093306

YUKON ASSESSMENT REPORT

PROPERTY: **LULU CLAIMS**

NTS MAP SHEET: 115 O/3

LATITUDE: 63° 02'N LONGITUDE: 139° 09'W

CLAIMS AND GRANT NUMBERS WORKED:

LULU 1 - 22 **YB45533 - 54**

OWNER OF PROPERTY: **Faith Mines Ltd.**

ADDRESS: **#1000 - 675 West Hastings Street**
Vancouver, B.C.
V6B 1N6

TELEPHONE: (604) 685-2222

OPERATOR: **Faith Mines Ltd.**

TYPE OF WORK: **Magnetic and VLF-EM surveys**

DATE WORK WAS DONE: **August 17 - 22, 1994**

AUTHOR OF REPORT: **Philip Southam, P. Geo.**

LIST OF PERSONNEL:
Lee Persinger, Hastings Management Corp.
David Persinger, Hastings Management Corp.
Philip Southam, Hastings Management Corp.

GEOPHYSICAL REPORT ON THE LULU CLAIMS

Dawson Mining Division, Yukon

NTS 115 O/3

Latitude: 63° 02'N

Longitude: 139° 09'W

OWNER:
Faith Mines Ltd.
#1000 - 675 West Hastings Street
Vancouver, B.C.
V6B 1N6

BY:
P. SOUTHAM, P. Geo. (B.C.)

March, 1995

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LOCATION AND ACCESS

The property is located 114 kilometers south of Dawson City, Yukon (figure 1) on Lulu Creek, a tributary of Thistle Creek, centered on 63° 02′ north latitude and 139° 09′ west longitude on NTS sheet 115 O/3. Access is by plane to the airstrip on Thistle Creek and then by a short road to the mouth of Lulu Creek. Helicopter service is available year round from Dawson City for quick, direct access to the property.

TOPOGRAPHY AND VEGETATION

The topography is rolling hills ranging in elevation from 760 meters (2500 ft.) above sea level (ASL) to 1158 meters (3800 ft.) ASL covered with scruffy spruce trees, poplar, birch and buck brush. The area escaped glaciation, thus the valleys are V-shaped and there is less than 1% natural outcrop exposure. The best exposure of bedrock is found at the tops of the hills.

On the north facing slope and shaded areas the vegetation consists of thick moss and buck brush due to permafrost in the underlying soil. Poplar and birch trees grow on the dry, thawed south, east and west facing slopes. Alder thickets are commonly found along the creek and in gullies.

PROPERTY STATUS

The property consists of 22 quartz claims staked as the Lulu claims (figure 2). They are:

Table 1 - Claims List

CLAIM NAME	GRANT NUMBER	EXPIRY DATE*	OWNER
Lulu 1 - 22	YB45533 - 54	Sept 9/95	Faith Mines Ltd.

* With acceptance of this report.

HISTORY

The property is located in the historic Klondike region where more than eleven million ounces of gold has been mined from placer deposits in existing creeks and former river channels. Placer gold was discovered in 1896 and mining of the creek and bench deposits still continues today.

Thistle Creek was worked extensively by miners at the turn of the century and later by dredge. Lulu Creek received some exploration on the lower stretch below the bend but is otherwise

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LULU PROPERTY

DAWSON M.D., YUKON

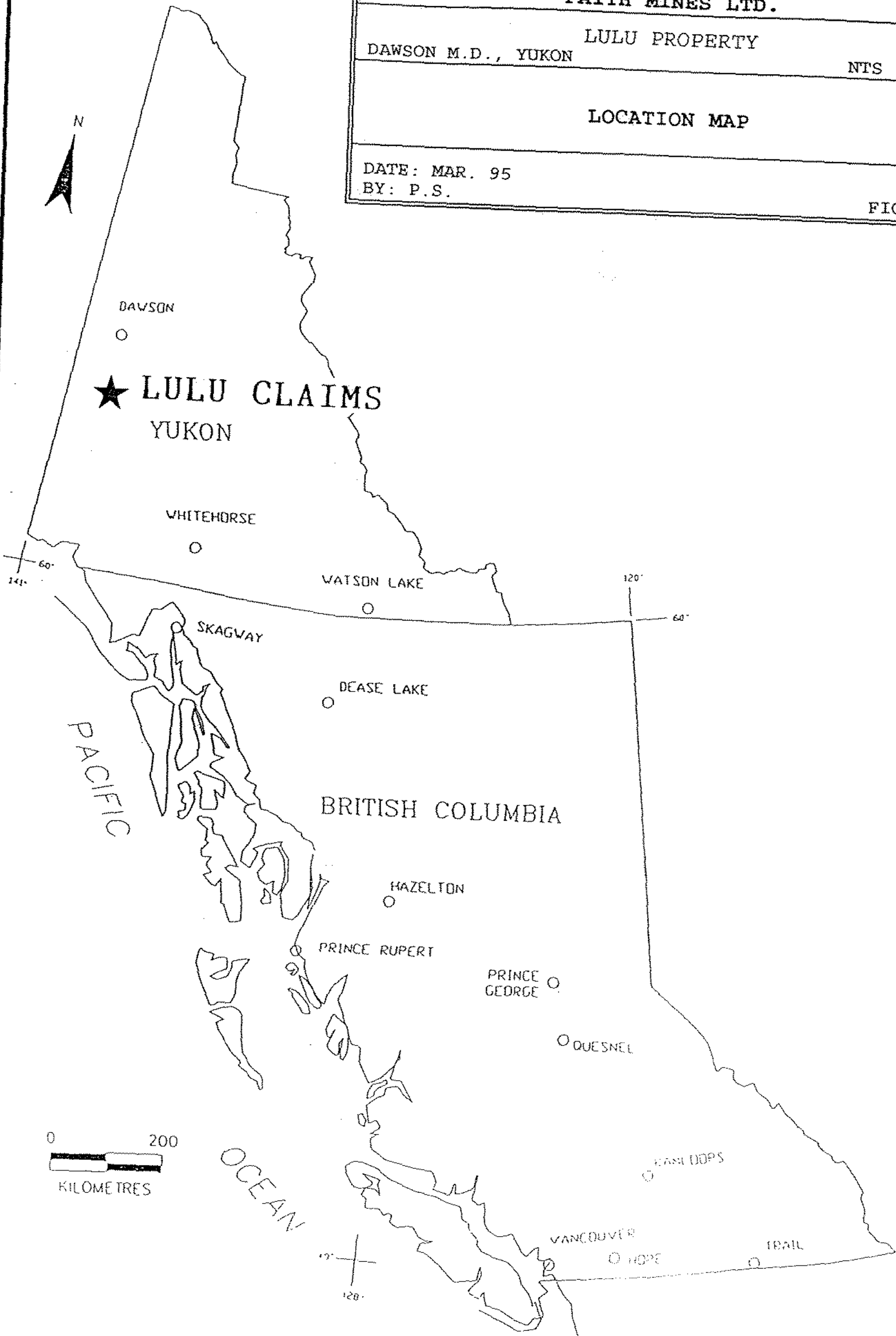
NTS 115-O-3

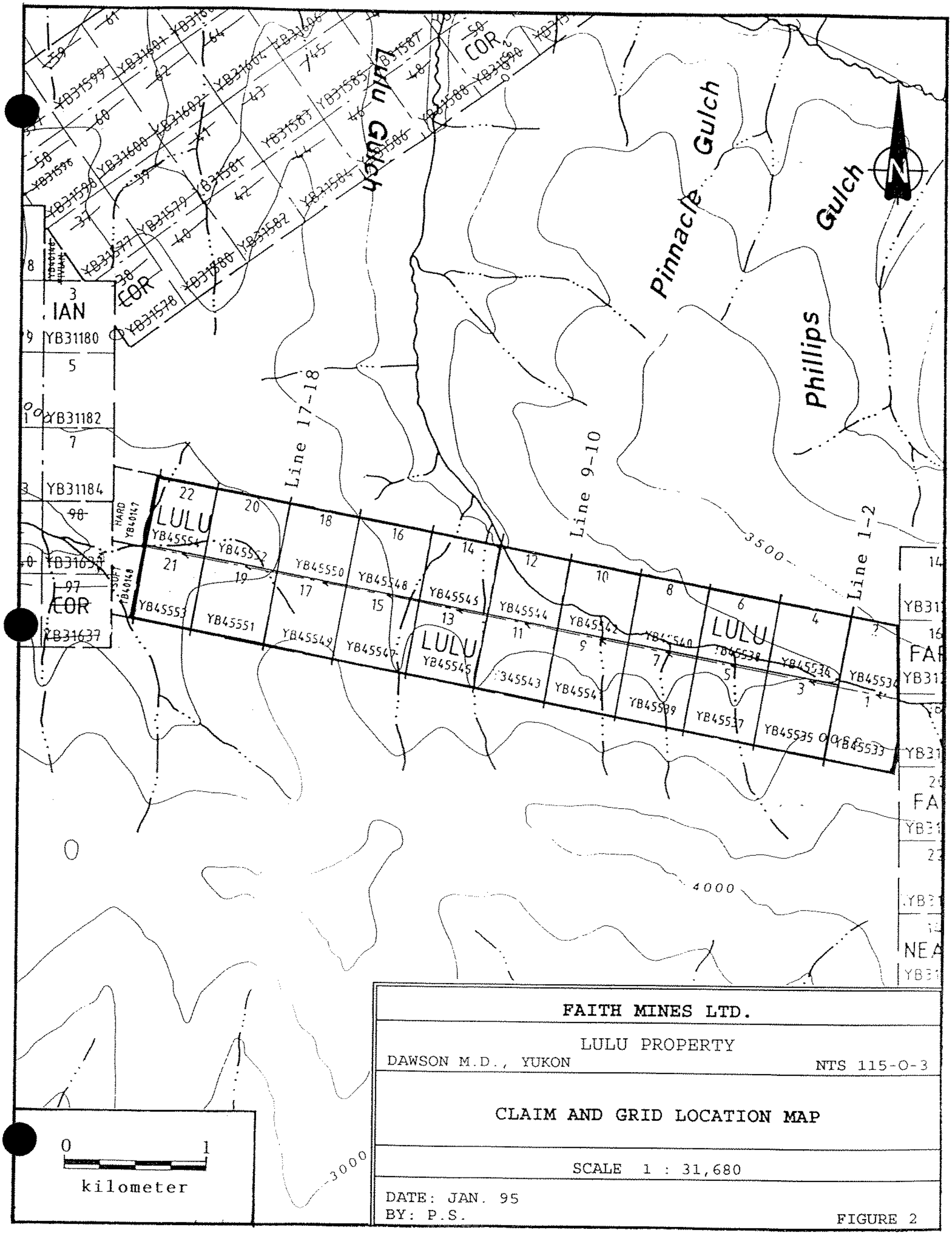
LOCATION MAP

DATE: MAR. 95

BY: P.S.

FIGURE 1





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LULU PROPERTY

DAWSON M.D., YUKON — NTS 115-O-3

CLAIM AND GRID LOCATION MAP

SCALE 1 : 31,680

DATE: JAN. 95
BY: P.S.

FIGURE 2

untouched. Some evidence of hard rock exploration in the area occurs on the neighboring Blueberry Creek at the Black Fox showing but no reference is made to work on Lulu Creek.

REGIONAL GEOLOGY

The Klondike region is underlain by a group of moderately metamorphosed rocks of late-Paleozoic age known as the Klondike Series and Nasina Series. They form part of the Yukon-Tanana Terrane (YTT) on the SW side of the Tintina Trench. The YTT is formed from the merging of the Omineca Crystalline Belt and the Coast Plutonic Complex into the Intermontane Belt (Tempelman-Kluit, 1977). The Tintina Trench is a major transcurrent fault along which at least 450 km of dextral offset has occurred (Mortensen, 1990).

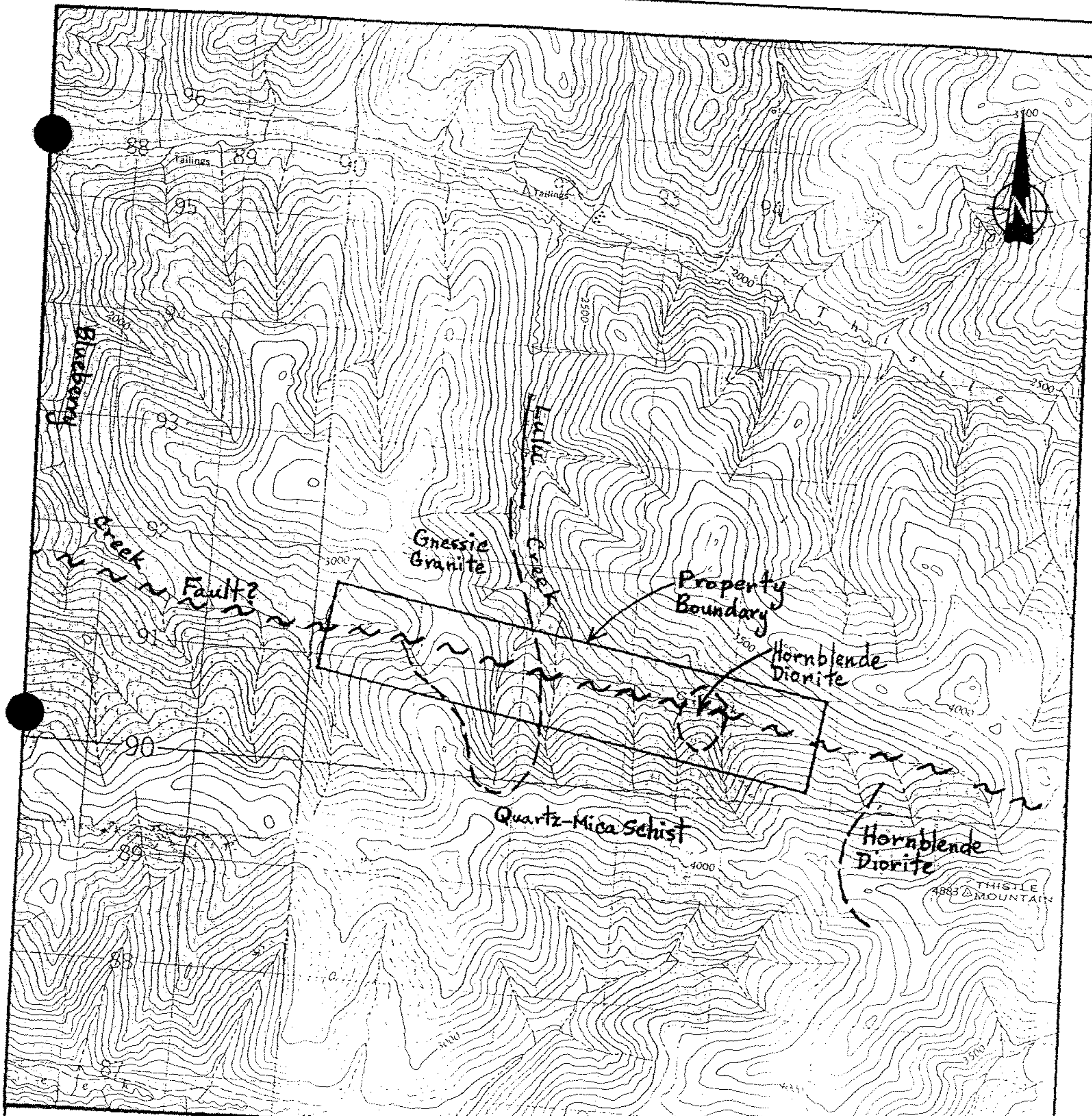
The gross lithologic assemblages within the YTT consist of Proterozoic and Paleozoic strata which can be correlated with the Omineca Crystalline Belt (OCB). The OCB includes a succession of clastic and carbonate rocks equivalent to miogeoclinal sequences to the east. The western part of the belt is overlain by upper Paleozoic mafic and felsic volcanic rocks with intercalated chert and slate (Tempelman-Kluit, 1977).

Mortensen (1990) describes the Klondike and Nasina geology as several imbricated thrust panels of polydeformed metavolcanics and metasediments of a buried island arc which can be subdivided into three assemblages. Assemblage I, the uppermost and more widely extensive thrust panel, is metamorphosed mid-Permian felsic plutonic, subvolcanic, and tuffaceous rocks. Assemblage II is mid-Paleozoic or older metasedimentary and mafic and felsic metavolcanic rocks intruded by a large body of latest Devonian - Early Mississippian granitic augen orthogneiss. Assemblage III underlies I and II structurally in the northern and southwestern part of the study area and consists of carbonaceous schists and phyllite.

PROPERTY GEOLOGY

The Thistle Creek area is underlain by the Nasina Group schist (figure 3) which has been intruded by various felsic to intermediate units. The western side of Thistle Mountain, which lies southeast of the property, has outcroppings of fresh to weakly foliated hornblende diorite amongst garnetiferous quartz-mica schist. At the west end of the property by the bend in Lulu Creek are several small exposures of gneissic granite.

The upper part of Lulu Creek forms part of a distinct linear feature which prompted the initial staking of the Lulu claims. The linear feature, interpreted to be a major fault, extends westward



0 1 2
kilometers

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DAWSON M.D., YUKON

NTS 115-O-3

PROPERTY GEOLOGY

SCALE 1 : 50,000

DATE: MAR. 95
BY: P.S.

FIGURE 3

connecting the upper parts of Blueberry Creek and the next major creek and extends eastward through the pass on Thistle Mountain into the upper end of Thistle Creek and beyond into Agate Creek. This fault structure may be the major source of the placer gold deposited in Thistle Creek and its southern tributaries.

WORK PROGRAM

Magnetic and VLF-EM surveys were completed over the Lulu claims at right angles to the creek. The claim line was used as the base line and cross lines were put in starting from the number two post of each claim, a distance of 480 meters between lines. A total of 9.9 kilometers of survey lines were flagged in at 25 meter stations along the cross lines.

GEOPHYSICAL SURVEY METHOD

A Scintrex MP-2 proton precession magnetometer was used for the magnetic survey. The instrument measured the local magnetism but the data was not corrected for diurnal variations (daily fluctuations in the base value related to sun-spot activity). The VLF-EM survey was completed with a Geonics EM16 VLF-EM. The Annapolis station was used for the survey. Details of its operation and specifications are in appendix III.

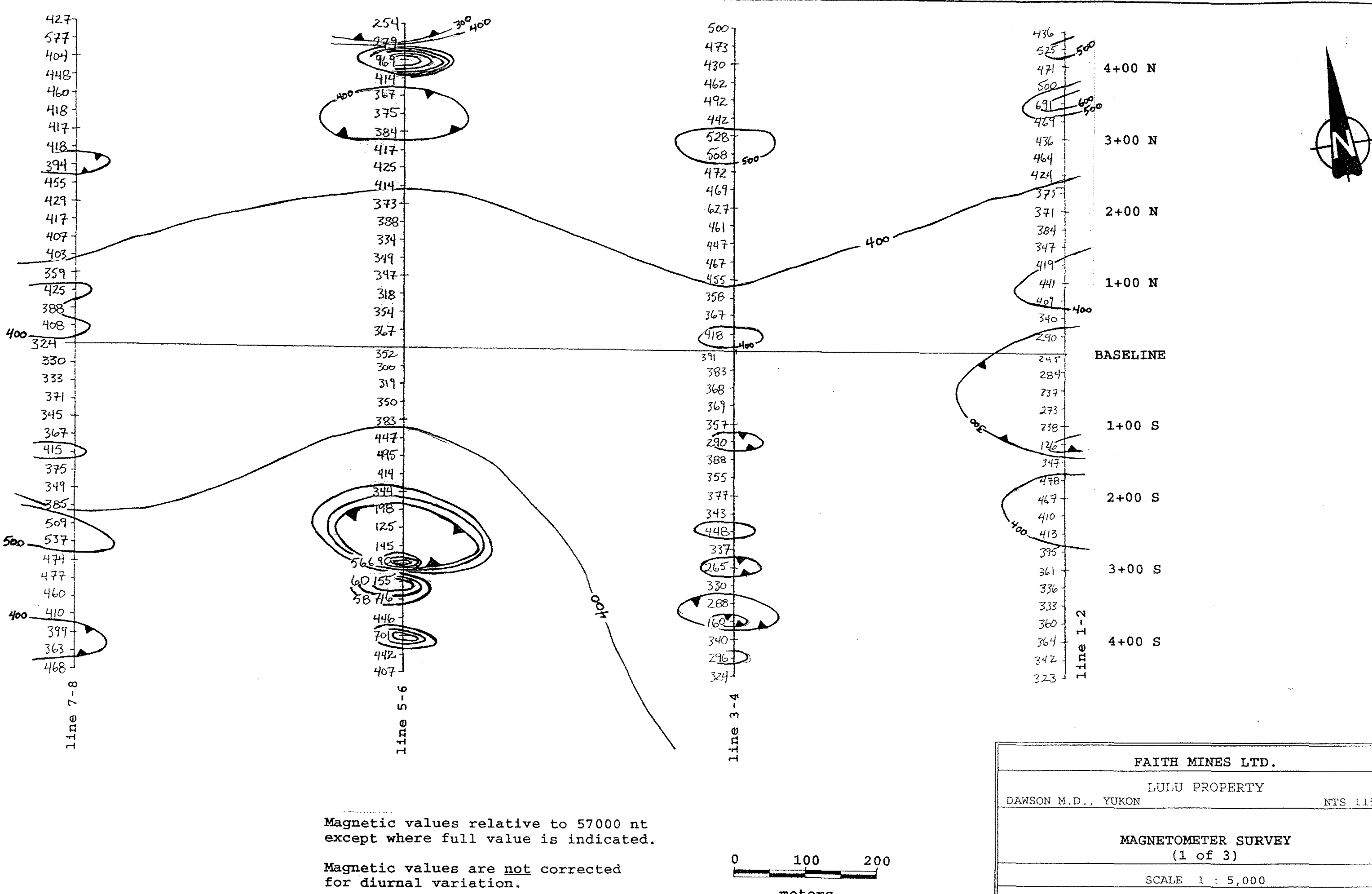
MAGNETIC SURVEY RESULTS

The magnetic survey (figures 4 to 6) was mostly quite flat with a generally higher response along the northwestern half of the surveyed area. This rise in resonse may be related to the gneissic granite observed in this area.

VLF-EM SURVEY RESULTS

The VLF-EM survey (figures 7 to 9) indicated the presence of several linear conductors parallel to the baseline and including two strong conductive zones on the western end of the property in upper Blueberry Creek and over the saddle into Lulu Creek.

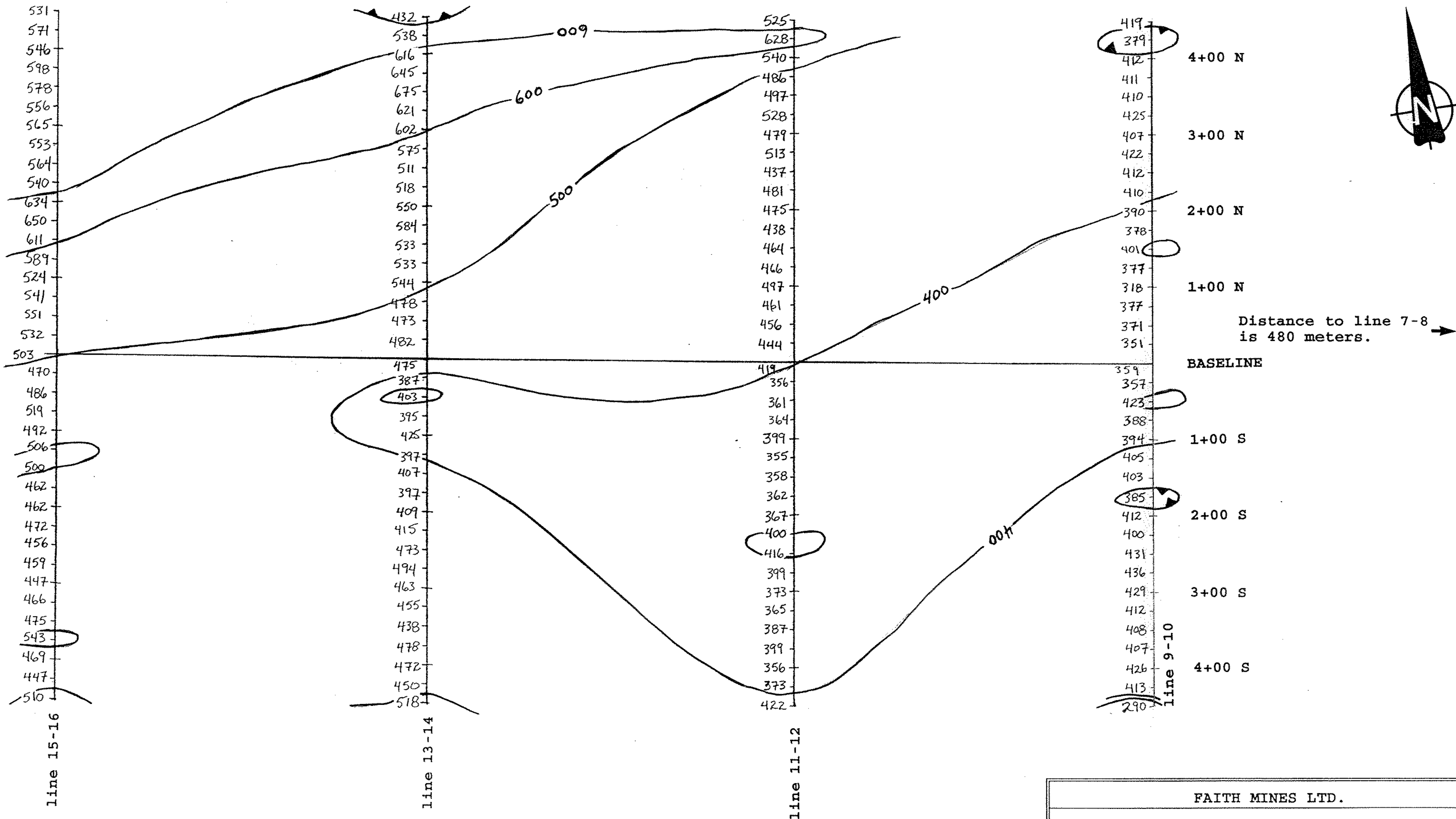
The strongest of the zones lies between 0+50 S and 1+50 S and extends from line 21-22 east to line 13-14, a distance of almost two kilometers. The second strongest conductor lies just north of the baseline between 0+50 N and 1+50 N and extending from line 21-22 to 19-20.



Magnetic values relative to 57000 nt
except where full value is indicated.

Magnetic values are <u>not</u> corrected
for diurnal variation.

FAITH MINES LTD.	
LULU PROPERTY	
DAWSON M.D., YUKON	NTS 115-O-3
MAGNETOMETER SURVEY (1 of 3)	
SCALE 1 : 5,000	
DATE: MAR. 95 BY: P.S.	FIGURE 4



Magnetic values relative to 57000 nt except where full value is indicated.

Magnetic values are <u>not</u> corrected for diurnal variation.

0 100 200
meters

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LULU PROPERTY

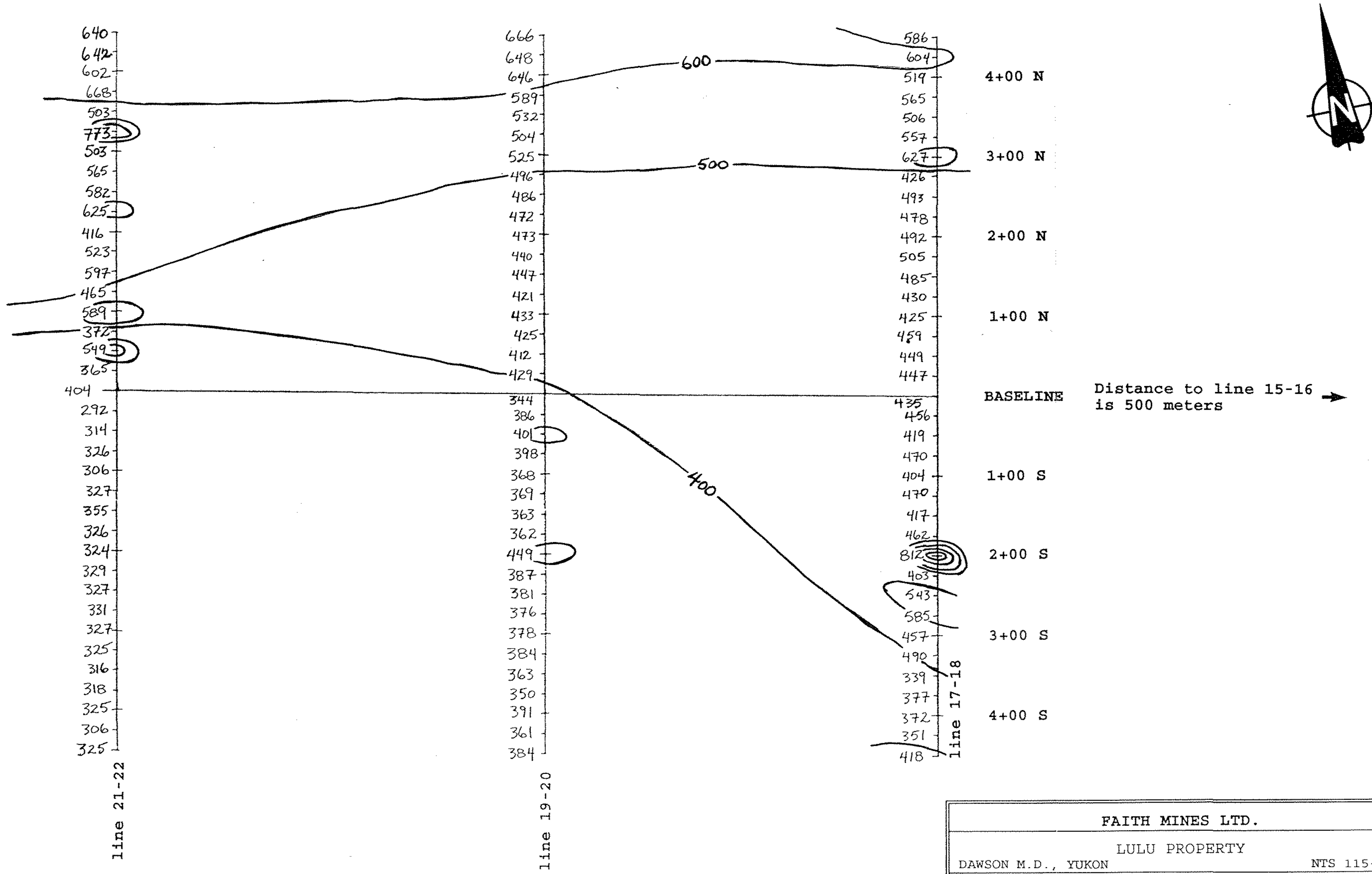
DAWSON M.D., YUKON — NTS 115-O-3

MAGNETOMETER SURVEY
(2 of 3)

SCALE 1 : 5,000

DATE: MAR. 95
BY: P.S.

FIGURE 5



Magnetic values relative to 57000 nt
except where full value is indicated.

Magnetic values are <u>not</u> corrected
for diurnal variation.

0 100 200

meters

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LULU PROPERTY

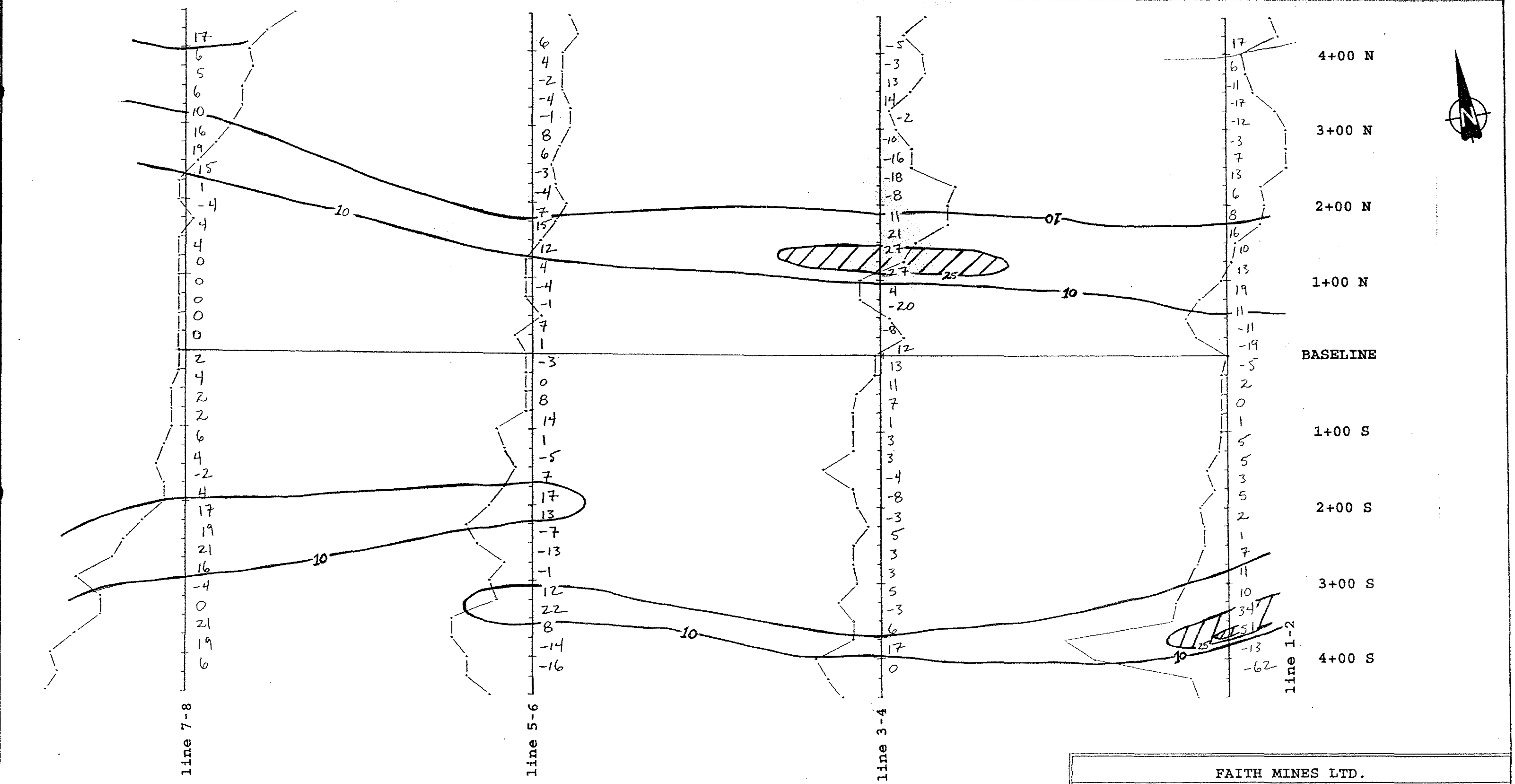
DAWSON M.D., YUKON NTS 115-O-3

MAGNETOMETER SURVEY
(3 of 3)

SCALE 1 : 5,000

DATE: MAR. 95
BY: P.S.

FIGURE 6



strong conductor

weak conductor

VLF profiles (inphase values)
vertical scale 1cm = 10%
positive values to the left

VLF inphase values Fraser-
Filtered from north to south

0 100 200
meters

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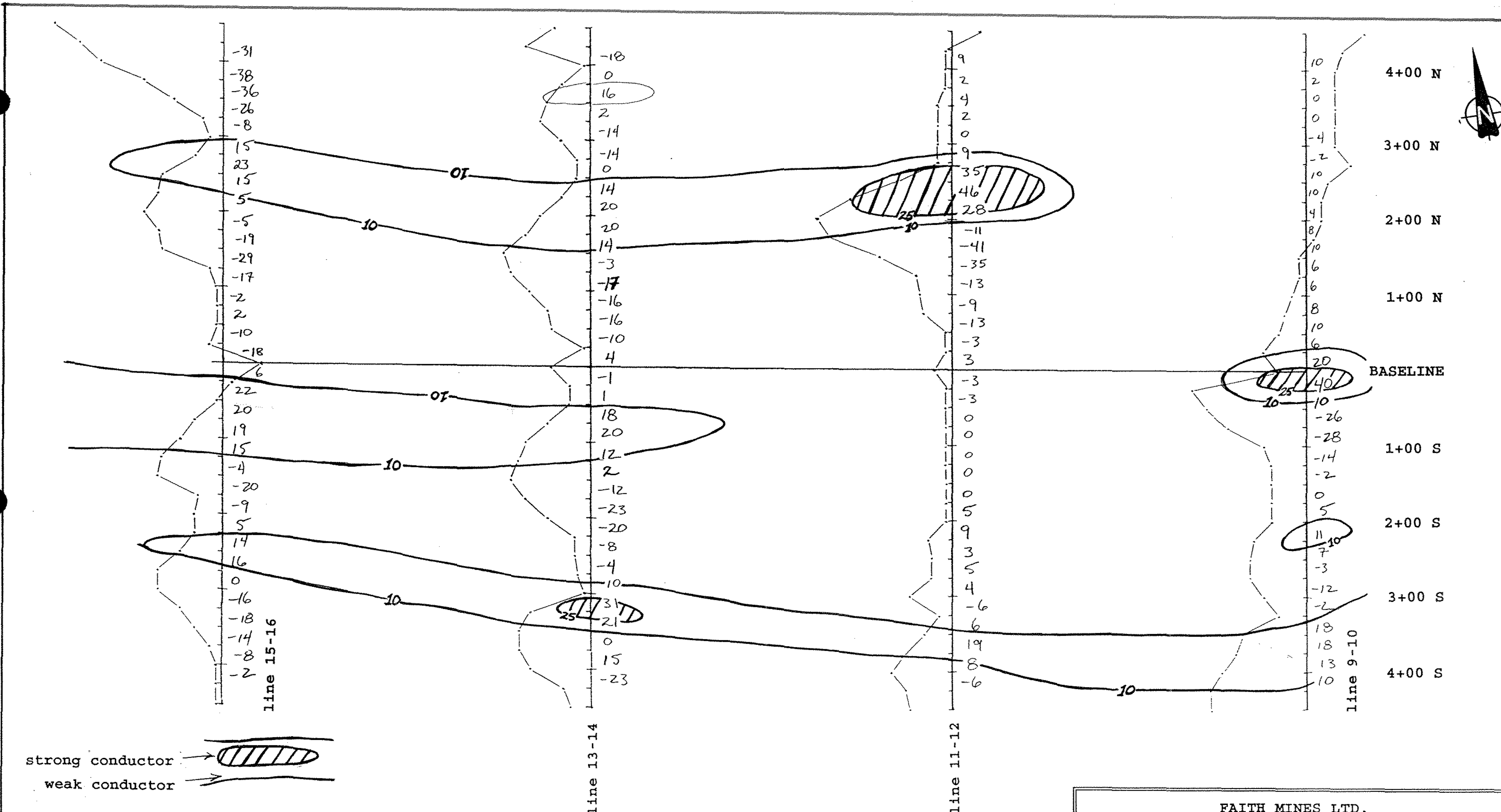
LULU PROPERTY	
DAWSON M.D., YUKON	NTS 115-O-3
VLF PROFILES AND FRASER FILTER CONTOURS (1 of 3)	
SCALE 1 : 5,000	
DATE: MAR. 95 BY: P.S.	FIGURE 7



VLF profiles (inphase values)
vertical scale 1cm = 10%
positive values to the left

VLF inphase values Fraser-
Filtered from north to south

0 100 200
meters

Distance to line 7-8
is 480 meters.

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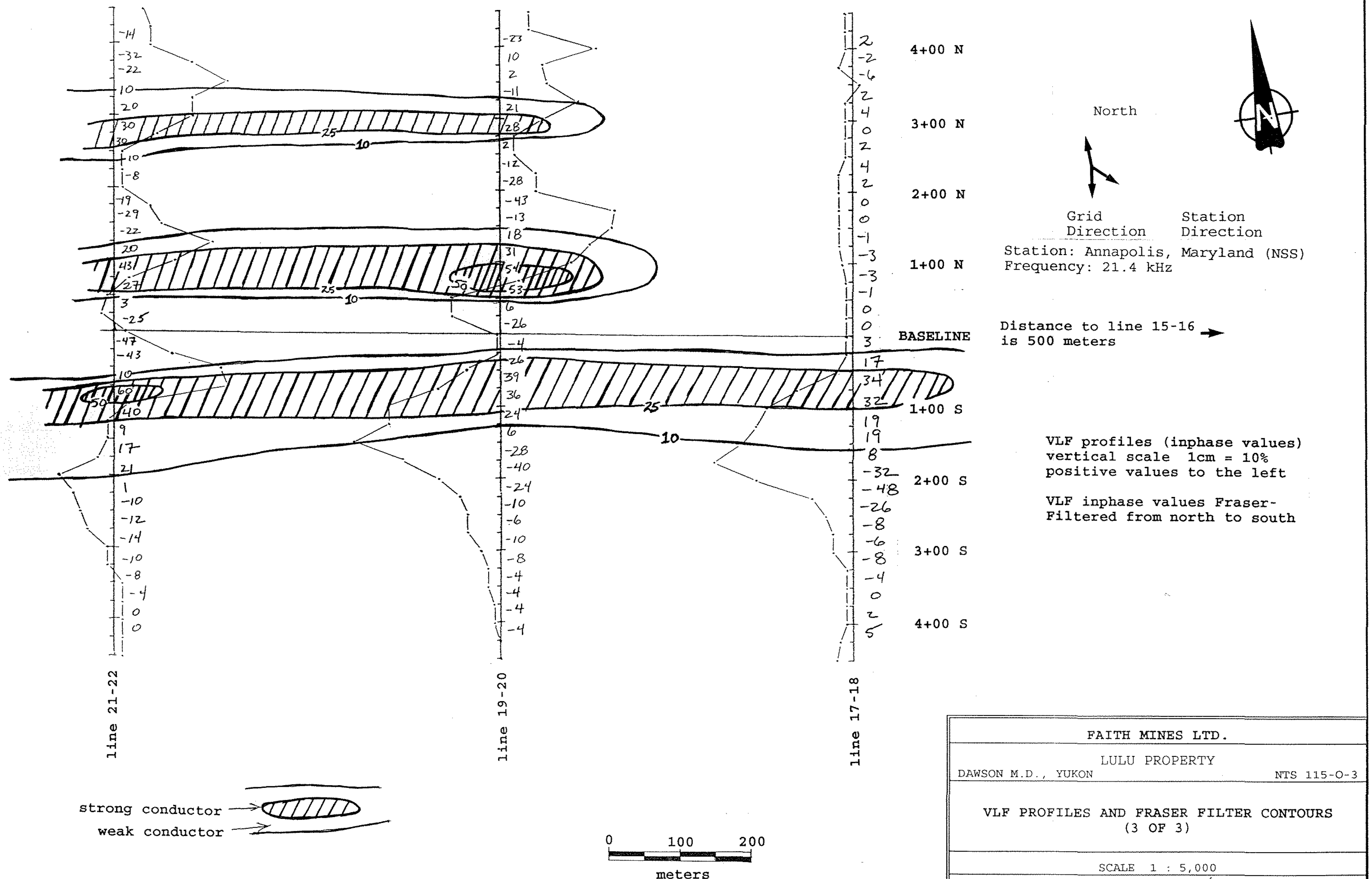
DAWSON M.D., YUKON NTS 115-O-3

VLF PROFILES AND FRASER FILTER CONTOURS
(2 of 3)

SCALE 1 : 5,000

DATE: MAR. 95
BY: P.S.

FIGURE 8



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LULU PROPERTY

DAWSON M.D., YUKON NTS 115-O-3

VLF PROFILES AND FRASER FILTER CONTOURS
(3 OF 3)

SCALE 1 : 5,000

DATE: MAR. 95
BY: P.S.

FIGURE 9

SUMMARY AND CONCLUSIONS

The Lulu claims are situated at the southern end of the Klondike region on a tributary of Thistle Creek, a significant placer gold producing creek. The claims overlie a major topographical lineament which has been interpreted to be a major fault and possibly the feeder zone for the gold in Thistle Creek and its tributaries.

The VLF-EM survey identified several linear conductors trending parallel to the major lineament. The strongest conductors lie at the west end of the property at the head of Blueberry Creek. A program of trenching on the conductors is recommended for the development of this property. Initial work should be focussed on the strong conductors at the head of Blueberry Creek. If this work proves successful in identifying a mineralized system, further trenching of other conductors should be commenced. If the system proves to be well mineralized, a diamond drilling program should be considered to test the system at depth.

BIBLIOGRAPHY

Mortensen, J.K., 1990. Geology and U-Pb geochronology of the Klondike district, west-central Yukon Territory; Canadian Journal of Earth Sciences, Vol. 27, p. 903-914.

Templeman-Kluit, D., 1976. The Yukon crystalline terrane: Enigma in the Canadian Cordillera; Geol. Soc. America Bull., v. 87, p. 1343-1357.

APPENDIX I

STATEMENT OF EXPENDITURES

LULU CLAIMS - EXPENDITURES

SALARIES

Lee Persinger - 6 mandays @ $150/day	900
David Persinger - 6 mandays @ $80/day	480
Report preparation - P. Southam - 2 mandays @ $180/day	360

LOGISTICAL COSTS

Food and lodging - 12 mandays @ $25/day	300
Mob/Demob - 2 flights @ $346/flight	692
SUBTOTAL	2732
Administration Fee (15%)	410
GST on Administration (#129350518)	29
TOTAL	**$3171**

APPENDIX II

STATEMENT OF QUALIFICATIONS

STATEMENT OF QUALIFICATIONS

I, Philip James Southam of 103 - 6615 Telford Avenue, Burnaby, British Columbia, do hereby certify:

1. I am a geologist registered with the Association of Professional Engineers and Geoscientists of British Columbia.

2. I graduated from Brandon University in 1987 with a Bachelor of Science degree majoring in geology.

3. I have practised my profession continuously since graduation in British Columbia, Manitoba, Yukon Territory and California in the field of mineral exploration.

4. I am employed by Hastings Management Corp. to provide geological services for Faith Mines Ltd.

5. All work completed for the purpose of this report was done under my supervision.

PROFESSIONAL
PROVINCE OF
P. J. SOUTHAM
BRITISH COLUMBIA
GEOSCIENTIST

Philip Southam

APPENDIX III

EM16 SPECIFICATIONS, OPERATION AND FRASER FILTER PROCESS

EM16 SPECIFICATIONS

MEASURED QUANTITY	In-phase and quad-phase components of vertical magnetic field as a percentage of horizontal primary field. (i.e. tangent of the tilt angle and ellipticity).
SENSITIVITY	In-phase :±150% Quad-phase :± 40%
RESOLUTION	±1%
OUTPUT	Nulling by audio tone. In-phase indication from mechanical inclinometer and quad-phase from a graduated dial.
OPERATING FREQUENCY	15-25 kHz VLF Radio Band. Station selection done by means of plug-in units.
OPERATOR CONTROLS	On/Off switch, battery test push button, station selector switch, audio volume control, quadrature dial, inclinometer.
POWER SUPPLY	6 disposable 'AA' cells.
DIMENSIONS	42 x 14 x 9cm
WEIGHT	Instrument: 1.6 kg Shipping : 4.5 kg

PRINCIPLES OF OPERATION

The VLF-transmitting stations operating for communications with submarines have a vertical antenna. The Antenna current is thus vertical, creating a concentric horizontal magnetic field around them. When these magnetic fields meet conductive bodies in the ground, there will be secondary fields radiating from these bodies. (See Figures 3 & 4). This equipment measures the vertical components of these secondary fields.

The EM16 is simply a sensitive receiver covering the frequency band of the VLF-transmitting stations with means of measuring the vertical field components.

The receiver has two inputs, with two receiving coils built into the instrument. One coil has normally vertical axis and the other is horizontal.

The signal from one of the coils (vertical axis) is first minimized by tilting the instrument. The tilt-angle is calibrated in percentage. The remaining signal in this coil is finally balanced out by a measured percentage of a signal from the other coil, after being shifted by 90°. This coil is normally parallel to the primary field,(See instrument Block Diagram - Figure 2).

Thus, if the secondary signals are small compared to the primary horizontal field, the mechanical tilt-angle is an accurate measure of the vertical real-component, and the compensation $\pi/2$-signal from the horizontal coil is a measure of the quadrature vertical signal.

GEONICS LIMITED

1745 Meyerside Drive, Unit 8, Mississauga, Ontario, Canada L5T 1C5 Tel. (416) 676-9580 Cables: Geonics

CONTOURING OF VLF-EM DATA

By

D. C. Fraser

Reprinted From

GEOPHYSICS

Vol. XXXIV, No. 6, December 1969

GEOPHYSICS, VOL. 34, NO. 6 (DECEMBER 1969), P. 958–967, 6 FIGS., 1 TABLE

CONTOURING OF VLF-EM DATA†

D. C. FRASER*

Prospecting for conductive deposits with ground VLF-EM instruments has received considerable impetus with the recent development of lightweight receivers. The large geologic noise component, which results from the relatively high-transmitted frequency, has caused some critics to avoid use of the technique. Those who routinely perform surveys with a VLF-EM unit find that, in some areas, a 5-degree peak-to-peak anomaly can be significant, whereas anomalies having amplitudes in excess of 100 degrees may occur as well. Consequently, there is a dynamic range problem when presenting the results as profiles plotted on a field map.

A data manipulation procedure is described which transforms noisy noncontourable data into less noisy contourable data, thereby eliminating the dynamic range problem and reducing the noise problem. The manipulation is the result of the application of a difference operator to transform zero-crossings into peaks, and a low-pass smoothing operator to reduce noise. Experience has shown that field personnel can routinely perform the calculations which simply involve additions and subtractions.

INTRODUCTION

VLF-EM data can be exceedingly difficult to interpret because a large geologic noise component can result from the relatively high-transmitted frequency of about 20,000 Hz. Routine surveys can yield useless data unless special care is taken both in survey procedure and in data presentation.

The purpose of this paper is to describe the survey procedure and the method of data presentation in use by the Keevil Mining Group and to illustrate the advantages of this approach.

VLF-EM GROUND SURVEY PROCEDURE AND DATA TREATMENT

The primary field

VLF-EM transmitter stations are located at several points around the globe. They broadcast at frequencies close to 20,000 Hz, which is low compared to the normal broadcast band. The purpose of these stations is to allow governmental communication with submarines, and the low frequency allows some penetration of the conductive ocean water. Skin depth is approximately $3.6\sqrt{P}$ meters, where P is the resistivity of a homogeneous halfspace in ohm-m, on the assumption that the frequency is 20,000 Hz and that the halfspace is magnetically nonpolarizable. Consequently, depth of exploration is severely restricted for overburden resistivities less than 200 ohm-m.

Since the area to be prospected normally is of considerable distance from the transmitter stations, the primary field is uniform in the area, allowing rather simple mathematics to be used in anomaly prediction and analysis.

Survey procedure and data treatment

The survey procedure first consists of selecting a transmitter station which provides a field approximately parallel to the traverse direction, i.e., approximately perpendicular to the expected strike of a conductor. The following points relate to the method of data treatment.

1. Readings should be taken every 50 ft, as will be shown below.
2. Transmitter stations should not be changed

† Manuscript received by the Editor April 24, 1969; revised manuscript received August 18, 1969.

* Keevil Mining Group Limited, Geophysical Engineering & Surveys Limited, Teck Corporation Limited, Toronto, Ontario, Canada.

for a given block of ground, to avoid distortion in the contour presentation. Hence, fill-in lines should be run with the same transmitter station as other lines in the block. The field direction of this station should be shown on the data map.

3. List the dip angle[1] data in tabular form, as follows:
    a) list in the direction of north (top of paper) to south, or from west to east;
    b) designate south or east dips as negative; and
    c) perform calculations as shown in Table 1.

   Thus, the filtered output or contourable quantity simply consists of the sum of the observations at two consecutive data stations subtracted from the sum at the next two consecutive data stations. The theoretical basis for this procedure will be described below.

4. The right-hand column (filtered data) is suitable for contouring. Normally, negative values are not contoured since, being caused by dip angle flanks, they do not aid interpretation but only confuse the picture. The positive values generally are contoured at 10-unit intervals, and the zero contour is shown only when it brackets an anomaly. In quiet areas, 5-unit contours may be meaningful.

[1] This paper assumes that data is recorded as for the Crone Radem which defines a north-dipping field as a south "dip" on the instrument. This convention was chosen because a south reading is interpreted as arising from a conductor to the south.

Example

Figure 1 presents dip-angle data, according to the Crone convention, in the vicinity of the Temagami mine of Copperfields Mining Corporation Limited in Ontario. This figure illustrates that several conductors are present yielding large dip angles. A complex pattern has resulted which requires some thought to interpret properly.

Figure 2 presents the filtered data in contoured form where only the 0, 20, and 40 contours are shown for simplicity. The conductor pattern is immediately apparent, even to exploration personnel untrained in VLF-EM interpretation. The three anomalies correlate with a zone of nearly massive pyrite and two brecciated fault zones. Depth to bedrock is 15 ft.

In practice, all the data of Figures 1 and 2 are

Table 1. Example of calculations

Location	Measured dips	Apply sign and form the moving sum of pairs of entries			Take first differences of alternate entries	
3+00S	6S	−6				
			(−6)+(−7) =	−13		
3+50S	7S	−7				
			(−7)+(−8) =	−15	(−23)−(−13) =	−10
4+00S	8S	−8				
				−23	(−39)−(−15) =	−24
4+50S	15S	−15				
				−39		+7
5+00S	24S	−24				
				−16		+57
5+50S	8N	+8				
				+18		+38
6+00S	10N	+10				
				+22		+8
6+50S	12N	+12				
				+26		+6
7+00S	14N	+14				
				+28	(+34)−(+26) =	+8
7+50S	14N	+14				
			(14)+(20) =	+34		
8+00S	20N	+20				

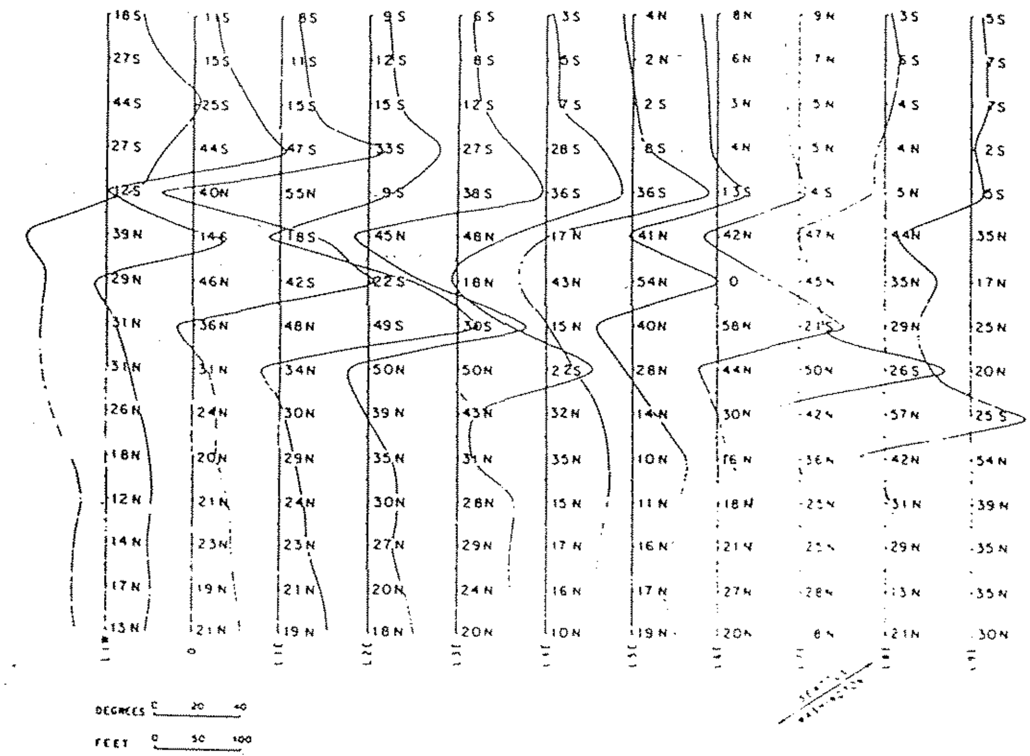

FIG. 1. Dip-angle data in the vicinity of the Temagami mine. The arrow defines the VLF-EM primary field direction from the transmitter at Seattle, Washington

placed on a single map. The above example illustrates that this very simple one-dimensional filtering scheme yields a practical and effective approach to VLF-EM data handling.

The filter improves the resolution of anomalies, thereby making them easier to recognize. An inflection on the dip profile from a conductor subordinate to a larger one yields a positive peak, thereby emphasizing the presence of such a conductor. Figure 3 illustrates this effect where nine lines were run over an SP (self-potential) anomaly in the Temagami area. The dip-angle anomaly is very poorly resolved due to the regional south dips produced by an areally large conductor to the south of the map area. The contoured VLF-EM data yields a clearly defined anomaly which was located over the negative center of the SP.

THE FILTER AND ITS EFFECT ON ANOMALIES

The filter operator

The filter operator was designed to meet the following criteria:

1. It must phase shift the dip-angle data by 90 degrees so that crossovers and inflections will be transformed into peaks to yield contourable quantities.
2. It must completely remove dc and attenuate long spatial wavelengths to increase resolution of local anomalies.
3. It must not exaggerate the station-to-station random noise.
4. It must be simple to apply so that field personnel can make the calculations without difficulty.

The first two criteria are met by using a simple difference operator, i.e.

$$M_2 - M_1,$$

where M_1 and M_2 are any two consecutive data points.

The third criterion is met by applying a smoothing or low-pass operator to the differences, i.e.

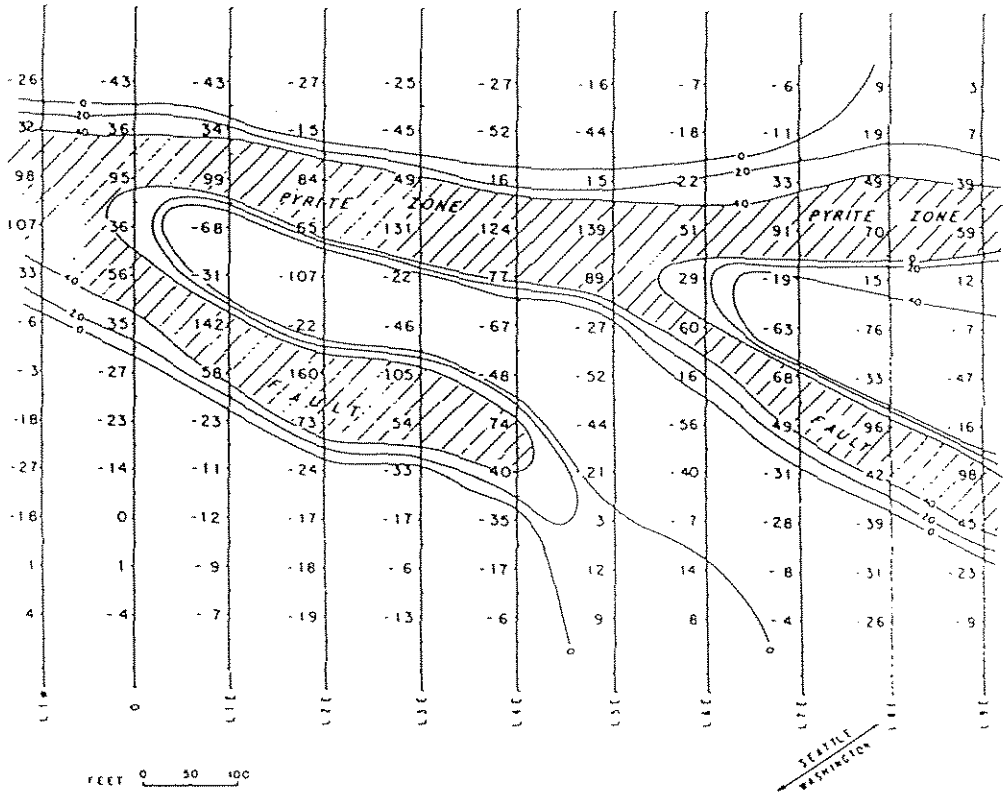

FIG. 2. Filtered data computed from the map of Figure 1.

$$\tfrac{1}{4}(M_2 - M_1) + \tfrac{1}{2}(M_3 - M_2) + \tfrac{1}{4}(M_4 - M_3),$$

where M_1, M_2, M_3, and M_4 are any four consecutive data points. The filtered output then is

$$\tfrac{1}{4}(M_2 - M_1) + \tfrac{1}{2}(M_3 - M_2) + \tfrac{1}{4}(M_4 - M_3) = \tfrac{1}{4}\left[M_3 + M_4 - M_1 - M_2\right].$$

The final criterion is enhanced by eliminating the constant, so that the plotted function becomes

$$\boxed{f_{2,3} = (M_3 + M_4) - (M_1 + M_2),}$$

which is plotted midway between the M_2 and M_3 dip-angle stations.

This filter has its frequency (wavenumber) response displayed in Figure 4, for a station spacing of 50 ft. Its characteristics are as follows:

1. All frequencies are shifted by 90 degrees.
2. Noise having a wavelength equal to the station spacing and dc bias are completely removed.
3. Maximum amplitude occurs for wavelengths of 250 ft, or five times the station spacing.

The frequency (wavenumber) response of the filter is shown for a station spacing of 50 ft, because this is the most suitable spacing for defining sulfide bodies within a few hundred feet of surface. This will be demonstrated below.