92I/10E

GEOPHYSICAL REPORT

ON A

HELICOPTERBORN MAGNETOMETER SURVEY

OVER THE

GREENSTONE MOUNTAIN AREA

AT, EX

SITUATED IN THE

KAMLOOPS MINING DIVISION

LATITUDE 50° 37' N: LONGITUDE 120° 35' W

N.T.S. 92-1/10 EAST

ON BEHALF OF

DELTA INTERNATIONAL MINERALS LTD.

by

SANDNER ASSOCIATES

VANCOUVER, B.C.

February 14, 1973.

Report by:

A. Mlcuch, PhD.,
Geophysicist

Instrument Operator:
J. Denham

4156

TABLE OF CONTENTS

	Page
Preface	1
Introduction	1
Introduction to Aeromagnetometry	2
Location	3
General Setting	3
Airborne Field Procedure	5
Data Processing	6
1. Flight Line X-Y Positioning	6
2. Editing of Paper Tape	7
3. Tabulation of Critical Fiducial Numbers	7
4. Contour Plotting	7
Discussion of Airbonrne Data	8
Comments on Results	9
#1 Location Map (Figure I)	10
#2 Airphoto Mosaic (approx.scale: 1 inch = 2 miles) (Figure II)	11
Appendix I Instrumentation	12
Appendix II Personnel and Dates Worked	14

Fold Maps:

#3 Figure III - Isomagnetic Plan
#4 Figure IV - Flightline layout and Isomagnetic Plan on the Airphoto mosaic.

REPORT ON

HELICOPTERBORNE AEROMAGNETIC SURVEY

GREENSTONE MOUNTAIN AREA

PREFACE

Magnetic susceptibility may change perceptibly from one lithologic unit to another; thus accurate detailed mapping of the geomagnetic field often provides valuable information about subsurface geology, even in heavily drift covered areas. Aeromagnetic surveying can aid in the delineation of buried contacts and disruptions, or the location of areas of possible plutonic differentation. Often local magnetic patterns associated with known ore bodies can be identified, and the existence of similar variations in magnetic intensity elsewhere may lead to the discovery of new ore bodies.

INTRODUCTION

During May 1 - 9, 1972, S.L. Sandner and Associates of Vancouver, B.C., conducted an airborne magnetometer survey over a 220 square miles area, south and west of the City of Kamloops, in the Kamloops Mining Division of British Columbia. A total of 1630 line miles of total intensity airborne magnetometer surveying was flown. This report describes the claim area of 6 square miles with the total of 56 line miles from the original survey, instrumentation, field procedure, data processing and discussion of the results obtained.

INTRODUCTION TO AEROMAGNETOMETRY

The earth has a magnetic field which is basically that of a magnetic dipole. There are, however, major and minor divergences from the basic dipolar field. Major divergences are interpretable as indications of structure within the geoid proper and are of mostly academic interest. Minor differences are of more interest to the mineral prospector since they may be attributable to local variations in either the ferromagnetic susceptibility or the natural rock magnetism, or both. Since ferromagnetic susceptibility and natural rock magnetism change measurably from one rock type to another, accurate detailed mapping of the local geomagnetic field often provides valuable information about the subsurface geology (even in heavily drift-covered areas). Aeromagnetic surveys can provide information about the type, general attitude, configuration and complexity of the geo-superstructure. Local elements associated with known ore bodies can often be identified, and the existence of similar local elements elsewhere may lead to the discovery of new ore bodies. Aeromagnetic prospecting can be applied to the delineation of buried contacts and disruptions, or the location of areas of possible plutonic differentation and its varied products.

LOCATION

The survey area covered by this report is approximately centered at latitude 50° 37' N and longitude 120° 35' W (N.T.S. 92-1/10 East), about 12 miles west of the City of Kmloops in south central British Columbia. The property is accessible by narrow loose surface all weather road, south from Trans-Canada Highway.

GENERAL SETTING

The area covered by this report lies within the belt of Interior Plateaux, south of Kamloops Lake, on the eastern slope of Greenstone Mountain. The slope rises from elevation of 3000 feet in the north-eastern corner up to 5000 feet A.S:L. on the western part of the map-area. Ned Roberts Creek and Cherry Creek control the drainage of the heavily timbered incline.

The rocks of the Nicola group (upper Triassic epoch) cover the entire property. The volcanic rocks comprise of a number of diverse types, but may be very largely grouped under the general term of greenstones. Associated with the lavas are tuffs, breccias, and agglomerates. Among the lavas the most common type is a grey-green to bright green, fine-grained rock - andesite porphyry, with a groundmass of medium sodic plagioclase, pyroxene, chlorite, epidote, actinolite, and some magnetite. Grey, purple and red types show little variation in composition from the others, but the purple and

rocks are impregnated with iron oxide.

The group also includes a number of feldspar porphyries, with feldspar crystals ranging from minute size to nearly half an inch long. The large feldspar phenocrysts are labradorite and may be accompanied by veinlets of a bright orange-red silicite minerals.

A very common type of breccia consists of a green, fine-grained rock carrying widely scattered, small, angular fragments of red or purple lavas. The agglomerates do not differ greatly from the breccias, but carry in addition fragments of the sedimentary rocks of the group. The most common fragments are of Nicola limestone, many of them carrying obscure fossils.

In general, the mineral deposits occur mostly in volcanic rocks and are accompanied in some instances by silicification with chalcedonic quartz, intense alteration of the rock to ankeritic carbonates and the development of dolomite veins or stringers in shear zones and fracture zones.

(1) Bulletin #48, S.S. Holland
Landforms of British Columbia, Department of Mines & Petroleum Resources, 1964.

(2) G.S.C. Memoir 249, W.E. Cockfield, Geology and Mineral Deposits of Nicola Map-Area, British Columbia. Department of Mines and Technical Surveys, 1961.

(3) Annual Report, Minister of Mines and Petroleum Resources, British Columbia, 1966.

AIRBORNE FIELD PROCEDURE

The total intensity of the geomagnetic field was measured and recorded along 208 flight lines, flown in a general northeast - southwest direction. Two tie lines were flown consecutively in northwest - southeast direction.

The survey was flown in a Bell Jet Ranger 206A towing an air foil sensor with a Varian V4937A proton precission magnetometer (± 1 Gamma), Varian SDV 4991 digital paper punch recorder and a Neyhard Automax 35 m.m. pulse camera. The terrain clearance was recorded with a Bonzar pulse type radar altimeter.

Analog records were made of the total magnetic field intensity and terrain clearance during flight.

At one second intervals, the field amplitude and fiducial number were recorded on punch tape by the digital recording system. At thirty second intervals, the time and line number were punched on the tape. At five second intervals, a split image camera simultaneously photographed (1) the terrain,

and (2) the clock and fiducial display panel. Thus, each terrain photograph is bordered by a photograph of the clock, and fiducial number.

A ground magnetometer monitored the geomagnetic field during the survey.

Solar flare warnings and predictions, issued daily at the Space Disturbance Forecase Centre in Boulder, Colorado, were used to schedule the flight during a magnetically quiet period.

The punch tape, chart and strip photograph processing is described in the following section. Instrument specifications are in Appendix I.

DATA PROCESSING

The data processing procedure consisted of four steps discussed under the following headings:

1. Flight line X-Y positioning.
2. Editing of the paper tape.
3. Tabulation of critical fiducial numbers and their X-Y co-ordinates.
4. Contour plotting.

1. Flight Line X-Y Positioning

From the aircraft, while the lines were being flown, the flight lines were roughly positioned on government aerial photographs. In the office, the beginning and end of each

flight line was marked on the strip photographs. S. L. Sandner & Associates personnel transferred the flight lines onto a mosaic prepared from the government photos.

An X-Y co-ordinate system was superimposed on the flight line mosaic with +Y north and +X east (see Figure 4). Thus, every position along a flight line was defined in terms of X (number of feet east of the origin) and Y (number of feet north of the origin), and has a corresponding magnetic value in gammas.

2. Editing of the Paper Tape

A computer printed listing of the contents of the paper tape was made and compared with the analogue record as a guard against possible machine or operator error.

3. Tabulation of Critical Fiducial Numbers

The first and last fiducial number on each line were tabulated along with their X-Y co-ordinates. In addition, points where the flight line changed direction were tabulated along with the appropriate fiducial number. The tabulated information was then keypunched onto computer cards.

4. Contour Plotting

The punch tape information was input to a computer, along with the X-Y co-ordinates of the start, end and any changes of direction that may have occurred in the flight line. The data sampling interval along the flight lines was roughly

200 feet. The magnetometer readings were evenly spaced along the line segments and posted by a computer-plotter unit. The posted values were than hand contoured at a contour interval of 10 gammas.

DISCUSSION OF AIRBORNE DATA

This section is intended as an aid to geologic interpretation of the airborne geophysical survey data.

In general, geophysical features which can originate from, or are associated with mineralization are used to localize favourable sites for more intensified exploration. The presence of certain minerals (e.g. magnetite), and geologic features (e.g. faulting) are detectable from geophysical observations. Faulting is sometimes expressed in a magnetic map as a steep gradient or magnetic low. Magnetic highs can be caused by increased concentrations of magnetic minerals.

Contact between two different rock types or phase differences within the same rock type often are expressed as moderate gradient along the interface. This effect is related to the difference in magnetic susceptibility between the two rock types.

In general, the geophysical data from a survey of this type can only be evaluated after a detailed examination and comparison of the geophysical data, terrain clearance charts, air photographs and government photograph mosaic. For instance, an anomaly on the magnetic map may be due to an occurrence of

concentrated magnetic minerals. However, relative to the other magnetic peaks it may be partially influenced by terrain clearance. Thus, an anomaly adjacent to it may prove to have an equal concentration of magnetic minerals.

COMMENT ON RESULTS

The low level airbrone magnetic survey produced interesting details of the 430 gammas overall low magnetic relief.

The highest magnetic value is in the north-western corner of the property. Three ridges stretch out in the north-west, north-east, and south direction from the magnetic peak. The steepest gradient is on the east side of this peak reaching minimum in the upper part of Ned Roberts Creek valley. Further south a flat-top magnetic high with a long curved flank in the east-west direction separates two magnetic depressions. The southern depression seems to follow the Cherry Creek Valley, the northern low spreads over the central part with little changes in the profile. To the south of Ned Roberts Creek the western side of an anomaly expands into the area.

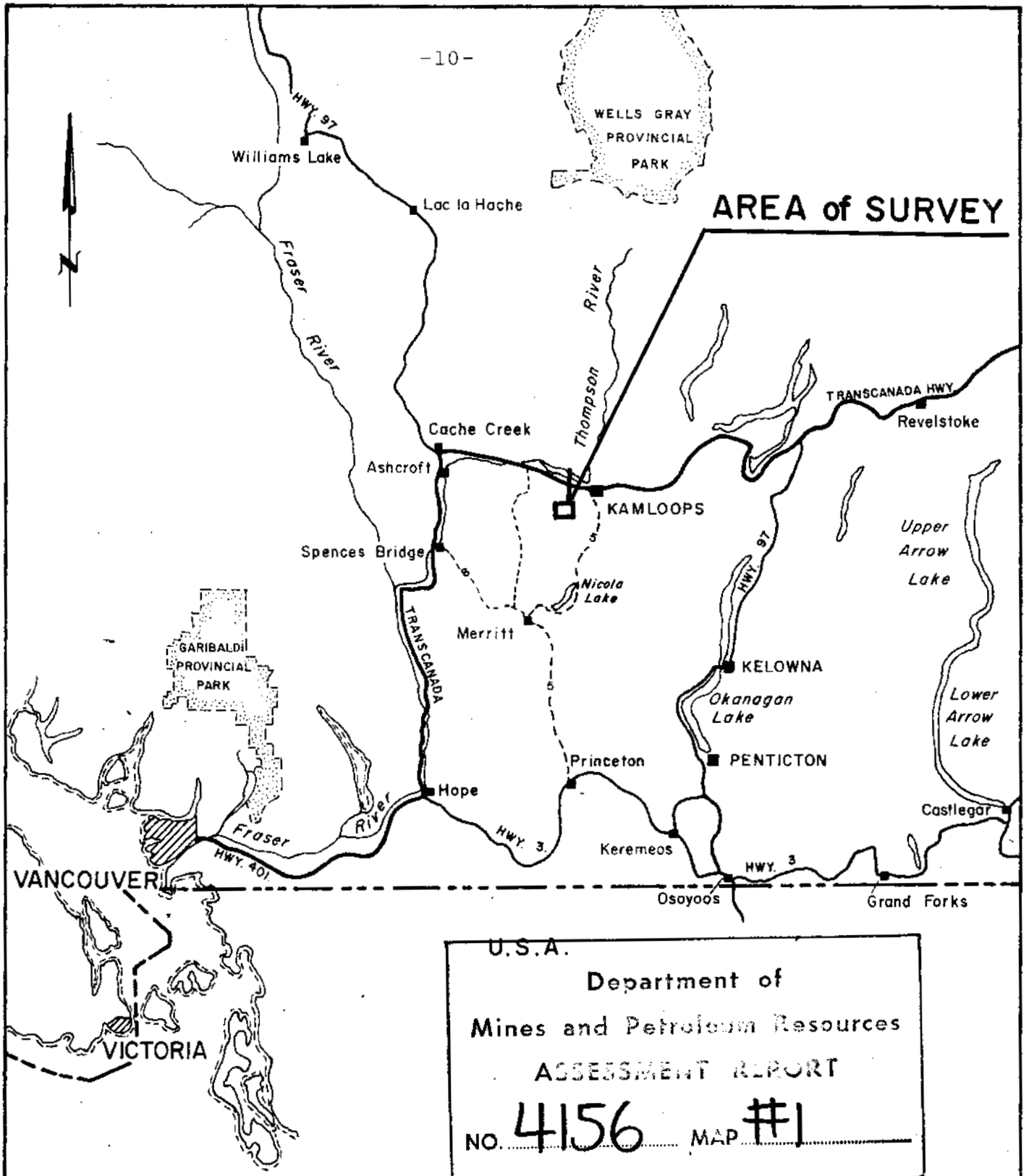
Known mineralization zones are found where the steep gradient broadens out away from the magnetic peak or when it forms a tongue shaped flank. Both magnetic contour shapes are abundant in the central area that indicates shear and/or fracture zones in the country rock.

Respectfully Submitted:

Alexander Mlcuch

A. Mlcuch, PhD.
Geophysicist.

February 14, 1973



Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 4156 MAP #1

0 40 80 120
SCALE : MILES

DELTA INTERNATIONAL MINERALS LTD.
CHERRY CREEK, KAMLOOPS M.D.

LOCATION MAP

SANDNER ASSOCIATES

DRAWN D.E.Y.	DATED FEB. 6, 1973	FIG. NO. 1
CHECKED A. Mls	JOB NO. 1206	

AIRPHOTO MOSAIC of KAMLOOPS - AFTON AREA

OUTLINING DETAILED AEROMAGNETIC SURVEY COVERAGE

1/2 1/4 0 1/2 1 1 1/2
MILES (APPROX.)

S.L. SANDNER & ASSOCIATES	DRAWN BY : T.M. DATE : APRIL 15, 1972	JOB No. 1204

4156 M-2

APPENDIX I

SPECIFICATIONS OF THE V-4937A MAGNETOMETER SYSTEM

Performance

Range:	20,000 to 100,000 gamma (worldwide)
Sensitivity:	± 1/2 and ± 1 gamma in any field.
Sampling Rate:	manual and "clock" operation permits any timing sequence.

Power Requirements

22-30 V, 6 amps for magnetometer, 60 watts for analog recorder and 100 watt maximum for digital recorder.

Physical Specifications

Console:	size - 19 x 17 x 24 inches; Weight 68 lbs.
Analog Recorder:	dual channel - 15 x 10 x 10 inches, 30 lbs.
Scanner-coupler:	fucical counter, ident. control, 24 hr. clock, 40 lbs.
Recorder:	size - 14 x 11 x 28 inches; Weight 41 lbs.

Data Output

Digital Recording:	BCD 1-2-4-8 (four line output) "O" state - 18 to -30v through 100K ohms 1 state -1 to +3v through 100k ohms
Print Command:	Positive going 12 to 25v pulse; 15M second.
Auxiliary Channels:	A & B for radio altimeter and navigation equipment.
Analog Recording:	Galvanometric -1 mA full scale into 1500 ohms Potentiometric: 100mV full scale. Minimum load resistance 20K Full scale resolution of the least most significant digits of the total geomagnetic field 0-99, 0-999 at 1 gamma sensitivity; 0-49, 0-499 at 1/2 gamma sensitivity.

APPENDIX I Cont'd.

Instrument Specifications

Camera

Type:	Neyhard Automax 35 m.m. pulse camera
Model:	G-2 with auxiliary data box
Pulse Rate:	Up to 10 frames per second
Film Format:	0.738" x 0.738" square picture with 0.200" x 0.738" data area.
Magazine:	Mitchell 400 foot 35 m.m.
Lenses:	(a) 17 m.m. F/14 Super-Takumar Fish-eye (b) 35 m.m. F/2.0 Super Takumar
Data Box:	(a) 24 hour Accutron Clock (b) Frame counter (c) Available for optional feature
Dimensions (less magazine):	8 3/8" high, 4 1/2" deep, 6 1/4" wide.
Weight (less lens and magazine):	12 lbs.

APPENDIX II

PERSONNEL AND DATES WORKED

A. Field Work:

S.L. Sandner	Supervisor	
Chad Murray	Pilot	May 1 - 9, 1972
Joe Denham	Operator	May 1 - 9, 1972

B. Report Preparation:

S.L. Sandner		
A. Mlcuch	Data Processor	May 10-31, 1972
		Jan. 22 - 26, 29 - 31,
		Feb. 12-14, 1973.

C. Drafting and Reproduction:

D.A. Chapman	Feb. 6 - 9, 1973.

CERTIFICATE

I, Alexander Mlcuch, of the Municipality of Vancouver, Province of British Columbia, hereby certify that:

1. I am a Physicist and Geophysicist and reside at #307 - 1234 Barclay Street, Vancouver 5, British Columbia.

2. I am a university graduate with Ph.D. in Physics - Komensky University at Bratislava, Czechoslovakia, 1958.

3. I have practiced my profession for the past 14 years.

4. My registration is pending in the Association of Professional Engineers of British Columbia.

5. I have no interest, direct or indirect, in the properties, securities or affiliates of Delta International Minerals Ltd.

Alexander Mlcuch

Alexander Mlcuch, Ph.D.

Date: Feb 14, 1973.

APPENDIX III

COST BREAKDOWN

The following is a cost breakdown of a detailed airborne magnetometer survey conducted over the "AT" Claim group Kamloops M.D. consisting of approximately 33 full size and fractional claims, owned by Delta International Minerals Ltd. located approximately 12 miles west of the City of Kamloops, for Delta International Minerals Ltd., through an agreement with Sandner Associates.

56 line miles of magnetometer survey		
@ $13.50/line mile	=	$ 756.00
Photo mosaic enlargement	=	44.00
Grand Total:		$ 800.00

S. L. SANDNER & ASSOCIATES
GEOLOGISTS/GEOPHYSICISTS
6-815 W. HASTINGS ST.
VANCOUVER 1, B.C.

S.L. Sandner, President

4156 M3

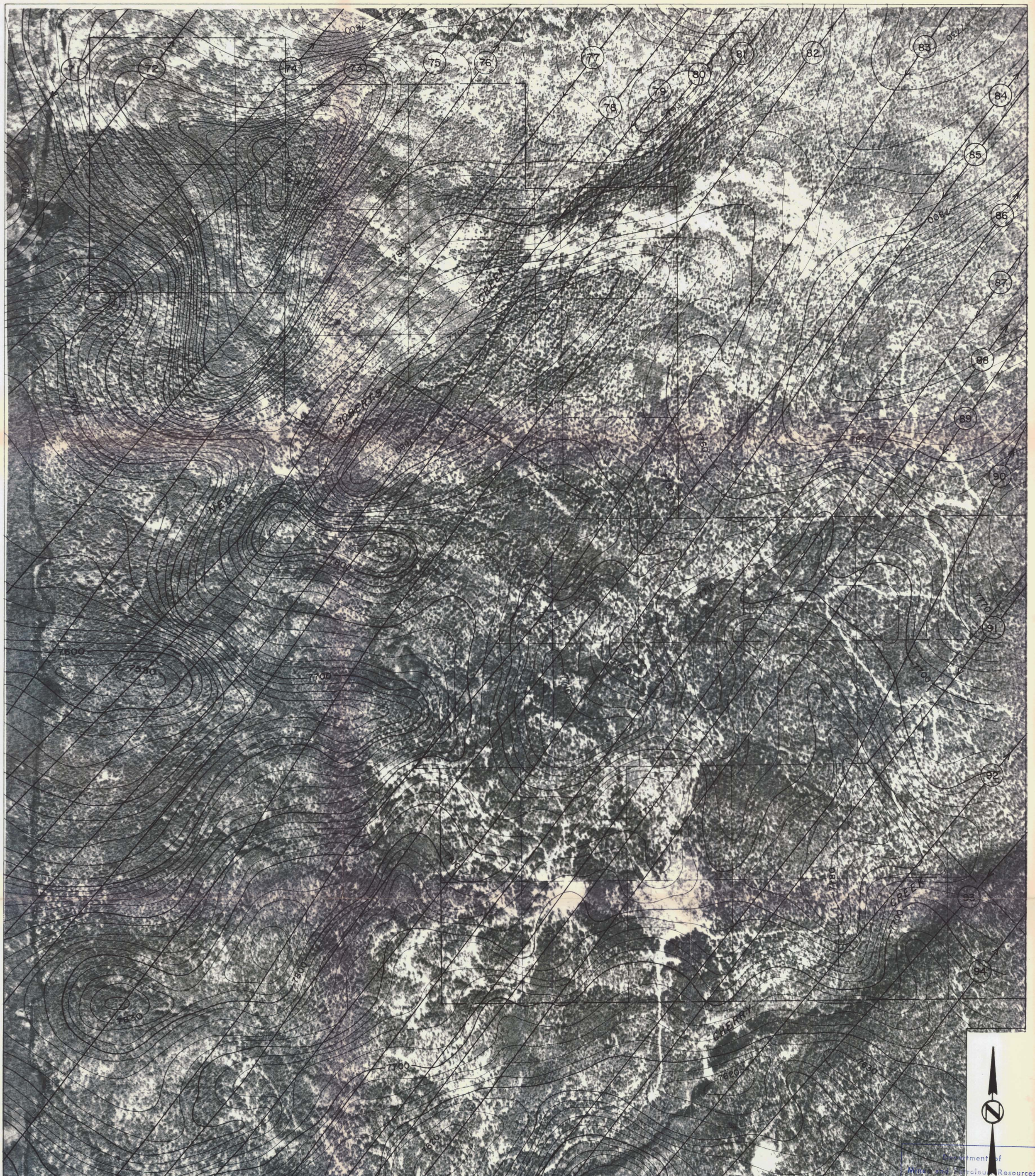
SCALE
500 0 500 1000 1500

Note: Add 50,000 gammas to all readings for total field.

DELTA INTERNATIONAL MINERALS LTD.
CHERRY CREEK, KAMLOOPS M.D.

ISOMAGNETIC PLAN

SANDNER ASSOCIATES				
	DRAWN	D.A.C.	JOB NO.	FIG. NO.
	DATED	Feb. 12/73	1206	3
	CHECKED	Q. Mitt		



SCALE

500 0 500 1000 1500

500 0 500 1000 1500

feet

Note: Add 50,000 gammas to all readings for total field.

DELTA INTERNATIONAL MINERALS LTD.
CHERRY CREEK, KAMLOOPS M.D.

ISOMAGNETIC PLAN

FLIGHT LINE LAYOUT

SANDNER ASSOCIATES			JOB NO.	FIG. NO.
	DRAWN	D.A.C.	1206	4
	DATED	Feb. 12/73		
	CHECKED	A. Mls		