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SUMMARY AND RECOMMENDATIONS

Early in March, 1970 Geo-X Surveys Ltd. completed 665 line miles of total field aeromagnetic and aeroradiometric surveying on an approximate 8.5 mile by 14.5 mile area encompassing the Casino Silver Mines Property in the Dawson Range, Yukon Territory, on behalf of Brameda Resources Ltd.

The survey was completed in an Excalibur 800 fixed wing aircraft with a Varian V4937A proton precession magnetometer ($\pm$1 gamma) Exploranium DiGRS 2000 differential spectrometer; SDV 4991 digital recorder and analogue chart recorders. Flight line positioning was facilitated by 35mm strip photography matched to a large control mosaic. Terrain clearance was recorded in analogue mode by a radar-type pulse altimeter.

Data processing was conducted by Geo-X Surveys Ltd. personnel using IBM equipment in Vancouver.

The total field isomagnetic plan and K-40 map were plotted by a computer-plotter unit at a contour interval of 25 gammas and 3 counts per second respectively.

The total field airborne magnetometer survey located a ridge of complex high magnetic intensities which have been dissected by NW-SE, NE-SW and E-W magnetic linears. The Casino

Silver Mines discovery is located in the area of the intersecting of a strong NW-SE trending magnetic linear (A-A') with a NE-SW trending magnetic linear (E-E'). The area of complex high magnetic intensities may be due to a more basic phase of the batholith, basic inclusions within the batholith and/or remnant volcanic material.

The potassium -40 data located several areas of moderate increases in radioactivity which may not be due to topography. These areas and particularly the areas of intersecting magnetic linears would appear to warrant further investigation.

Respectfully submitted,

Glen E. White, B.Sc.,
Geophysicist

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 differentiation.

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.

Radioactivity may likewise vary from one rock type to another and can be used as a geological mapping tool. Both the total gamma ray count and the K-40 are used as indirect geologic aids. The measurement of K-40 is particularly useful in that potassium -40 is in greater abundance in acidic intrusives, and related rocks and frequently (associated with K-feldspars) in areas of certain varieties of hydrothermal alteration. However, the usefulness of this method is somewhat limited because of the variation in overburden thickness and extent, and variation in terrain clearance.

INTRODUCTION

During the period March 3-5, 1970, Geo-X Surveys Ltd. of Vancouver, British Columbia, on behalf of Brameda Resources Limited, conducted airborne magnetometer and airborne radiometric surveys over the Casino Silver Mines Property, Dawson Range, Yukon Territory.

A total of 665 line miles of total intensity airborne magnetometer and airborne radiometric surveying was conducted. This report describes the instrumentation, field procedure and data processing, and discusses the results obtained.

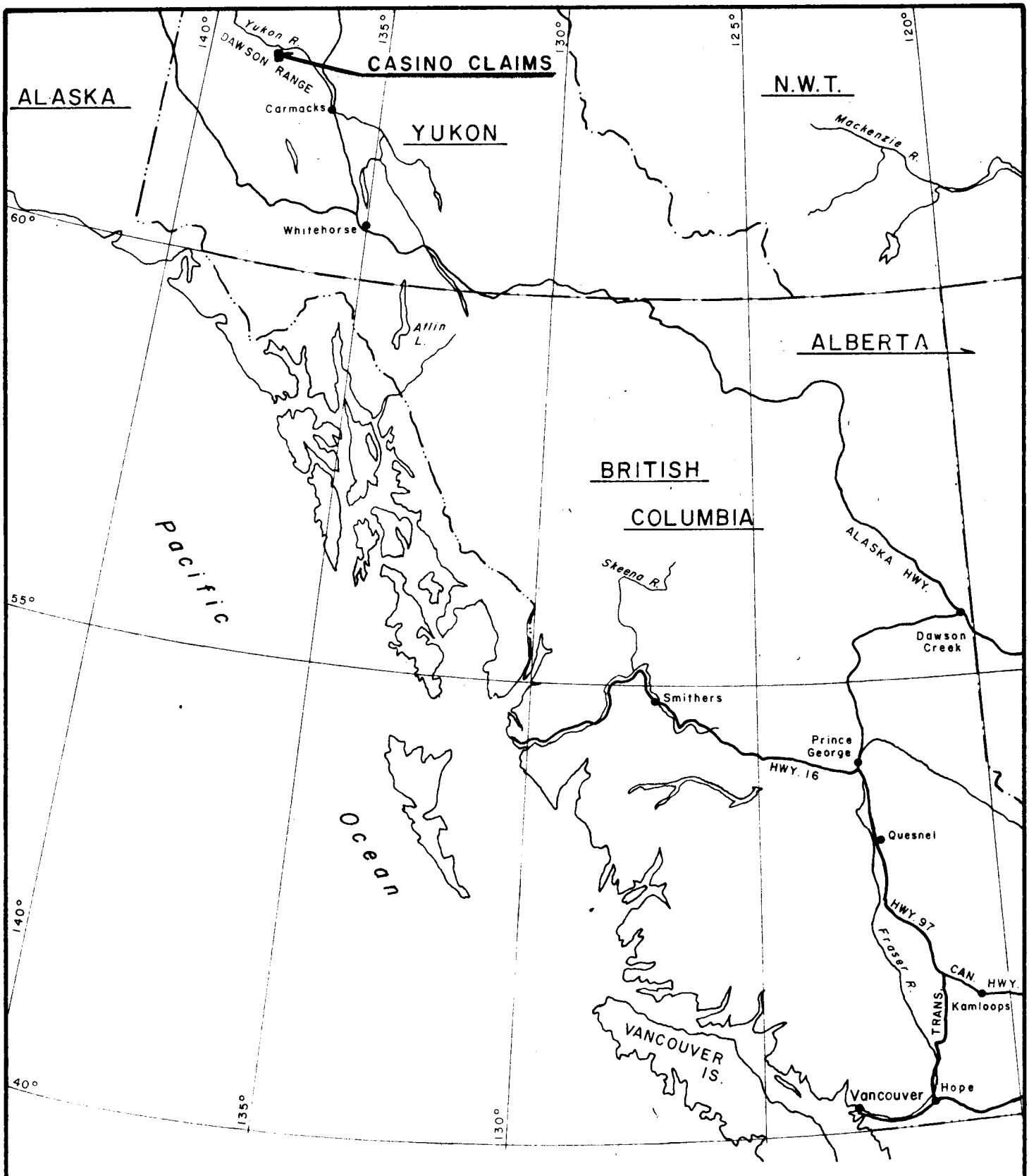
LOCATION AND ACCESS

The survey area covered by this report is centered at latitude 62° 43'N and longitude 138° 50'W between the Yukon and Klotassen Rivers at the headwaters of Canadian and Casino Creeks in the Dawson Range, Yukon Territory.

Facile access to the area is by rotary or fixed wing aircraft. The survey was conducted on behalf of Brameda Resources Ltd.; 7th floor - 1177 West Hastings Street, Vancouver, B.C.

GENERAL SETTING

The area surveyed is located in the Dawson Range on the Klondike Plateau, a physiographic subdivision of the Western Yukon Plateau. The topography is unglaciated and



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MILES (APPROX.)

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LOCATION MAP

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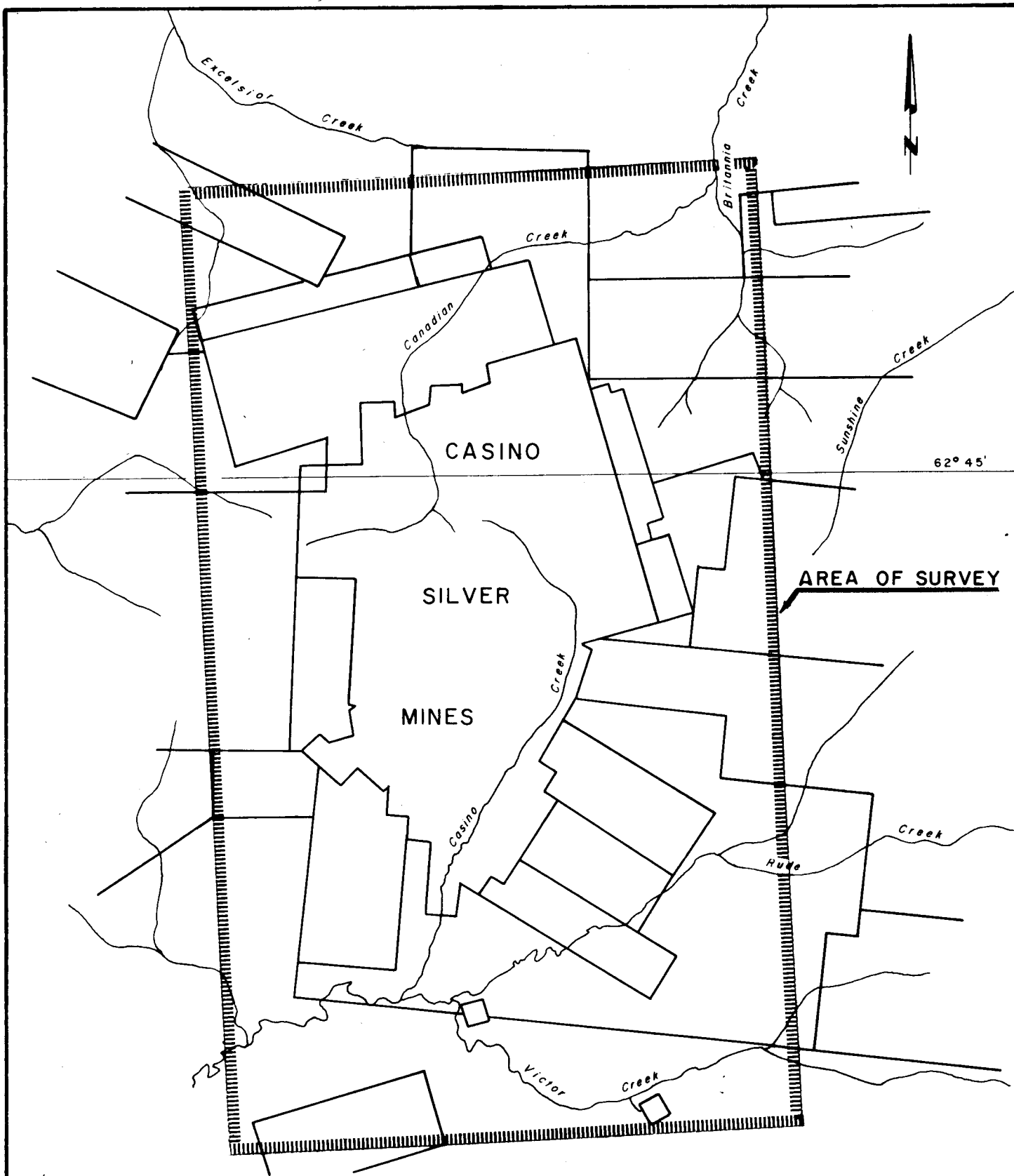
Drawn A.N.S.	Dated: May 15/70	Fig. No. 1
Checked	Job No. 1139	



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MILES (APPROX.)

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PROPERTY MAP

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Drawn A.N.S.	Dated: May 15/70	Fig. No. 2
Checked	Job No. 1139	

consists of deep narrow valleys separated by long smooth-topped ridges. These ridges converge and culminate in monadnocks that consist of dome-like eminences or groups of relatively smooth-sloped mountains including the Dawson Range.

The generalized geology of the Dawson Range consists of Pre-Cambrian metamorphic rocks of sedimentary and igneous origin which have been intruded by a succession of igneous rocks (largely granite and granodiorite), probably of Cretaceous or Jurassic Age apparently contemporaneous with the Coast Range Intrusives.

H. S. Bostock. Physiography of the Canadian Cordillera with special reference to the area North of the fifty-fifth parallel. G.S.C. Memoirs 247.

AIRBORNE FIELD PROCEDURE

The aeromagnetic and aeroradiometric data were measured and recorded along 50 flight lines flown in a north-south direction at an average terrain clearance of

500 feet and with an approximate line spacing of 500 feet.

The survey was flown in a fixed wing aircraft, towing an airfoil sensor. A proton magnetometer, DiGRS 2000 spectrometer, digital and chart recorders, camera and altimeter were mounted in the aircraft. The magnetometer, spectrometer and chart recorders, camera and altimeter were mounted in the aircraft. The magnetometer, spectrometer and chart recorders continuously measured and recorded the magnetic field intensity, terrain clearance and radiometric data (Total count, K-40, Tl-208, Bi-214). At one second intervals, the magnetic and radiometric intensities 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 two 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.

The terrain clearance was measured with a Bonzar pulse type radar altimeter and recorded by a G-2000 chart recorder.

Solar flare warning and predictions, issued daily at the Space Disturbance Forecast Center 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 located in Appendix IV.

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 coordinates.
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 aerial photographs. In the office, the beginning and end of each flight line was marked on the strip photographs.

From the strip photos Geo-X personnel plotted the flight lines on a large scale aerial mosaic. An X-Y coordinate system was also superimposed on the flight line mosaic with +Y north and +X east. Thus, every position along a flight line is defined in terms of X (number of feet east of the origin) and Y (number of feet north of the origin).

2. Editing of the Paper Tape

A listing of the contents of the paper tape was made by IBM of Vancouver. The listing was examined and compared with the analogue record as a guard against possible machine or operator error. The magnetic readings for areas of flight line intersection were compared as a check on the time variations of the geomagnetic field.

3. Tabulation of Critical Fiducial Numbers

The first and last fiducial number on each line were tabulated along with their X-Y coordinates. In addition, points where the flight line changed direction were tabulated along with the appropriate fiducial number.

The tabulated information was keypunched onto computer cards, and sent with the punch tape to IBM.

4. Contour Plotting and Data Presentation

IBM fed the punch tape to a computer, along with the X-Y coordinates 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 165 feet. The magnetometer readings were evenly spaced along the line

segments and contoured by a computer-plotter unit at a contour interval of 25 gammas (figure 3).

A two point filter was applied to the K-40 data. The results were then computer plotted at a contour interval of 3 counts per second.

DISCUSSION OF RESULTS

The aeromagnetic and aeroradiometric survey data is presented as follows:

(1) Figure 3 consists of a black line mosaic and flight line map at an approximate scale of 1"=1000'
(2) Figure 4 represents the isomagnetic contour map
(3) Figure 5 illustrates the potassium 40 data in contour form
(4) Figure 6, the general interpretation map illustrates the primary features to be discussed.

The total field magnetic intensity showed considerable variation from a minimum of 57,250 gammas to a maximum of some 58,550 gammas around a mean of some 57,650 gammas. The principle feature is the strong northwest-southeast trending magnetic linear A-A' which dissects magnetic linears B-B' and C-C' and passes through the area of the Casino Silver Mines mineral discovery. Linears B-B' and C-C' reflect the contact of

relatively plateau-like values of magnetic intensity to the north with a region of complex high magnetic intensities to the south. Correlation of the magnetic data with Cairnes' geological map of 1916 indicates that linears B-B' and C-C' coincide with a contact of the granitic batholith of Cretaceous or Jurassic Age to the south, with Pre-Cambrian mica schists and gneisses to the north. The region of complex high magnetic intensities, trends in an east-west direction and is cut by a series of parallel northeast-southwest trending linears one of which (E-E') intersects linear A-A' in the immediate vicinity of the Casino Silver Mines showing. The magnetic highs and magnetic peaks I, II, III and IV appear to be caused by variable concentrations of high magnetic susceptibility material within the granite. Correlation of the magnetic data with Cairnes' map indicates that magnetic peak I may at least partially be caused by volcanic material.

The magnetic intensity in the central and southern sections of the survey area is also more plateau-like but is traversed by several strong magnetic linears. One of these D-D' trends in an east-west direction parallel to B-B' and may possibly be due to a fault system or be caused by granitized Pre-Cambrian rocks. In this area magnetic linear H-H' also appears to be offset in an eastwest direction by a linear

parallel to D-D'. Magnetic linear G-G' correlates directly with a powerful northeast linear, shown on the government magnetic maps, which intersects a major bend in the Yukon River.

The potassium 40 showed only moderate changes around a plateau level of some 14 counts per second. The radiometric method is sensitive to changes in terrain clearance. Thus a portion of the K-40 highs may be topographic. In general the K-40 values in the areas to the extreme north and south of the survey area appear to be slightly lower. These areas are geologically mapped as underlain by Pre-Cambrian sediments. Correlation of the magnetic and potassium 40 radiometric data indicates that the northwestern quadrant of the survey area has several K-40 highs which correlate with either magnetic linears or the high magnetic trend. Magnetic linear D-D' also appears to correlate with a shallow K-40 trough which does not appear to be topographic.

Respectfully submitted,

Glen E. White, B.Sc.,
Geophysicist

APPENDIX IV

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 IV

SPECIFICATIONS OF THE McPHAR KEM (Kilocycle Electromagnetic) SYSTEM

Operation

The KEM operates as a receiver off of a horizontal primary electromagnetic field transmitted by a worldwide network of VLF radio stations operating in the 15 to 30 Kilohertz frequency range. The KEM system continuously measures the angle of the resultant field caused by a conductor, and variations in relative amplitude.

(a) System noise approximately 0.5 microvolts rms.

(b) Field strength measurement range $\pm$7.5 db

(c) Tilt angle measurement range $\pm$30 degrees

(d) Display; Field Strength and Field angle meters and analogue traces on Hewlett Packard analogue recorder.

(e) Power Requirements 28 volts dc 0.2 amps

(f) Receiver Console: Dimensions 14-1/2" X 9-1/6" X 7"
Weight 12 lbs.

(g) Sensor Unit Dimensions 10 1/2" X 5 1/2" X 5"
Weight 1.25 lbs.

Performance

The VLF electromagnetic systems are high frequency systems with respect to frequencies used by most electromagnetic methods. (15-30 Kilohertz verses 1 Kilohertz). Thus any airborne VLF system in addition to detecting massive sulphides will be sensitive to changes in surface conductivities, topography, aircraft movement and heading.

APPENDIX IV

SPECIFICATION OF THE EXPLORANIUM DIGRS - 2000 SPECTROMETER

Crystals — Three 6" x 4" NaI (TI) each coupled to three photomultiplier tubes.

Spectrum Stabilization — Pulse height at output of detector maintained constant by spectrum stabilization using Cesium 137 as reference. Cesium 137 has an ultra-stable single gamma emission at .662 MeV, and half life of 32 years.

Channels — Four. Each independently adjustable for E (peak energy level of channel-count) and ΔE (range of energy level counted)

Approximate values used:

	E	ΔE
Potassium 40	1.47 Mev	150 Kev
Bismuth 214	1.76 Mev	180 Kev
Thallium 208	2.62 Mev	270 Kev
Total count	2.05 Mev	1.2 Kev

Differential Linearity — 1%

Resolution — Better than 8.3% at .662 MeV & 1000 V

Mechanical Configuration - Designed to conform to TID - 20893

Recommended U.S.A. electrical and mechanical standard for nuclear instruments and power supplies.

Temperature Stability - Approximately .1% per °C

All pulse and analog processing circuiting is temperature compensated. Integrated circuits used throughout.

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FLIGHT LINE LAYOUT

DRAWN	B.K.	JOB NO.	FIG. NO. 1
DATE	MAY 15, 1970	1139	3
CHECKED			

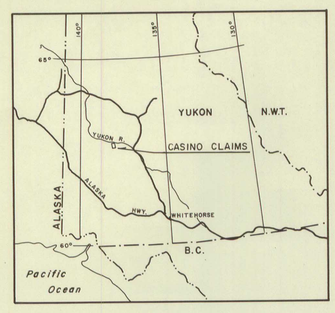
GEO - X SURVEYS LTD.

TO ACCOMPANY THE GEOPHYSICAL REPORT ON THE AEROMAGNETIC AND AERORADIOMETRIC SURVEY OVER THE CASINO SILVER MINES PROPERTY OWNED BY BRAMEDA RESOURCES LTD.
BY G.E. WHITE, GEOPHYSICIST
VANCOUVER, BRITISH COLUMBIA

1000 0 1000 2000 3000
FEET (APPROX.)

SURVEY SPECIFICATIONS

LINE SPACING — 500'
FLIGHT DIRECTION — N.S.
MEAN TERRAIN CLEARANCE — 500'



INDEX MAP
SCALE 1" = 120 MILES

Y Axis
X Axis

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ISOMAGNETIC PLAN

DRAWN	CROSS CANADA COMP	JOB NO.	FIG. NO.
DATED	MAY 15, 1970	1139	4
CHECKED			

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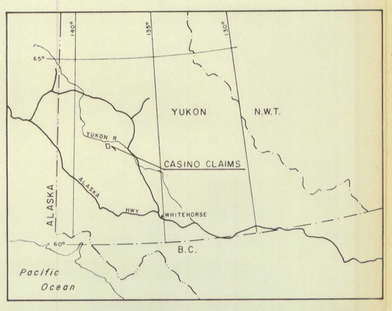
OVER THE CASINO SILVER MINES PROPERTY OWNED BY BRAMEDA RESOURCES LTD.
BY G.E. WHITE, GEOPHYSICIST
VANCOUVER, BRITISH COLUMBIA

1000 0 1000 2000 3000 3000
FEET (APPROX.)

N

SURVEY SPECIFICATIONS
LINE SPACING – 500'
FLIGHT DIRECTION – N.S.
MEAN TERRAIN CLEARANCE – 500'



INDEX MAP
SCALE 1" = 120 MILES

Y Axis
X Axis

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POTASSIUM 40

CONTOUR INT. 3 C.P.S.

DRAWN	CROSS CANADA COMP.	JOB NO.	FIG. NO.
DATED	MAY 15, 1970	1139	5
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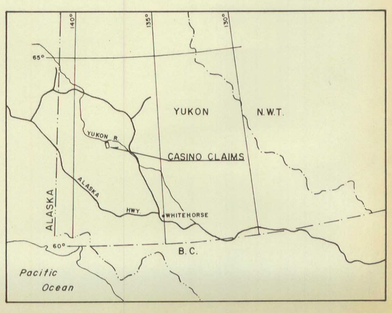
1000 0 1000 2000 3000
FEET (APPROX.)

N

SURVEY SPECIFICATIONS

LINE SPACING — 500'
FLIGHT DIRECTION — N.S.
MEAN TERRAIN CLEARANCE — 500'



INDEX MAP
SCALE 1"=120 MILES

60
55
50
45
40
35
30
25
20
15
10
5
0

0 5 10 15 20 25 30 35

X Axis

Y Axis

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NERAL INTERPRETATION

	A.N.S.	JOB NO.	FIG. NO.
	MAY 15, 1970	1139	6
D			

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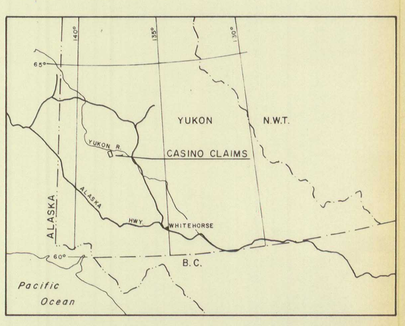
SURVEY SPECIFICATIONS
LINE SPACING - 500'
FLIGHT DIRECTION - N.S.
MEAN TERRAIN CLEARANCE - 500'



INDEX MAP
SCALE : 1" = 120 MILES

LEGEND
- AREAS OF ANOMALOUS K-40 VALUES WITH K-40 PEAKS
- MAGNETIC PEAKS
- " HIGHS
- " HIGH TREND
- " DEPRESSION
- " LINEAR