831

line creek resources ltd.

In reply please
quote file:

Mr. Barry Ryan, Coal Geologist
Geological Survey Branch
Ministry of Employment and Investment
1810 Blanshard Street
Victoria, B.C. V8V 1X4

July 19, 1996

Re: Assessment Report for Saddle Surface Geophysics Project

Enclosed, please find a copy of the assessment report for the above project which was completed in 1993. Various components had to be added to Mr. Sharma's base report, which was produced for in-house use only, to create a more complete package.

Any questions about this material should be directed to me.

Thank You.

Yours truly,

T. Hannah

Ted Hannah
Senior Geologist
(604) 425-3118

line creek resources ltd.

In reply please
quote file:

Ministry of Employment and Investment
Energy and Minerals Division
525 Superior Street
Victoria, B.C.
V8V 1X4

Dear Sirs:

Re: Professional Verification of Report
Entitled: Saddle (Ewin Pass) Surface Geophysics
Kootenay Land District, B.C., 1993

Enclosed please find our report on the Saddle Surface Geophysics Project.

This report has been prepared by Mr. A. Sharma and Mr. T. Hannah, both of whom were employed by Crows Nest Resources Limited, now Line Creek Resources Ltd., as geologists.

Mr. A. Sharma, B.Sc., graduated in Geophysics from the University of Calgary in 1989. Prior to his graduation, Mr. Sharma worked as an assistant for a major coal company in the Crows Nest coalfields. Mr. Sharma was employed by Crows Nest Resources Limited as a Project Geologist from May 1989 until December 1993.

Mr. T. Hannah, B.Sc.P.Geol., graduated in Geology from the University of New Brunswick in 1972. Since graduation, Mr. Hannah has spent 24 years working for Shell Canada Ltd., Crows Nest Resources and Line Creek Resources on a wide variety of coal exploration projects in B.C. and Alberta. His present position is that of Senior Geologist, Engineering Group, Line Creek Mine.

In my opinion, these personnel are fully qualified, by training and experience to prepare this report.

Yours truly,

Line Creek Resources

R. Williams

R.Williams, P.Eng.
Chief Engineer

ISO 9001 line creek resources ltd. CERTIFIED

MAILING ADDRESS: P.O. BOX 2003, SPARWOOD, B.C., CANADA V0B 2G0 (604) 425-2555 FAX (604) 425-7144

QMI REGISTERED QUALITY SYSTEM

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List of Figures and Appendices

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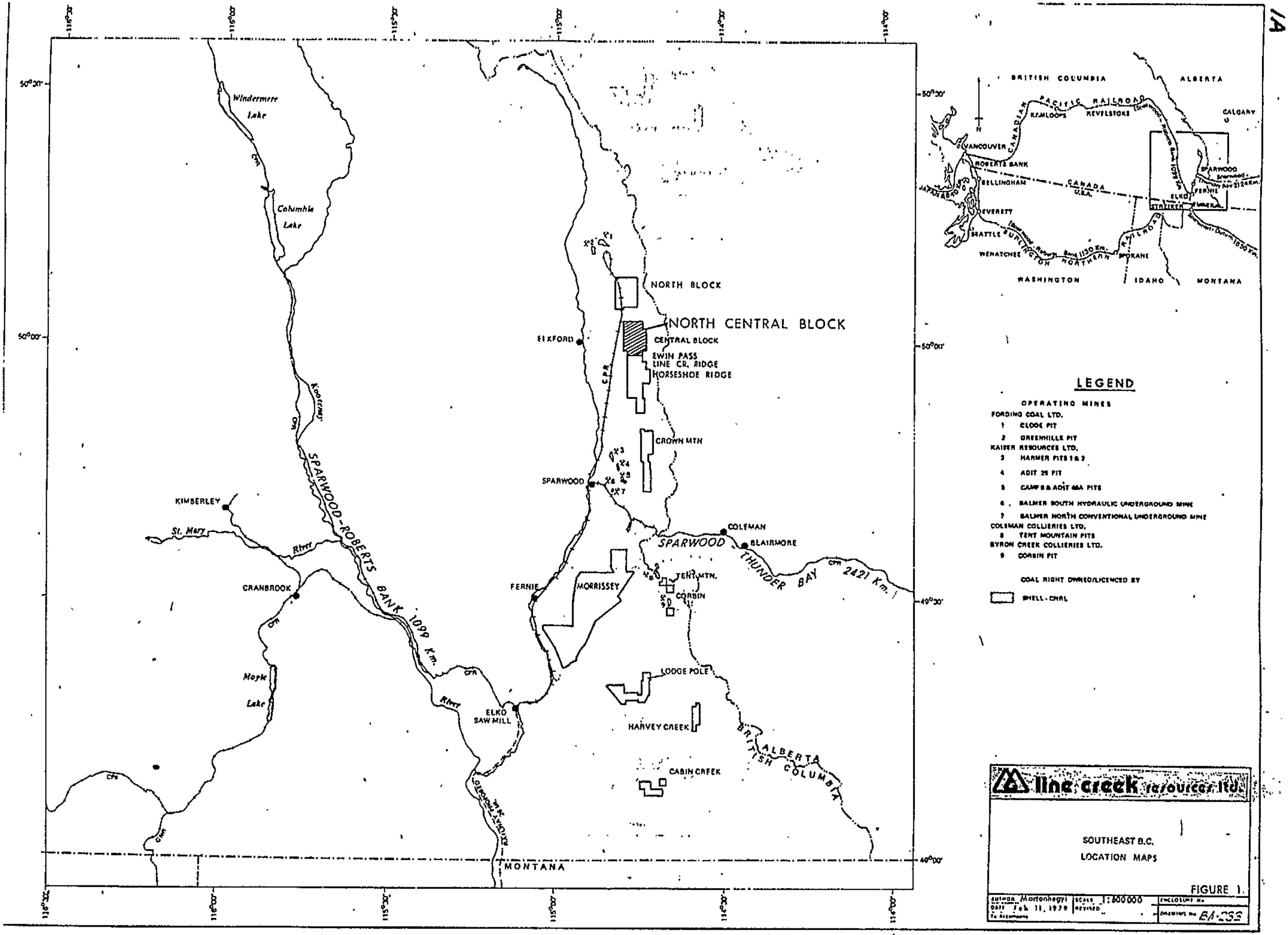

1A
BRITISH COLUMBIA
ALBERTA
CALGARY
CANADIAN PACIFIC RAILROAD
KAMLOOPS
REVELSTOKE
VANCOUVER
ROBERTS BANK
BELLINGHAM
CANADA
U.S.A.
EVERETT
SEATTLE
WENATCHEE
BURLINGTON NORTHERN RAILROAD
SPOKANE
SPARWOOD
FERNIE
ELKO
EUREKA
WASHINGTON
IDAHO
MONTANA
Windermere Lake
Columbia Lake
Kootenay
SPARWOOD-ROBERTS BANK 1099 Km.
KIMBERLEY
St. Mary River
CRANBROOK
Moyie Lake
River
ELKO SAW MILL
NORTH BLOCK
NORTH CENTRAL BLOCK
CENTRAL BLOCK
EWIN PASS
LINE CR. RIDGE
HORSESHOE RIDGE
ELKFORD
CROWN MTN
SPARWOOD
COLEMAN
BLAIRMORE
SPARWOOD - THUNDER BAY 2421 Km.
TENT MTN.
CORBIN
FERNIE
MORRISSEY
LODGE POLE
HARVEY CREEK
CABIN CREEK
ALBERTA
BRITISH COLUMBIA
MONTANA
CPR
50°30'
50°00'
49°30'
49°00'
116°30'
116°00'
115°30'
115°00'
114°30'
114°00'
LEGEND
OPERATING MINES
FORDING COAL LTD.
1 CLODE PIT
2 GREENHILLS PIT
KAISER RESOURCES LTD.
3 HARMER PITS 1 & 2
4 ADIT 29 PIT
5 CAMP 2 & ADIT 29A PITS
6 BALMER SOUTH HYDRAULIC UNDERGROUND MINE
7 BALMER NORTH CONVENTIONAL UNDERGROUND MINE
COLEMAN COLLIERIES LTD.
8 TENT MOUNTAIN PITS
BYRON CREEK COLLIERIES LTD.
9 CORBIN PIT
COAL RIGHT OWNED/LICENCED BY
line creek resources ltd.
SOUTHEAST B.C.
LOCATION MAPS
FIGURE 1.
AUTHOR Mortonhegyi
DATE Feb 11, 1979
SCALE 1:800 000
BA-233

Objectives

The objectives of the 1993 Saddle (Ewin Pass) Area project were to experiment with Horizontal Loop Electro - Magnetics and use the obtained data to assist in the interpretation of the structural geology of the area.

Location

Geographic Location

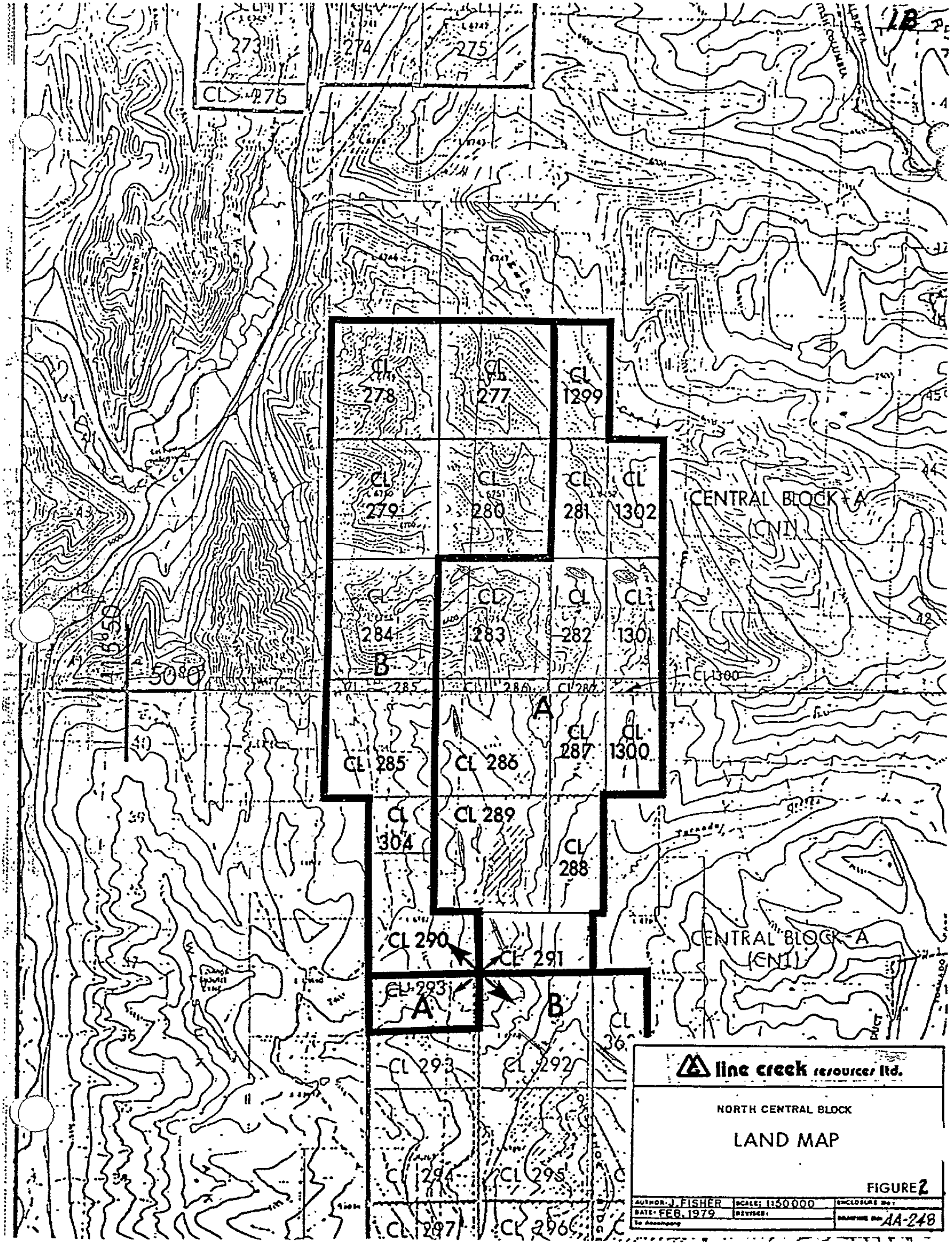
The property is located adjacent to the Elk River Valley in the Crowsnest Pass of the Rocky Mountains in the Southeastern British Columbia. The property is approximately 1150 kilometres east of Vancouver and 27 kilometres north of the town of Sparwood. (Figure No. 1)

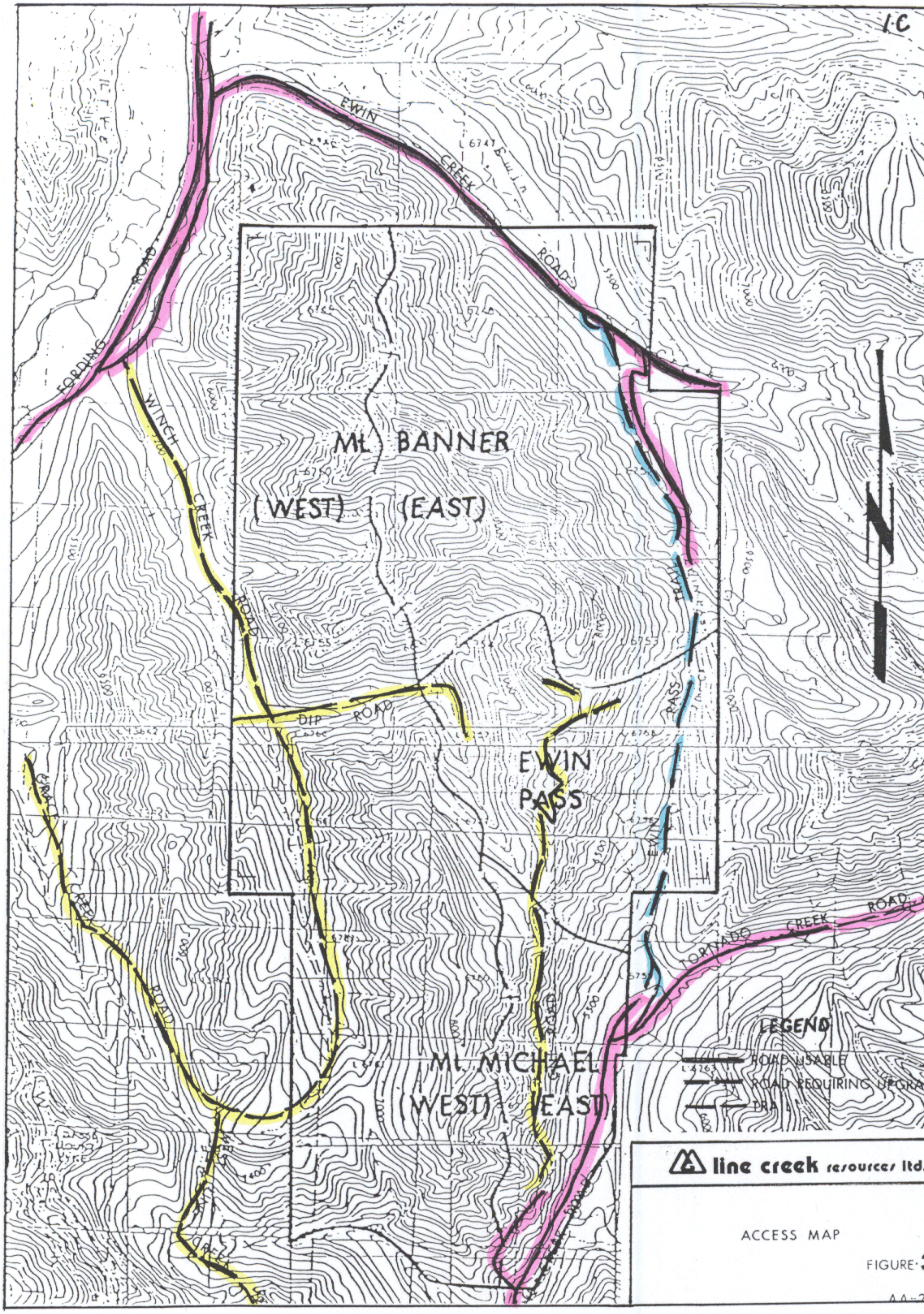
The North Central Block is to be found on National Topographic System (NTS) map 82G, FERNIE (1: 250 000), 82G/15, TORNADO MOUNTAIN (1: 50 000), and 82J/2 FORDING RIVER (1: 50 000). It is encompassed by 49° 57' N, 50° 03' N, and 114° 44' W, 114° 48' W of the prime meridian, and comprises slightly more than 43 km^2.. (Figure No. 2)

Access

The southern portion of the area is accessible from the south via the Line Creek Road. This road follows the valley floor, paralleling the North Central Block for approximately 2.7 km. It is necessary to climb the slopes from the valley - bottom road to the work area, on useable exploration roads.

Crows Nest industries Limited constructed a road, (CNI Road), from the valley floor to Ewin Pass Ridge in the late 1960's. This road has been maintained and is in fair condition. (Figure No. 3)


1B
273
274
275
CL 276
CL 278
CL 277
CL 1299
CL 279
CL 280
CL 281
CL 1302
CENTRAL BLOCK - A
(CN1)
CL 284
CL 283
CL 282
CL 1301
B
A
CL 285
CL 286
CL 287
CL 1300
CL 304
CL 289
CL 288
CL 290
CL 291
CL 293
A
B
CENTRAL BLOCK - A
(CN1)
CL 293
CL 292
CL 294
CL 295
CL 297
CL 296
line creek resources ltd.
NORTH CENTRAL BLOCK
LAND MAP
FIGURE 2
AUTHOR: J. FISHER
SCALE: 1:50 000
DATE: FEB. 1979
DRAWING No. AA-248


1.C
EWIN CREEK ROAD
FORDING ROAD
WINCH CREEK ROAD
Mt. BANNER
(WEST) (EAST)
DIP ROAD
EWIN PASS
EWIN PASS
TORNADO CREEK ROAD
Mt. MICHAEL
(WEST) (EAST)
LEGEND
ROAD USABLE
ROAD REQUIRING UPGRA
TRAIL
line creek resources ltd.
ACCESS MAP
FIGURE 3

2A

Era	Period or Epoch	Group Formation	Lithology	Thickness (m)
MESOZOIC	Disconformity			
	Lower Cretaceous	Crowsnest Formation	Trachyte agglomerate, tuff, volcanic - rich sandstone; mudstone, conglomerate	28
	Lower Cretaceous May be younger		Trachyte, syenite, volcanic breccia.	
	Lower Cretaceous	Blairmore Group	Grey and greenish sandstone, arkosic sandstone, green and red mudstone; minor brown limestone.	100 - 208
	Disconformity			
	Jurrassic and Cretaceous	Kootenay Formation	Dark grey, carbonaceous sandstone and conglomerate sandstone, siltstone, shale ; coal.	28 - 94
	Jurassic	Fernie Group	Grey calcareous shale, shaly limestone, silty limestone; dark grey shale, limestone; sandstone.	69
	Disconformity			
	Triassic	Spray River Formation	Grey dolomitic siltstone and sandstone; brown siltstone and silty shale	17

line creek resources ltd.

TABLE of FORMATIONS

FIG. 4

Dwn. by:	Date:
Chk'd. by:	File no.:

Geology

Regional Stratigraphy

The Kootenay Formation of Upper Jurassic - Lower Cretaceous age is the coal - bearing sequence of south-eastern B.C. It is a thick sequence of clastic sediments representing delta progradation over marine shales, siltstone and sandstones of the Jurassic Fernie Formation. (Figure No. 4)

Deposition was initiated by an epeirogenic uplift of the source area in early phases of the Columbian Orogeny in Late Jurassic time. The Kootenay section thickens from east to west; the source of sediments being southwest and the shoreline on the east and northeast. Its thickness within the Upper Elk Coal Field ranges up to 100..

The Kootenay Fm. can be subdidvided into three main units. (Figure No. 5) A basal, clifff-forming "Moose Mountain Member" is composed predomintely of sandstones and shales. It is a prograding sequence of delta front sheet sands, barrier bars and tidal channel deposits.

The middle "Coal - bearing Member" is generally in sharp contact with the underlyinng Moose Mountain sandstone. It consists of alternating beds of sandstone, shale, siltstone and coal representing prograding delta plain environments. The Coal - bearing Member is 245m - 860m thick, including 6m to 61m of coal in the south contained within two seams and up to 90m of coal in 23 seams on the north.

The upper portion of the Kootenay Fm., the "Elk Member", consists of alternating sandstone, siltstone, shale and conglomerates with minor lenticular coal beds. It represents progradation of the alluvial plain over the delta plain coal - forming environments.

The upper contact of the Kootenay is an erosional surface. It is overlain by the Cretaceous Blairmore Group, beginning with rejuvinated piedmont-plain deposits of the Cadomin Formation (Cadomin Conglomerate).

Only erosional remnants of the Kootenay Formation are preserved in the south of the Fording Syncline. A 10° north plunge on the syncline preserves an increasing thickness of

Norris 1959 Alberta		Newmarsh 1953 British Columbia		Jansa 1972 Alberta - B.C.		Gibson Alberta - B.C.
		Cadomin Fm.		Cadomin Fm.		
		Elk Formation	KOOTENAY Fm	Elk Member	KOOTENAY Fm	Pocaterre Mbr.
						Elk Member
KOOTENAY Fm.	Mutz Member	Kootenay Formation		Coal Bearing Member		Coal Bearing Member
	Hillcrest Member					
	Adnac Member					
	Moose Mtn. Mbr	Moose Mtn Mbr		Moose Mtn. Mbr		Basal Sandstone Unit A Unit B
		Fernie Fm.		Fernie Fm.		

Nomenclature chart illustrating and comparing the main Kootenay and stratigraphically adjacent formations and members recongnized.

Figure no.

line creek resources ltd.

KOOTENAY FORMATIONS

FIG. 5

Dwn. by:	Date:
Chk'd. by:	File no.:

Kootenay section to the north. Faulting and folding has caused some repetitions of the section and thickening of the coal seams.

Shales are generally dark gray to black, slightly calcareous, lensy and thin. Two notable exceptions occur persistently at 12m and 16m below the top of the Moose Mountain Member. The thickness randges from 0.2m to 1,0m and lithology varies from carbonaceous shale to bright coal. These beds appear as two slightly recessive layers in the moose Mountain Member outcrops, especially noticable along the west side of the ridge.

The lower contact of the Moose Mountain Member is transitional into Pasage Beds (Fernie Formation) while the upper contact is generally sharp below the #10A seam of the Coal - bearing Member.

The middle Coal - bearing Member is an interbedded sequence of shale siltstones, sandstones and coal.

Shales range from carbonaceous to silty and dark gray to black in color. Thin laminea of siltstone and coaly stringers of wisps are common throughout the section. In road cuts (constructed between 1968 and 1971) the carbonaceous shales are almost completely sloughed over whereas the silty shales are ofte still partially exposed.

Siltstones are interbedded with shales and sandstones or occur in transition from one to the other. Roadcut occurances are often still well exposed.

Sandstones are fine - to medium grained and tend to become coarser down section. Laminar bedding, crossbedding and soft sediment deformation are seen throughout. The lower 75m of the Coal-bearing Member (below #8 seam) has a higher proportion of thick, persistant sandstone units, some of which are easily correlated in drill holes. Above #8 seam, sandstones in the Coal-bearing Member are less common, thinner, and move more variable. Their upper and lower contacts tend to be graditional, compared with the relatively sharp sandstone contacts below #8 seam. Petrographic analysis of the cliff-forming quartzite between #8 and #9 seams (G. Wilson, 1976) is as follows:

Quartz & Chert	73%
Cement - Silica	20%
Matrix	7%
Accessory Minerals	Trace
	100%

Coal seams are numbered from the top #1, #2, #3, #4, #5, #6, #7, #8. #9, #10B, #10A, with 45% of the coal thickness occuring in the lower four seams. The main mineable seams are:

- #4, two coal seams, separated by a shale parting

Average thickness is 8.0 m.

- #6, two coal seams separated by a shale parting which ranges in thickness from zero to 13.0 m.

Average thickness is 2.4 m.

- #7, maintains a regular thickness of about 6.0 m.
- #8, is the thickest seam, averaging 12.5 m. Its stratigraphic and geophysical characteristics are very consistent. Thickness variations are probably due to structural disturbances (faulting and / or folding).
- #9, maintains a regular thickness (average 4,5 m) except where faulted. Its upper contact is interbedded carbonaceous shale and shaly coal and is therefore not as sharp as the basal contact.
- #10A, maintains a regular thickness (average 2.8 m). Its basal contact is often a sandy coal or coaly sandstone.

Regional Structure

The Coal-bearing Kootenay Formation occurances of southeastern B.C. are preserved in north - south trending synclines referred to as the East Kootenay Coalfields. High structural relief of Paleozoic rocks surrounding the coalfields fades out in relatively incompetent rocks of the Fernie and Kootenay formations. The structure within the syncline is complicated to varying degrees by thrust faults and their associated folds, and also by normal faults. The complexity of this structure increases towards the thinner, east side of the coalfields where they have been thrust against the underlying Paleozoics.

The East Kootenay Coalfields can be subdivided into three coal-bearing areas. From south to north they are the Flathead Coalfield, the Fernie Coalfield and the Upper Elk Coalfield. Since they are all part of the same depositional complex, the subdivision is based on erosional boundaries and structural boundaries. (Figue No. 6, found in pocket)

Upper Elk Coalfield

The Upper Elk Coalfield is an elongated basin composed of two major synclines (Greenhills and Fording) separated by an anticline and the northern extension of the Erickson normal fault. The eastern, Fording syncline, can be traced northwards from Alexander Creek to the Kananaskis Lakes. At its south end, it is symmetric with moderate to steep dips on both limbs. To the north it becomes more asymmetric with a west dipping axial plane, vertical strata on the west limb and moderately dipping strata on the east limb.

On the west side of the Erickson Fault, the Greenhills syncline has been downthrown approximately 900 m. It can be traced up the Elk River Valley from Fording Mountain to where it is cut off by the Elk River Thrust. The Greenhills Syncline is slightly asymmetric with a west dipping axial plane.

Structure Saddle (Ewin Pass) Area

In the Saddle (Ewin Pass) Area we have the benefit of results from 9 dfrill holes to give us a better understanding of the dip and nature of the coal seams.

In this area there is strong evidence for faulting along the trend of the synclinal axis. The sudden change in magnitutde of the dip of the strata on the east limb from the horizontal to approximately 65° in a few tens of metres indicates that the fault continues northwards along the axial fold line.

The Fording River thrust fault is present in the North Central Block and is mapped from the southernmost portion of Mt. Michael into the Saddle (Ewin Pass) sector. The dip of the beds in the east limb of the syncline generally decrease as one moves from the south to the north. In the Saddle (Ewin Pass) sector the measurement of dip ranges from 30° - 40° W. The dip of the coal seams in this area are almost coincident with the slope of the ground, presenting an advantageous situation for an open pit mining operation.

Thrust faulting along bedding planes has resulted in a marked thickening and repetition of coal seams. In the Saddle (Ewin Pass) sector the #8 seam displays an increase in thickness indicative of fault action. The remainder of this block contains nine seams with a thickness greater than 1.5 m. The aggregate thickness is 51.8 m. These figures, (CNI's) do not include the 10B and 10A seams. The inclusion of these seams may raise the aggregate thickness to 59m.

Seams no. 5, 6, 7, 8, 9, 10B, and 10A extend northwards from the area drilled by CNI Ltd., and increases the possibility of extending the mineable area in that direction. This block deserves further detailed exploration and mapping.

STRATIGRAPHIC SECTION

EWIN PASS SOUTH (N 400 N/500 W)

Scale: 1:10,000 1,000

STRATIGRAPHIC SECTION

EWIN PASS - CENTRAL (~2200 N/500 W)

SCALE 1:10,000 1,000

INTRODUCTION:

This report presents the results of a surface geophysical program that was carried out in the Saddle Area, at the Line Creek Mine in August,1993. The geophysical technique used was Horizontal Loop Electro–Magnetics (HLEM). Data Acquisition, processing and interpretation was carried out by LCRL and Manalta personnel. The objective of the program was to assist in the structural mapping of the area.

THEORY:

Electro–Magnetic surveys respond to contrasts in conductivity within the subsurface. Geological structures such as faults, fractures, fold axis, etc. will generally have a higher iron oxide and moisture content, and perhaps more clay minerals than the surrounding rock. This will result in a relatively higher conductivity for that zone and will yield a definitive geophysical response.

Basic EM theory states that if an alternating dipole magnetic field (produced by an AC current flowing in a wire coil transmitter) is introduced to the subsurface it will create or induce a secondary dipole alternating magnetic field around any conductive zone within range.
HLEM equipment consists of a transmitter; emitting a fixed primary magnetic field, having a specific frequency, phase, amplitude and intensity. And a receiver which detects the combined primary and secondary fields. The transmitter/receiver pair are connected by a reference cable (60m in this survey) which serves as a communication link and as a means of keeping a constant distance between the transmitter and receiver. The strongest response occurs when the conductor is at the midpoint of the cable. As stated before the receiver detects the combined primary and secondary fields, however the data is more useful if the secondary field can be plotted by itself. Therefore the receiver applies a compensating signal, which is equal to the primary signal but 180 degrees out of phase, to the combined detected signal. The receiver now displays only the secondary field, this field is seperated into two components the quadrature (out–of–phase) and the real (in–phase). A phase shift of 90 (quadrature) to 180 degrees (real) occurs to the secondary field, relative to the phase of the primary field. An excellent conductor will produce a secondary field consisting of only a real component. The majority of conductors will produce a field with both components. Close analysis and

modelling of this two component data will define conductor characteristics such as dip of conductor, depth to conductor, and conductivity. The magnitude of the data is shown as a percent of the primary field intensity. Erroneous signals such as those produced from topography, incorrect coil orientations and spacing effect the real component only.

DATA ACQUISITIONS AND LOGISTICS:

There were 7 lines that were geophysically surveyed. The lines had an azimuth of 103/283 they were located 400m apart and ranged in length from 980m to 2160m. Cumulative line distance was 11.3km. Each line was characterised by steep–rough topography with slopes often reaching 35–40 degrees.

Due to poor road access endpoints of each line were located and surveyed using helicopter support. Lines were then slashed by a local contractor at a rate of 450m/manday. Stations were then located every 20m thru the length of the line, a piece of flagging every 20m and a short stake every 100m was used for station identification. The slope angle between each station was also measured, this angle was used for applying topographic corrections to the data. Station spacing preceded at the rate of 1.4 km\manday. Geophysical data was acquired at 3 different primary field frequencies; 56,320hz, 14080hz, 1760hz. It took approx. 30sec. to obtaing the secondary field data at each station, data acquisition occurred at the rate of 1.13 km /manday.

The UTM coordinates for the endpoints of each line are listed below:

LINE	EAST END POINT(m)	WEST END POINT(m)
L400N	5539380N 661080E	5539580N 660145E
L800N	5539765N 661225E	5540070N 659800E

L1200N	5540165N 661268E	5540457N 659885E
L1600N	5540580N 661235E	5540875N 659865E
L2000N	5540960N (put in by hipchain) 661370E	5541340N 659615E
L2400N	5541340N 661508E	5541765N 659545E
L2800N	5541780N 661365E	5542140N 659680E

When L2800N was being chained a large cliff was encountered near the valley bottom at station 1240, the line was broken and restarted at the top of the cliff. The second half of L2800N went from station 1260 to 1780, it was stopped approx. 70m short of the west end point because of the large cliffs near the top of the west ridge. Due to the breakage in the line survey control in the second half of L2800N became very poor. The Motorola Global Positioning System (GPS) was used successfully to help establish this control.

INTERPRETATION:

Interpretation was relatively straightforward on each line. Response lows on both the quadrature and real components indicated the prescense of a conductor. The magnitude of the response was a function of the type of conductor and amount of overburden present. Since the real component is effected by slight variations in coil orientation and spacing the real profile was "noisy" therefore the quadrature component was used almost exclusively for conductor location. Conductor characteristics such as dip, depth, and conductivity could not be determined since these computations require "clean" real and quadrature profile. Appendix 3 shows typical real and quadrature profiles over conductors in a laboratory and in a real environment. Appendix 1 shows the anomalies that occurred on each line. Field investigations were made to every anomaly that fell at or near an outcrop to determine the exact cause of the anomaly.

Flowing subsurface water at L800N, stn. 1450 gave an excellent response as did a flowing peizometer hole at L800N,stn. 470. A large positive response occurs at L1200N,stn.810 this is in the middle of a large land slide, and the anomaly may be due to water "pockets" within the slide or the overburden being conductive. The Elk Sandstone horizon gave an anomalous response on every line it crossed, with the exception of L400N. This horizon is yielding a response either because it is acting as a retardent to water flow or due to a higher iron content Field mapping showed this sandstone to be highly oxidized and bright yellow in colour. Coal seams that outcropped on the west limb of the Ewin Syncline on L2800N, stns. 910 and 970 showed a weak response, these were the only coal seams that were interpreted with a relatively high degree of confidence. Two weak signals on L2000N, stns. 1580 and 1690 may also have been caused by coal seams.

Outcrops that showed signs of faulting were located at: L400N, stn. 850; L800N, stns. 1210 and 1340; L1200N, stns. 950; L2800, stn. 1620 and 1370. At L2800N, stn. 620 the bedding was observed to be near horizontal, this is the approximiate location of the Ewin Syncline fold axis. All of these locations gave strong geophysical responses. Every anomaly including those listed above are plotted (Appendix II.)

After plotting the anomalies onto the geological map an attempt was made to correlate between the lines. This correlations was difficult for several reasons; signals that occured along the conductor did not always match, this is more than likely due to the depth and nature of the overburden varying along the strike of the conductor. A line spacing of 400m is too large for confident correlations. After filtering out signals that were that were due to groundwater and lithological units, faults and fold axis were correlated from line to line. The Ewin Syncline and Anticline were traced for the entire length of the survey, as was the Ewin Anticline Thrust Fault. A high degree of confidence is attached to the location of these three structures. The Ewin Thrust Fault showed on L2400N and L2800N but then it trends too far west to be picked up on the more southern lines. Two other prominent structures also showed on L800N thru to L2800N between the Ewin Anticline and the Ewin Anticline Thrust Fault.

The east portion of the valley shows a peculiar lack of anomalies. Anomalies that do occur are weak and questionable. In the author's opinion this is because of the dip slope geology on the east side. Bedding and structures are intersecting the topography at a very low angle, whereas on the west side this intersection is near perpendicular.

The reader must keep in mind that this interpretation has been based on a reconnaisance geophysical program. Infill lines are needed for a more confident interpretation of the weaker conductors.

CONCLUSIONS AND RECOMMENDATIONS:

The Horizontal Loop Electro–Magnetic method has been field proven to delineate conductive zones within the subsurface. These zones may be groundwater, lithological units, faults, fractures, and fold axis. Careful field investigations should be made after each profile has been interpreted, to filter out erroneous signals. It is highly recommended that a surface geophysics program be carried out after comprehensive field mapping has been done, field mapping data is near mandatory to do a proper interpretation of geophysical data. Grid layout should be designed to fill in "holes" which appear to exist in the structural model. Tight grids (100m line spacing, and 10m stations spacing) over shorter areas will yield a more confident interpretation.

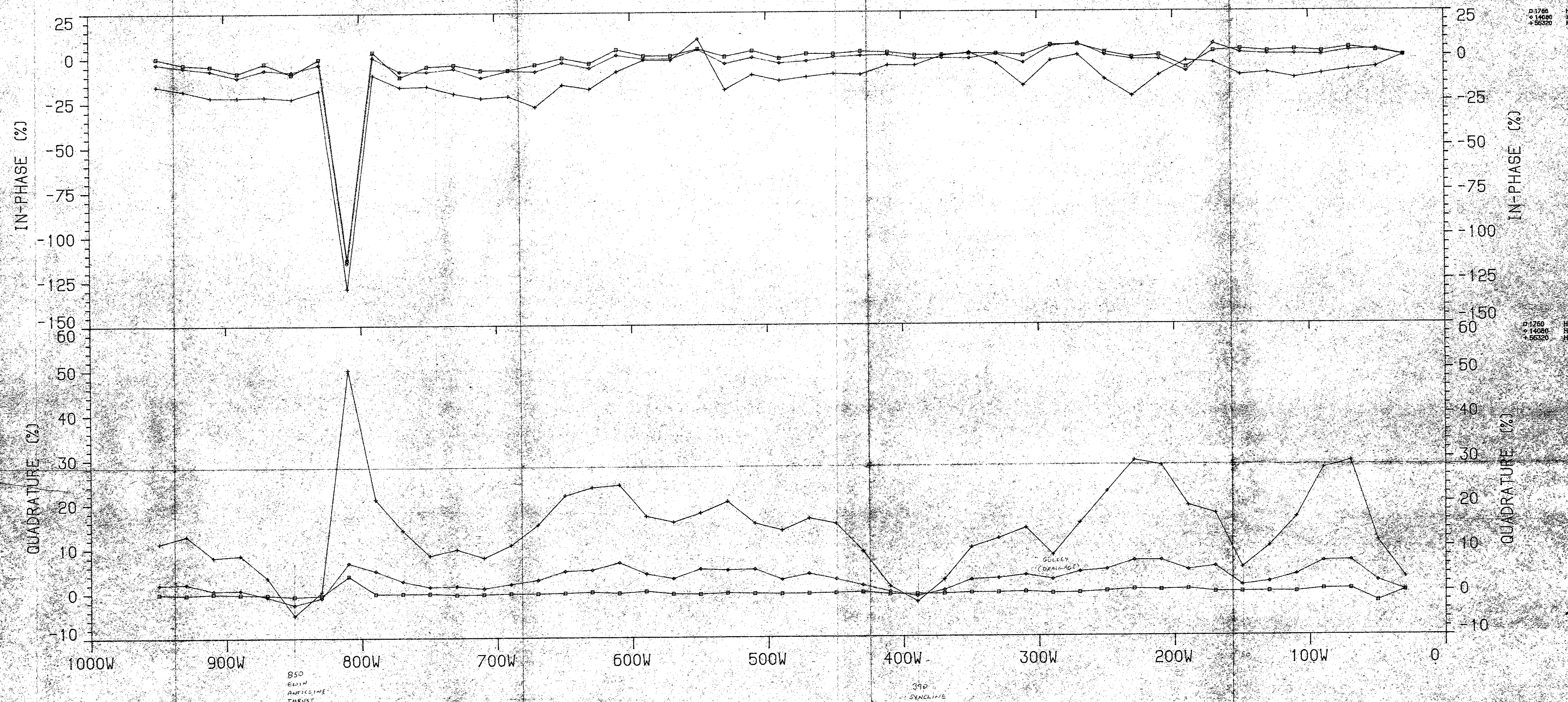
ACKNOWLEDGEMENTS;

Doug Walilko – Manalta Coal Ltd.

Gordon Zurowski – Line Creek Resources Ltd.

Terry Stickney – Line Creek Resources Ltd.


LEGEND
DRILLHOLE WITH DIRECTIONAL DEVIATION PROJECTION
COAL SEAM - DEFINED
COAL SEAM - APPROXIMATE
COAL SEAM - ASSUMED
THRUST FAULT - DEFINED
THRUST FAULT - APPROXIMATE/INTERPRETED
NORMAL FAULT - DEFINED
NORMAL FAULT - APPROXIMATE/INTERPRETED
ANTICLINE
ANTICLINE - OVERTURNED
SYNCLINE
SYNCLINE - OVERTURNED
BEDDING ATTITUDE - OVERTURNED
TRENCH
ADIT WITH PROJECTION FROM ENTRY
CONGLOMERATE
SANDSTONE
COAL
3.55/4.85 TRUE THICKNESS: COAL / ROCK
7.11 TRUE THICKNESS: COAL ONLY
MAIN ROAD
INTERPOLATION OF CONDUCTOR BETWEEN LINES
CONDUCTOR LOCATION (STATION NUMBER)
LINE NUMBER
L400
800
200
THRUST FAULT - DEFINED
ELK SST
SUBSURFACE DRAINAGE
SCALE 1:5000
CONTOUR INTERVAL : 2 METRES
DATE OF PHOTOGRAPHY : JUNE/JULY, 1978
line creek resources ltd.
SADDLE AREA
HLEM SURVEY
Dwn. by: M.L.E.
Date: AUG. 1993
Chk'd. by: A.L.
File no.: 41772
Overlay: A ,C



SCALE

m 100 0 100 m

SCALE = 1: 1458

LINE [redacted] 400N

for: LINE CREEK RESOURCES LTD.	
by: Line Creek Reasources Ltd.	
Data Set: L400B	Date: AUG. 1993
Equipment: MAXMIN EQUIPME	Sounding: 400N

HLEM SURVEY

SADDLE EXPLORATION AREA
S.E. BRITISH COLUMBIA

Azimuth: 103/283

LINE 800N

SCALE

m 250 0 250 m

SCALE = 1: 2552

for: LINE CREEK RESOURCES LTD.	
by: Line Creek Reasources Ltd.	
Data Set: L810B	Date: AUG., 1993
Equipment: APEX MAXMIN	Sounding: 800N

HLEM SURVEY

SADDLE EXPLORATION AREA

SOUTHEAST B.C.

Azimuth: 103/283

LINE 1200N

SCALE 0.

SCALE = 1: 2187

for: LINE CREEK RESOURCES LTD.

by: Line Creek Reasources Ltd.

Data Set: L1200	Date: AUG. 1993
Equipment: MAXMIN EQUIPME	Sounding: 1200N

HLEM SURVEY

SADDLE EXPLORATION AREA

S.E. BRITISH COLUMBIA

Azimuth: 103/283

LINE 1600N

for: LINE CREEK RESOURCES LTD.	
by: Line Creek Reasources Ltd.	
Data Set: 16000	Date: AUG. 1993
Equipment: MAXMIN EQUIPME	Sounding: 1600N

HLEM SURVEY

SADDLE EXPLORATION AREA
S.E. BRITISH COLUMBIA

Azimuth: 103/283

SCALE 0

SCALE = 1: 2167

for: LINE CREEK RESOURCES LTD.	
by: Line Creek Reasources Ltd.	
Data Set: L2000	Date: AUG. 1993
Equipment: MAXMIN EQUIPME	Sounding: 2000N

LINE 2000N

HLEM SURVEY

SADDLE EXPLORATION AREA

S.E. BRITISH COLUMBIA

Azimuth: 103/283

LINE 2800N

SCALE

m 250 0 250 m

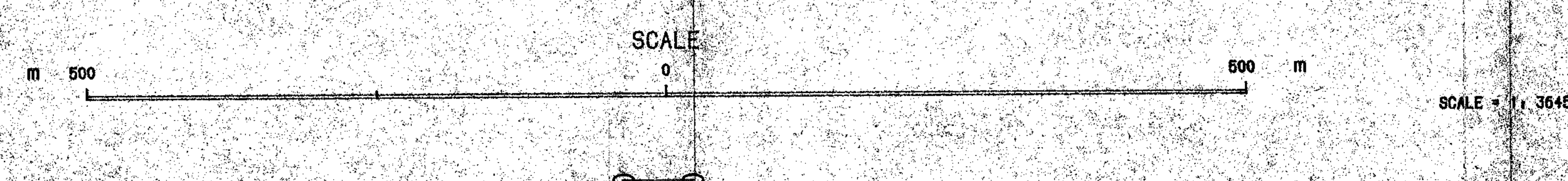
SCALE = 1: 2552

for: LINE CREEK RESOURCES	
by: Line Creek Reasources Ltd.	
Data Set: L2800	Date: AUG. 1993
Equipment: MAXMIN EQUIPME	Sounding: 2800N

HLEM SURVEY

SADDLE AREA EXPLORATION
S.E. BRITISH COLUMBIA

Azimuth: 103/283



LINE 2400N

for: LINE CREEK RESOURCES LTD.	
by: Line Creek Reasources Ltd.	
Data Set: L2400	Date: AUG. 1993
Equipment: MAXMIN EQUIPME	Sounding: 2400N

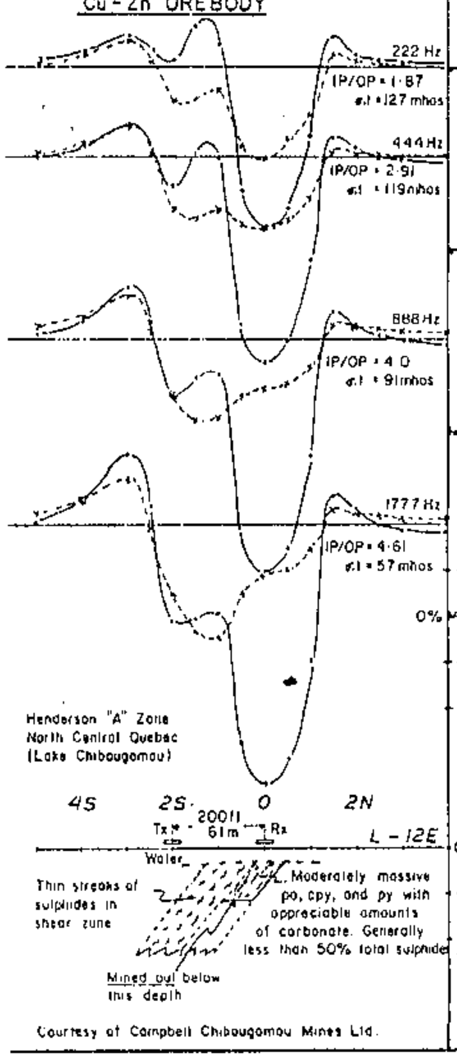
HLEM SURVEY

SADDLE EXPLORATION AREA
S.E. BRITISH COLUMBIA

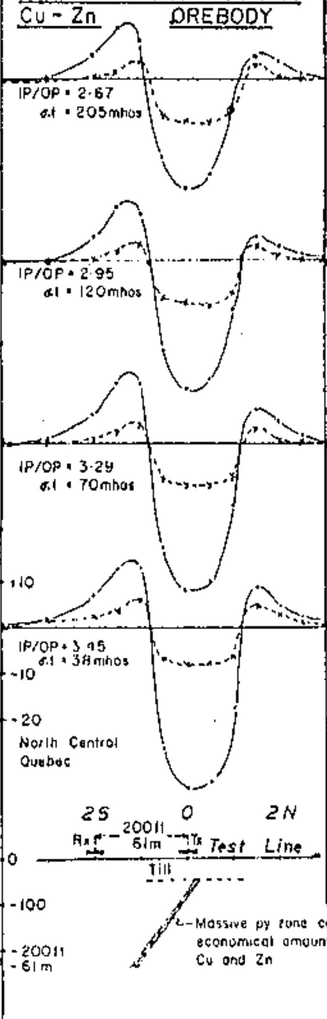
Azimuth: 103/283

CONDUCTIVITY-THICKNESS STUDIES OF MASSIVE SULPHIDE BODIES

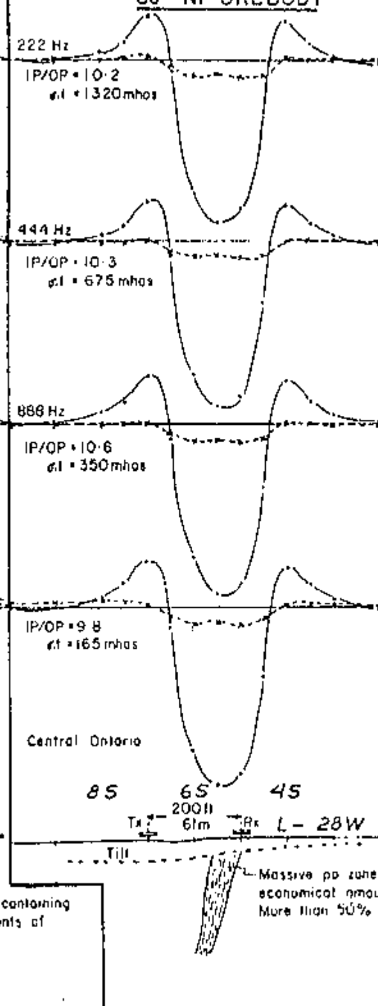
CASE 1 - SHEAR ZONE REPLACEMENT Cu-Zn OREBODY

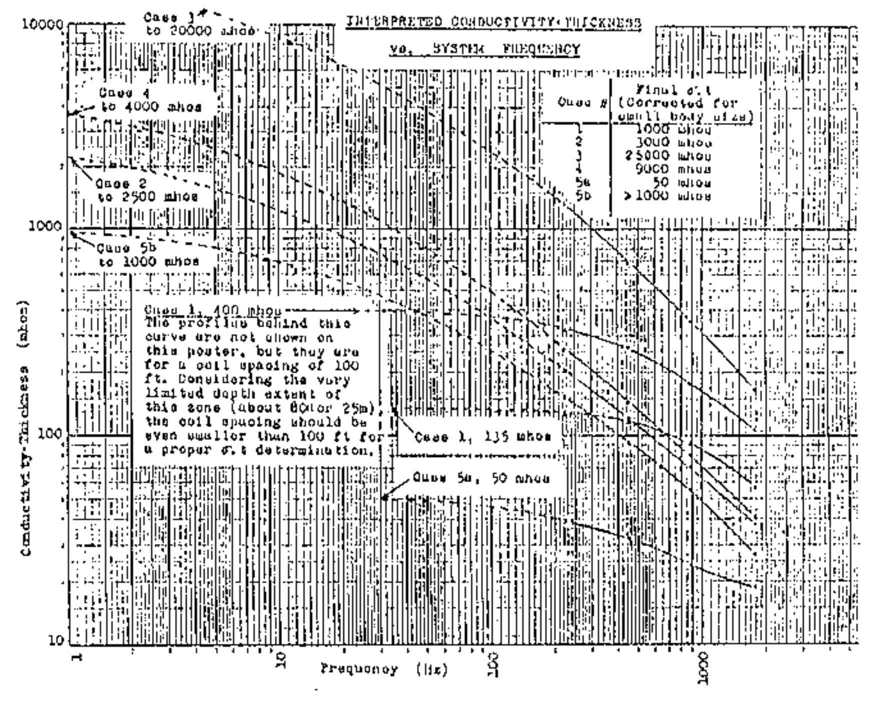


CASE 2 - VOLCANOGENIC Cu-Zn OREBODY



CASE 3 - BASIC INTRUSIVE Cu-Ni OREBODY

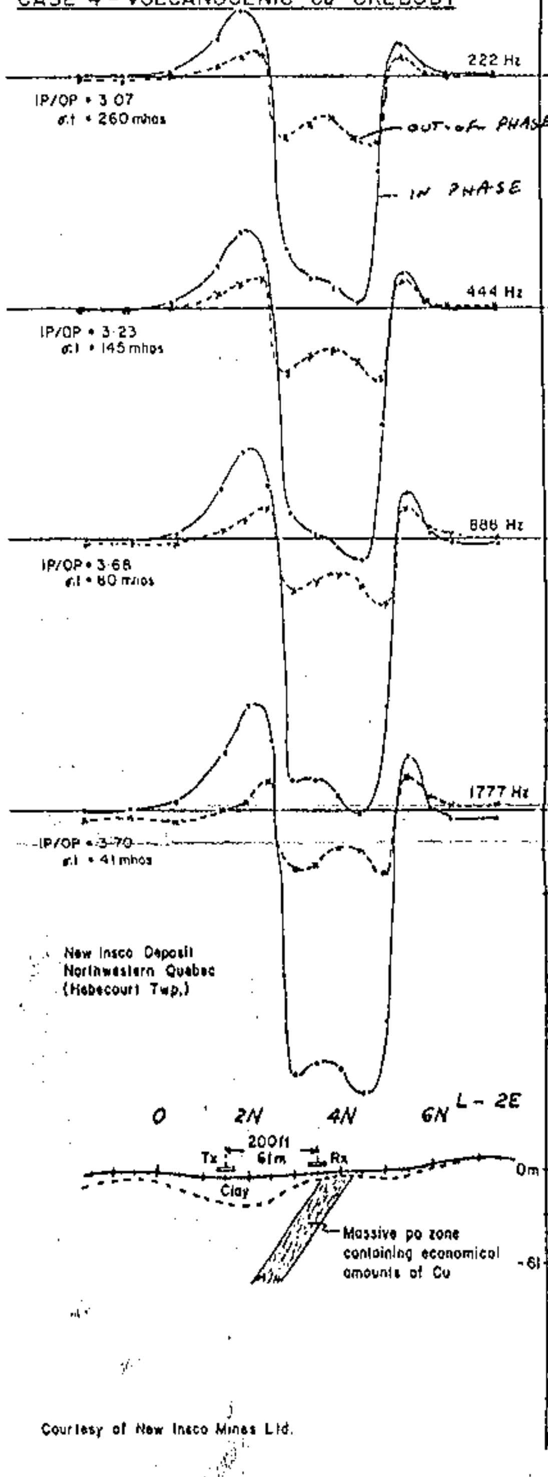




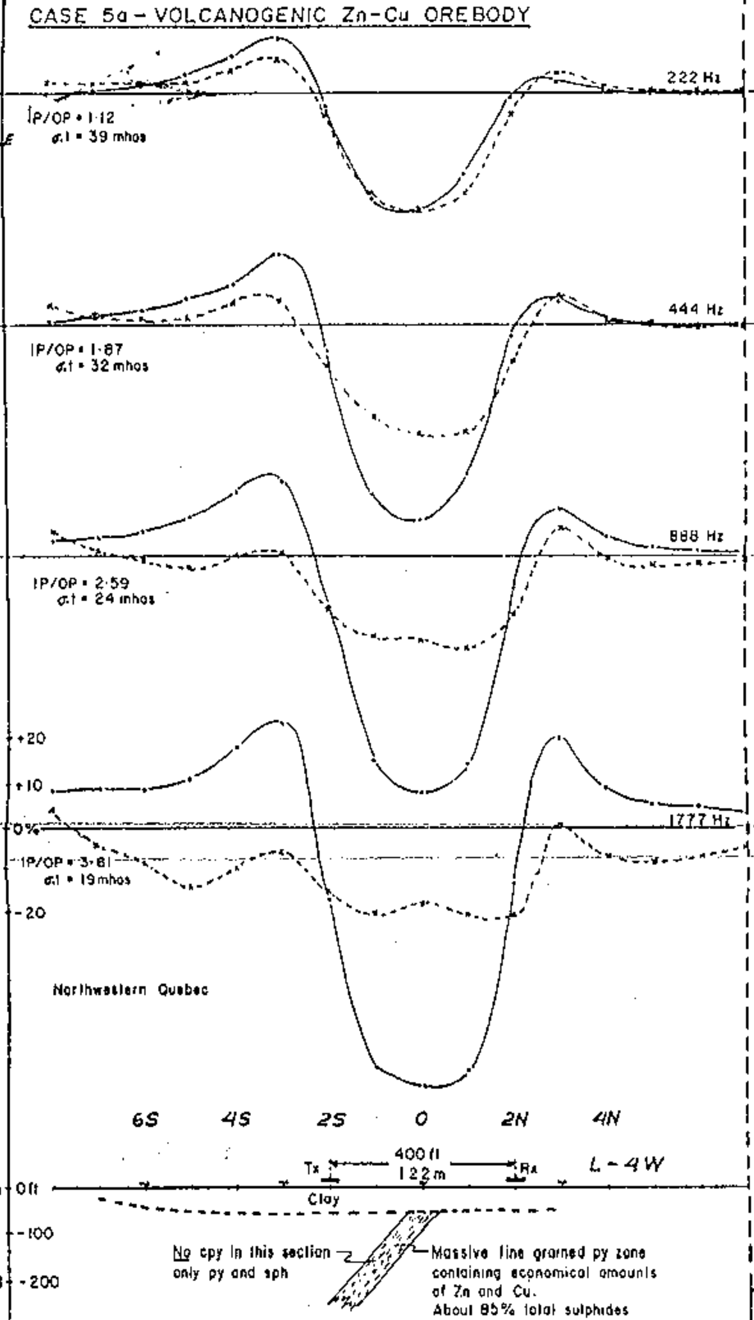
Note: The conductivity thickness (σt) determinations are made from curves derived from laboratory scaled modelling on "inductively thin" conductive dikes in an infinitely resistive environment (free space). In nature, effects known as "current gathering" and "inductive thickness", cause the σt determination to be too small, when using interpretive curves derived from thin dike modelling. These effects decrease, and the σt determinations become more accurate, with decreasing system frequency. (See Poster 2 for a fuller description of these effects.) By determining a value of σt at several frequencies, and extrapolating to the region of very low frequencies, a more accurate value of σt can be derived. The extrapolated σt value can still be too small if the conductor size is "finite" compared to the coil spacing used, i.e. if the strike-length is less than three times and the depth-extent is less than twice the coil spacing, or if the traverse is run close to one end of the conductor. However, by making frequency extrapolated σt determinations at more than one coil spacing, it is possible to extrapolate to the region very short coil spacings to get a more accurate estimate of the true σt. Although not all of the data is shown here, this procedure was followed in all cases, except 5b, to get the final corrected σt values shown in table in the upper right corner of this poster.

Continued below

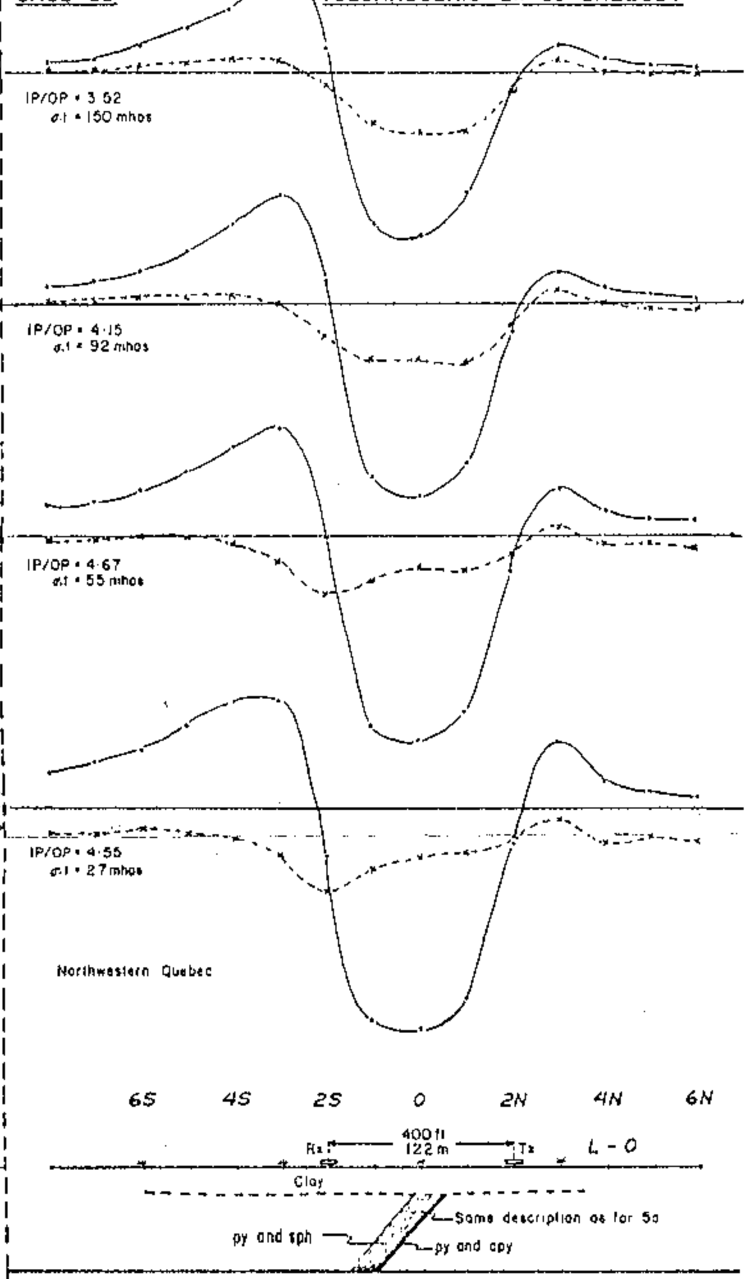
CASE 4 - VOLCANOGENIC Cu OREBODY



CASE 5a - VOLCANOGENIC Zn-Cu OREBODY



CASE 5b VOLCANOGENIC Zn-Cu OREBODY



Continued from above

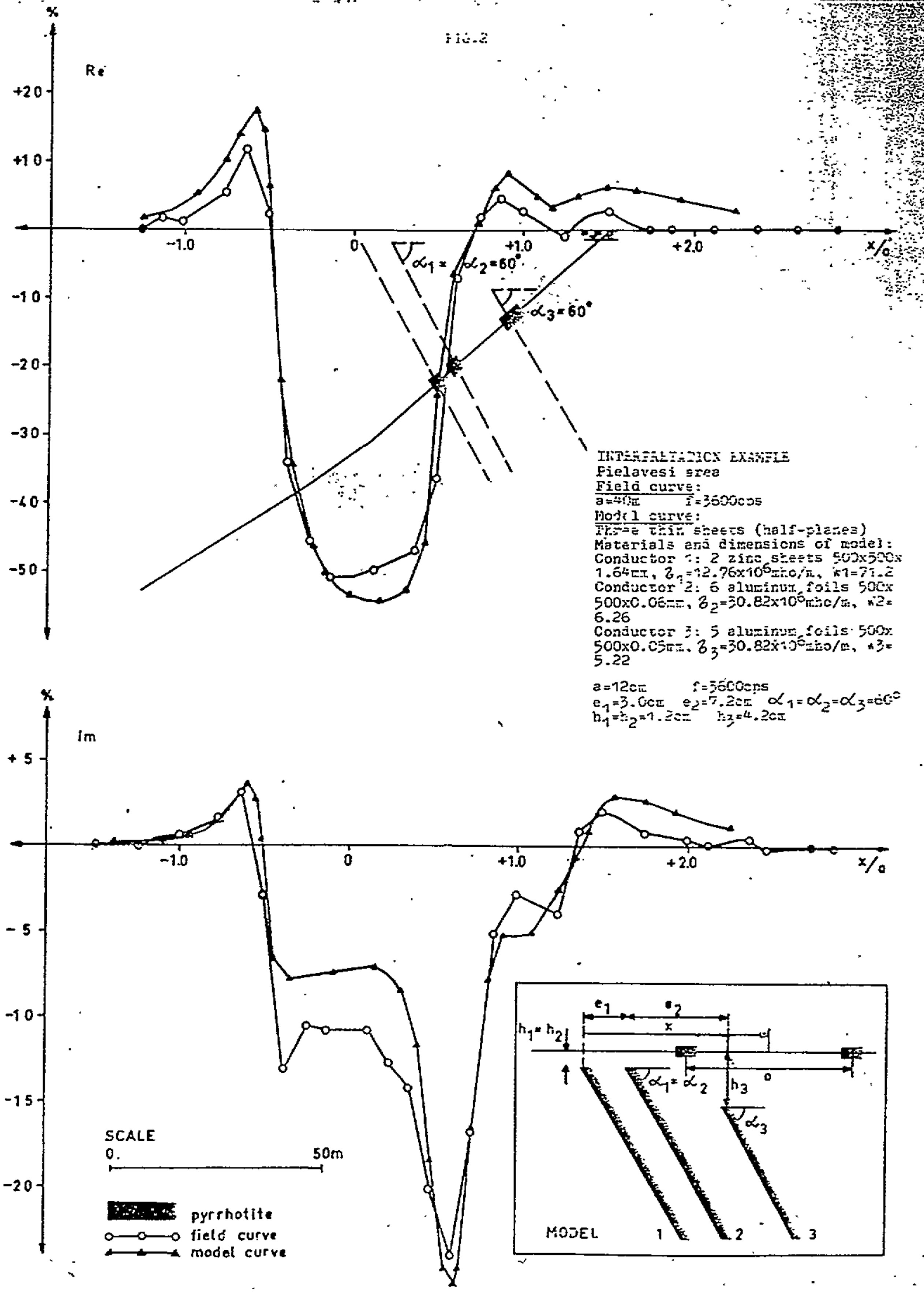
It is of interest to note that where appreciable amounts of po and cpy are present, the "true" σt value is quite large. An advantage of this is that zones of large σt can be detected to greater depths under "noisy" overburden than zones of small σt. This will become apparent following a perusal of Poster 4.

MAXMIN II POSTER I

By J.E. Betz, geophysical consultant.

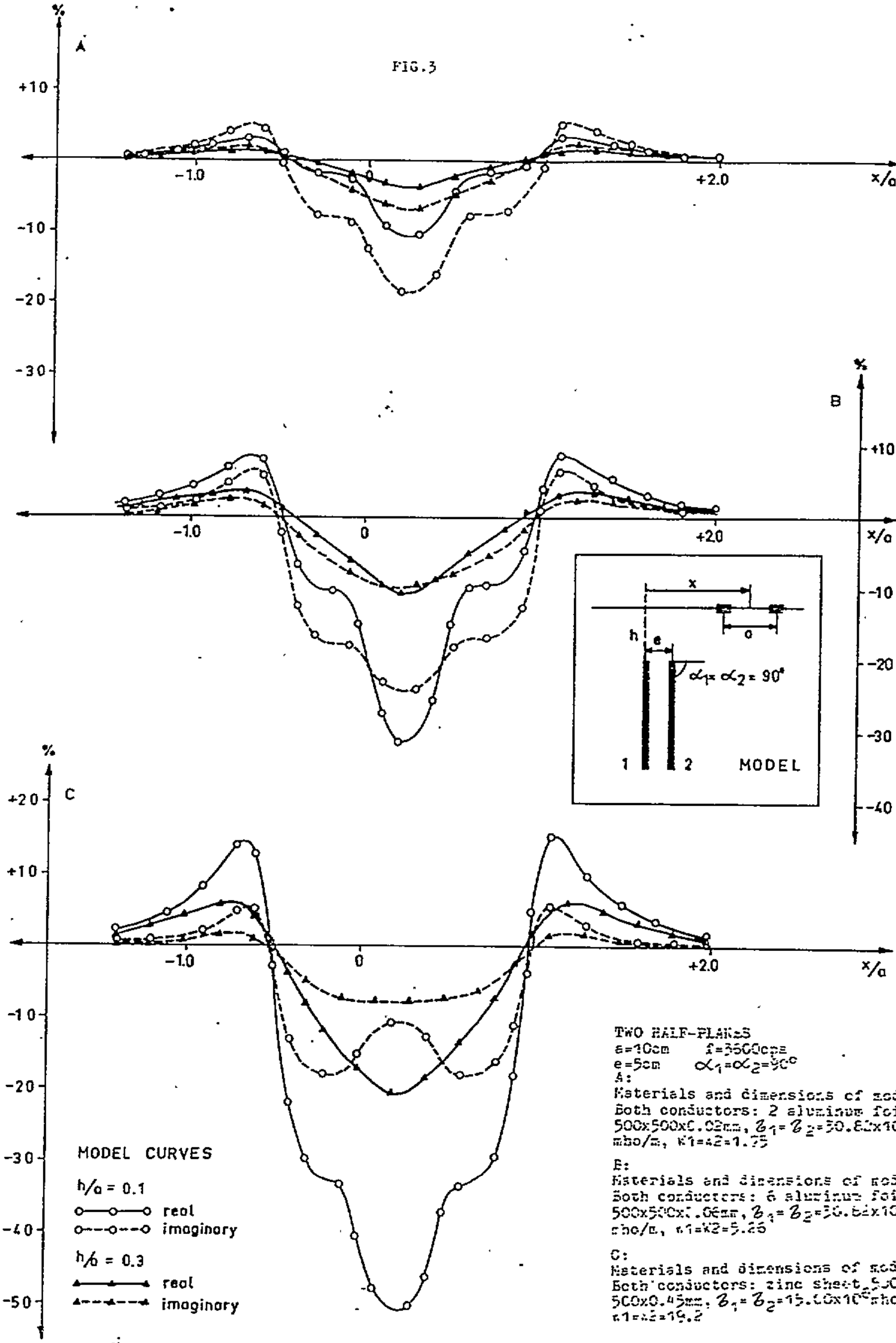
March, 1976.

FIG.2



%
Re
+20
+10
-10
-20
-30
-40
-50
-1.0
0
+1.0
+2.0
x/a
α1 = α2 = 60°
α3 = 60°
INTERPRETATION EXAMPLE
Pielavesi area
Field curve:
a=40m f=3600cps
Model curve:
Three thin sheets (half-planes)
Materials and dimensions of model:
Conductor 1: 2 zinc sheets 500x500x
1.64mm, σ1=12.76x10^6 mho/m, κ1=71.2
Conductor 2: 6 aluminum foils 500x
500x0.06mm, σ2=30.82x10^6 mho/m, κ2=
6.26
Conductor 3: 5 aluminum foils 500x
500x0.05mm, σ3=30.82x10^6 mho/m, κ3=
5.22
a=12cm f=3600cps
e1=3.0cm e2=7.2cm α1=α2=α3=60°
h1=h2=1.2cm h3=4.2cm
%
Im
+5
-5
-10
-15
-20
-1.0
0
+1.0
+2.0
x/a
SCALE
0.
50m
pyrrhotite
field curve
model curve
e1
e2
x
h1 = h2
α1 = α2
h3
a
α3
MODEL
1
2
3

FIG.3



TWO HALF-PLANES
a=10cm f=3500cps
e=5cm $\alpha_1=\alpha_2=90°$

A:
Materials and dimensions of model:
Both conductors: 2 aluminum foils 500x500x0.02mm, $\sigma_1=\sigma_2=30.82\times10^6$ mho/m, $\kappa_1=\kappa_2=1.75$

B:
Materials and dimensions of model:
Both conductors: 6 aluminum foils 500x500x0.06mm, $\sigma_1=\sigma_2=30.82\times10^6$ mho/m, $\kappa_1=\kappa_2=5.25$

C:
Materials and dimensions of model:
Both conductors: zinc sheet 500x500x0.45mm, $\sigma_1=\sigma_2=15.60\times10^6$ mho/m, $\kappa_1=\kappa_2=19.2$