along surveyed lines, with a constant distance (NX) between the nearest current and potential electrodes. Measurements were taken with values of N=1, 2 and 3 for X= 100 m.

Apparent resistivity is the bulk resistivity of the ground between the extreme electrodes. Many factors influence this parameter; zoning, two and three layer geometry, swamps and physical electrode placement.

Percent frequency effect is the difference in resistivity measured by the receiver at two transmitted frequencies, generally a decade apart. P.F.E. is independent of the physics of the survey, dependent mostly the polarization of the subsurface rocks. Sulfides (except those of zinc and molydenum) and graphite, as well as clays respond predictably to induced polarization.

Metal factor is a built up parameter which is supposed to remove the effects of resistivity from the P.F.E. data. It also enhances responses made by good targets.

In plotting the results, the values of the apparent resistivity, percent frequency effect and the apparent metal factor measured for each set of electrode positions were plotted at the intersection of grid lines, one from the center point of the current electrodes and the other from the center point of the potential electrodes.

The apparent resistivity, percent frequency effect and metal factor values are each plotted on their respective "pseudo-section." The lateral displacement of a given value is determined by the location along the survey line of the center point between the current and potential electrodes. The distance of the value from the line is determined by the distance (NX) between the current and potential electrodes when the measurement was made. The separation between sender and receiver electrodes is only one factor which determines the depth to which the ground is being sampled in any particular measurement. The plotted results were contoured using a logarithmic contour interval 1, 1.5, 2, 3, 5, 7.5 and 10.

CEM - "SHOOTBACK" EM

It was decided to run CEM at 390 and 1830 Hz on line 10W in order to more clearly define the extremely low resistivity zone between 2N and 8N. Vertical transmitting configuration was used. The line was surveyed to 12S and to 14N before power line interference and low batteries forced a halt to the operation.

Results of all work were plotted in section in the field and were then used to produce plans of the magnetics,and EM data. Maps were drawn to 1:5000 scale (approximately 1 inch = 400 feet).

GEOCHEMICAL SOIL SURVEY

Sampling Method

Samples were taken at the same stations as the geophysical readings. Where possible, samples were taken in the "B" horizon, a rusty zone ranging from 6-10 inches in depth. Where necessary, samples were taken in the rocky "C" horizon. Enough sample was taken with a mattock to fill a small kraft paper bag making 1/2 pound to 1 pound of sample. Much of the southern part of the property was crossed by eskers or terminal moraines. This transported material was sampled, but a note was made that the material was probably not representative of bed rock. Highly organic samples from swamps or creek beds were not taken.

ASSAY METHOD

Samples were dried in a hot air drier and then sifted in -80 mesh sieves.

GOLD PROCEDURE

Portions of the -80 mesh fractions were digested with concentrated hydro-bromic acid; then gold was extracted using methyl isobutyl ketone and analysed with a Perkin-Elmer 403 atomic absorption spectrophotmeter using a wave-length of 2438Å.

SILVER PROCEDURE

Portions of the -80 mesh fraction were digested and extracted with concentrated nitric acid. The solution was analysed with a Perkin Elmer 403 atomic absorption spectrophotometer using a wavelength of 32814A°.

LEAD AND COPPER

Portions of the -80 mesh fraction wire digested in a hydrochloric/puchloric acid solution. Aliquots of the digested sample were analysed with a Perkin Elmer 403 spectrophotometer. Wavelengths used were:

lead - 2170A°

copper - 3247A°

INTERPRETATION - GEOPHYSICS

The geophysical methods used to survey the area were, VLF-EM, and total field magnetics along all the lines; frequency domain IP along the lines 10W, 00 and 10E; and Shootback EM only along the line 10W.

TABLE I

LIST OF MAJOR VLF-EM ANOMALIES

NO.	ANOMALY LOCATIONS	P-P * DIP ANGLE (θ^{o})	PEAK TO PEAK* DISTANCE.(or Max thickness) in meters	OUT OF PHASE** APPROX. %	COMMENTS AND RECOMMENDATIONS	PRIORITY FURTHER ASSESSMENT WORK
1	L-16W, St-26½N	26°	75	6	The Camp McKinney anomaly. Right over the old mine workings. Anomaly orientation approximately agrees with the strike of the Cariboo vein (Appendix II). More orientation work desirable using E-M.	HIGH
	L-18W, St-25½N	13° ?	75 ?	8		
2	L-14W, St-16½N	27°	150	10	Over graphitic gneiss outcrop. Possibly due to graphite veins or lenses within the Anarchist. Trenching is desirable along L-12W where the overburden is thinner.	LOW
	L-12W, St-15¼	18°	50	4		
3	L-16W, St-8½N	10°	100	7	Rusty (pyritic) gneiss outcrops were noted in the Vicinity of this anomaly. Also there is a rusty quartz vein opproximately 2m across along L-10W. Most likely to be due to sulphide mineralization. Position of the conductor should be located accurately using VLF along 12.5 m stations and must be trenched and/or drilled. Western extension should be followed by additional lines.	VERY HIGH
	L-14W, St-7½N	8°	100	5		
	L-12W, St-7½N	30°	75	12		
	L-10W, St-8½N	31°	100	5		
4	L-18W, St-5½N	16°	100	5	Shootback EM gives the best anomaly over this feature (L-10W) indicating excellent conductivity. Rusty pyritic gneiss outcrop was noted along L-14W and graphitic soil was noted along the L-10W. May be due to vein type sulphide mineralization. Position of the conductor should be located accurately using VLF 12.5 m or shorter stations and must be trenched and / or drilled.	VERY HIGH
	L-16W, St-5¼N	13°	50	4		
	L-14W, St-4½N	40°	150	10		
	L-12W, St-3½N	13°	125	4		
	L-10W, St-33/4N	10°	50	9		

continued on next page

TABLE I (cont'd)

NO.	ANOMALY LOCATION	P-P * DIP ANGLE (θ^{o})	PEAK TO PEAK * DISTANCE .(or Max thickness) in meters	OUT OF PHASE ** APPROX. %	COMMENTS AND RECOMMENDATIONS	PRIORITY IN FURTHER ASSESSMEN WORK
5	L-12W, St-5 3/4	18°	25	13	Merges to the anomaly No. 3 along the line 8W. Shootback-EM indicates it is a moderate conductor (similar to anomaly No. 3) and closer to surface than the No. 3 & 4. Position of the conductor must be located accurately using VLF, and must be trenched and / or drilled.	VERY HIGH
	L-10W, St-6N	22°	50	18		
	L-8W, St-6½N	15°	50	5		
6	L-16W, St-1½N	21°	100	20	The source is doubtful. Overburden seems to be thick. Diorite boulder was noted along L-16W. May be due to a mineralized dyke or vein. Position of the Conductor should be located accurately using VLF and should be trenched and/ or drilled.	HIGH
	L-14W, St-2N	12°	150	5		
	L-12W, St-1¼N	10°	150	4		
7	L-18W, St-¼N	20°	100	18	Doubtful source but may be similar to the feature which caused the anomaly No.6. High out of phase component. Western extent should be followed by additional lines and should be trenched and / or drilled.	HIGH
	L-16W, St-¼S	22°	100	18		
8	L-14W, St-7½S	22°	150	8	Sharp crossovers and low out of phase but no shootback EM anomaly indicating low conductivity. IP indicates a low resistivity zone dipping to the north with moderate PFE values. Most likely to be a shear zone. Trenching along Line-14W is desirable.	HIGH
	L-12W, St-6 3/4S	11°	100	5		
	L-10W, St-6¼S	18°	100	4		

continued on next page

TABLE I (cont'd)

NO.	ANOMALY LOCATION	P-P * DIP ANGLE (θ^{o})	PEAK TO PEAK * DISTANCE. (or Max thickness) in meters	OUT OF PHASE ** APPROX. %	COMMENTS AND RECOMMENDATIONS	PRIORITY IN FURTHER ASSESSMENT WORK
9	L-10W, St-4S	7°	100	5	No significant shootback-EM anomaly, poor conductor. May be an extension of the anomaly No. 8 (shear zone ?). No further work is required unless a trench on anomaly No. 8 proves any mineralization.	HIGH
	L-8W, St-3 3/4S	15°	50	3		
	L-6W, St-4S	23°	250	7		
	L-4W, St-4 3/4S	10°	150	10		
10	L-6W, St-16N	23°	50	4	Located in the vicinity of several graphitic gneiss and marble outcrops. May be due to graphite lenses within the Anarchist or some vein type sulphide mineralization. Trenching is recommended along L-4W after locating the conductor accurately using VLF-EM along closely spaced stations.	HIGH
	L-4W, St-17½N	22°	100	5		
	and St-19N	10°	?	5		
	L-2W, St-17¼N	15°	50	4		
	and 19N	10°	100			
11	L-8W, St-3/4N	12°	150	4	Not laterally continuous. Source is doubtful. Trenching is advisable along the line -4W after accurately locating the conductor.	LOW
	L-6W, St-2N	16°	100	4		
12	L-6W, St-11¼S	8°	100	4	Associated with a mag low. Possibly a shear zone with a northerly dip (?).	
	L-4W, St-11½S	18°	125	7		
	L-2W, St-11 3/4S	12°	150	12		
13	L-6W, St-14S	18°	50	4	Little lateral continuity. Located at the interpreted Intrusive-Anarchist contact. May be due to minor sulphide or graphite concentrate	

TABLE I (cont'd)

NO.	ANOMALY LOCATION	P-P * DIP ANGLE (θ^o)	PEAK TO PEAK * DISTANCE. (or Max thickness) in meters	OUT OF PHASE ** APPROX. %	COMMENTS AND RECOMMENDATIONS	PRIORITY IN FURTHER ASSESSMENT WORK
14	L-6W, St-17½S	14°	150	6	No proper VLF crossover. Most likely to be a shear zone within the intrusive. No further work is recommended.	
	L-4W, St-18¼S	15°	150	4		
15	L-2W, St-11½N	9°	100	5	Little lateral contimuity. Overburden appears to be thick not to make trenching feasible.	
	L-00, St-1o¼N	21°	50	4		
16	L-2E, St-17 3/4N	17°	50	7	Source is doubtful. At the northern end of the anomaly rusty outcrops were noted. May be due to vein type sulphide mineralization. Position of the anomaly should be located accurately using VLF-EM and should be trenched.	HIGH
	L-4E, St-16 3/4N	15°	100	5		
	L-6E, St-16 3/4N	9°	50	3		
17	L-10E, St-8½S	27°	250	5	Broad crossovers within volcanics. Coincides with an IP anomaly. Appears to be due to low dipping massive mineralization. Must be trenched and / or drilled.	HIGH
	L-12E, St-7S	15°	250	2		
18	L-10E, St-15½S	16°	150	4	Falls close to Anarchist-Volcanics boundary. Most likely to be due to sulphide mineralization within volcanics. Appears to be the continuation of the IP anomaly detected by Gunnex Survey (1970) along the lines 18E and 20E	LOW

* Refer to Appendix III for the description of the Peak to Peak dip angle (θ^o) and Peak to Peak distance.

** Average of the out of phase component between the dip angle peaks.

Good VLF data was obtained over most of the property. Proximity of power lines caused broadening of the nulls and a great deal of noise in the residual field strength readings. This phenomenon was not apparent more than 50 metres from the power line. All VLF data was subject to a "Fraser filter" and the positive values were contoured.

Crossovers became much weaker and broader over the central part of the property, probably due to the increase in cover evidenced by the abundance and apparent thickness of eskers in the area.

Total field Mag data was obtained to an accuracy of $\pm$ 2 gammas, occasionally $\pm$ 5γ in areas of high gradient. Data immediately under powerlines and over the pipeline were suspect and largely discounted.

Spot highs are probably due to local concentrations of magnetite or small dykes within the Anarchist group. Most of these sharp anomalies have a half width of 25 metres. It must be recalled however, that the station spacing is also 25 m., therefore, depths of burial would certainly be less than the indicated depths.

In the south-central portion of the property, eskers indicate the much thicker cover of glacial debris. No outcrop is to be found anywhere near the drainage basin of Rice Creek south of the Legal Corner Post.

Contoured magnetic data indicates a N.W. - S.E. trend, roughly paralleling the expected intrusive contact to the south. This bias however, is rather subjective and is due in part to the station spacing/line spacing ratio.

I.P. data was generally good with little noise experienced in areas of high resistivity. Only in low resistivity areas are the resistivity values and P.F.E. readings questionable. Telluric channeling effects and lack of signal due to the low resistivities meant extremely noisy conditions.

Of the three lines surveyed, line 10W gave the most interesting results. Roughly speaking, the south end of the line is characterized by low (residual) P.F.E.'s and remarkably uniform high resistivities, typical of barren (unmineralized) intrusive rocks. The north end of the line is more typical of metamorphic rocks. Resistivities were quite variable over short distances. P.F.E.'s were consistently high but variable. This response was considered typical of the Anarchist series (pyritized volcanics, gneisses, marbles, etc.)

The magnetometer survey was the most helpful in identifying various geological boundaries. The susceptibility contrasts between the Volcanics and the Anarchist, and the intrusive (Oliver granite) and the Anarchist, are large enough to cause different background readings over these major rock units. Also the Anarchist series could be recognized from the noisy character of the magnetic data. VLF-EM method responded to a wide range of conductors regardless of the "quality" of these conductors. The features which are believed to be detected by VLF-EM include; graphitic members and graphite lenses within the Anarchist, vein-type sulphide deposits (similar to that in Camp McKinney), pyritic zones within volcanics, shear zones, and variations in the overburden thickness. The VLF-EM response to geologic contacts was either very weak or nil, and it was not useful in identifying various rock types. Quality of the IP data was very poor over a major portion of the area due to low signal strength which was caused by low resistivities of some of the Anarchist rocks.

A feature of the Anarchist series which is rather important from the geophysical point of view is that these rocks are highly variable in composition and as a consequence they are highly variable in electrical conductivity and magnetic susceptibilities.

This is expected because the intensity of metamorphization and deformation within the Anarchist series appear to vary over a wide range. Some of the gneisses and marbles contain large amounts of graphite which is believed to be the major cause of some of the VLF-EM anomalies, such as the anomaly number 2 on the northwestern corner of the map area.

However, not all the EM anomalies within the Anarchist should be attributed to presence of graphite;because the VLF-EM survey detected a surprising anomaly (anomaly No.1) over the Camp McKinney area which is known to be the location of a major vein type sulphide and gold deposit, striking in more or less east-west direction. The vein has been known as the famous Cariboo vein from which most of the gold had been produced in the past. It is described by Hedley (1940) as being, "persistent, rather narrow, quartz filled fissure mineralized with pyrite, sphalerite, galena and chalcopyrite... the strike is westernly and the dip vertical to steep southward. Little is known of the other veins in the camp." Old mine workings, and structure of the Camp McKinney have been described in great detail by Hedley (1940), which gives a good idea about the character of mineralization which can be expected elsewhere in the area. An excerpt from this report describing the geology in the underground workings is attached to this report as Appendix II. It should be noted that the strike direction indicated by the VLF-EM survey over the Camp McKinney area is in approximate agreement with the strike of the Cariboo vein.

Major VLF-EM anomalies are indicated with numbers on the contoured VLF-EM dip angle map, and they are listed and described in Table I. Comments on the causes of the anomalies and recommendations for future work are also presented in this table. The most interesting VLF-EM anomalies are found at the northwestern part of the survey area. Even though some of these anomalies appear to be caused most probably by graphitic zones or lenses in the Anarchist, one cannot be certain about the origin until the anomalies are trenched or drilled.

As a matter of fact, study of outcrops in the vicinity of some of the anomalies are in favour of the argument that the vein type of mineralization, similar to the one at Camp McKinney, may be the cause of these anomalies (anomaly No. 3, 4, and 5).

From the study of the outcrop distribution in the survey area and the geophysical data, some general conclusions were drawn about the electrical and magnetic character of various formations. These are listed in the following table - II.

TABLE - II

ELECTRICAL AND MAGNETIC PROPERTIES OF FORMATIONS

Formation	Properties
Glacial Overburden	Resistivity is variable. Typical values seem to be in the range of 400-700 Ohm-meters. Low PFE values.
Volcanic Rocks (Porphyritic Basalts, Andesites and Pyroclastics)	Highly magnetic (higher than the Intrusive)and noisy magnetic response. Resistivities are intermediate (approximately 400-600 Ohm-m.), and intermediate PFE values (approximately 2-3%).
Granodiorite and Quartzdiorite (Oliver granite) and related dyke rocks	Intermediate magnitude, quiet magnetic response. Highly resistive (approximately 1000 Ohm-m.) and low PFE values (1% or less).
Anarchist Series	In general magnetic response is the lowest and noisiest. In graphitic and pyritic members (gneiss, marble etc), the resistivities are variable depending on the conductive mineral content, but usually very low (100 Ohm-m or less), and PFE values are high (10% or greater). In greenschists and non-graphitic members, the resistivities are intermediate (about 500 Ohm-m.) and intermediate PFE.

Note: PFE = Percent frequency IP Effect.

The general information given in Table II was taken as the basis in interpretation of formation boundaries and other features such as faults indicated on the attached geologic map.

In some areas, the data gathered using different geophysical methods do not agree with the criteria stated in Table II, and if there are no outcrops, a great deal of confusion arises about the kind of structure and rock types in those areas. For example, the IP survey along line 00 tells us that there is a resistive and low PFE zone within the Anarchist between the stations approximately 12S and 5S. The resistivity and PFE values of this zone (resistivity 1000 Ohm-m or greater and PFE is less than 1%) are about the same as the resistivity and PFE values of the intrusive which was determined with the IP survey along line 10W. One tends to think that there is a stock or extension from the main body of the intrusion within the mentioned interval, but the magnetometer readings over the same zone correspond to the typical readings over the Anarchist, being lower than those obtained over the intrusive (see the contoured Mag. map). In that case we have a few alternatives to choose from as to what this anomalous zone might be: (1) a "window" of different intrusion with a lower magnetite content than the one located in the SW corner of the survey area (Oliver); or, (2) some resistive member(s) of the Anarchist series with lower conductive mineral content.

Regardless of the type of lithology, the northern and southern boundaries of the zone appear to be faulted. This conclusion was derived from the fact that there are two VLF anomalies (anomaly no. 9 and 12) bordering this zone, which are believed to be faults (see Table I).

The volcanic rocks are located in the east-southeast part of the survey area and are easily identified from their response to the magnetometer survey. The background magnetic readings over the Volcanics are at least 300-400 gammas higher than those values obtained over the surrounding Anarchist rocks.

Also the IP survey along the line 10E indicates that the resistivity of the Volcanics is greater than the Anarchist rocks (about fourfold) and the PFE values are much lower in general (about 2-3%).

The Anarchist-Volcanics boundary does not appear to be as simple as it was indicated on a smaller scale geologic map by Cockfield (1935). For example, along the lines 18E and 20E, volcanic rocks appear between the stations approximately 6N and 1N, and Anarchist rocks came into the picture between the stations 1N and 13S except with a narrow strip of volcanic rocks at about the stations 7S and 8S. Volcanic rocks are located to the south of the station 13S, down to about station 20S where the Anarchist rocks reappear. Distribution of volcanic rocks could not be determined between the lines 18E and 20E to the north of the base line due to lack of any survey lines in that area.

A problem area exists within the volcanic rocks along line 10E between stations approximately 7S and 12S, within which the IP and VLF-EM data do not seem to agree. From the IP survey, there seems to be two polarizable features gently dipping to the south, one is located at about station 7½S and the other one is at station 11½S. But the VLF-EM data indicates a conductive zone which is located in between the double feature interpreted from the IP data (anomaly No. 17, see Table I). However, the VLF cross-overs are quite broad (widest among all the VLF anomalies) and the VLF-EM survey might have responded to the combined effect of the mentioned gently dipping zones. Even though the conductive body configuration is somewhat ambigious, this zone might be economically interesting. Therefore it is desirable that the source of the anomaly be revealed either by means of trenching or drilling.

Another interesting VLF-EM anomaly within the volcanics is located at about station 15½S along the line 10E (the anomaly no. 18). This is believed to be the continuations of a polarizable zone which was detected by an earlier IP survey by the Gunnex Limited (Baird, 1970), and located at about the stations 17S and 18S along the lines 18E and 20E.

There is also a weak VLF anomaly over the mentioned zone. Metallic mineral content of the anomalous zone was claimed to be about 5% by volume (Baird, 1970).

INTERPRETATION GEOCHEM

867 soil samples were taken and analysed. Soil analysis maps for gold, silver, lead and copper are located in the pocket in back of this report. Due to the erratic nature of the results, no attempt was made to contour the results. A colour code was used to denote anomalous sample locations. The code was: red - very anomalous
orange - anomalous
yellow - slightly anomalous
green - blue-grey - background

Three anomalous areas are noted. Area "one" consisting of samples:

L2W	▲ 6+00N and ▲ 6+50N
L0	▲ 1+00S and ▲ 1+50S
L2E	▲ 3+00S
L4E	▲ 4+50S and ▲ 5+00S

is extremely anomalous in all four elements analyzed. These samples were all taken near or in the valley of the present stream bed and might be contaminated by material transported by the stream.

Area "two" is a zone of erratic, high samples, anomalous in gold and silver on lines 8 west to 14 west inclusive between stations 1+00 north to 5+00 north. This area lies just down ice of geophysical anomaly #4.

Area "three" lies on line 8W, stations 17+50N → 19+00N and is very anomalous in silver and lead. Gold and copper are weakly anomalous in the same area. There may be a slight coincidence between this and geophysical anomaly #10.

CONCLUSIONS

Geophysical and geochemical investigations of the property reveal several anomalous zones; one in particular has a coincident geochem and geophysics response. This area gives the best geophysics response. A narrow but nevertheless distinct geochem zone is situated just "down-ice" of this area. The most favorable feature is anomaly 4 as it gives much the same response as the traverse over the Camp McKinney vein.

The western half of the claim area appears to be more favourable than the eastern section. Better quality VLF targets and proximity to Camp McKinney argue in favour of concentrating efforts in the north-west quadrant.

Table I lists the major VLF-EM anomalies and sets priorities for further investigation. Anomalies 3,4,5 are prime targets while 6,7, 10, 16, 17 are secondary. Anomaly 1 is over the worked out vein at Camp McKinney. Magnetics indicated the intrusive contact to lie at about 12S on line 10W. The data suggests that the contact conforms fairly well with Cockfields map in the western section of the claim group.

I.P. resistivity data placed this intrusive contact at about 11 or 12S on line 10W with a low resistivity zone about 100 m wide at 6S This low resistivity unit may be a shear zone. From 8S to 2N, high P.F.E. values indicate a zone of polarizable material in otherwise highly resistive rock. Up to 2% sulfides may be present. This area (8S to 2N on line 10E) also has VLF anomalies 8 and 9 associated with it and indicate lateral continuity several hundred meters both east and west. Overburden depth should be determined prior to trenching and/or drilling.

Geochem results were more than dissappointing over most of the property. Save Rice Creek and the aforementioned anomalous zone, the 40 Km. of line sampled was essentially flat. A small area near VLF anomaly 10 gave slightly anomalous values in gold, silver and copper. Overburden is very thin in this area and the geochem values are probably close to the rock values.

Rice Creek itself seems incapable of transporting gold except in times of extremely high runoff. The creek goes underground at about line 4W at the road and emerges in seeps near 15S on line 4E and 12S on Line 0. Beaver Dams help to control the flow making physical movement of gold impossible.

Possibly a "winnowing" effect has resulted in the high stream geochemical values. The most favourable area for mineralization still appears to be along the Anarchist/intrusive interface. The incidence of good VLF crossovers in the western area of the property indicates that the search for gold bearing sulphides must be concentrated to the west.

The search for massive mineralization (gold in pyrite) must of necessity include the Anarchist rocks where electrical methods are hampered by the amount of graphite. All VLF targets are favourable since massive or simply heavily disseminated mineralization may lurk within the graphitic zones.

RECOMMENDATIONS

1. Table I (pages 9A -) lists the VLF anomalies and priorities for further work; detail is necessary prior to trenching and/or drilling.

2. VLF and Mag coverage of the western part of the property from 20W to 25W, from the intrusive on the south (10S) to the Camp McKinney claims (15N).

3. IP between lines 4W and 14W, between (10 Km.) 0 and 14S to outline the P.F.E. anomaly. Six lines min. at 1400 metres = 10 Km.

4. Determine the depth of cover at 6S, on L/0W with resistivity sounding at 8S and 4S or refraction seismic. On the basis of overburden depth, either trench or drill (percussion) to test the resistivity anomaly.

5. Further work in the eastern section of the property should be curtailed unless further geological examination warrants it.

6. It has been suggested that Rice Creek bed be sampled to a depth of 5 to 8 metres with a power auger to test the continuity of the gold values with depth. A hammer seismic survey could develop a rough tonnage figure should the overburden prove economic.

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APPENDIX I

RICE CREEK ROCK SAMPLES

SAMPLE LOCATION	DESCRIPTION
L-21E, 11S	Very fine grained and sheared. Mostly chlorite, slightly magnetic. Greenschist.
L-20E, 20S	Composed of mostly quartz and biotite. Magnetic. Sugary texture and weakly foliated. Quartz-biotite schist.
L-20E, 15½S	Composed of quartz, feldspar and biotite. Quartz and plagioclase phenocrysts in a felsic groundmass. Quartz-feldspar porphyry.
L-20E, 14S (from mine dump)	Mostly interlocking quartz grains, feldspar is altered to clay minerals, pyritic. Metabreccia or conglomerate.
L-20E, 9S	Weakly foliated, fine grained, mostly chlorite. Greenschist or chlorite schist.
L-18¼E, 10S	Greenschist with a calcite veinlet.
L-17E, 10 3/4S	Mostly quartz, interlocking coarse quartz grains with limonite. Meta-conglomerate.
L-16E, 6S	Amphibole (hornblende) phenocrysts in a fine, dark coloured medium. Strongly magnetic. Basalt prophyry.
L-16E, ON	Composed of interlocking grains of dark coloured quartz and chert (?), medium grained. Meta-breccia or quartzite.
L-14E, 7S	Porphyritic, amphibole phenocrysts in a grey felsic groundmass. Little or no quartz strongly magnetic. Basalt porphyry.
L-14E, 6½S	Composed mostly fine grained mica and clay minerals. Weakly foliated. Meta-argillite.
L-14E, 1S	Same as above.
L-12E, 10½S	Quartz and feldspar porphyroblasts in a felsic groundmass. Groundmass contains biotite. Magnetic. Andesite porphyry.

SAMPLE LOCATION	DESCRIPTION
L-2W, 20N	White-gray massive quartz rock. Pyritic. Either a quartz vein or quartzite.
L-6W, 4½N	Composed of mostly chlorite, biotite and some quartz, indicates weak foliation. Greenschist.
L-6W, 9½N	Same as above.
L-10W, 8N	Mostly quartz with a soft pinkish fine-grained mineral (calcite?). Sheared and fractured. Fault breccia?.
L-10W, 20N	Crystalline, medium to fine grained calcite with graphitic bands. Graphitic marble.
L-12W, 8½N -I-	Weakly foliated and rather soft. Composed of mostly chlorite. Meta-argillite.
L-12W, 8½N -II-	Same as L-10W, 20N.
L-12W, 15 3/4 N	Fine grained, crystalline and foliated. Bands of quartz and biotite. Paragneiss.
L-12W, 16N	Same as above.
L-14W, 17½N	Gneissic texture. Contorted bands of graphite and quartz. Paragneiss.
L-16W, 7N	Fine to medium grained. Consists of mostly feldspar, 15-20% quartz, biotite and hornblende. Quartz monzonite or granodiorite. May be from a dyke or erratic boulder.
L-16W, 17½N	Weakly foliated, fine grained. Consists of mostly chlorite and biotite and some pyrite. Greenschist (or meta-argillite?).

APPENDIX II

Description of the Cariboo-Amelia vein and underground workings, excerpt from Hedley (1940). Excerpts: B.C. Dept of Mines, Bulletin No. 6.

The rock series, at least within the area of the mine workings, is disrupted by faults, along many of which the displacement has been considerable. This fact is not apparent from a study of the outcrops, and the lack of surface evidence of existing faults makes it hard to predict the character of ground in any of the yet unexplored sections of the vein.

THE VEIN

The Cariboo vein is a quartz-filled fissure with clearly defined walls, that ranges from a mere stringer to a width of 10 feet or more. The dip is vertical or steep southward, in places as low as 70 degrees southward, or as in the western section of the mine, locally overturned but on the average approximately vertical throughout the explored depth. The effective horizontal displacement along the vein-fissure has been about 30 feet, and the north side has moved westerly.

It is difficult to obtain an idea of the average width because much of the vein is mined, but early reports state that the vein was 3 to 4 feet wide in the upper workings. In the western section it ranges from 5 to 8 feet and is locally as much as 15 feet wide; in the central and eastern sections the width ranges between 2 and 5 feet although some stopes indicate greater local widths.

The vein has with local exceptions, free walls. It consists of white quartz which, particularly in the richer sections contains narrow bands of sulphide or shadowy, dark-colored material. Blue quartz, referred to in old reports as containing free gold, is not abundant. As seen at the eastern end of No. 2 level this is bluish, dense quartz, chalcedonic in appearance; no free gold was observed, but mineralization in this section is locally heavy.

Mineralization consists largely of pyrite, in addition sphalerite is fairly prominent and there is less galena and small amounts of chalcopyrite. An idea of the sulphide content may be gained from the fact that during operation, in early days on richer sections of the vein the sulphides con-

stituted 3 to 3 1/2 per cent of the mill-heads; in 1901 the concentrating ratio was 39:1 when, supposedly, a considerable amount of low-grade material from the western section was milled.

Results of sampling by Pioneer Gold Mines of B. C. Limited indicate that higher values are in general to be expected from (a) well-banded sections of the vein, and (b) quartz containing prominent amounts of sphalerite and galena. Three polished sections were studied; gold was seen in only one of these, associated with galena and sphalerite which, with chalcopyrite, are later than, and vein the pyrite. It is not known whether the gold is always associated with these last-formed sulphides throughout the mine.

The walls of the vein have been altered, locally so strongly that it is not always possible to be sure of the original character of the rock. The alteration varies in degree with the character of the rock; it is least marked in argillite and quartzites and is most marked in greenstone and dyke-material. In hand-specimens the alteration has produced a bleached, earthy material in which the original texture is in part or wholly obliterated. Under the microscope alteration is seen to have resulted in sericitization with the development of a considerable amount of calcite and a small amount of quartz. In advanced stages of alteration the product is schistose.

The vein is most clean-cut and well-defined between walls of calcareous greenstone and the large dyke on the western end of No. 3 level. In these rocks the walls are smooth and free and the vein is uniform. In broad zones of quartzite the vein is more irregular, tends to be frozen, and offshoots extend for short distances into the shattered walls. In the mixed quartzites and softer sediments, as on No. 2 level east, the vein tends to be smaller and erratic. Width and uniformity of the quartz vary directly with the competency of the wall-rock to sustain a clean-cut fissure. Westerly from the shaft the vein disappears in a belt of soft, biotite-bearing and schistose sediments, that have been incapable of sustaining the fissure.

On No. 3 level near the shaft-station the vein is split and consists of a weak foot-wall band up to 16 inches wide, 12 feet north of the main band. A short distance easterly, from the shaft the main body of the vein is split and irregular. In caved ground at the top of the raise to surface from No. 3 level west, a band of quartz 8 to 20 inches wide is 6 feet in the foot-wall of the vein. No other splitting of the vein is apparent.

Replacement is seen in No. 2 level stope at the base of the air-shaft. Here the vein intersects the prominent band of limestone and penetrates it irregularly over a stope width of 25 feet. This stope is 80 feet long in a north-westerly direction at an angle to the elsewhere normal vein.

Surface Workings

On the Maple Leaf an old, 15-foot shaft is sunk on a quartz vein that strikes south 70 degrees east and dips 80 degrees southward; the vein is 4 to 4 1/2 feet wide on the west wall, and is 20 to 30 inches wide on the east wall, plus a little additional quartz on the hangingwall of the 4 1/2-foot zone. The walls are sheeted and partly schistose close to the vein, and are hydrothermally altered; the rock is apparently greenstone, but does not outcrop near the shaft.

The quartz contains pyrite which occurs as trains, bands and masses aligned parallel with the walls of the vein; a considerable amount of well-mineralized vein-matter on the dump shows the pyrite, when most massive, to be fractured and veined with quartz. A sample of selected better material from the dump assayed: Gold, 0.14 oz. per ton; silver 0.4 oz. per ton. A grab-sample of fines from the dump assayed: Gold, trace; silver, 0.6 oz. per ton. This is a well-defined vein that has not been traced in either direction from the shaft.

The Emma shaft is perhaps 30 feet deep, and was filled with water at the time of examination. Rock on the dump is strongly altered and appears to have been greenstone. A considerable part of the quartz on the dump is barren, but some is well-mineralized with pyrite and very small amounts of galena and chalcopyrite. New stripping easterly from the shaft discloses rather irregular quartz about 2 feet wide containing sulphide which has been largely leached.

The raise from No. 3 level to surface coincides with the position of an old shaft, and another shallow shaft lies a short distance to the west. The rocks here include soft argillaceous and biotite-bearing sediments, some quartzite, and dyke-rock. The vein cannot be clearly seen at this point, but appears to be irregular and branching, with a prominent footwall-strand.

The original discovery of the Cariboo vein, on the west bank of Rice Creek, consists of a strong outcrop of quartz 45 to 50 inches wide and about 70 feet long, which has not been mined. The vein is exposed at the "Whim" and "Doyle" shafts and at the latter shaft is 40 to 50 inches wide at the surface.

The vein has not been positively traced by surface workings easterly from the main shaft. About the top of the raise from No. 2 level (air-shaft) a number of old open-cuts are nearly all caved. One of these is in a mass of quartz several feet across, the boundaries of which are not seen, and nearby is a narrow width of quartz containing a considerable amount of galena. Neither of these showings appear to be directly related to the vein.

Underground Workings

The workings are about 2,000 feet long on the strike of the vein, extending 910 feet easterly from the shaft and 1,080 feet westerly. Total length of working, exclusive of sub-levels, aggregates about 8,700 feet. Fifty-eight per cent of all workings consists of drifts on vein-matter and of this 83 per cent (48 per cent. of the total) was in stoping ground.

The mine is developed by a vertical shaft 360 feet deep. Below the lowest level a winze extends an additional 200 feet. Levels, with distance below the collar of the Main shaft (elevation 4,400 feet) include: Tunnel, 70 feet; No. 1, 130 feet; No. 2, 165 feet; No. 3, 250 feet, and No. 4, 350 feet. No. 5 level is 103 feet below No. 4 level and No. 6 level is 187 feet below, No. 4. No. 6 level is 530 feet lower in elevation than the collar of the main shaft.

Earliest access to the mine was by Doyle and Whim shafts and by an adit (Tunnel level). The adit portal, on the easterly side of Rice Creek, is now covered by a waste dump, the shafts are largely stoped out, and Tunnel level is unsafe in those parts remaining westerly from the shaft; No. 1 level is also stoped out. This upper western section of the mine was consequently not examined, and data were obtained from an old map.

The general condition of the mine on dewatering in 1939 was good. A section of No. 4 level easterly from the shaft beneath a flat fault was completely caved for nearly 100 feet and had to be re-driven, and sections on No. 4 level west had to be shovelled out owing to an accumulation of surface debris from a cave at the top of the raise to the surface. A cave on the western end of No. 5 level was not cleaned out. Elsewhere, the only trouble was encountered in the shaft, which was blocked by debris at the Tunnel and No. 2 levels.

At the time of examination and with the exception of the Tunnel level, which is above water-line and in bad condition, all timber was protected by water and was sound. Nails were

of course leached and ladders and chutes were unsafe. Stulls were set solidly in deep hitches and were sufficiently abundant. The vein-walls were sound and not sheeted or slabby, and loose masses of rock were seen in only two or three places in the stopes. Drifts through sheared or faulted ground were lightly timbered, which allowed the section of No. 4 level east to cave, and bad ground was seen in the sheared section on No. 3 level west. One pocket of methane was encountered trapped in the eastern end of No. 3 level immediately after dewatering, but otherwise the air was good, and there was a good natural circulation throughout the body of the mine.

A cave prevented examination of a western section of No. 5 level, some 200 feet in length according to an old plan; this is indicated in broken lines in Fig. 3. Although the mine was completely dewatered the writer did not examine No. 6 level, which was again flooded at the time of his last visit. Data on this level are furnished through the courtesy of Pioneer Gold mines of B. C. Limited.

The mine is considered to the best advantage in three sections, the subdivision being a natural one of rock-types and faulting. The western section is westerly from a belt of soft, biotite-bearing sediments in which faulting is localized and through which the vein has not been followed. The central section includes the shaft and all original, near-surface workings. The eastern section lies easterly from the major eastward-dipping fault (7).

On No. 3 level the rocks to the west of the incompetent belt are largely indeterminable for a distance of 200 feet; they are all strongly altered and apparently include some dyke-rock and many interbedded types. Farther westerly is a 220-foot belt of quartzite and argillaceous quartzite, and the westernmost 240 feet of No. 3 level is in a large dyke. On No. 4 level, the complex sedimentary belt is 60 feet wide, and the remainder of the drift, for 240 feet to the face, is in argillaceous quartzite.

The vein in the complex of sediments is somewhat irregular and tends to be small on No. 3 level but is wide on No. 4 level. In the quartzites it is wider and sends off-shoots into the walls. In the dyke, above No. 3 level, is the most clean-cut stope in the mine; the vein has smooth, straight walls and is 5 to 10 and more feet in width. Values in this whole section, particularly in the west end, are believed to be low. Quartz in the westernmost stope is massive and poorly mineralized. Three small Tertiary dykes limit the stope but the vein is still seen in the face of No. 3 level and in the face

of the sub-level above. The vein is not seen in the face of No. 4 level, and the reason for its absence is not clear.

Faults in the western section are not numerous and each faulted segment of the vein has been traced.

The central section is one of considerable complexity. From it, particularly above No. 3 level, much high-grade material has been mined over a continuous stope length of about 500 feet. Faulting is complex but all important segments of the vein have been explored.

The rocks are dominantly greenstones, including both massive and banded calcareous types; argillaceous quartzites and quartzites are interbanded with these. The vein is strong down to No. 3 level but on No. 4 level it is weak and only a few inches wide; the stope below No. 3 level is filled. On No. 3 level west the vein narrows and ends against the incompetent belt and on No. 2 level west passes into a broken zone between a complex of flatly-dipping faults.

The shaft is collared 35 feet southerly from a surface stope, encounters the faulted vein at 50 feet depth, follows it for 140 feet and continues downward in solid rock past a second major offset in the vein; stopes have been carried right to the shaft. The vein is offset by flat and eastward-dipping faults, and the major segments are further broken by minor faults. The combination of faulting results in different offsets on different levels; some faults are offset and there is some "take-up" between others. The eastward-dipping fault (7), a branch of which penetrates the central section, is one of the most important in the mine.

The eastern section is bounded on the west by the major plane of fault (7). Above No. 2 level faulting is not serious, the vein is irregularly stoped, and a raise extends to the surface. There is a flat fault of major importance between No. 2 and No. 3 levels, and another irregular flat fault occurs above No. 5 level. The workings bottom in a wedge between an eastward-dipping and a westward-dipping fault, (13) and (11).

Above No. 2 level east the rather narrow vein is in interbanded argillaceous quartzite and greenstone westerly from the air-shaft and in argillaceous quartzites and assorted grey sediments on the east. At the extreme eastern end the vein rolls into a shear-zone parallel with the formation.

No. 3 level is driven in greenstones, for the most part calcareous, and the face is in black argillite and argillaceous

quartzite. Some ground is stoped above the level, up to fault (8). Below No. 3 level the rock is calcareous greenstone, and in it the vein is largely stoped out, down to the apex on No. 6 level. This large, continuous stope is as much as 360 feet in length and is offset appreciably only by fault (9).

Rock in the easternmost sections of No. 4 and No. 5 levels, as well as that encountered in diamond-drilling, is largely calcareous greenstone but includes some argillaceous quartzite and dyke rocks.

Faulting

Faults are numerous in the Cariboo-Amelia, and displacements, large and small, have greatly impeded the course of mining and development. Solution of the problems presented by faulting is not always easy, and it must be admitted that the early operators, although in some cases they turned the wrong way, succeeded well in the difficult task of development and accounted for most of the faulted vein-segments in the developed sections of the mine.

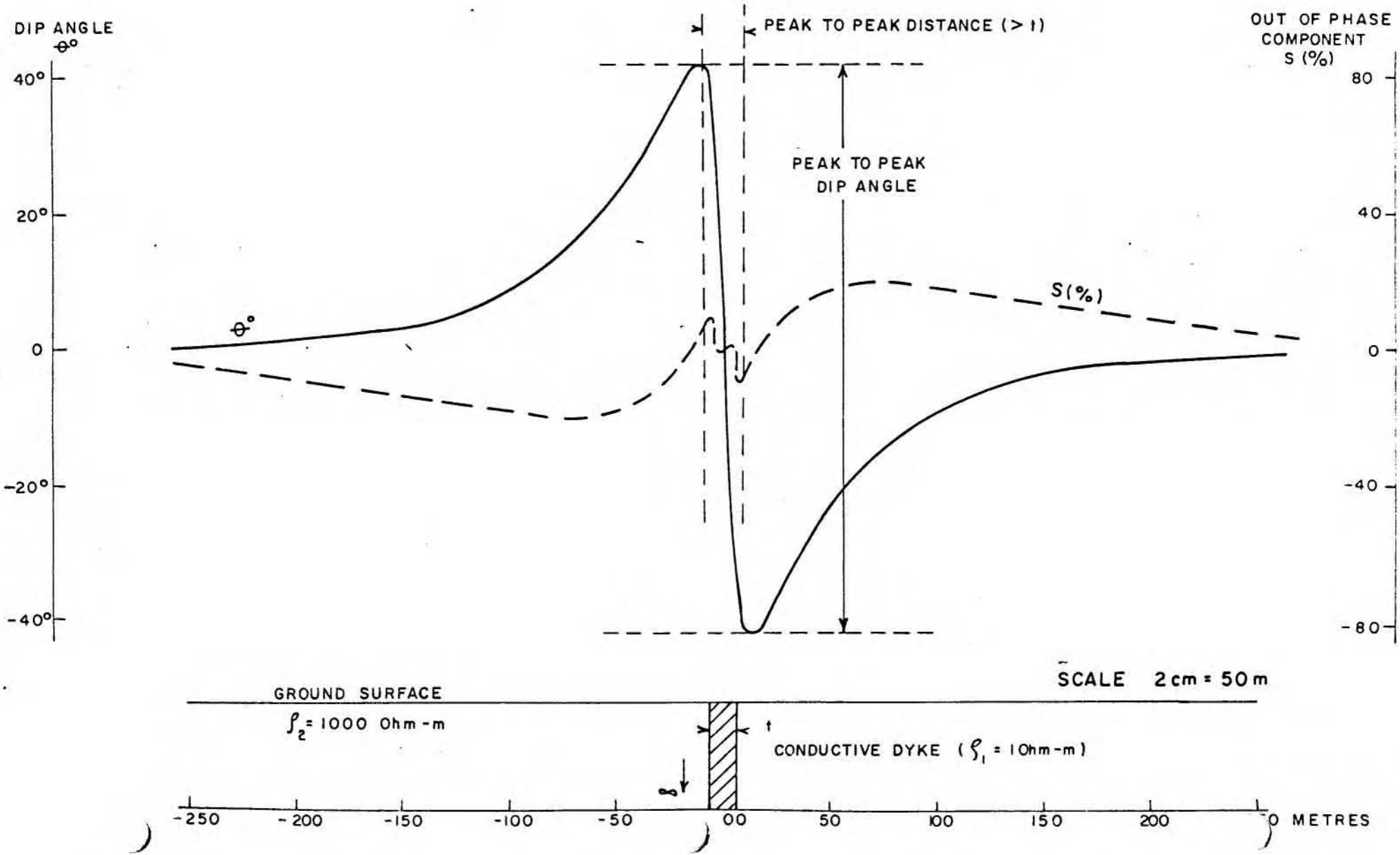
Although some fault displacements do not seem great as judged by lateral offsets of the vein, the vein is essentially vertical and the amount of offset produced on it is a measurement of the horizontal component of movement only, and not of the total displacement in the plane of the fault. This is illustrated by the fault at the base of the air-shaft above No. 2 level east; the vein is offset only 12 feet, but in the stope above is a 30-foot band of limestone that is not seen on the level, and a displacement to have so shifted the limestone must be about 40 feet or more. The flat fault (8), between No. 2 and No. 3 levels produces a vein offset of about 60 feet, but the actual displacement in the plane of the fault has been 400 feet or more.

All the faults should be considered, in a sense, as thrusts, since a horizontal component of movement is indicated in each case, and no movement seems to have consisted simply of a relative sliding of the hanging-wall either up or down the dip. The thrusting has in most cases consisted of a relative movement of the uppermost fault-blocks to the north and west, but there are exceptions to this rule.

It is commonly possible in a study of fault problems to group the individual faults into sets, referring to relative age, attitude and character of displacement; it may then be possible to demonstrate, co-ordinate or relate, sets of a particular age.

APPENDIX - III : VLF DIP ANGLE ANOMALY OVER A CONDUCTIVE DYKE

[TAKEN FROM MADDEN-VOZOFF VLF MODEL SUITE, MADDEN AND VOZOFF (1970)]



APPENDIX 4 - DETAIL WORK AND PROPOSED DRILLING PROGRAM

DETAIL WORK

In November 1975, detailed vertical loop Shootback EM and VLF-EM surveys were carried out over the anomalies numbered as 3, 4, 5, 6, and 1, on the VLF contour map. The total length of lines surveyed by Shootback and VLF-EM methods was about 5,500 m and 2,300 m respectively.

The Shootback EM survey was done using a coil separation of 100 m along the lines 11W, 12W, 14W and 15W; and a coil separation of 60 m was used along the lines 8W and 18W. Both coil spacings were appropriate for our purpose and produced satisfactory results. Reading intervals were normally 20 m and 10 m for coil separations of 100 m and 60 m respectively. At every station, tilt angle (of the major axis of polarization ellipse) and field strength of out of phase component were measured at frequencies of 390 Hz and 1,830 Hz.

VLF-EM survey was done along the lines 8W, 10W and 12W, using station spacings of 10 m. VLF-EM survey results are in very close agreement with the results which were obtained earlier in June, except that the recent results indicate more detail.

The Shootback and VLF-EM profiles are plotted together with the interpreted cross sections on the following sections. Information concerning the inferred attitude of the zones of interest (conductive zones), their thickness, depth to the top, position of proposed drill holes (see next section), etc., can also be found on these sections. The Shootback EM results are also presented in the form of stacked profiles on page 42. Note that the E-W scale is twice of the N-S scale (1:5,000) to avoid confusion in presentation.

Shootback - EM results helped to distinguish at least five conductive zones striking roughly NE, which are located to the north of the base line and to the west of line 8W. The surface projection of these inferred conductors and proposed drill hole locations are indicated on an attached plan map. These conductive zones, which are named as, A,A' , B,B' , C,C' , could be in many cases, easily correlated along each line due to persistance of their conductivities and their attitudes along the strike. The conductivities of the zones A,A' , B and B' are excellent (about .5-1 mho) and the zones C and C' appear to be poorer in conductivity (about .1 mho or less). The zones A and B are laterally most persistent and they seem to continue further W-SW of the line 15W. The western extent of the zones A and B could not be followed due to deteriorating weather conditions.

The zones A' and A appear to be dipping steeply to the north and the zones B, C and C' appear to be dipping to south. Therefore it seems like we are dealing with a syncline whose axis is running between the conductive zones A and B in a NE-SW direction, and the zones themselves are some graphite or graphitic beds in the limbs of the syncline. However, interpreted dip of the conductors may be erroneous due to a bias imposed on dip angle readings for the conductors A and B (which are excellent conductors) being so close together. Even though it seems like a minor possibility at this point, one should not exclude the likelihood of some massive sulphide veins which might be extending from the main intrusive body; because the Intrusive - Anarchist contact is believed to be only a few hundred meters SW of the western edge of the recently surveyed area. Therefore drilling is recommended to test the origin of these anomalies.

The Shootback EM survey along line 18W was done across the VLF-EM anomaly in Camp McKinney (anomaly No. 1). No definite Shootback anomaly was obtained from the conductor which gave rise to the VLF-EM anomaly. This is another setback for the idea that some massive sulphide mineralization may be causing the high amplitude Shootback tilt angle anomalies to the south. However, it is known that sulphide veins under Camp McKinney have been mined to a large extent, and discontinuous bits and pieces of conductive material in veins would not be a large enough target to be "seen" by the Shootback EM method, even though they may produce a large amplitude anomaly at the VLF range.

DRILLING PROGRAM

The following six priority diamond drill holes are recommended to test the origin of inferred conductors A, A', B, B', C and C'.

Hole No.	Test Conductor	Location	Dip	Azimuth	Depth(m)	Expected Results
1	A	L-10W, 420N	-60°	180°	140	40 m - 110 m conductor.
2	B' and B	L-10W, 500N	-40°	0°	150	30 m - 50 m conductor, 50 m - 110 m hostrock (?), 110 m - 130 m conductor.
3	C'	L-12W, 560N	-45°	0°	130	30 m - 45 m conductor, 45 m - 80 m hostrock (?), 80 m - 90 m conductor.
4	C	L-10W, 840N	-60°	0°	80	30 m - 45 m conductor.
5	A'	L-12W, 200N	-70°	180°	80	30 m - 50 m conductor.
6	B	L-14W, 425N	-60°	0°	100	40 m - 70 m conductor.

Total length of priority drill holes - 680 m (or 2,200 feet).

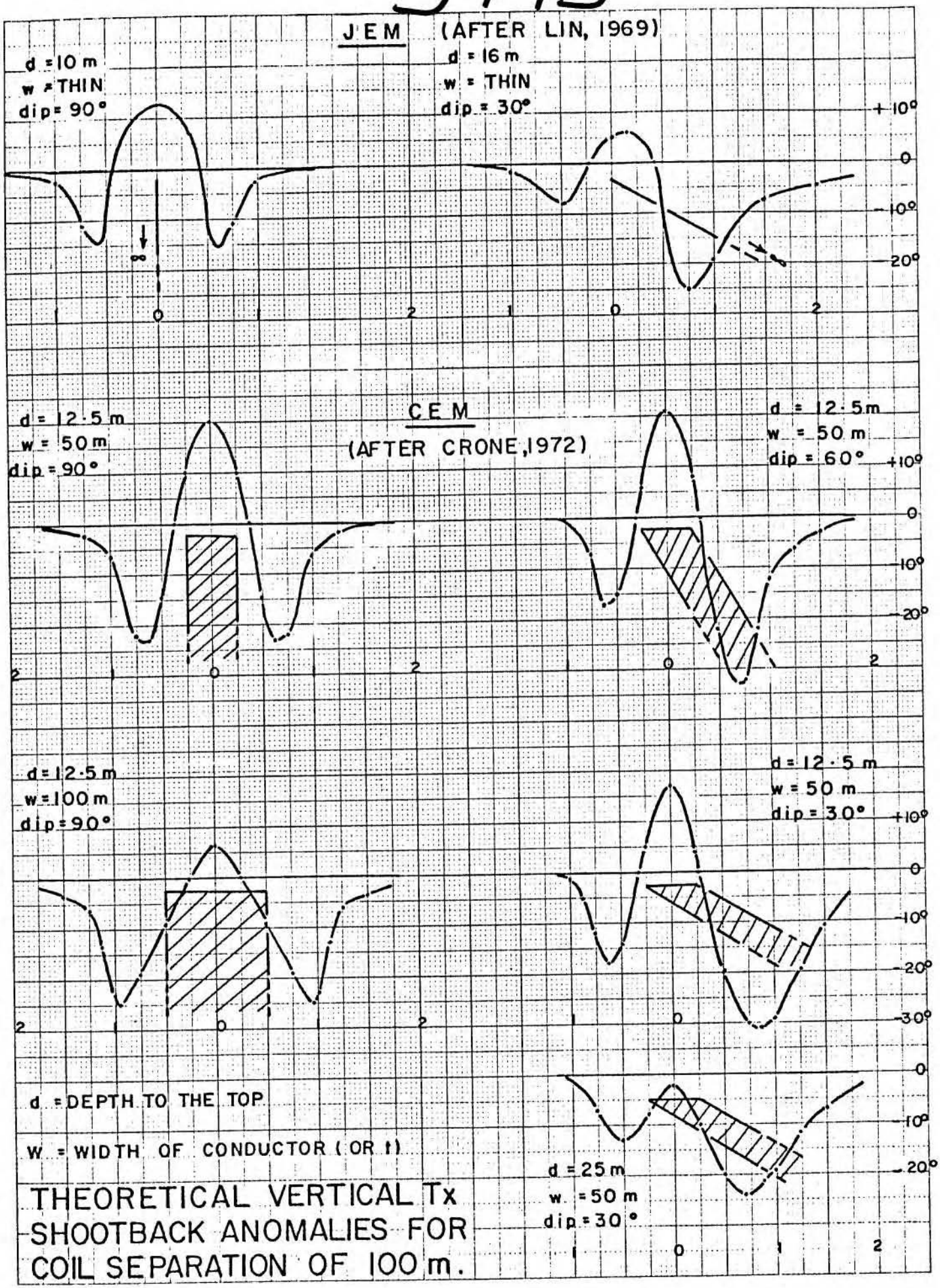
If any of the priority drill holes encounters sulphide mineralization of economic interest within any of the inferred conductors, then the following additional drill holes are warranted only over the conductor(s) of economic importance:

Hole No.	Test Conductor	Location	Dip	Azimuth	Depth(m)	Expected Results
7	A	L-8W, 650N	-60°	180°	130	40 m - 130 m conductor.
8	A	L-11W, 350N	-90°	-	130	40 m - 90 m conductor.
9	A	L-12W, 380N	-50°	180°	120	45 m - 100 m conductor.
10	A	L-14W, 310N	-90°	-	100	55 m - ? conductor.
11	B	L-8W, 680N	-50°	330°	80	30 m - 50 m conductor.
12	B	L-11W, 450N	-60°	335°	100	45 m - 100 m conductor.
13	B	L-12W, 425N	-60°	0°	120	40 m - 80 m conductor.
14	B	L-15W, 220N	-60°	320°	80	40 m - 60 m conductor.
15	A'	L-14W, 210N	-90°	-	110	40 m - ? conductor.
16	C	L-11W, 770N	-60°	340°	120	60 m - 100 m conductor.
17	C	L-12W, 725N	-50°	0°	70	30 m - 70 m conductor.
18	C'	L-14W, 550N	-60°	0°	80	35 m - 60 m conductor.

Total length of additional drill holes - 1,240 m (or ~4,000 feet)

If all of the six priority drill holes produce negative results (i.e. intersect graphite rather than massive sulphide), no further drilling should be done over the interpreted conductors. In that case, further exploration activities should be concentrated onto poorer conductors which do not respond or respond slightly to Shootback EM method over the used frequency range (390 Hz and 1,830 Hz), but produce high amplitude VLF-EM anomalies. In addition to the VLF-EM anomaly over Camp McKinney (L-18 W, 550 N), other VLF-EM anomalies which are caused by poorer conductors are located at L-12 W, 830 N, and close to the Intrusive - Anarchist contact along line 10 W and at stations 400 S, 640 S and 950 S. In future, these poor conductivity zones should also be surveyed by Shootback EM method at a frequency of 5,010 Hz to obtain some idea about attitude and conductivity of the targets if they respond to that frequency.

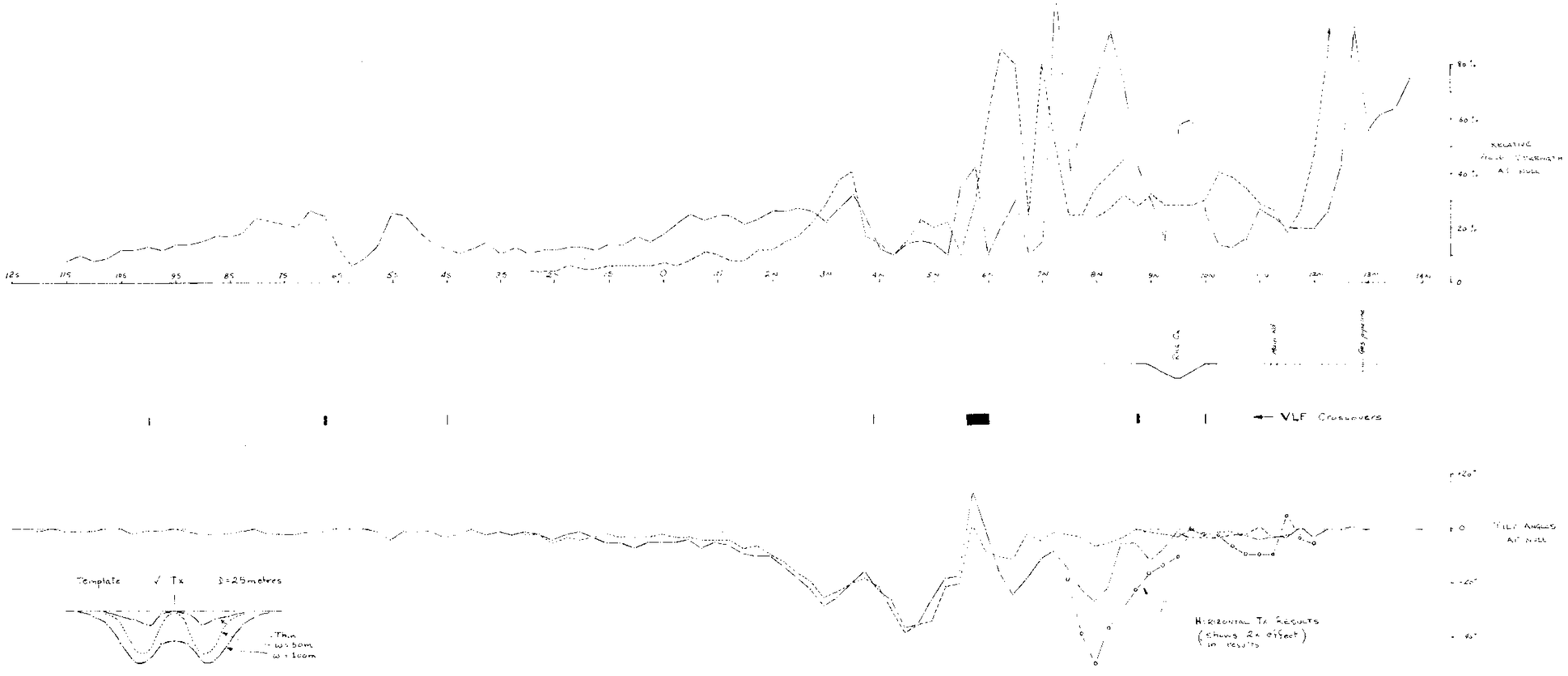
A.S. Saydam



THEORETICAL VERTICAL Tx SHOOTBACK ANOMALIES FOR COIL SEPARATION OF 100 m.

461510

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM. KEUFFEL & ESSER CO. MADE IN U.S.A.



VTx 1830 Hz
390 Hz
HTx 1830 Hz

5795

CANEX PLACER LIMITED

EM RESULTS CRONECEM

VERTICAL LOOP SHOOTBACK SURVEY

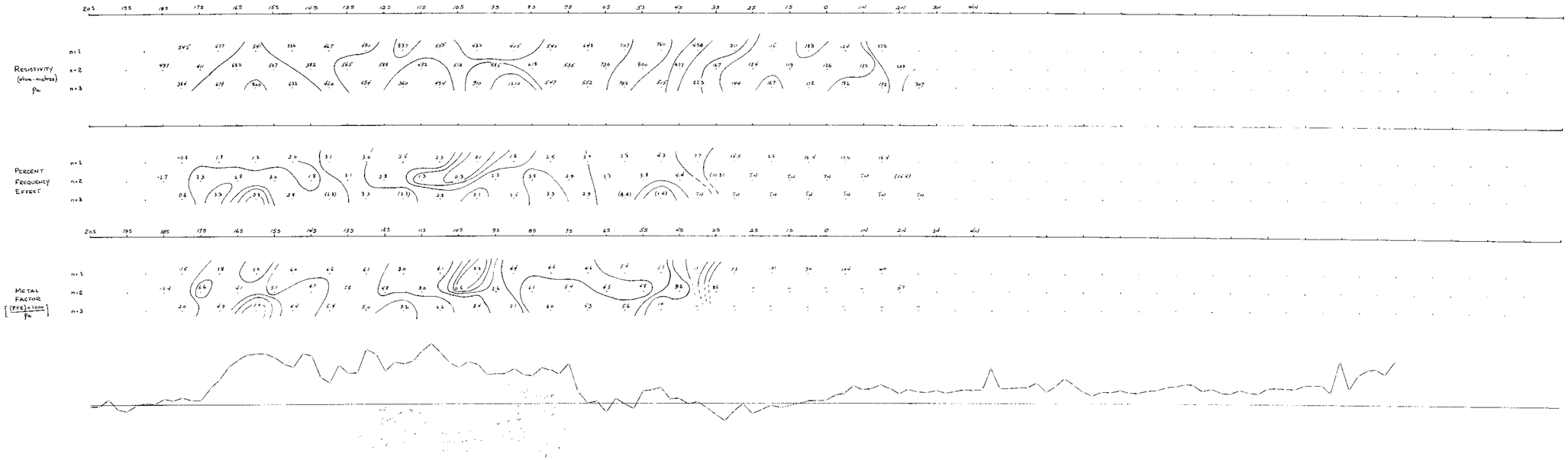
LINE 10+00 W

NEVEX

V-149

RICE CREEK PROPERTY

JUNE, 1975.



5795

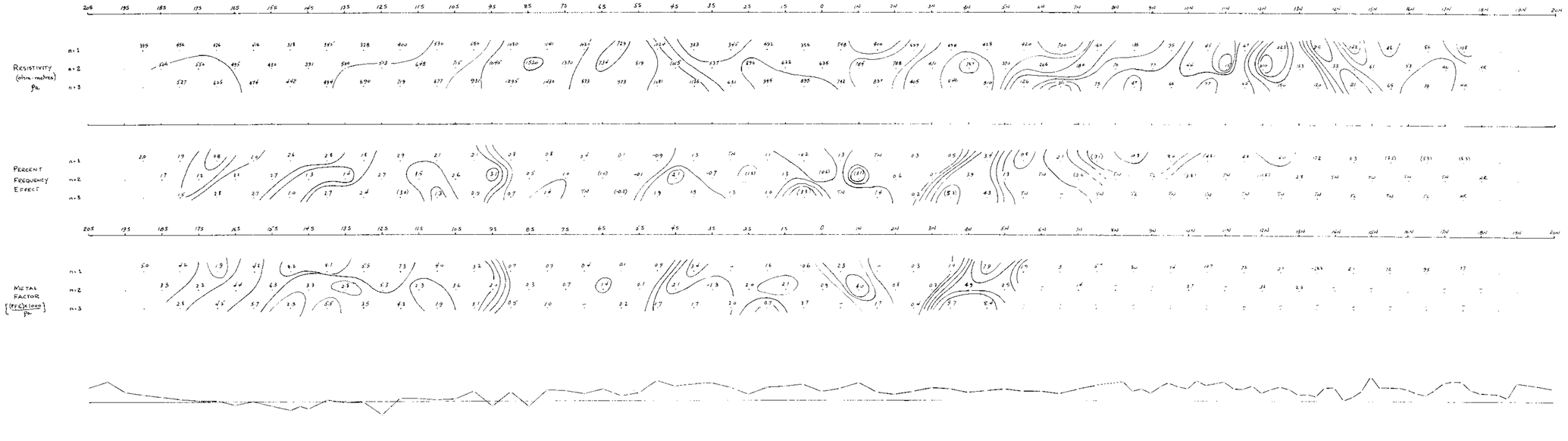
CANEX PLACER LIMITED

INDUCED POLARIZATION RESULTS

DIPOLE-DIPOLE ARRAY - 0.38 50Hz

LINE 10+00E

HAG CLAIMS, V-149 JUNE, 1975.



5795

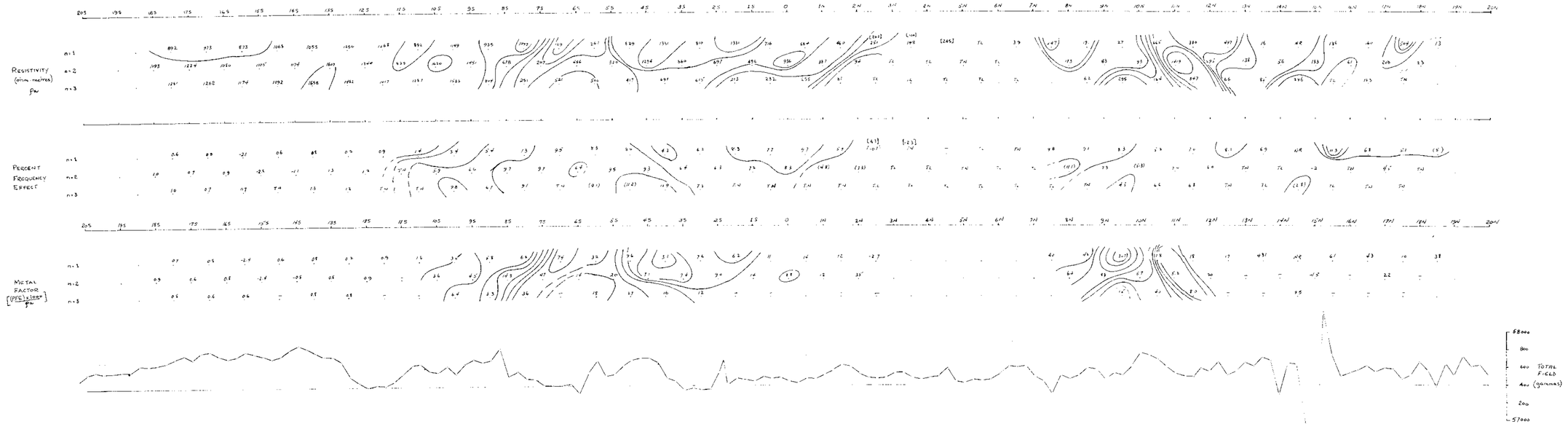
CANEX PLACER LIMITED

INDUCED POLARIZATION RESULTS

DIPOLE-DIPOLE ARRAY-0.3 & 5.0Hz

LINE 0+00

HAG CLAIMS, V-149 JUNE, 1975.



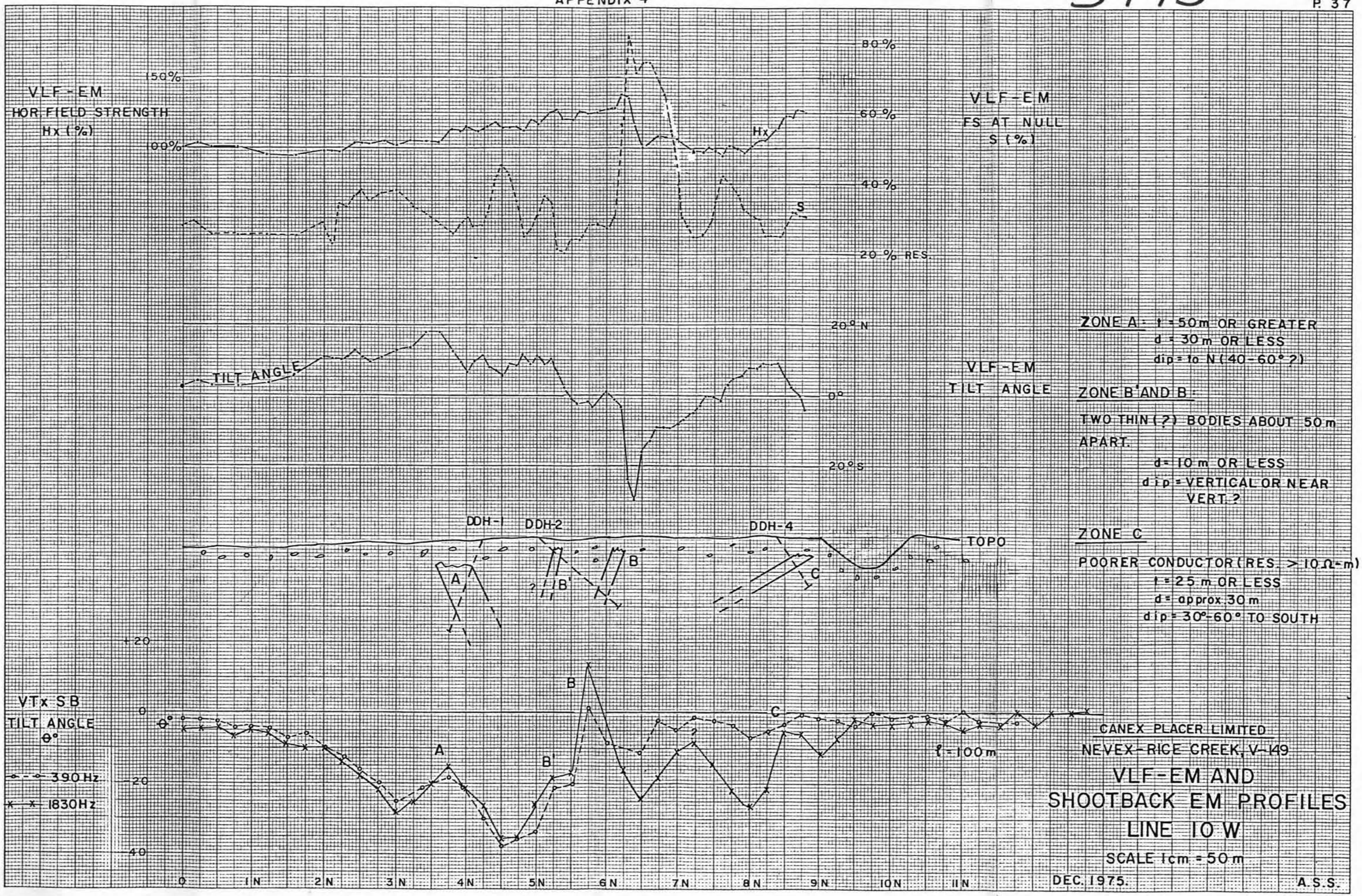
5795

CANEX PLACER LIMITED

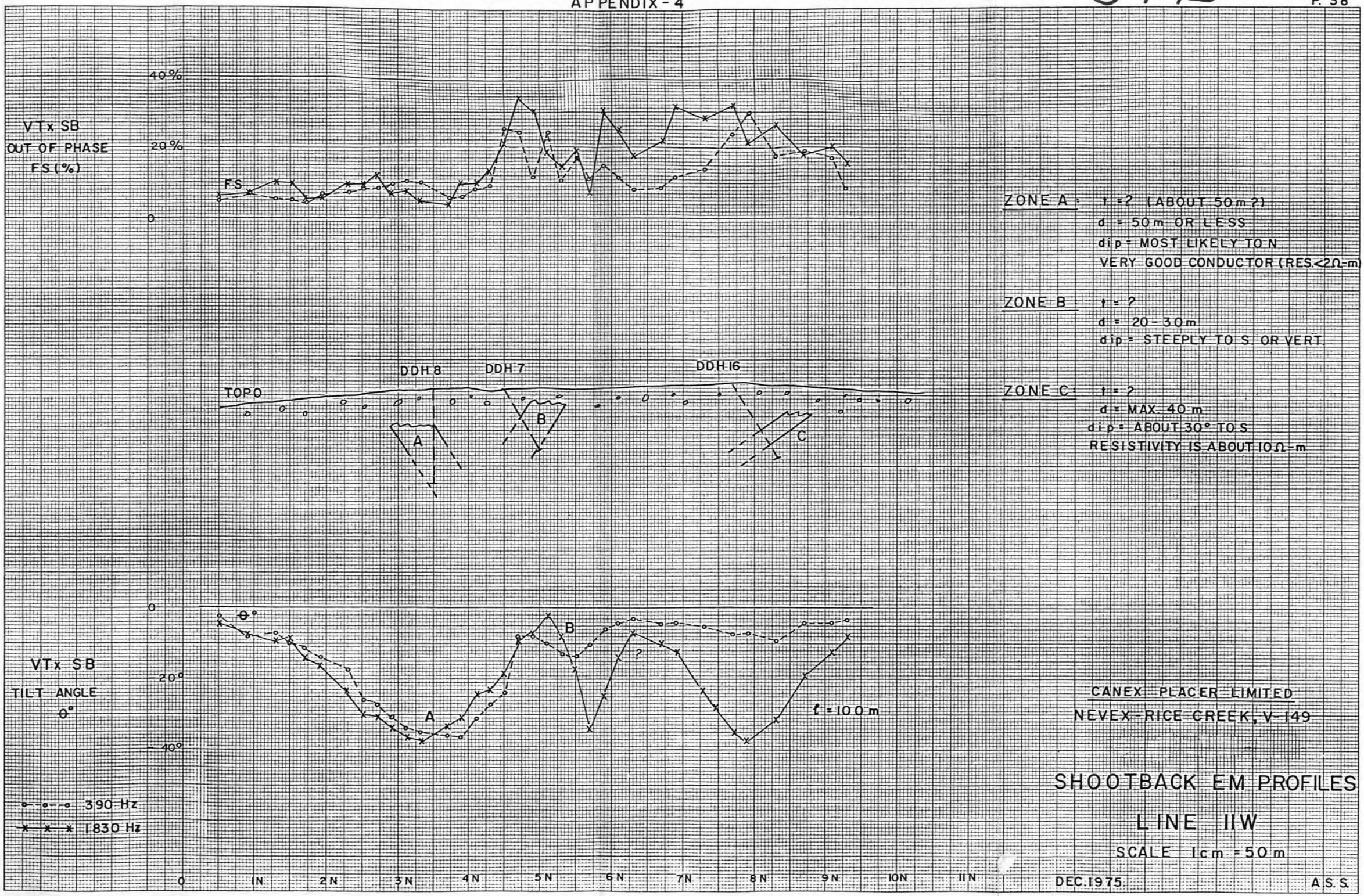
INDUCED POLARIZATION RESULTS
DIPOLE-DIPOLE ARRAY - 0·3 & 5·0Hz
LINE 10+00 W

HAG CLAIMS, V-149 JUNE, 1975.

5795



47 1510
K+E 10 X 10 TO THE CENTIMETER • 25 X 30 CM.
KEUFFEL & ESSER CO. MADE IN U.S.A.



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KEUFFEL & ESSER CO. MADE IN U.S.A.

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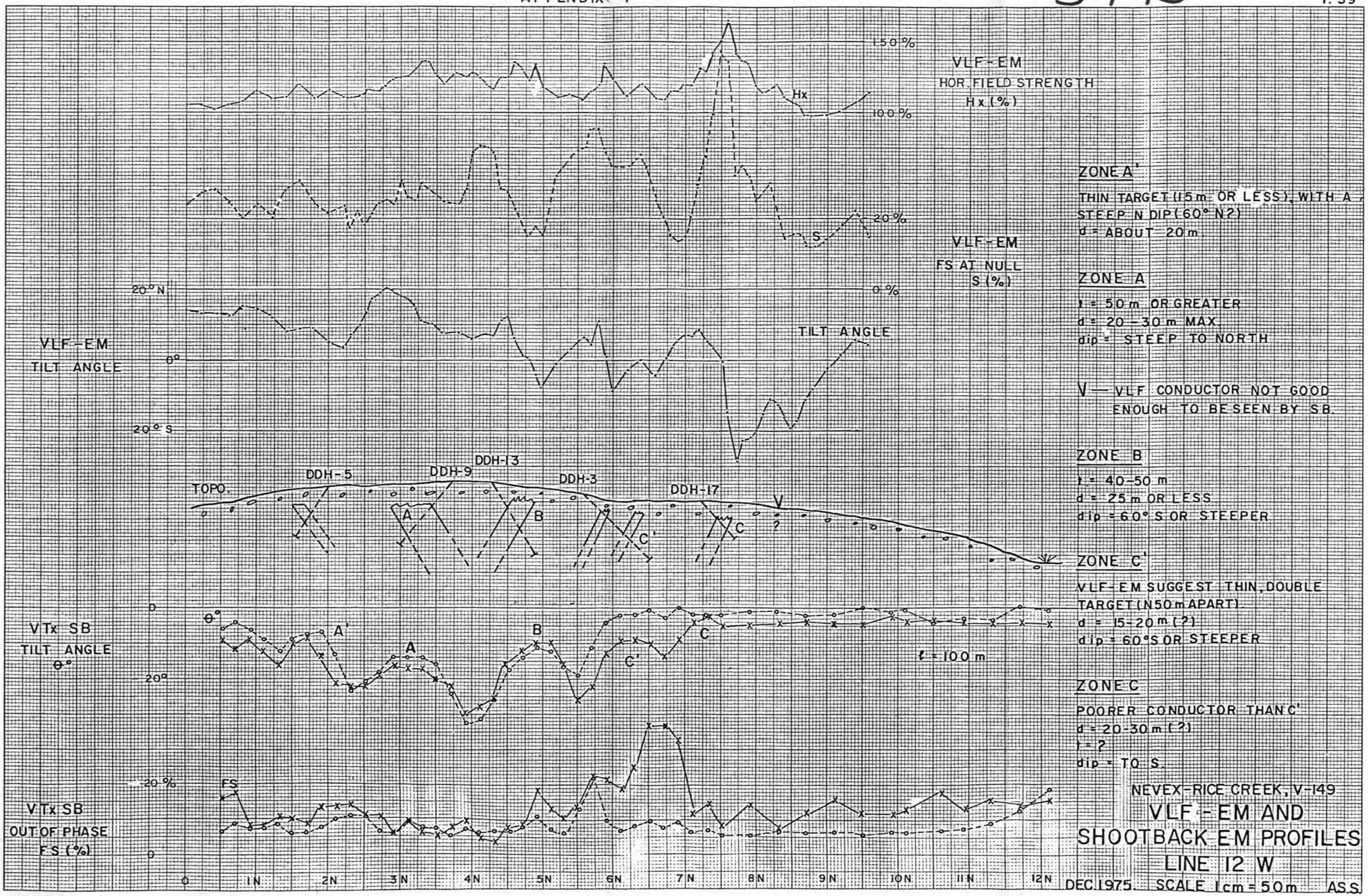

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K+E 10 X 10 TO THE CENTIMETER • 25 X 38 CM.
KEUFFEL & ESSER CO. MADE IN U.S.A.

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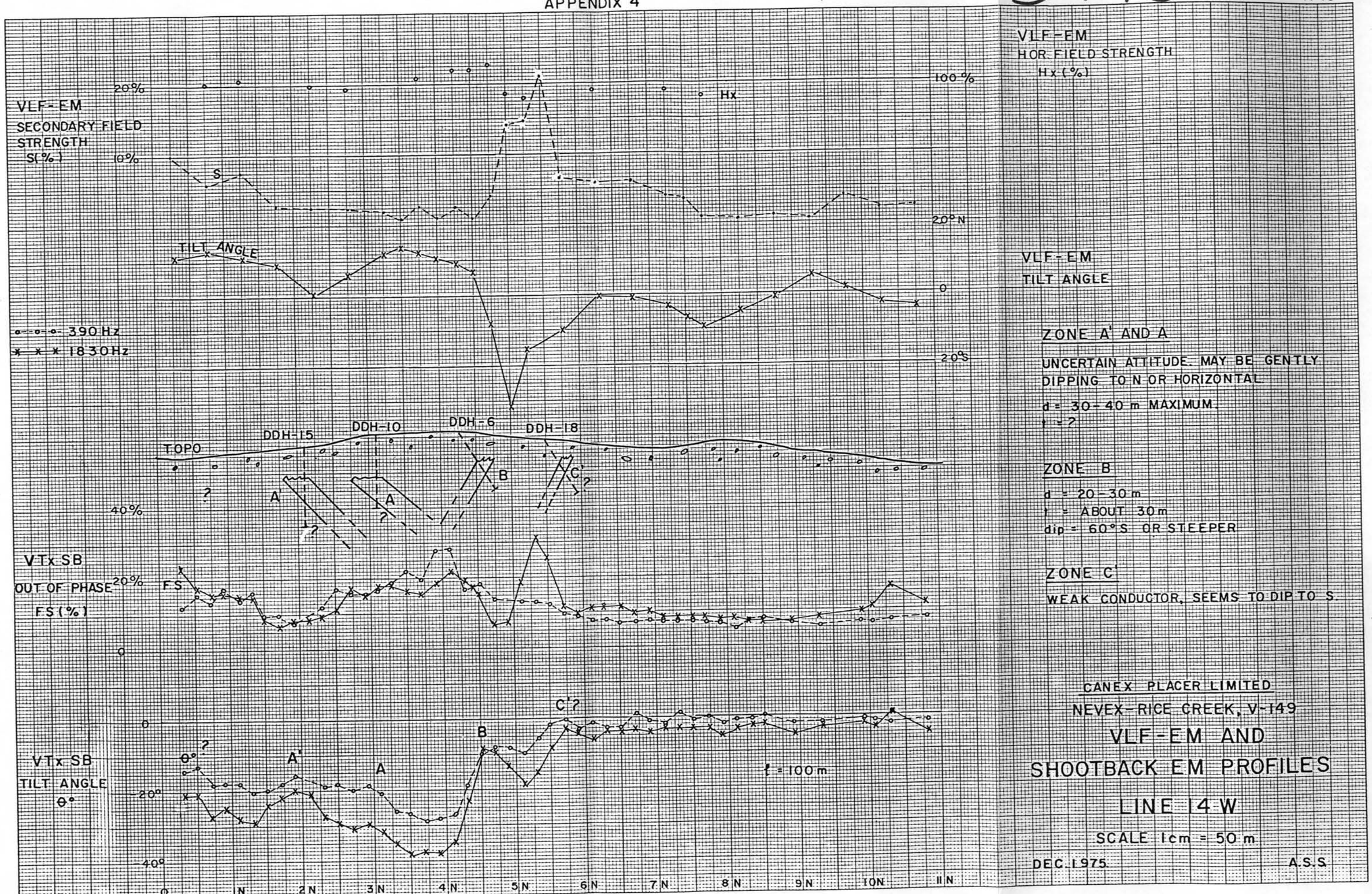

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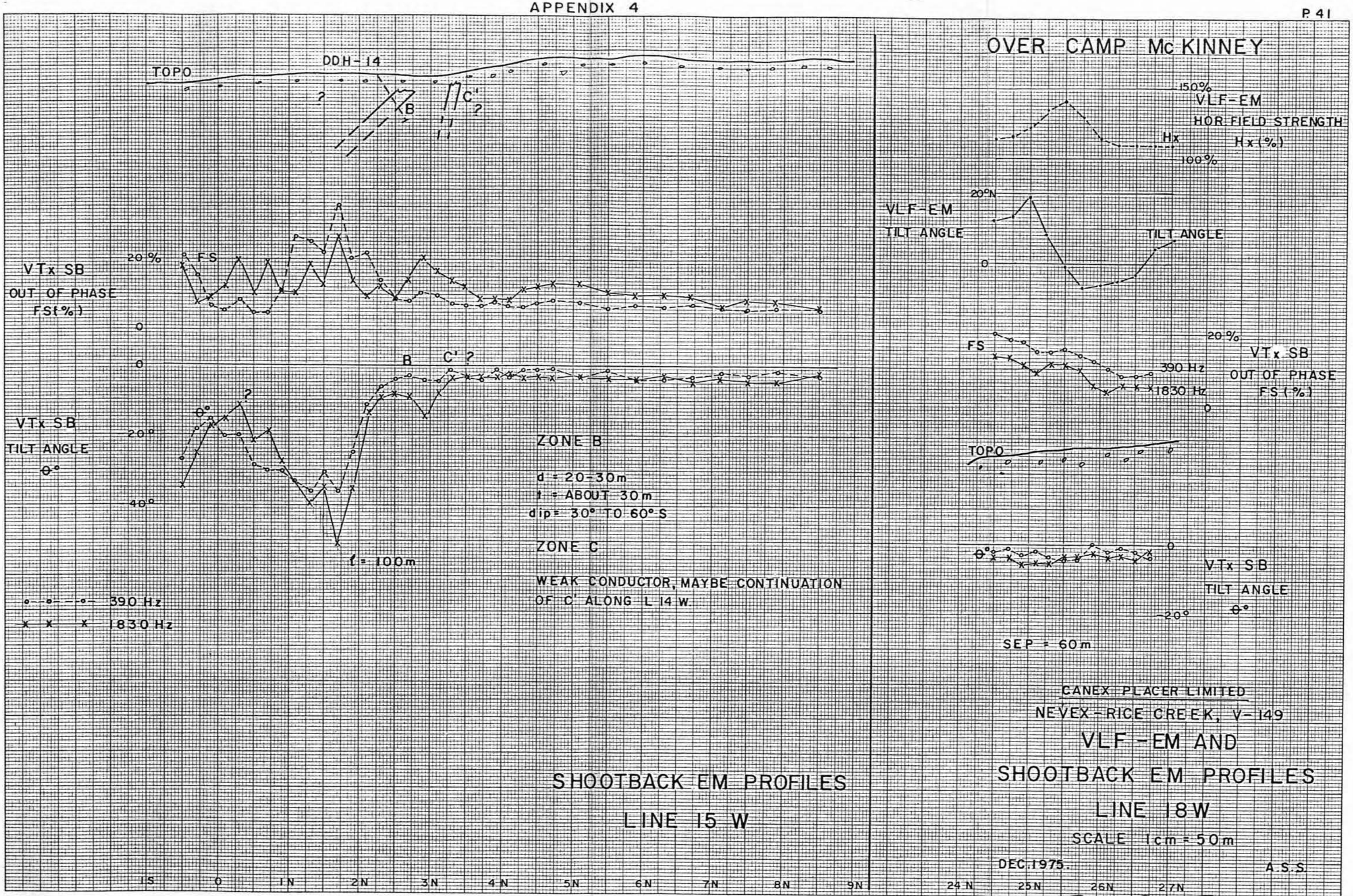

K+E 10 X 10 TO THE CENTIMETER • 25 X 38 CM. KEUFFEL & ESSER CO. MADE IN U.S.A.
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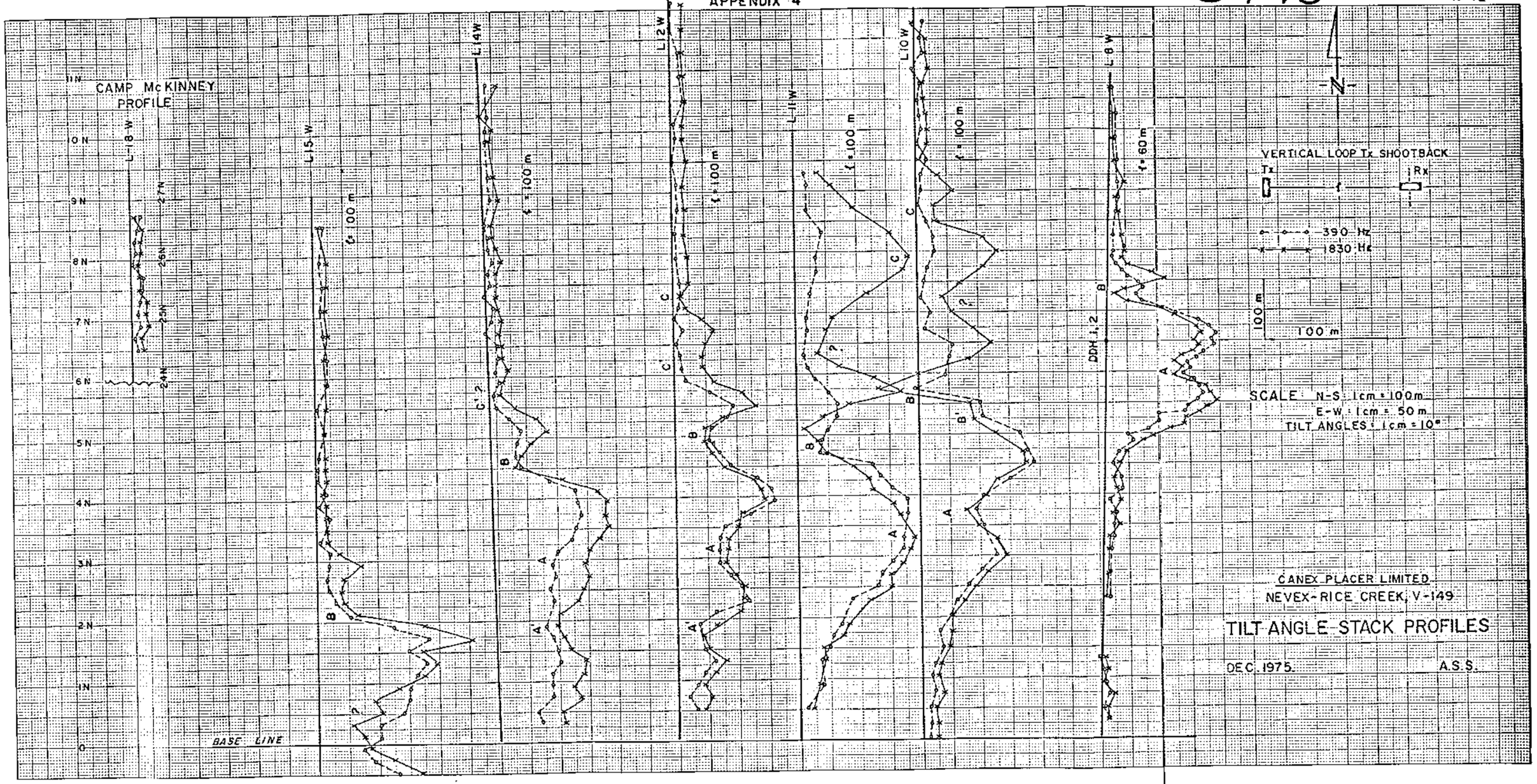
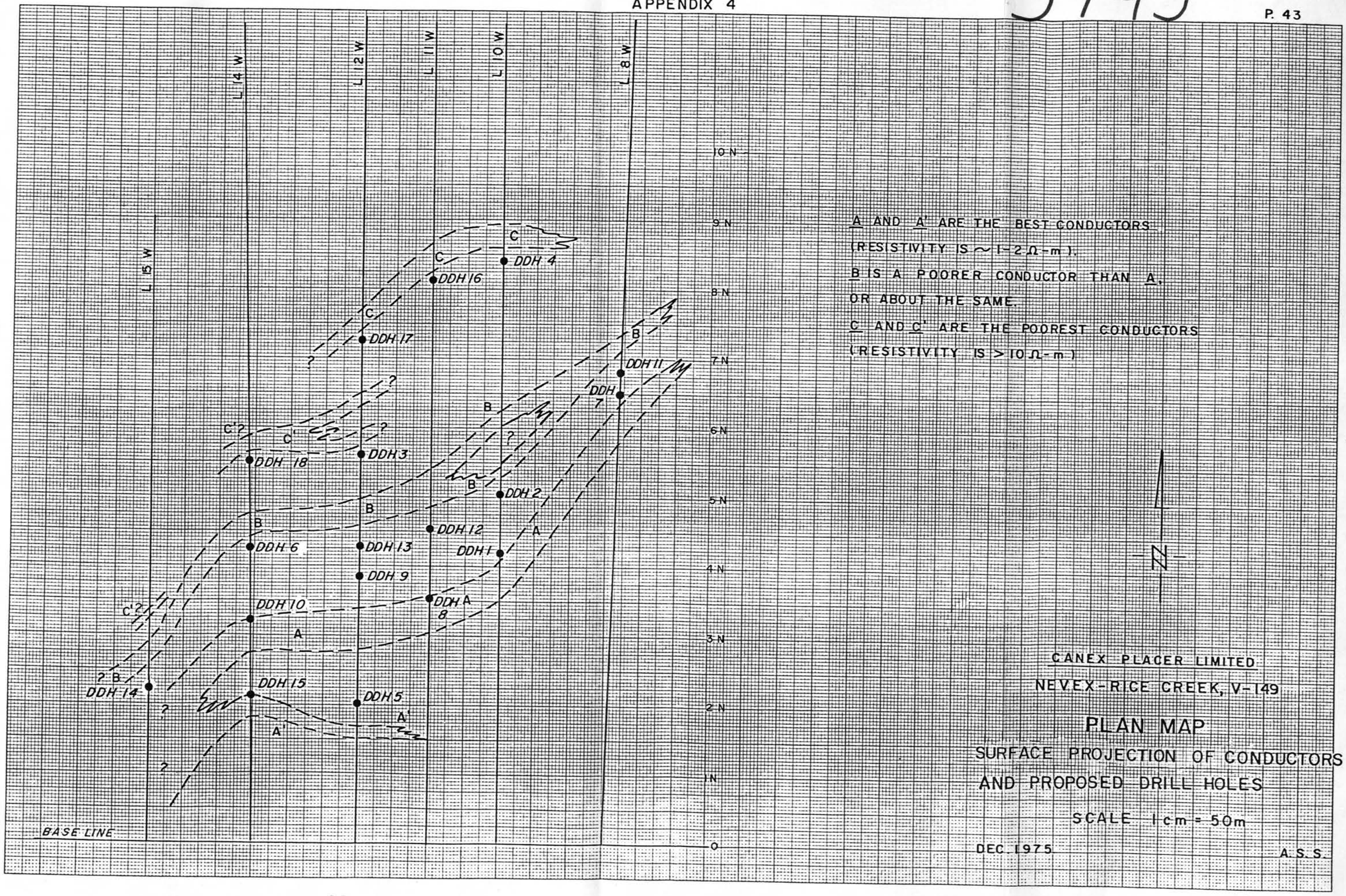

CAMP McKINNEY PROFILE
L18W
L15W
L14W
L12W
L11W
L10W
L8W
f = 100 m
f = 60 m
27N
26N
25N
24N
11N
10N
9N
8N
7N
6N
5N
4N
3N
2N
1N
0
BASE LINE
DDH 1, 2
VERTICAL LOOP Tx SHOOTBACK
Tx
Rx
390 Hz
1830 Hz
100 m
SCALE: N-S: 1cm = 100m
E-W: 1cm = 50 m
TILT ANGLES: 1cm = 10°
N
CANEX PLACER LIMITED
NEVEX-RICE CREEK, V-149
TILT ANGLE-STACK PROFILES
DEC. 1975.
A.S.S.



47 1510
K+E 10 X 10 TO THE CENTIMETER • 25 X 38 CM.
KEUFFEL & ESSER CO. MADE IN U.S.A.

CANEX PLACER LIMITED
EXPLORATION DIVISION

CERTIFICATE OF QUALIFICATIONS

February 19, 1976

I, J.M. Thornton, of 800-1030 West Georgia Street, Vancouver, B.C. do hereby declare:

1. That I have no personal interest in Nevex Mines Ltd., nor have I had in the past.

2. That I have worked in a geophysical capacity for Placer Development Ltd. continuously for at least 8 years.

3. That I worked on the property carrying out the geophysical prospecting during the time period May 26-June 20, Sept. 14-Sept. 20, Nov. 26-Dec. 1, 1975.

4. That I am a graduate of B.C. Institute of Technology (Electronics Technology) in 1967.

Dated at Vancouver, B.C. February 19, 1976

J.M. Thornton
CANEX PLACER LTD.
Geophysicist

700 BURRARD BUILDING • 1030 WEST GEORGIA STREET • VANCOUVER, B.C., CANADA V6E 3A8 • (604) 682-7082

CANEX PLACER LIMITED
EXPLORATION DIVISION

CERTIFICATE

February 19, 1976

I, A.D. Drummond of 800-1030 West Georgia Street, Vancouver, B.C., hereby declare:

1. That I am a registered Professional Engineering (Geological Branch) in the Province of British Columbia.

2. That I am a graduate of the University of British Columbia with Bachelor of Applied Science (Geological Engineering) degree in 1959, with a Masters of Applied Science (Geological Engineering) degree in 1961 and a graduate of the University of California at Berkeley, California with a Ph.D. degree in 1966.

3. That I have worked as a geologist since 1959 and have been employed by Placer Development Limited since 1966. I currently am the Assistant Exploration Manager for Canex Placer Limited in Western Canada.

4. That the work undertaken on the claims of Nevex Mines Ltd. near Camp McKinney, B.C. was carried out under my supervision.

Dated at Vancouver, B.C. February 19, 1976

A.D. Drummond, P.Eng.

A.D. Drummond, Ph.D., P.Eng.
Canex Placer Ltd.
Assistant Exploration Manager
Western Canada

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Canada
Department of Mines
HON. W.A. GORDON, MINISTER; CHARLES CAMSELL, DEPUTY MINISTER

BUREAU OF ECONOMIC GEOLOGY
GEOLOGICAL SURVEY

Issued 1935

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 5795 MAP 2

LEGEND

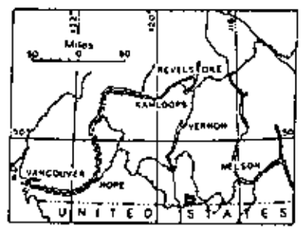
- Alluvium and glacial drift
- 6 — Lavas
- 5 — Granodiorite
- 4 — Granodiorite, quartz diorite (Oliver granite)
- 3 — Sheared amphibolite and serpentine
- 2 — Gneissic granite (Osoyoos batholith)
- 1 — ANARCHIST SERIES: micaceous quartzite, mica schist, crystalline limestone, sheared greenstone

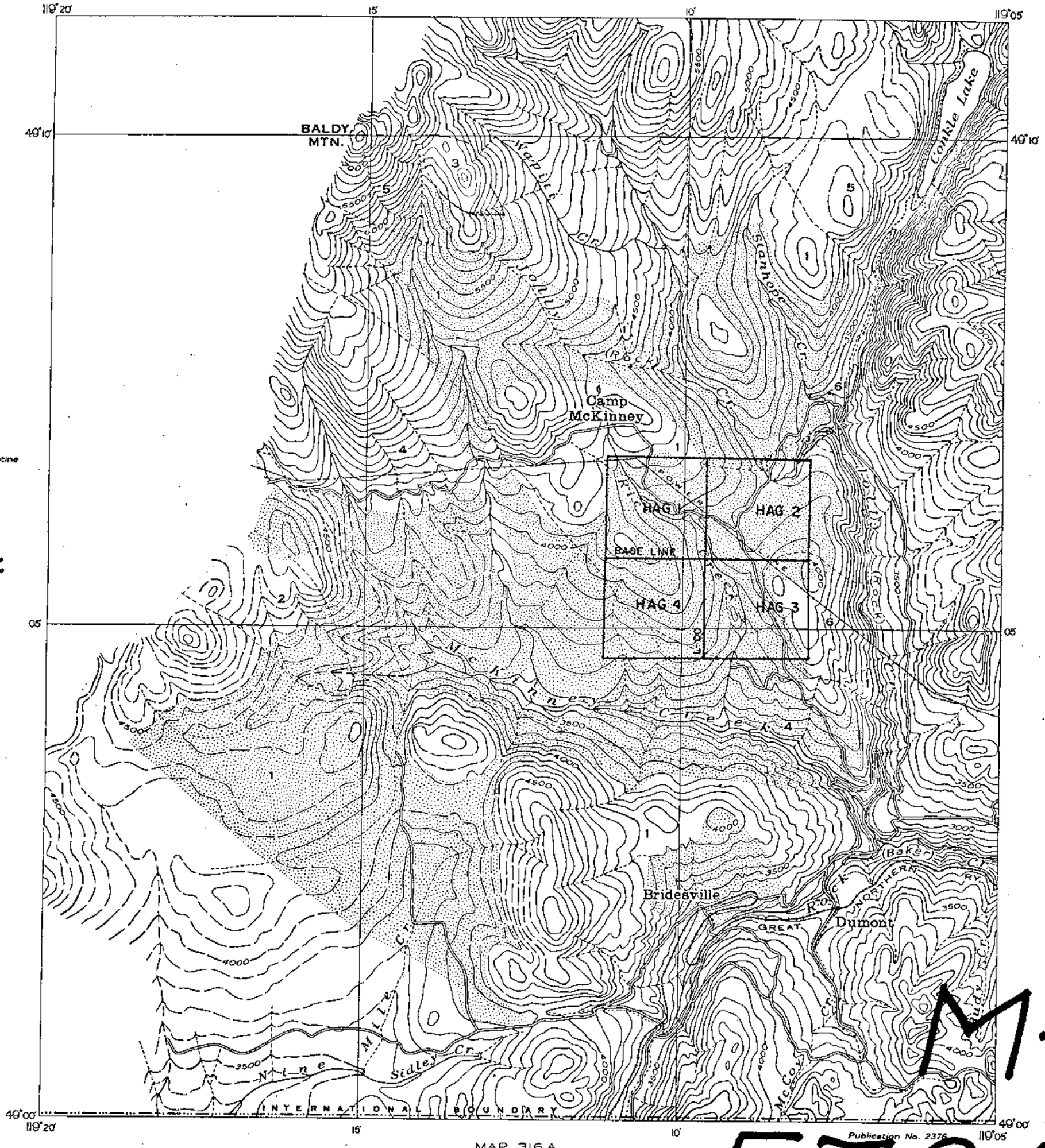
Geological boundary
Road and trail
Power line

Geology by W.E. Cockfield, 1934.

Topography from maps supplied by Department of Lands, British Columbia.

To accompany Memoir by W.E. Cockfield.





Publication No. 2376

MAP 316 A

CAMP McKINNEY

SIMILKAMEEN DISTRICT
BRITISH COLUMBIA

Scale, 1/63360 or 1 inch to 1 Mile

M-2

5795

DIAGRAMS TO ACCOMPANY APPENDIX II

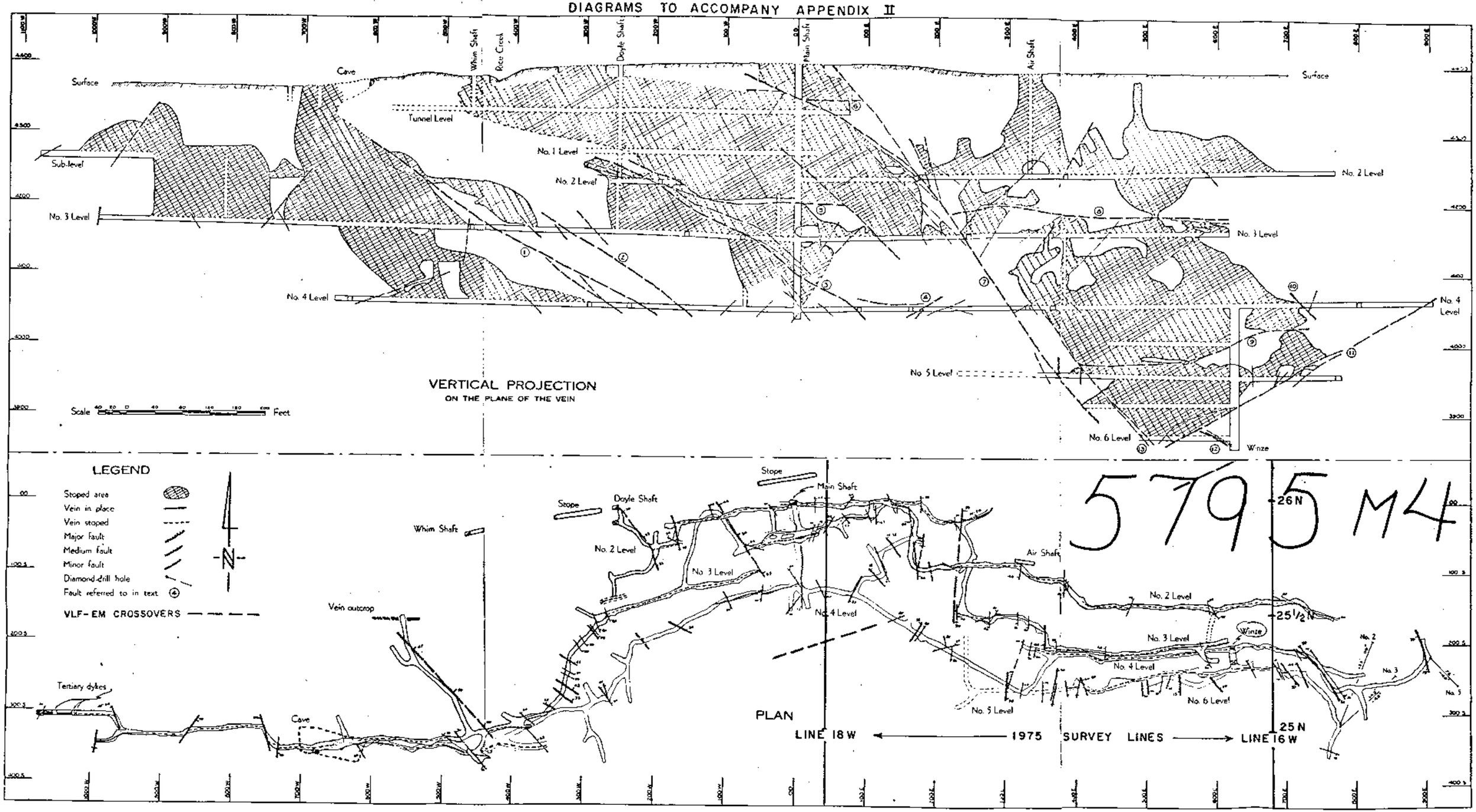
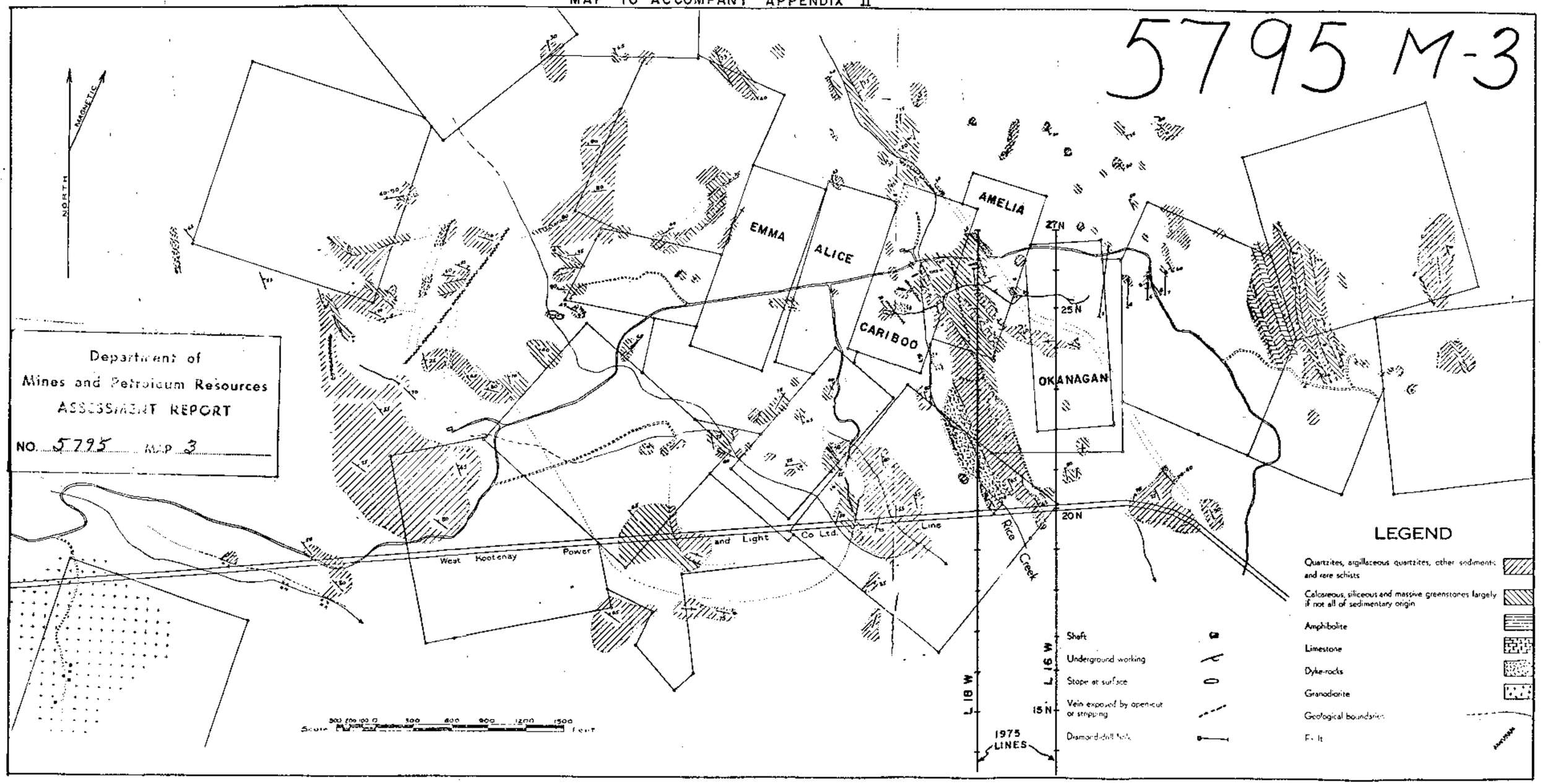
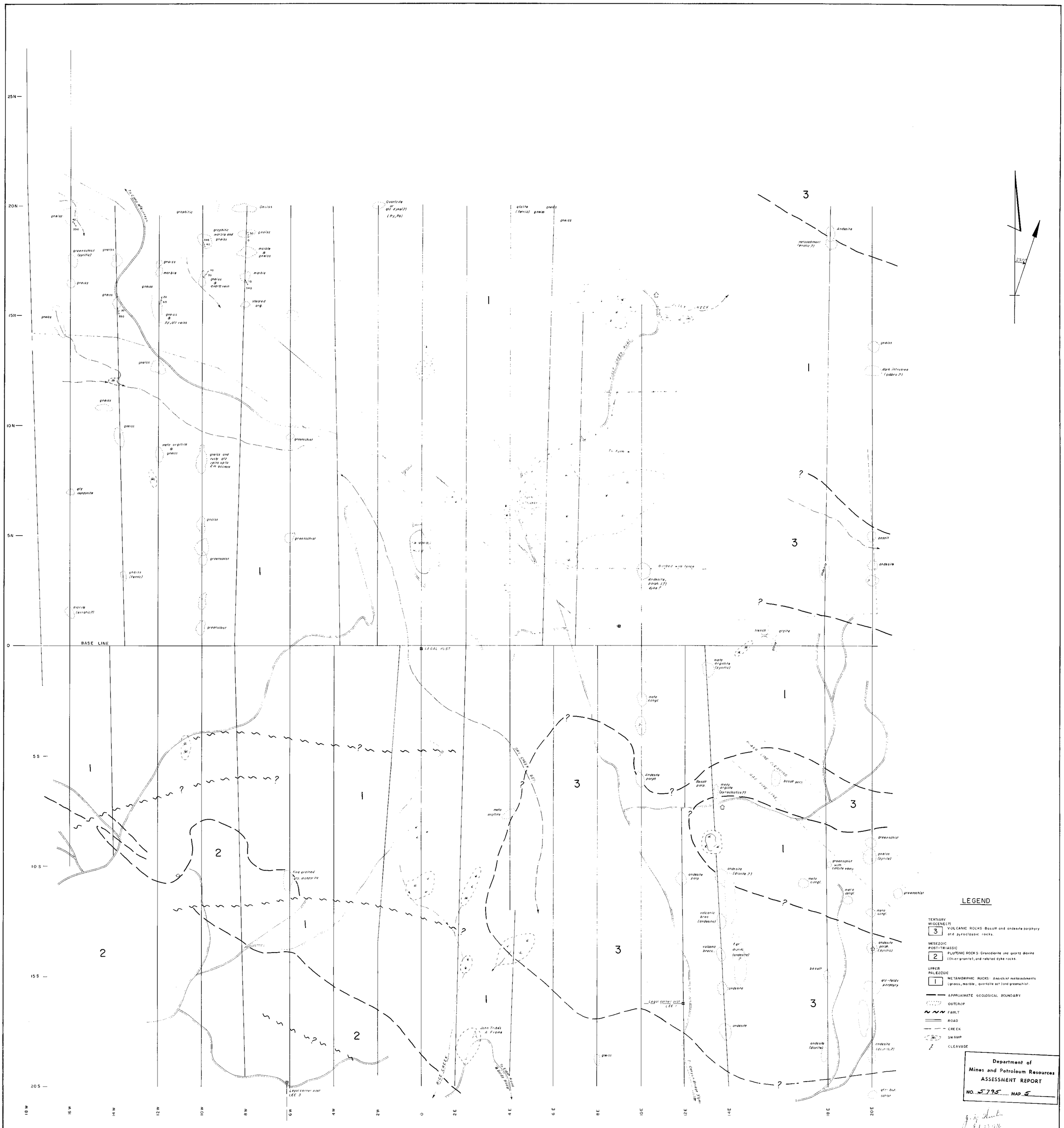


Fig. 3. Plan and vertical projection of Cariboo-Amelia workings (after surveys by Pioneer Gold Mines of B. C. Limited).

MAP TO ACCOMPANY APPENDIX II

5795 M-3

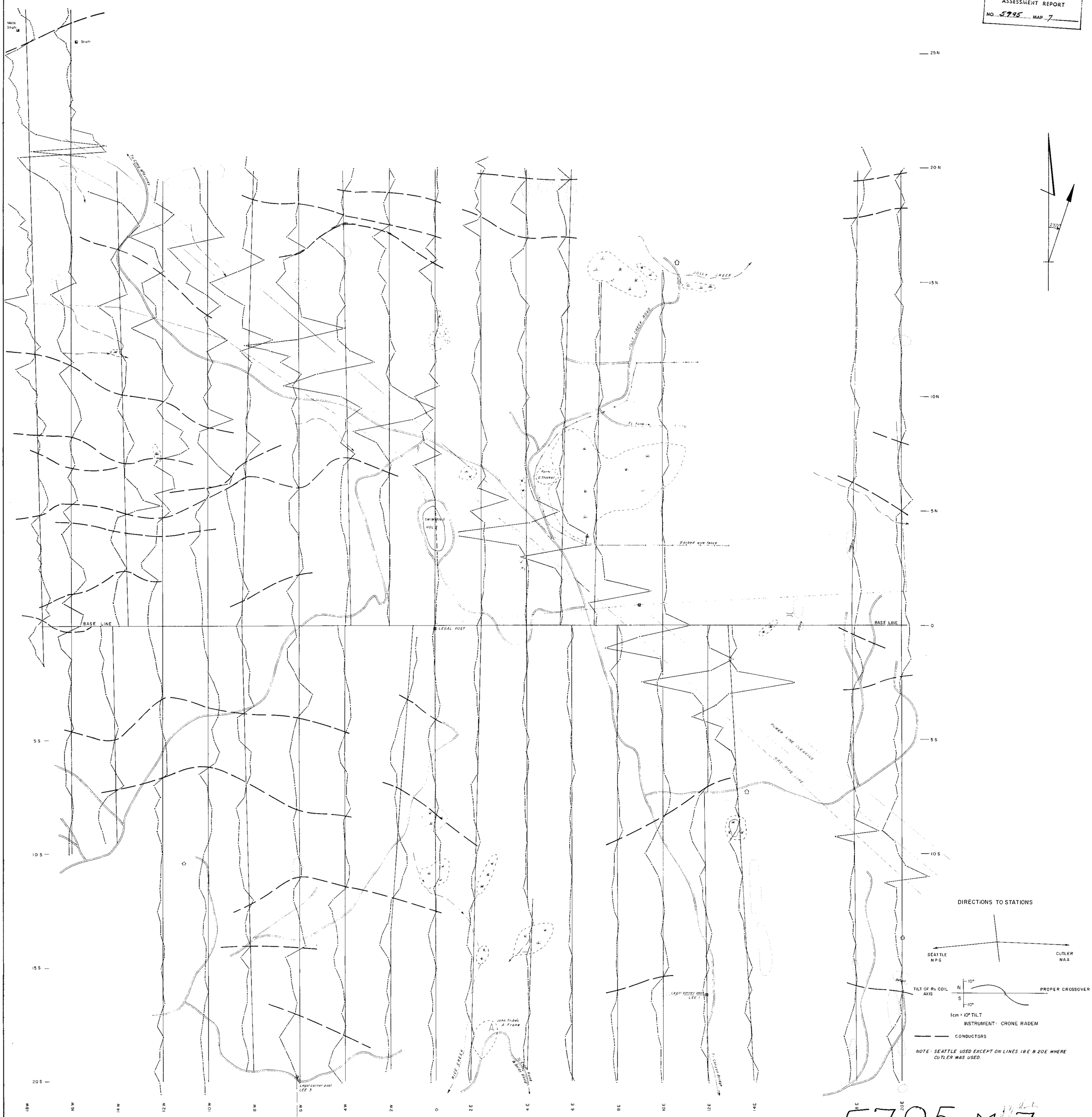




DRAWN A.S.S.	SCALE 1:5000	CANEX PLACER LIMITED	GEOLOGICAL MAP
TRACED J. L.	DATE JUNE, 1975.	NEVEX – RICE CREEK	
APPROVED			FILE NO. V-149

DRAWN	SCALE 1:5000	CANEX PLACER LIMITED	PHYSICAL PLAN SHOWING CLAIMS
TRACED	DATE JUNE, 1975	NEVEX - RICE CREEK	FILE NO. V-149
APPROVED			

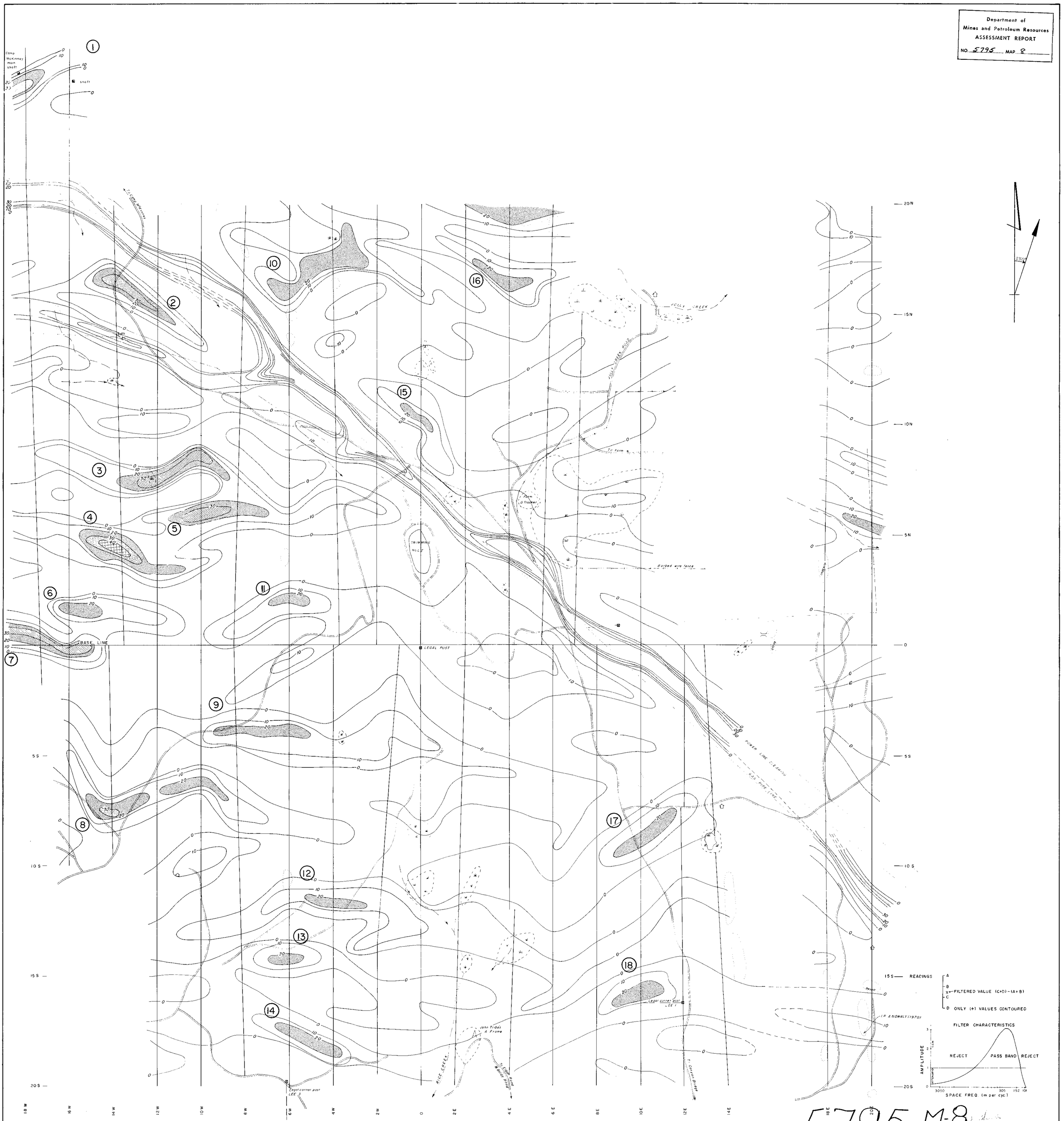
Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 5795 MAP 7



5795 M-7

DRAWN	SCALE 1:5000	CANEX PLACER LIMITED	VLF DIP ANGLE PROFILES
TRACED	DATE JUNE, 1975.	NEVEX – RICE CREEK	FILE NO. V-149
APPROVED			

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 5795 MAP 8

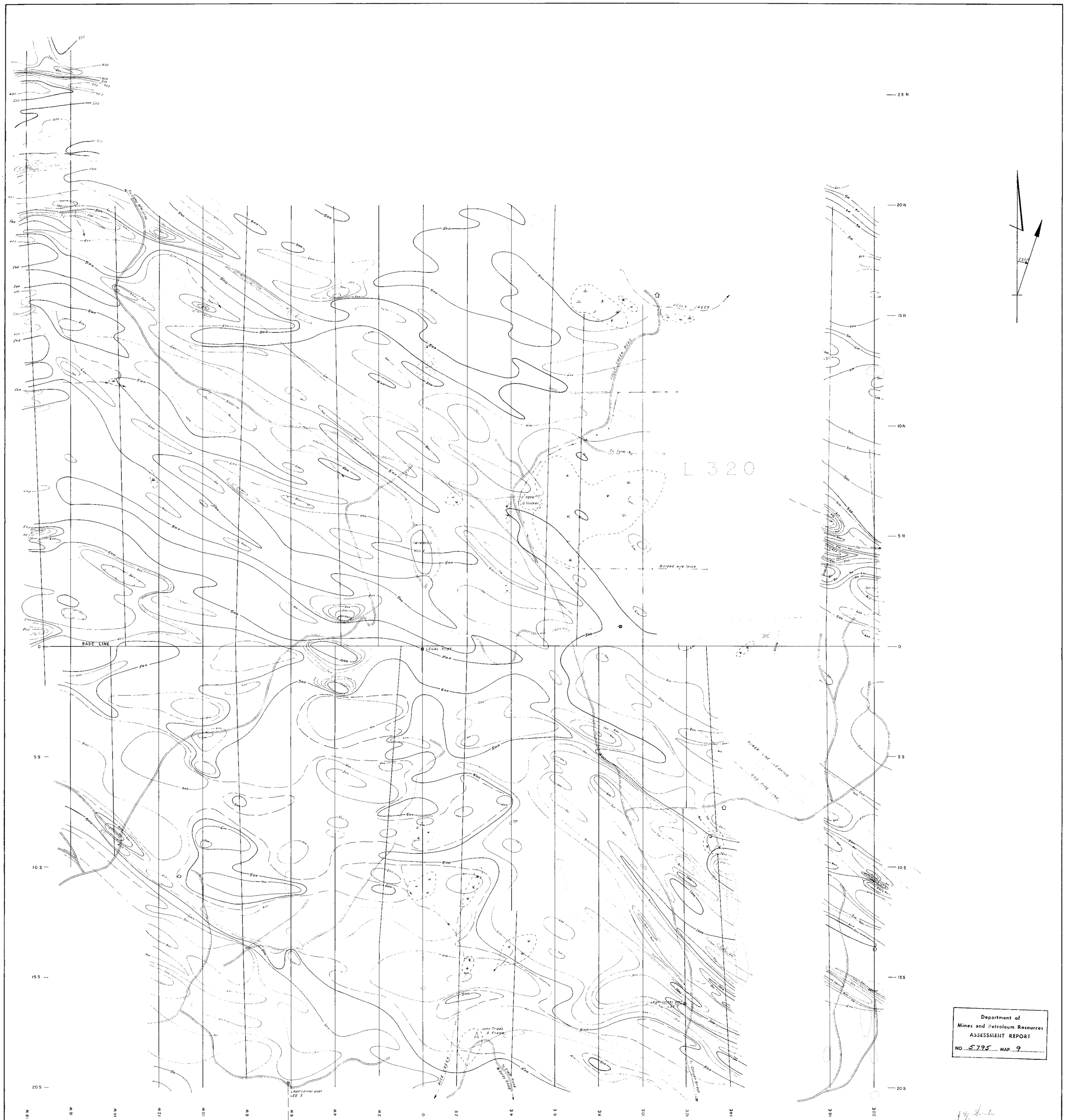


5795 M-8

STATION SPACING 50m

CONTOUR INTERVAL 10 UNITS

DRAWN A. S. S.	SCALE 1:5000	CANEX PLACER LIMITED	VLF Filtered dip angle contour map
TRACED J. L.	DATE JUNE, 1975.	NEVEX - RICE CREEK	FILE NO. V-149
APPROVED			

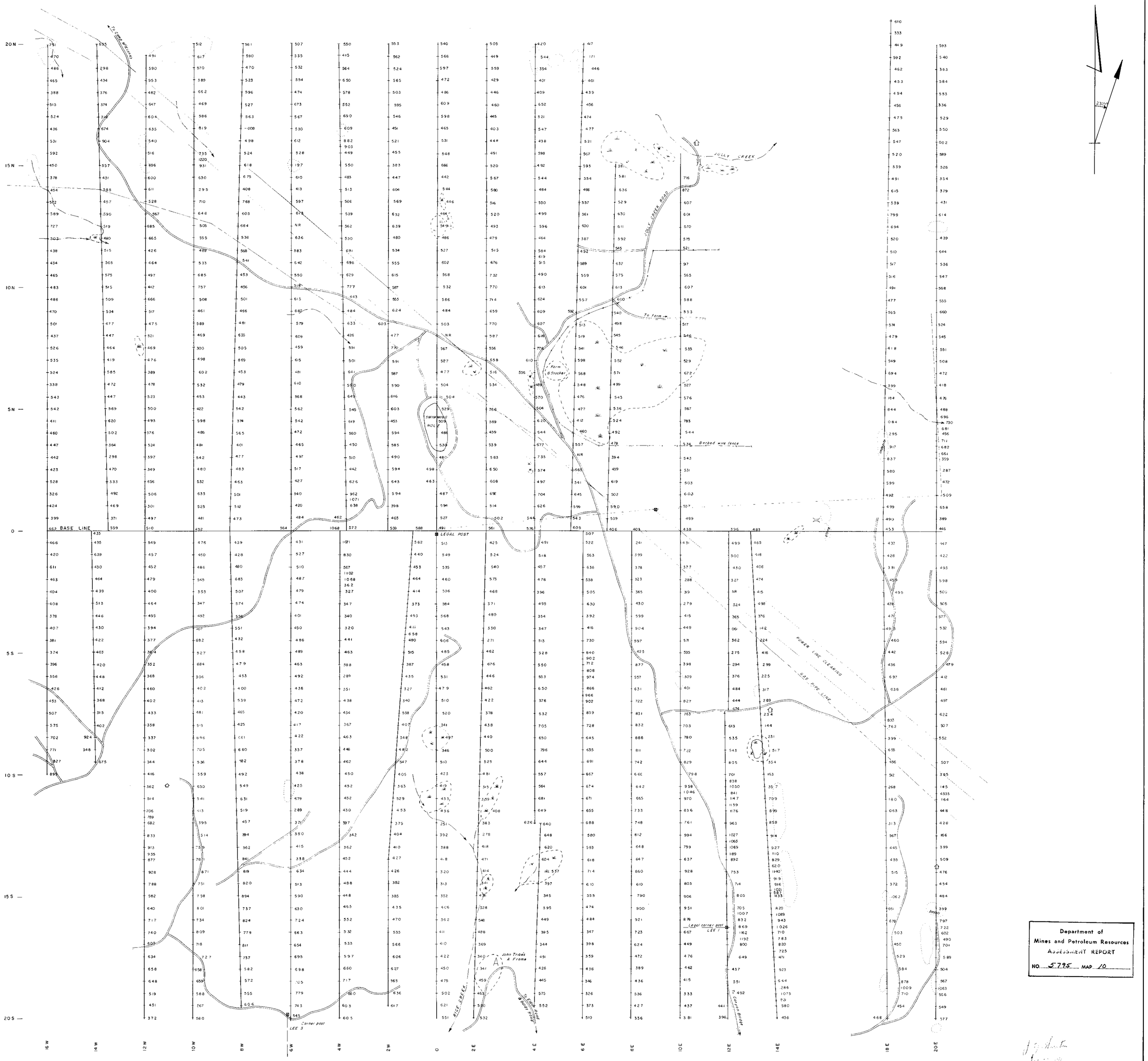


Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 5795 MAP 9

INSTRUMENT: SCINTREX MP 2

NOTE: 57000 GAMMAS REMOVED FROM DATA.

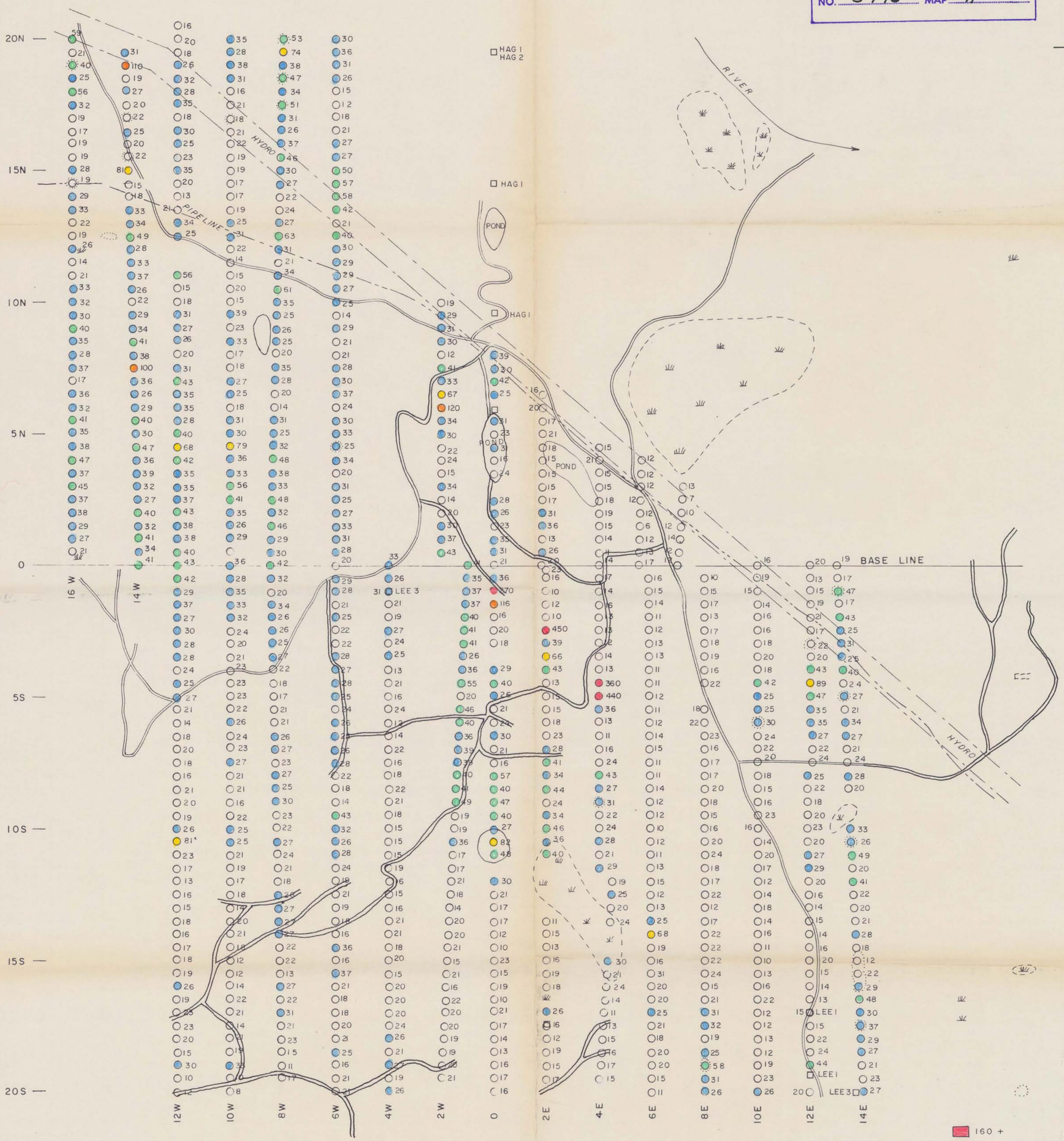
DRAWN	SCALE 1:5000	CANEX PLACER LIMITED	Magnetometer Survey Total Field
TRACED	DATE JUNE, 1975.	NEVEX - RICE CREEK	
APPROVED			FILE NO V-149



Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 5795 MAP 10

DRAWN	SCALE 1:5000	CANEX PLACER LIMITED	
TRACED	DATE JUNE, 1975.	NEVEX - RICE CREEK	FILE NO. V-149
APPROVED			

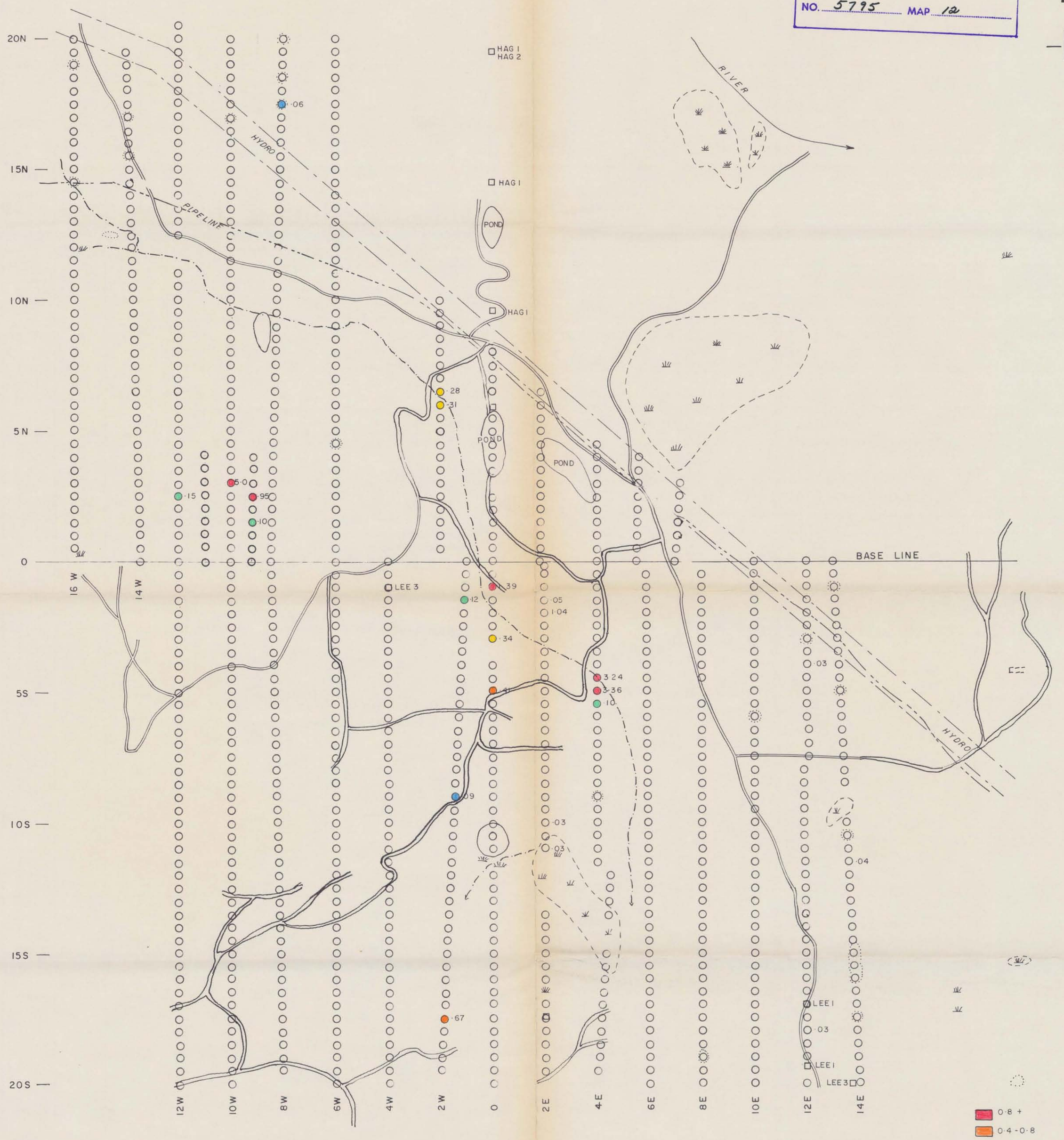
Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 5795 MAP 11



J. M. Thornton
Feb 23, 1976

DRAWN	SCALE 1:10000	CANEX PLACER LIMITED	Hag Claims - Soil Sample Grid
TRACED J. L.	DATE JUNE, 1975.	RICE CREEK 82E3	
APPROVED			FILE NO. V-149

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 5795 MAP 12

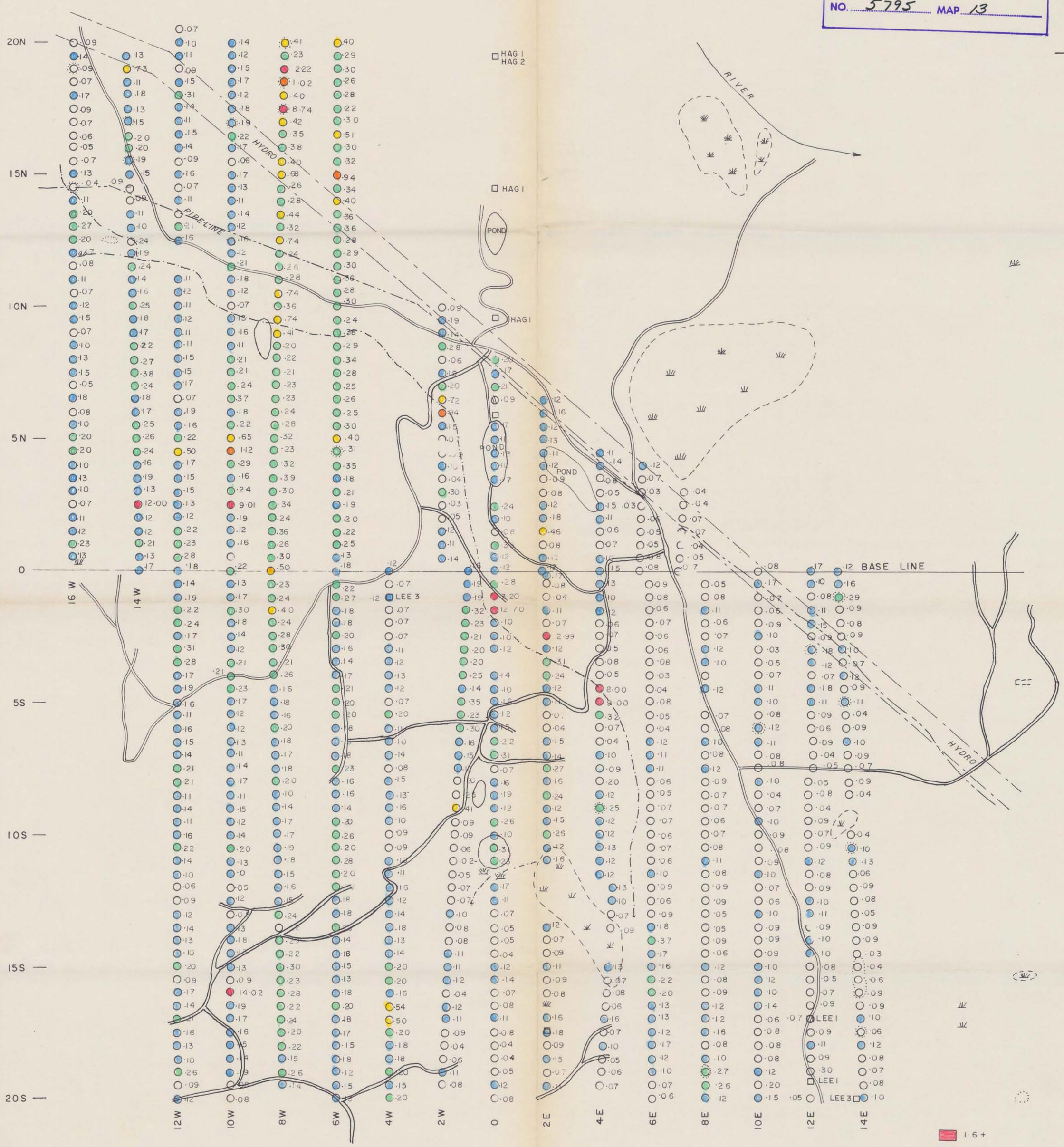


J. M. Thornton
Feb 23, 1976

NOTE: SAMPLE LOCATION WITH OUT NUMBER IS LESS THAN 0.02 ppm Au.

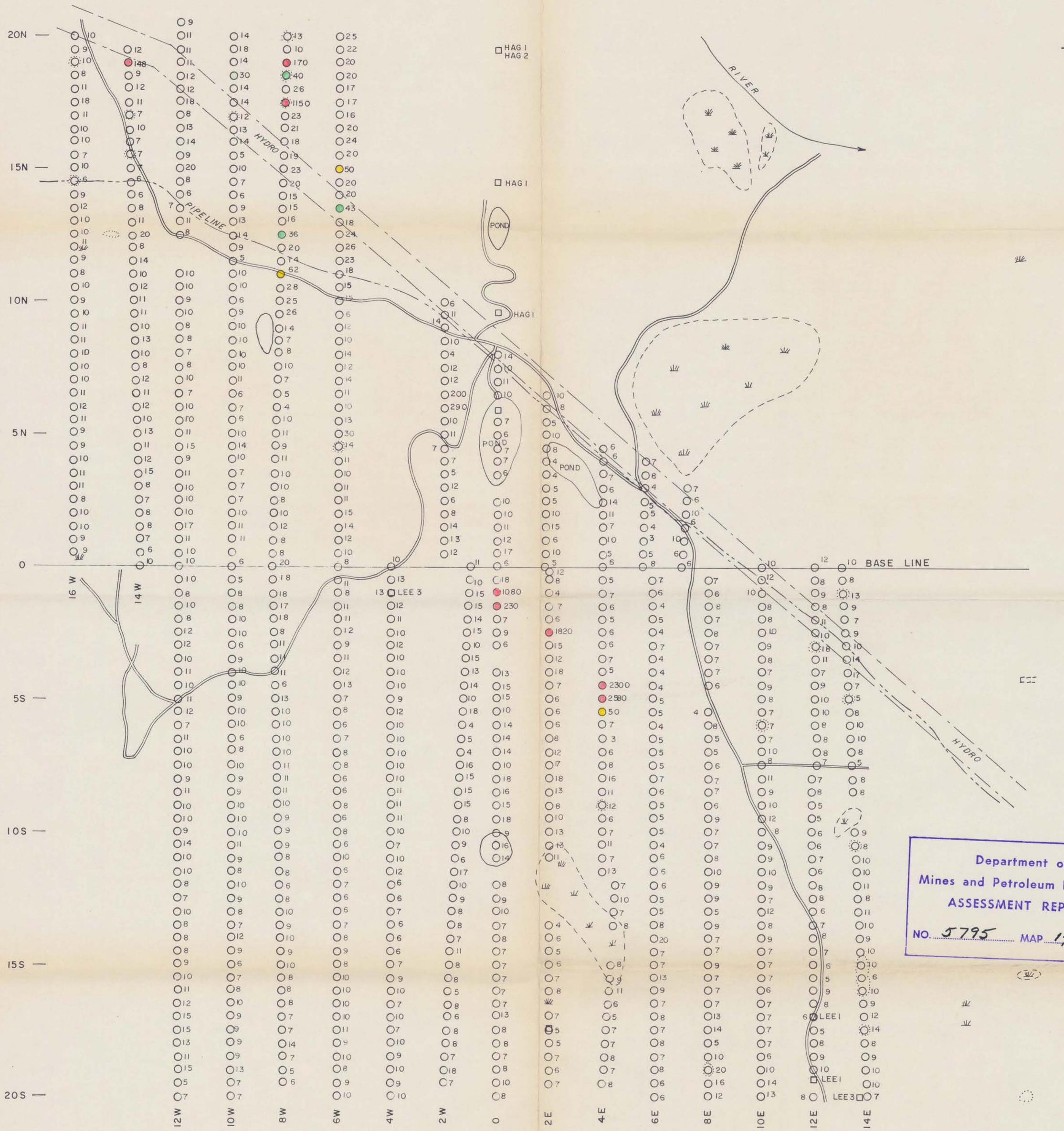
DRAWN	SCALE 1:10000	CANEX PLACER LIMITED	Hag Claims - Soil Sample Grid
TRACED J. L.	DATE JUNE, 1975.	RICE CREEK 82E3	
APPROVED			FILE NO. V-149

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 5795 MAP 13



J. M. Thornton
Feb 23, 1976

DRAWN	SCALE 1:10000	CANEX PLACER LIMITED	Hag Claims - Soil Sample Grid
TRACED J. L.	DATE JUNE, 1975.	RICE CREEK 82E3	
APPROVED			FILE NO. V-149



Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 5795 MAP 14

J. M. Shenton
Feb 23, 1976

DRAWN	SCALE 1:10000	CANEX PLACER LIMITED	Hag Claims - Soil Sample Grid
TRACED J. L.	DATE JUNE, 1975.	RICE CREEK 82 E 3	
APPROVED			FILE NO. V-149