

A REPORT



ON

A GROUND MAGNETIC AND ELECTROMAGNETIC SURVEY

FOR

INTERNATIONAL MINE SERVICES LIMITED

TORONTO, ONTARIO

BY



EAGLE GEOPHYSICS LIMITED

VANCOUVER, BRITISH COLUMBIA

NOVEMBER 1968

This report has been examined by  
the Geological Evaluation Unit.  
Approved as to technical worth by:

*A. B. Craig*  
RESIDENT GEOLOGIST

Approved as to cost in the amount  
of: \$2800

*R. J. Hudson*  
RESIDENT MINING ENGINEER

Accepted as representation work  
under Section 53(4) Yukon Quartz  
Mining Act.

*Commissioner of Yukon*  
COMMISSIONER OF YUKON

TABLE OF CONTENTS

	<u>PAGE</u>
INTRODUCTION . . . . .	1
SURVEY SPECIFICATIONS . . . . .	2
DISCUSSION OF RESULTS . . . . .	3
SUMMARY AND RECOMMENDATIONS . . . . .	4

APPENDIX

COST OF SURVEYS . . . . .	(i)
PERSONNEL EMPLOYED ON SURVEY . . . . .	(ii)
CERTIFICATION . . . . .	(iii)

ACCOMPANYING MAPS

	MAP POCKET
GROUND MAGNETOMETER SURVEY (1" = 200 FT.)	MAP No. E.139-1
GROUND CRONE ELECTROMAGNETIC SURVEY (1" = 200 FT.)	MAP No. E 139-2
RONKA E.M. 16 DETAIL ELECTROMAGNETIC SURVEY (1" = 50 FT.)	MAP No. E 139.3

## INTRODUCTION

FROM 23RD AUGUST TO THE 31ST AUGUST, 1968, EAGLE GEOPHYSICS LIMITED CARRIED OUT A GROUND MAGNETIC AND ELECTROMAGNETIC SURVEY ON A PROPERTY HELD BY INTERNATIONAL MINE SERVICES LIMITED OF TORONTO, ONTARIO.

THE PROPERTY, KNOWN AS THE APOLLO AND J.M. CLAIM GROUPS, IS LOCATED ON JUBILEE MOUNTAIN, AT AN ELEVATION OF ABOUT 5,000 FEET AND IS SOME 60 AIR MILES SOUTHEAST OF WHITEHORSE IN THE YUKON TERRITORY.

THE PROPERTY MAY BE REACHED BY HELICOPTER FROM WHITEHORSE. ALTERNATIVELY IT IS POSSIBLE TO DRIVE TO WITHIN A FEW MILES OF THE PROPERTY AND CONTINUE ON FOOT OVER FAIRLY GOOD TERRAIN UNTIL THE MAIN SHOWINGS ARE REACHED.

THE PURPOSE OF THE SURVEY WAS THREEFOLD. FIRSTLY, TO EVALUATE, BY MAGNETIC AND ELECTROMAGNETIC METHODS, POSSIBLE EXTENSIONS OF THE KNOWN SURFACE SHOWINGS AS POSTULATED BY GEOLOGICAL STUDIES CARRIED OUT BY INTERNATIONAL MINE SERVICES OWN GEOLOGISTS.

SECONDLY, TO TRY AND OBTAIN, FROM THE GEOPHYSICAL DATA, STRUCTURAL INFORMATION WHICH MAY LEAD TO A BETTER UNDERSTANDING OF THE ORIGIN OF THE MINERALISED ZONES THAT OCCUR ON THE PROPERTY. THIRDLY, TO EXPLORE FOR SIMILAR MINERAL OCCURRENCES OCCURRING AS SUBSURFACE ZONES, AND THEREFORE, NOT LOCATED BY A GEOLOGICAL STUDY.

THE ROCKS OUTCROPPING ON THE PROPERTY HAVE BEEN STUDIED BY INTERNATIONAL MINE SERVICES OWN GEOLOGISTS AND NOTHING FURTHER NEED BE WRITTEN HERE ABOUT THE GEOLOGY OF THE PROPERTY.

BOTH THE MAGNETIC AND THE ELECTROMAGNETIC SURVEYS WERE CARRIED OUT OVER E-W TRAVERSE LINES TURNED OFF AT RIGHT ANGLES FROM A N-S BASELINE. FOR THE MAJORITY OF THE AREA COVERED THESE TRAVERSE LINES WERE 200 FEET APART. HOWEVER, IN AREAS OF KNOWN SURFACE SHOWINGS LINES WERE 100 FEET, OR IN SOME CASES, 50 FEET APART. IN AREAS OF LESS IMPORTANCE SOME LINES WERE 400 FEET APART.

THE MAGNETIC SURVEY WAS CARRIED OUT USING A SHARPE M.F.1 FLUXGATE MAGNETOMETER. THE INITIAL ELECTROMAGNETIC SURVEY WAS CARRIED OUT USING A CRONE ELECTROMAGNETIC UNIT. THE DETAIL ELECTROMAGNETIC SURVEY WAS CARRIED OUT USING A RONKA E.M. 16 ELECTROMAGNETIC UNIT.

THE RESULTS OF THE SURVEY ARE PRESENTED ON THREE MAPS ACCOMPANYING THIS REPORT. MAP No. E139-1 (SCALE 1" = 200 FT.), SHOWS THE MAGNETIC DATA IN CONTOUR FORM. MAP No. E139-2 (SCALE 1" = 200 FT.), SHOWS THE CRONE ELECTROMAGNETIC SURVEY IN PROFILE FORM. MAP No. E139-3 (SCALE 1" = 50 FT.), SHOWS THE DETAIL RONKA E.M. 16 SURVEY, ALSO IN PROFILE FORM.

## SURVEY SPECIFICATIONS

THE BASIC PRINCIPLE OF ANY ELECTROMAGNETIC SURVEYING METHOD IS AS FOLLOWS: WHEN CONDUCTORS (MINERALIZED ZONES) ARE SUBJECTED TO PRIMARY ALTERNATING FIELDS, SECONDARY MAGNETIC FIELDS ARE INDUCED WITHIN THEM. MEASUREMENTS OF THESE SECONDARY FIELDS GIVE INDICATIONS AS TO THE LOCATION, SIZE, SHAPE AND CONDUCTIVITY OF THE CONDUCTORS.

THE INITIAL SURVEY WAS CARRIED OUT USING A CRONE ELECTROMAGNETIC UNIT. READINGS WITH THIS UNIT WERE TAKEN EVERY 100 FEET (OR IN SOME CASES EVERY 50 FEET) ALONG THE TRAVERSE LINES USING A FREQUENCY OF 1800 CYCLES PER SECOND AND A COIL SEPARATION OF 200 FEET. FOR THIS SURVEY LINES WERE EITHER 400, 200, 100 OR 50 FEET APART. THIS UNIT UTILIZES THE "SHOOT BACK" TECHNIQUE, WHICH REQUIRES A RECEIVER AND TRANSMITTER IN EACH COIL. EACH COIL IN TURN MEASURES THE DIRECTION OF THE TOTAL ELECTROMAGNETIC FIELD (IN DEGREES FROM THE HORIZONTAL) WHILE THE OTHER COIL ACTS AS THE TRANSMITTER. ON ADDITION OF THE TWO MEASURED ANGLES THE RESULTANT ANGLE IS INDEPENDENT OF DIFFERENCES OF ELEVATION, AND IS PLOTTED MIDWAY BETWEEN THE LOCATION OF THE TWO COILS.

THE DETAIL SURVEY WAS CARRIED OUT USING A RONKA E.M. 16 ELECTROMAGNETIC UNIT. READINGS WITH THIS UNIT WERE TAKEN EVERY 50 FEET ALONG THE TRAVERSE LINES, 50 FEET APART. THIS UNIT UTILIZES THE VLF RADIO STATIONS THAT EXIST FOR SUBMARINE COMMUNICATIONS. THEIR VERTICAL ANTENNAE CREATE CONCENTRIC HORIZONTAL PRIMARY MAGNETIC FIELDS, AND THE RECEIVER, THE E.M. 16 UNIT, MEASURES THE VERTICAL COMPONENTS OF THE SECONDARY FIELDS THAT MAY BE INDUCED BY THE PRIMARY ONES.

## DISCUSSION OF RESULTS

### THE MAGNETOMETER SURVEY

THE MAGNETIC SURVEY (MAP No. E139-1) SHOWED THAT THE PROPERTY IS UNDERLAIN BY ROCKS OF FAIRLY UNIFORM MAGNETIC CHARACTERISTICS. HOWEVER, A NUMBER OF SMALL MAGNETIC HIGHS, AND CLOSELY ASSOCIATED LOWS, DO OCCUR ON THE PROPERTY. THESE ARE BELIEVED TO REPRESENT PYRRHOTITE MINERALIZATION. EVEN WHERE SUFFICIENT MAGNETIC READINGS WERE TAKEN IT IS DIFFICULT TO CORRELATE ANY PRECISE LINEAR TRENDS WITH THE KNOWN SURFACE SHOWINGS. HOWEVER, THE WRITER WOULD LIKE TO MAKE THE FOLLOWING OBSERVATION. OF SOME 20 SMALL "HIGH-LOW" MAGNETIC ANOMALIES APPROXIMATELY 10 OF THESE OCCUR IN VERY CLOSE PROXIMITY TO THE KNOWN SHOWINGS. THERE ARE NO SIGNIFICANT PATTERNS IN THE MAGNETIC RESULTS TO SUGGEST ANY MAJOR STRUCTURAL CONTROL OF THE MINERALIZED ZONES. NO NEW MINERALIZED ZONES, BELIEVED TO BE AS SIGNIFICANT AS THE PRESENT SHOWINGS, WERE DETECTED DURING THE COURSE OF THE MAGNETIC SURVEY.

### THE CRONE E.M. SURVEY

THE CRONE ELECTROMAGNETIC SURVEY (SEE MAP No. E139-2) LOCATED NO SIGNIFICANT ANOMALIES. HOWEVER, A WEAK ELECTROMAGNETIC RESPONSE WAS DETECTED ON LINE 0 + 50N AT 2 + 75E AND CORRELATES WITH A STRONG KNOWN SURFACE SHOWING AT THIS LOCATION. THE WRITER BELIEVES THAT THE LACK OF RESPONSE FROM THIS SURVEY IS A RESULT OF THE DISCONTINUOUS NATURE OF THE MINERALIZED ZONES. THE DISCONTINUOUS NATURE OF THESE ZONES IN THIS PARTICULAR CASE REFERS ESSENTIALLY TO DISCONTINUITY IN STRIKE AND TO A LESSER DEGREE TO DISCONTINUITY OF CONDUCTIVE MATERIAL WITHIN THE ZONES THEMSELVES.

### THE E.M. 16 SURVEY

THE E.M. 16 SURVEY (SEE MAP No. E139-3) LOCATED FOUR FAIRLY STRONG CONDUCTORS. CONDUCTOR 'A' IS ABOUT 400 FEET LONG. IT COULD, HOWEVER, BE JOINED TO CONDUCTOR 'B', WHICH WOULD THEN GIVE A CONDUCTOR OF SOME 700 FEET TOTAL STRIKE LENGTH. IT IS STRONGEST AT ABOUT 3 + 50E ON LINE 0 + 50N WHERE IT CORRELATES WITH A SURFACE SHOWING. FROM THIS POINT IN BOTH DIRECTIONS ALONG ITS STRIKE LENGTH THE CONDUCTOR WEAKENS. THIS COULD MEAN ONE OF TWO THINGS. EITHER THE CONDUCTOR REPRESENTS A SHEAR (NOT SUBSTANTIATED BY THE MAGNETOMETER SURVEY) AND ONLY CONTAINS MINERALIZATION AT THE LOCATION OF THE KNOWN SHOWING OR THE CONDUCTOR REPRESENTS INSTEAD MINERALIZATION ALONG ITS ENTIRE STRIKE LENGTH WITH THIS MINERALIZATION BEING CONSIDERABLY DEEPER TOWARDS THE ENDS OF THE CONDUCTOR.

SINCE THE TRAVERSE LINES OVER THIS CONDUCTOR WERE 50 FEET APART, AND NO ABRUPT DISCONTINUITIES ON THE MAGNETOMETER SURVEY WERE NOTED, THE IRREGULAR SURFACE EXPRESSION OF THIS CONDUCTOR IS NOT BELIEVED TO BE CAUSED BY FAULTING.

CONDUCTOR 'B' MAY BE A STRIKE EXTENSION OF CONDUCTOR 'A'. HOWEVER, IT IS GENERALLY WEAKER THAN CONDUCTOR 'A' AND MAY REPRESENT MINERALIZATION AT DEPTH OR SOME TYPE OF MINOR FAULTING OR SHEARING.

CONDUCTOR 'C' IS A WEAK CONDUCTOR AND HAS A MAXIMUM STRIKE LENGTH OF 150 FEET.

CONDUCTOR 'D' IS A WEAK CONDUCTOR BUT LIES VERY CLOSE TO A KNOWN MINERALIZED ZONE. IT DOES NOT APPEAR TO HAVE ANY SIGNIFICANT STRIKE LENGTH.

SUMMARY AND RECOMMENDATIONS

FROM 23RD AUGUST TO THE 31ST AUGUST, 1968, EAGLE GEOPHYSICS LIMITED CARRIED OUT A GROUND MAGNETIC AND ELECTROMAGNETIC SURVEY FOR INTERNATIONAL MINE SERVICES LIMITED ON A PROPERTY LOCATED IN THE WHITEHORSE AREA OF THE YUKON TERRITORY.

THE GEOPHYSICAL SURVEY REVEALED A SIGNIFICANT MAGNETIC AND ELECTROMAGNETIC RESPONSE FROM AT LEAST ONE CONDUCTOR, WHICH CORRELATES IN PART WITH STRONG SURFACE MINERALIZATION, WHICH CONTAINS SIGNIFICANT AMOUNT OF COPPER.

AS A RESULT OF THESE SURVEYS THE WRITER RECOMMENDS THAT FURTHER EXPLORATION OF THE PROPERTY BE CARRIED OUT AS FOLLOWS:

(A) THE AREA COVERED BY THE PRESENT DETAIL E.M. 16 SURVEY SHOULD BE SUBJECTED TO A FURTHER DETAIL MAGNETOMETER SURVEY WITH READINGS TAKEN EVERY 25 FEET ON LINES 25 FEET APART.

(B) PARTS OR ALL OF THE AREA COVERED BY THE PRESENT E.M. 16 SURVEY SHOULD BE SURVEYED BY THE INDUCED POLARISATION METHOD USING THE GRADIENT ARRAY TECHNIQUE TO DELINIATE THE SURFACE EXPRESSION OF THE MINERALIZATION.

(C) A FEW LINES DIRECTLY OVER THE KNOWN SHOWINGS SHOULD BE SURVEYED BY THE INDUCED POLARISATION METHOD USING THE THREE-ELECTRODE ARRAY TECHNIQUE, TO TEST FOR THE POSSIBLE OCCURRENCE OF MINERALIZATION AT DEPTH .

(D) LOCATE BY MEANS OF AN ACCURATE SURVEY THE POSITION OF THE KNOWN SURFACE SHOWINGS AND TRENCHES.

SHOULD THE INDUCED POLARISATION METHOD (WHICH IS A VOLUME SAMPLING TECHNIQUE) LEAD TO LARGE AREAS OF HIGH CHARGEABILITIES WITH POOR RESOLUTION OF DEFINITE TARGETS, CONSIDERATION SHOULD THEN BE GIVEN TO USING THE DEEP PENETRATION TURAM ELECTROMAGNETIC METHOD.

THE COST OF THIS ADDITIONAL GEOPHYSICAL WORK SHOULD NOT EXCEED \$2,000.00.

RESPECTFULLY SUBMITTED,  
EAGLE GEOPHYSICS LIMITED

*John Lloyd*  
J. LLOYD, M.Sc.  
GEOPHYSICIST.

VANCOUVER, B.C.  
NOVEMBER, 1968.

*Peter E. Walcott*  
PETER E. WALCOTT, P. Eng.

A P P E N D I X

COST OF SURVEYS

EAGLE GEOPHYSICS LIMITED UNDERTOOK THE SURVEY AT \$85.00 PER LINE MILE FOR E.M. SURVEYING AND \$55.00 PER LINE MILE FOR MAGNETOMETER WORK. A TOTAL OF 15.85 MILES OF E.M. SURVEYING AND 16.60 MILES OF MAGNETOMETER SURVEYING WAS COMPLETED. THEREFORE, THE TOTAL COST OF SERVICES PROVIDED BY EAGLE GEOPHYSICS LIMITED WAS \$2,260.25.


PERSONNEL EMPLOYED ON SURVEY

<u>NAME</u>	<u>OCCUPATION</u>	<u>ADDRESS</u>	<u>DATES</u>
J. LLOYD	GEOPHYSICIST	EAGLE GEOPHYSICS LTD. 815-736 GRANVILLE ST. VANCOUVER 2, B.C.	23RD AUGUST TO 31ST AUGUST, 1968 24th & 25th NOVEMBER, 1968
P. WALCOTT	"	"	30th AND 31ST AUGUST, 1968
V. PASHINAK	GEOPHYSICAL HELPER	"	23RD AUGUST TO 31ST AUGUST, 1968
W. P. WADMAN	DRAUGHTING	"	19th TO 22ND NOVEMBER, 1968
MRS. STEWART	TYPING	311-736 GRANVILLE ST.	25th NOVEMBER, 1968

CERTIFICATION

I, JOHN LLOYD OF 1080 GILFORD STREET, VANCOUVER, BRITISH COLUMBIA,  
HEREBY CERTIFY THAT:

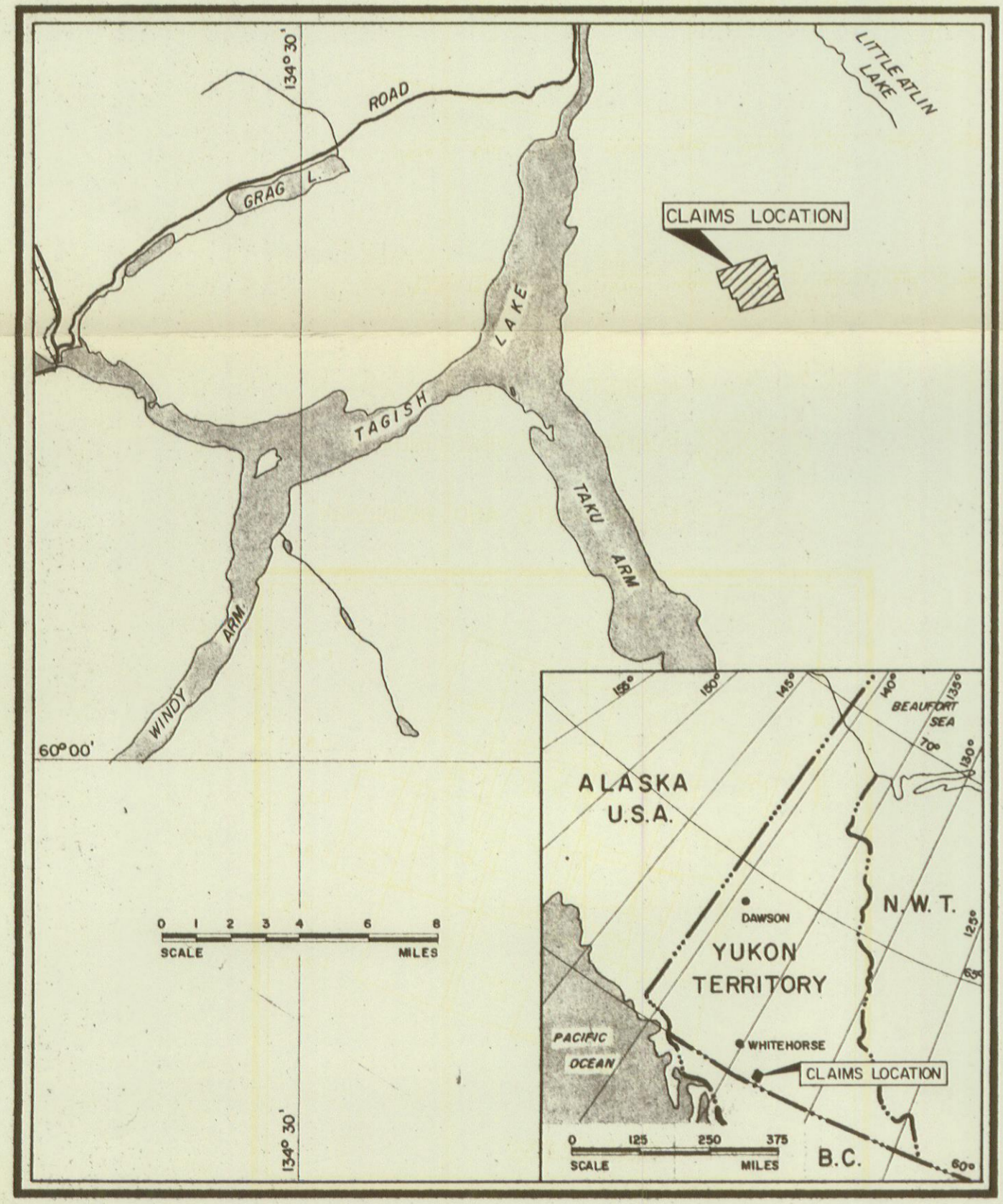
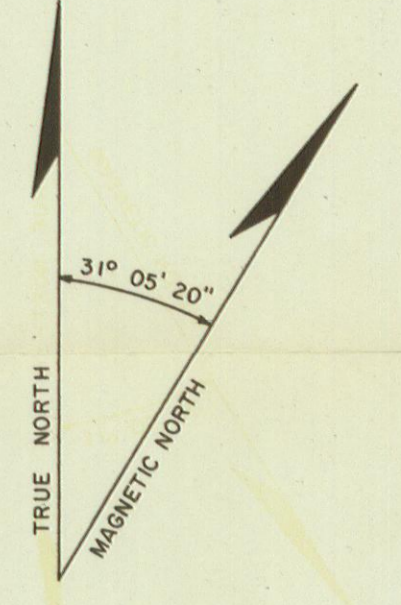
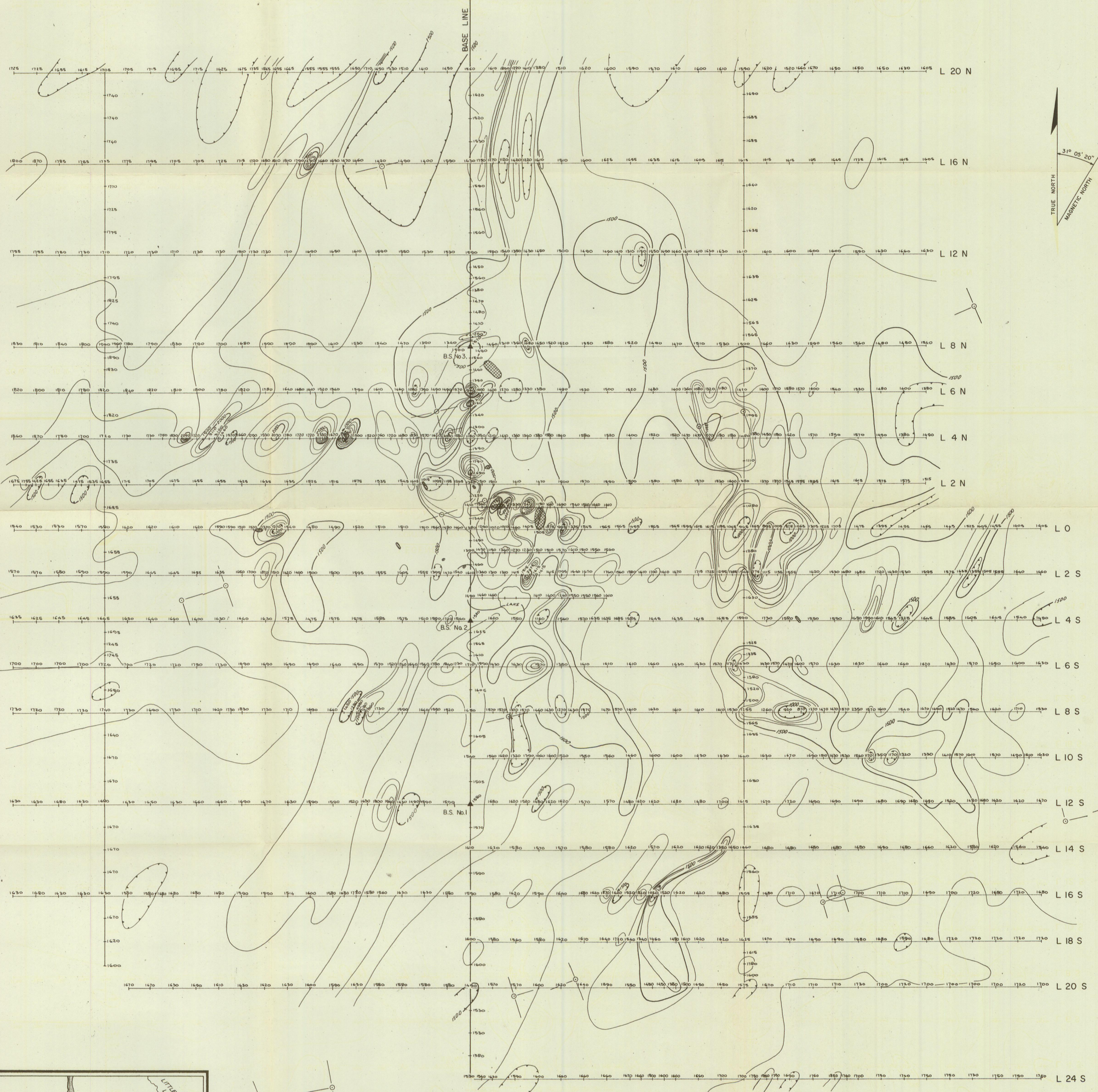
1. I WAS BORN IN WALES ON 10<sup>th</sup> MAY, 1938
2. I AM A GRADUATE OF THE UNIVERSITY OF LIVERPOOL, ENGLAND, IN 1960  
WITH A B.Sc. IN PHYSICS AND GEOLOGY.
3. I AM A GRADUATE OF THE ROYAL SCHOOL OF MINES, UNIVERSITY OF LONDON,  
IN 1962 WITH AN M.Sc. IN GEOPHYSICS.
4. I HAVE BEEN PRACTISING MY PROFESSION FOR THE LAST EIGHT YEARS.
5. I HAVE NO INTEREST OR SHARES IN INTERNATIONAL MINE SERVICES LIMITED,  
NOR DO I EXPECT TO RECEIVE ANY.



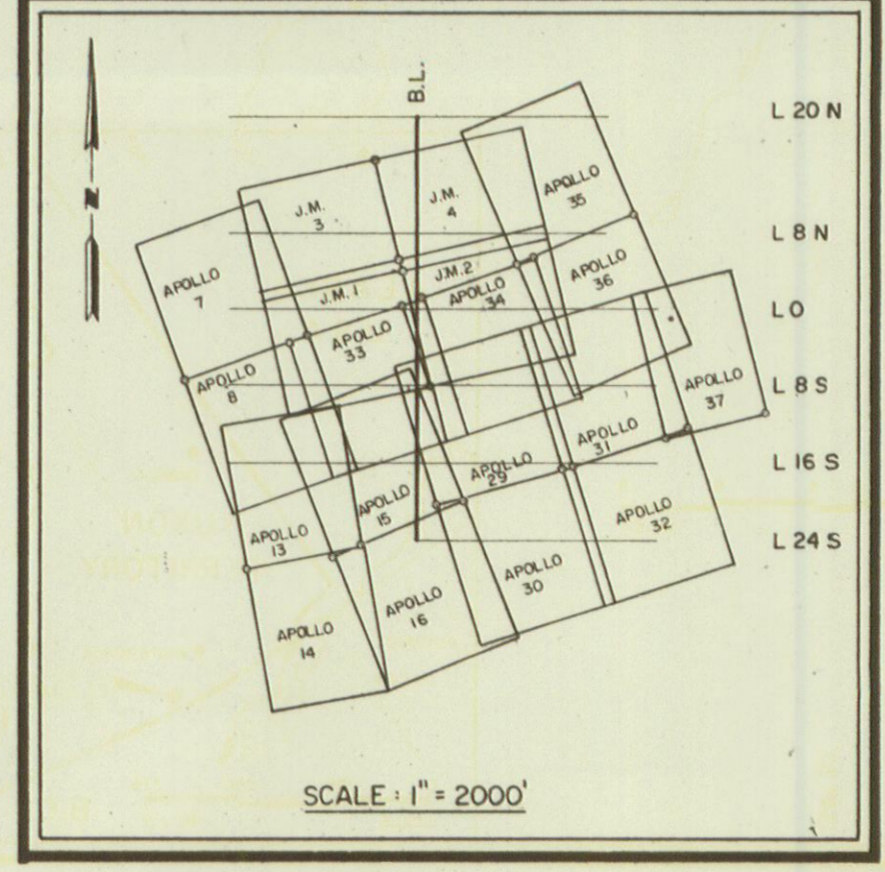
JOHN LLOYD, M.Sc.

25 NOVEMBER, 1968.

20 W 18 W 16 W 14 W 12 W 10 W 8 W 6 W 4 W 2 W 0 2 E 4 E 6 E 8 E 10 E 12 E 14 E 16 E 18 E 20 E 22 E 24 E 26 E



- LEGEND**
- CONTOUR INTERVAL 100 GAMMAS
  - B.S. No. 1 ▲ BASE STATION
  - MAGNETIC LOW
  - ▨ SURFACE SHOWING AND/OR TRENCHING
  - CLAIM POSTS AND BOUNDARY



**INTERNATIONAL MINE SERVICES LTD.**  
 APOLLO AND J.M. CLAIM GROUPS  
 JUBILEE MOUNTAIN, WHITEHORSE MINING DIVISION, YUKON TERRITORY

**GROUND  
 MAGNETOMETER SURVEY**

SCALE: 1 INCH = 200 FEET

200 100 0 200 400 600  
 FEET FEET

MAP No. E139-1  
 TO ACCOMPANY A REPORT  
 BY J. LLOYD M. Sc.

*J. Lloyd M. Sc.*

**EAGLE GEOPHYSICS LIMITED**  
 SEPTEMBER, 1968

018626

20 W 18 W 16 W 14 W 12 W 10 W 8 W 6 W 4 W 2 W 0 2 E 4 E 6 E 8 E 10 E 12 E 14 E 16 E 18 E 20 E 22 E 24 E 26 E

BASE LINE

L 20 N

L 16 N

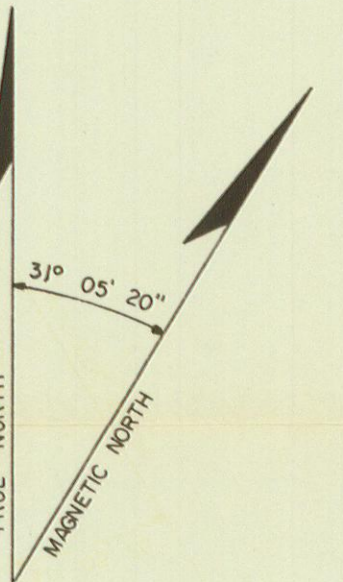
L 12 N

L 8 N

L 6 N

L 4 N

L 2 N



L 0

L 2 S

L 4 S

L 6 S

L 8 S

L 10 S

L 12 S

L 14 S

L 16 S

L 18 S

L 20 S

L 24 S

AREA COVERED BY "RONKA EM 16"  
SEE MAP No. 139-3, DETAIL ELECTROMAGNETIC SURVEY

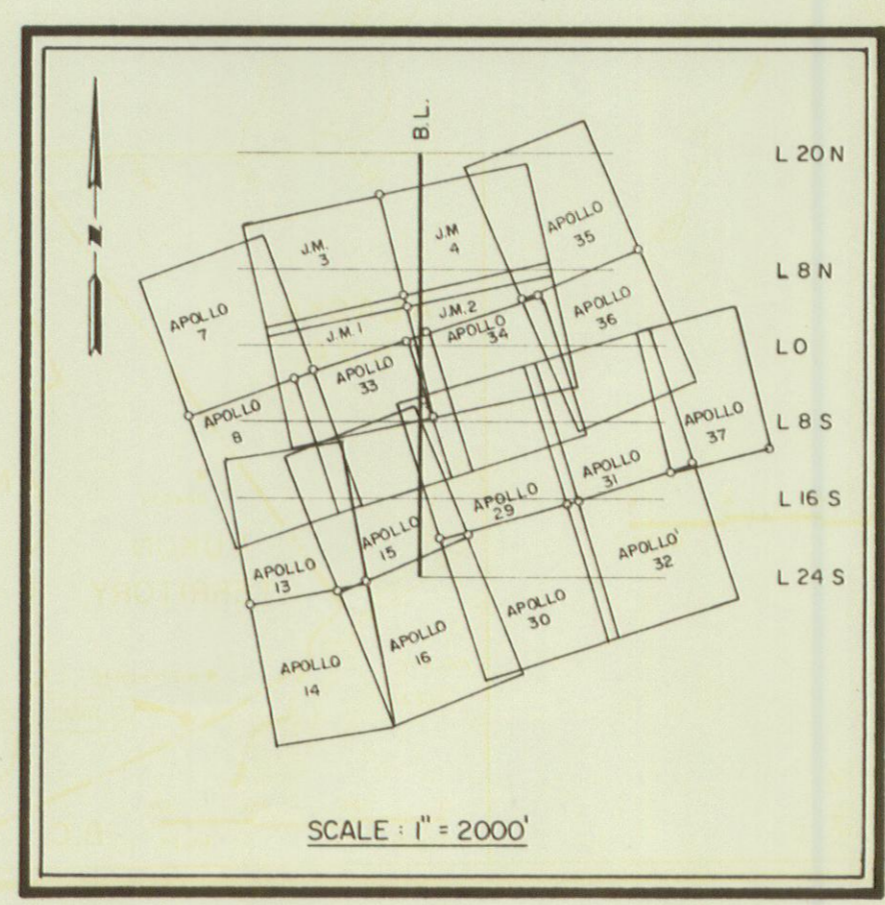
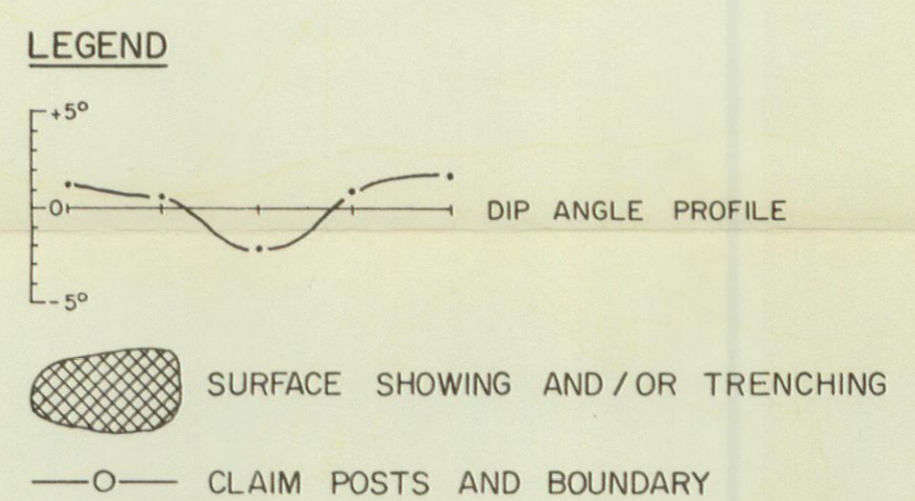
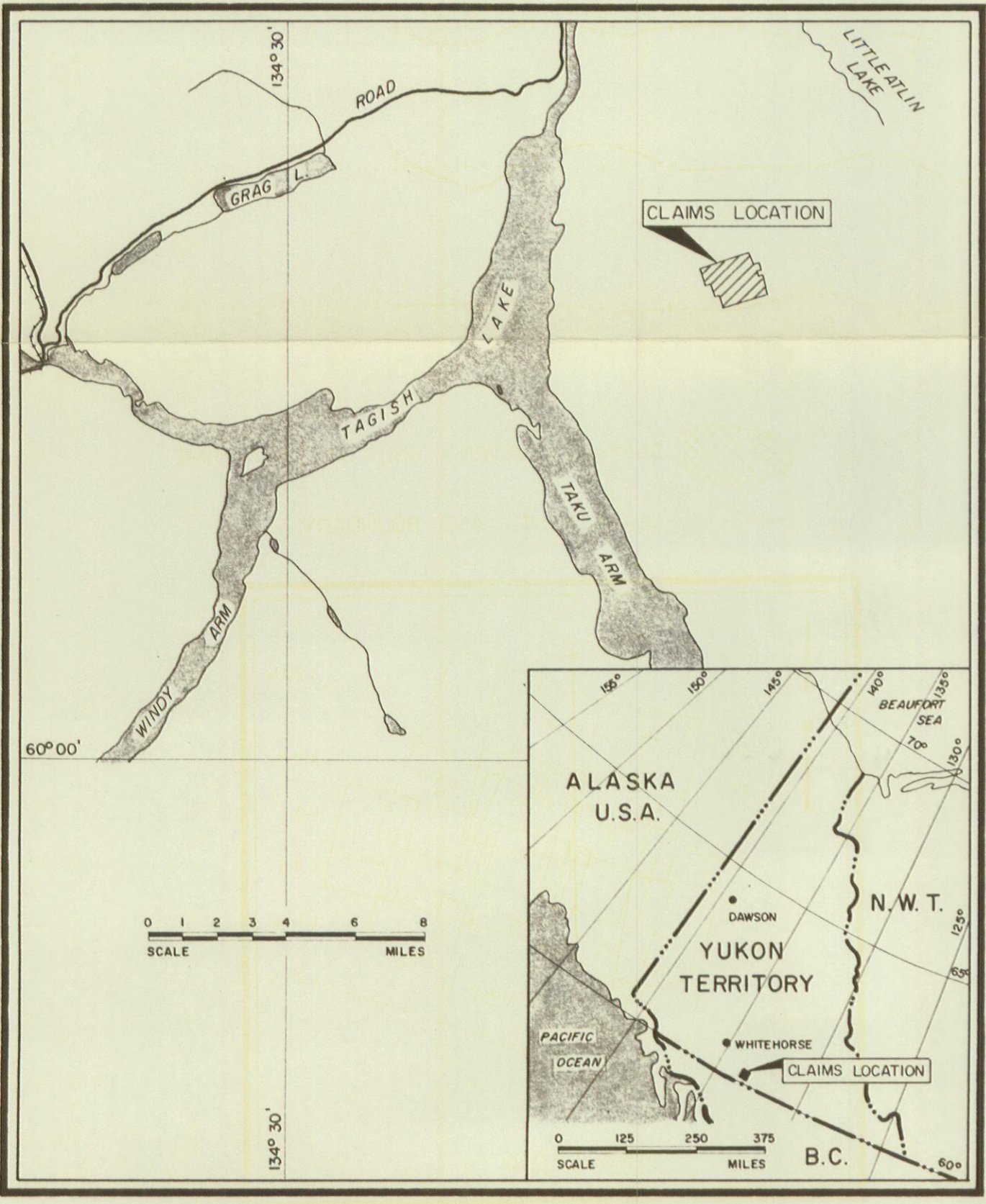
DETAIL

AREA 1

DETAIL

AREA 2

LAKE



**INTERNATIONAL MINE SERVICES LTD.**  
 APOLLO AND J.M. CLAIM GROUPS  
 JUBILEE MOUNTAIN, WHITEHORSE MINING DIVISION, YUKON TERRITORY

**GROUND CRONE ELECTROMAGNETIC SURVEY**

SCALE: 1 INCH = 200 FEET

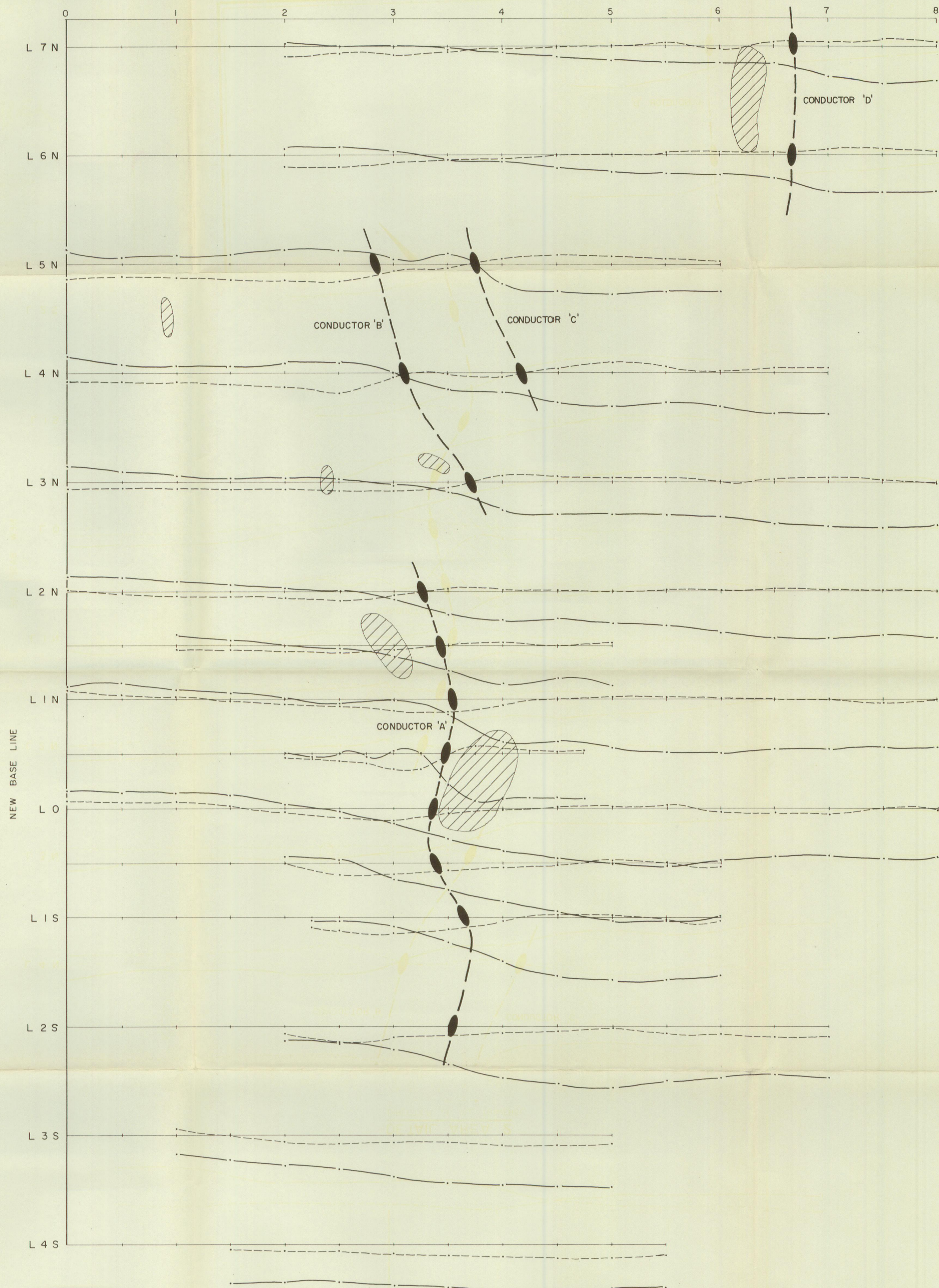
200 100 0 200 400 600  
FEET FEET

MAP No. E139-2  
 TO ACCOMPANY A REPORT  
 BY J. LLOYD M. Sc.

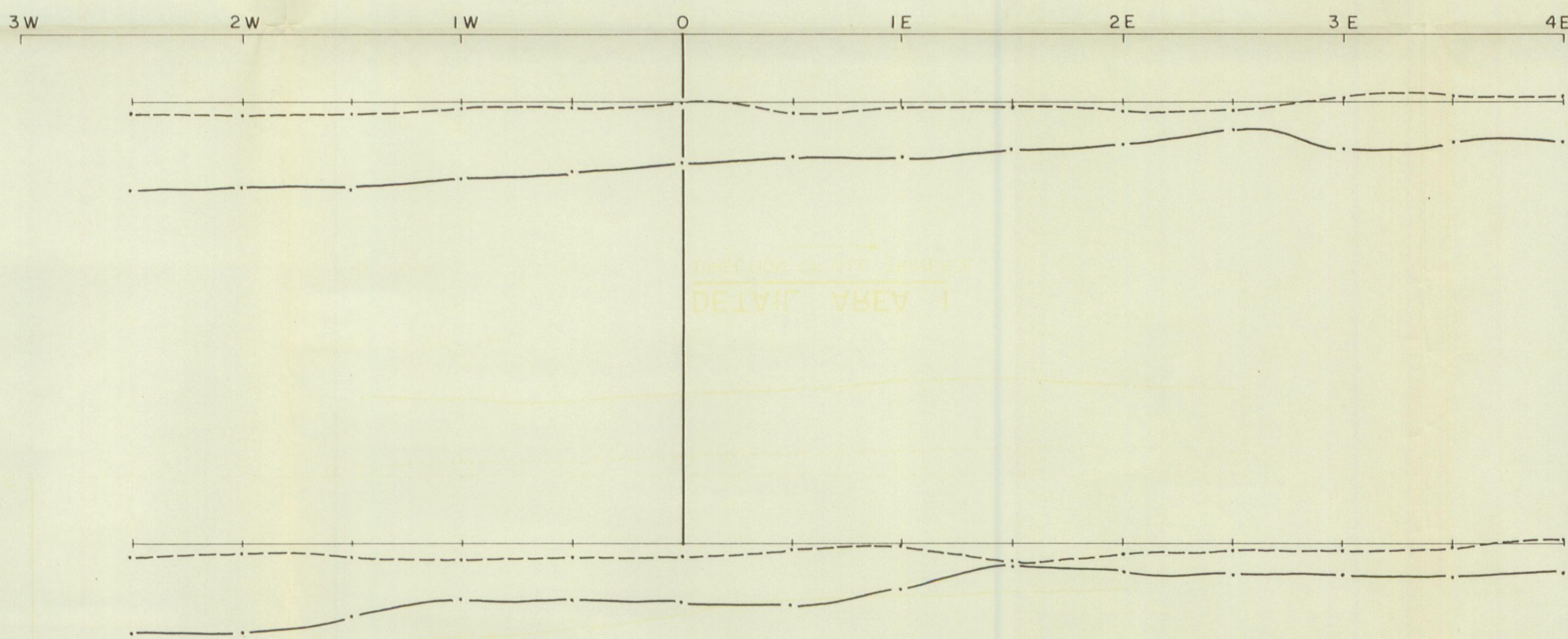
*John Lloyd*

EAGLE GEOPHYSICS LIMITED  
 SEPTEMBER, 1968

018626

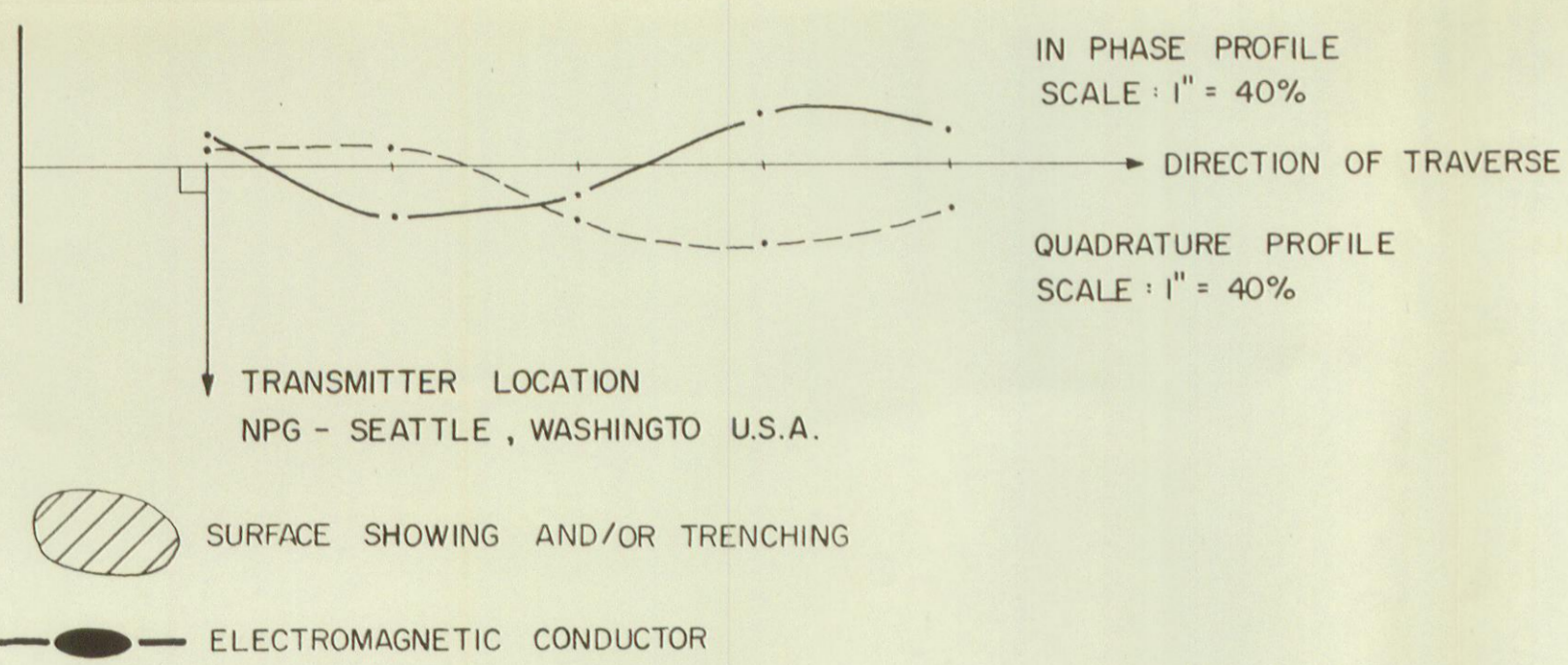


**DETAIL AREA 1**  
DIRECTION OF ALL TRAVERSE



**DETAIL AREA 2**  
DIRECTION OF ALL TRAVERSE

**LEGEND**

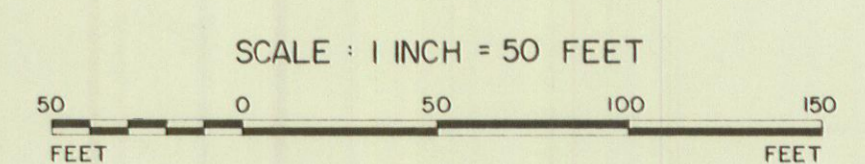


**INTERNATIONAL MINE SERVICE LTD.**

APOLLO AND J.M. CLAIM GROUPS

JUBILEE MOUNTAIN, WHITEHORSE MINING DIVISION, YUKON TERRITORY

**RONKA EM.16  
DETAIL ELECTROMAGNETIC SURVEY**



MAP No. E 139-3  
TO ACCOMPANY A REPORT  
BY J. LLOYD M.Sc.

EAGLE GEOPHYSICS LIMITED  
SEPTEMBER, 1968