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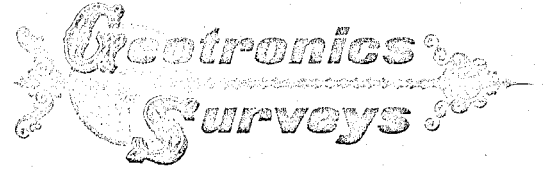
Department of  
Mines and Petroleum Resources  
ASSESSMENT REPORT  
NO. 2641 MAP.....

AIRBORNE MAGNETIC SURVEY  
R. W. SHAW  
JOAN & BE CLAIM GROUPS  
CHURCHILL COPPER AREA, LIARD M.D., B. C.  
94K/60. SEPTEMBER 1970

JOAN & BE CLAIMS: 100 miles S80W of Fort Nelson, B.C.  
58° 125° SE

Report by: DAVID G. MARK, B.Sc.  
Geophysicist  
GEOTRONICS SURVEYS LTD.

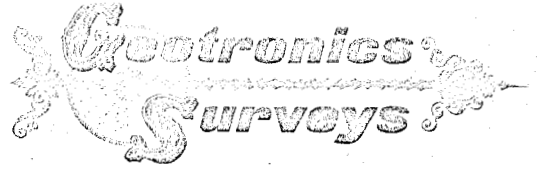
Submitted to: R. W. SHAW  
2675 West 42nd Avenue  
Vancouver, B. C.



517 - 502 West Hastings Street, Vancouver, British Columbia, Canada ✶ Telephone 688-4342

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## SUMMARY

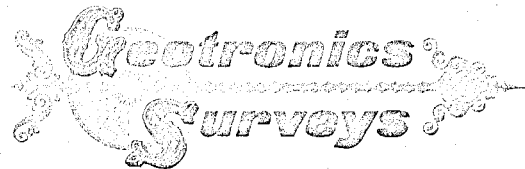
An aeromagnetic survey was carried out by Geotronics Surveys Ltd. over the JOAN and BE claims, located near Churchill Copper Mines in the Racing River Area, in early September, 1970. It was anticipated that diabase dikes, associated with copper mineralization in the Racing River Area, could be picked up by the survey. The dikes cut only Windermere type rocks which underlay almost all of the JOAN and BE claims.

The aeromagnetic data was quite noisy, but it seemed to reflect the underlying argillite-shales throughout most of the claims area, and a broad low in the northern part of the JOAN claims appeared to reflect the grey limestones. A magnetic high on the central western edge of the JOAN claims could very likely be due to diabase diking.

## CONCLUSIONS AND RECOMMENDATIONS

The data is relatively noisy which makes more accurate interpretation difficult. This data could perhaps be 'cleaned up' using appropriate filters. It is possible, then, that target areas would be more clearly defined.

It is also recommended that the claims area be prospected, especially in the anomalous high area, for any diabase dikes and accompanying mineralization that might occur.



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GEOPHYSICAL REPORT ON AEROMAGNETIC SURVEY  
ON THE  
JOAN & BE CLAIMS  
CHURCHILL COPPER AREA, LIARD M.D., B. C.

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Submitted to: R. W. Shaw

Written : October, 1970

INTRODUCTION

An airborne magnetic survey was carried out on the JOAN and BE claim groups under supervision of the writer and under technical supervision of T. Rolston on September 3, 1970.

The object of the survey was to try to locate diabase dikes which, according to Vail, have a magnetite content of 15% in many cases. These dikes seem to be associated with the copper mineralization in the Churchill Copper mine and the copper showings in the area.

### LOCATION

The 2 claim groups are located approximately 100 miles S80W of Fort Nelson, B.C. in the Racing River area at  $58^{\circ} 28'$  latitude and  $125^{\circ} 17'$  longitude. They are easily accessible by any 2-wheel drive vehicle on the Churchill Copper mine road which leaves the Alaska Highway at Mile 401. The road runs through the JOAN claims and parallels Delano Creek about 1000 feet north of it. The claims are centered about 6 miles past the mill site.

### TOPOGRAPHY

The topography of the whole area, in general, is extremely rugged. The elevation varies from under 3000 feet in the broad U-shaped river valleys to over 9000 feet on the mountain peaks. Delano Creek, a tributary of Racing River, flows easterly through the southern edge of the JOAN claims. On each side of this creek, as well as its tributaries, are talus slides with an incline from  $30^{\circ}$  to  $45^{\circ}$ . These slides are interspersed with rock bluffs and extend for approximately 1500 to 3000 horizontal feet to larger, often impassable, bluffs.

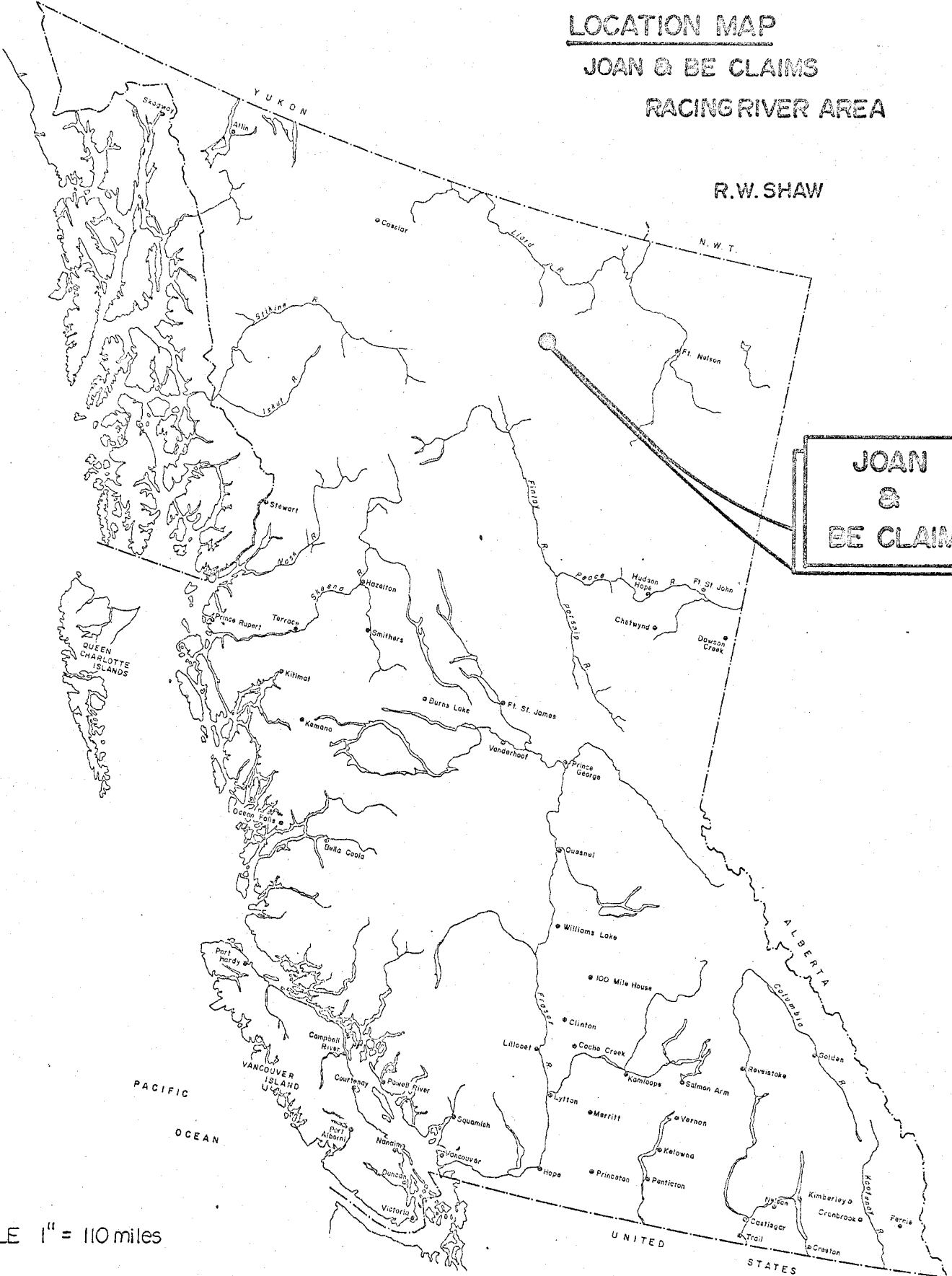
### SURVEY PROCEDURE

The equipment was installed in the helicopter at Fort Nelson and test flown over the Fort Nelson Airport area. The survey grid over the JOAN and BE claims was then flown. Elevation over the local terrain was attempted to be kept at

**LOCATION MAP**  
**JOAN & BE CLAIMS**  
**RACING RIVER AREA**

R.W. SHAW

**JOAN  
&  
BE CLAIMS**



SCALE 1" = 110 miles

CLAIM MAP

JOAN & BE CLAIMS  
R.W. SHAW

JOAN CLAIMS →

DELANO CREEK

BE GROUP →



26	25	34	33	42	41	
24	23	32	31	40	39	
22	21	30	29	38	37	
20	19	29	27	36	35	
13	14	15	16	17	18	
2	4	6	8	10	12	
		3	5	7	9	11

2	1	13	15	25	27
4	3	14	16	26	28
6	5	18	17	30	29
8	7	20	19	32	31
10	9	22	21	34	33
12	11	24	23	36	35

SCALE 1" = 3000'

LIARD M.D.  
Racing River Area

500 feet. Flight line separation is an average  $1/8$  mile. However, it varies from about 400 to 1000 feet due to rough topography and high winds. It is also for these reasons that some of the claims area was not flown. Though an air speed was kept at 60 mph, ground speed varied greatly due to winds.

The instrument took a reading every 1.7 seconds. Data was controlled by photographs and topographical points such as creeks and roads.

#### INSTRUMENTATION

The data was detected using an ELSEC nuclear free precession magnetometer, type 592. This measures the absolute value of the earth's magnetic field intensity. The sensitivity is 1 gamma and the absolute calibration is governed by a crystal-controlled oscillator so that it cannot drift. The scale used throughout the survey area was 4000 fsd.

Data was recorded analog on a Bausch and Lomb 6" strip chart recorder.

#### MAP PLOTTING

All data is plotted on Sheet 1, scale  $1" = \frac{1}{4}$  mile, with flight lines and topography. This data is contoured on an overlay, Sheet 2, of the same scale.



## GEOLOGY

The whole Racing River area is generally underlain by sedimentary rocks of every type varying in age from Late Precambrian to Upper Cretaceous. Except for a few diabase dikes there are no igneous rocks present.

Most of the JOAN and BE claims are underlain by Windermere type rocks, as seen in Fig. 3. Most of this consists of rock type 6, an argillaceous shale. Separated by a fault striking approximately north on the west side of the BE claims are quartzites of rock type 5.

Grey limestones occur on the north part of the JOAN group and on the southeast part of the BE group. In addition conglomerates are found on the extreme western edge of the BE group.

In the Racing River area, sulphide mineralization in the form of chalcopryrite is found to occur in a quartz and calcitic gangue in contoured beds of argillite (or argillaceous shale) of the Windermere type. The extreme folding seems to be due to nearby (within 200 feet) fault or shear zones. The mineralization occurs near, or on contact with, older diabase dikes that vary in width from 15 to 150 feet and in many cases have a magnetite content up to 15%. It appears that the calcite, quartz and chalcopryrite followed the plumbing system that produced the diabase dikes.

When the claims were staked, an interesting amount of mineralization was found near the initial post of the JOAN 13 and 14 claims. It was in the form of chalcopryrite, emplaced in argillite-shale.

**GEOLOGY**  
**BE & JOAN CLAIMS**  
**LIARD M.D.**  
**R.W. SHAW**

Traced by D. Mark after J.R. VAIL



**LEGEND**

1 - Drift & Alluvium


2 - Grey Limestones


3 - Conglomerate  
 (McDougal Formation)  
 WINDERMERE TYPE


4 - undifferentiated  
 5 - quartzitic  
 6 - argillaceous

DIP & STRIKE  
 20°  
 observed  
  
 from air photographs

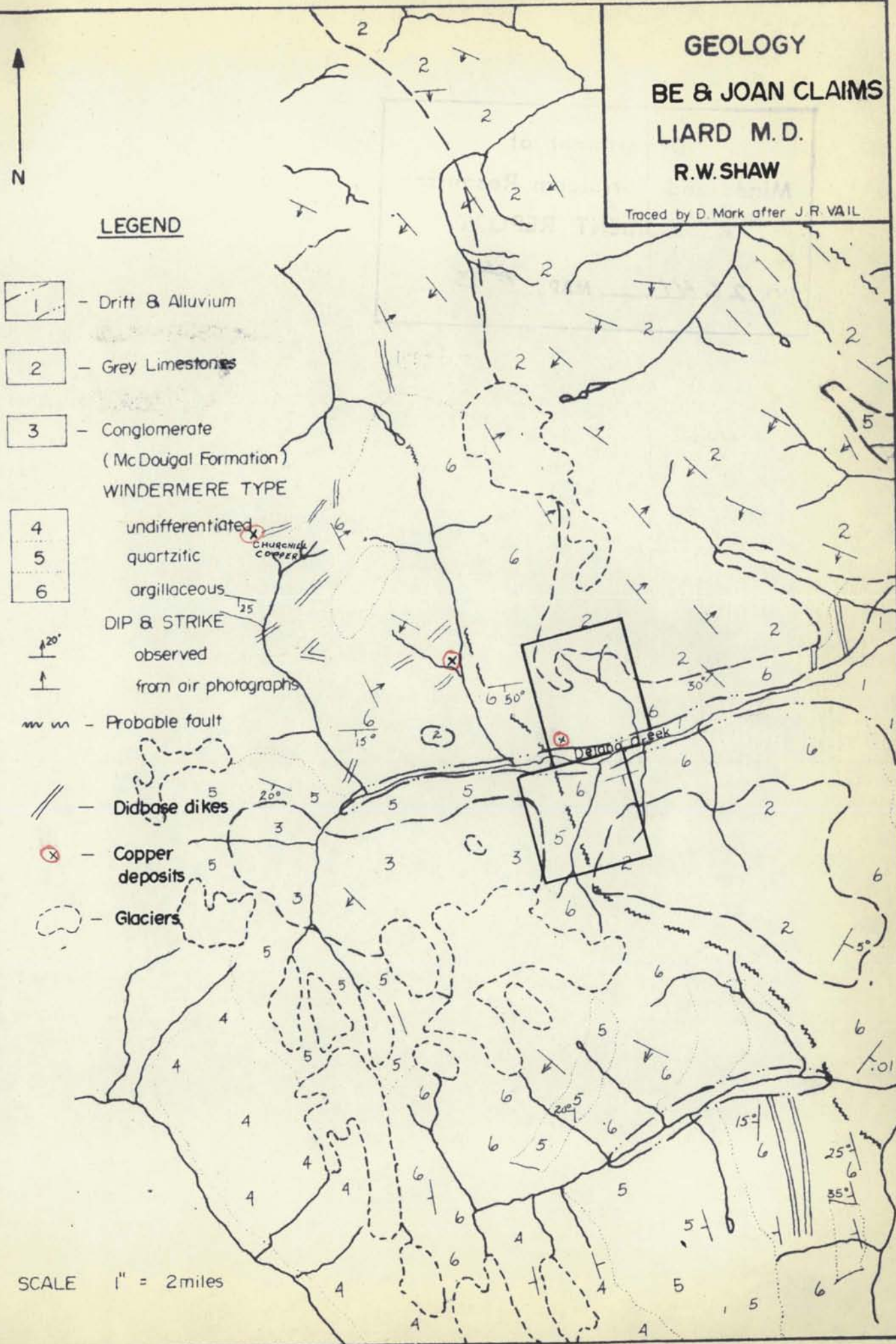
 - Probable fault

 - Diabase dikes

 - Copper deposits

 - Glaciers

SCALE 1" = 2 miles



## INTERPRETATION

The overall magnetic relief in the survey area is approximately 800 gammas from a minimum of 800 gammas to 1600 gammas. This is relatively low and can be expected considering that the bedrock is almost exclusively sedimentary. The background level is approximately 1100 to 1200 gammas.

Looking at the contour map, Sheet 2, the contours are elongated in a north-south direction throughout most of the map area, and in an east-west direction in the northwest corner. This is due to the bias error produced by the flight lines. Readings are taken along the flight line approximately every 100 feet and flight line separation is around 800 feet. Therefore contours around any anomalous value will be elongated perpendicular to the flight line direction.

Looking generally at the contour map, there are 4 features that merit discussion. These are:

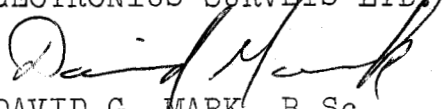
- (1) The general noisy readings over the whole map area. This is thought to be caused by the rough terrain.
- (2) The magnetics are moderately less noisy along Delano Creek. This is probably due to the loose talus slopes and the undifferentiated overburden of the valley bottom. This effect, though not as much, is also noticed along its tributaries. Another reason is, no doubt, the flatter terrain in the creek areas.

- (3) There is a large broad low in the north part of the JOAN claims. This is quite likely due to the grey limestones, which usually have less magnetic content than shale-argillites which are found throughout most of the rest of the claim group. Also, these limestones are a younger rock and rest upon the neighboring Windermere argillite-shales. Therefore the masking effect of any basement rock that contains magnetic material would be greater.
- (4) Both sides of Delano Creek, especially north of it, contain many small anomalies. These are partly due to the rough terrain and the greater amount of magnetite that usually occur in shales over limestones. All of these relatively low anomalies occur in rock type 6, the argillite-shales. Another reason could possibly be due to a basement structure being relatively close to the surface and/or diabase dikes.

There is a relatively high anomaly on the center western edge of the JOAN claims which shows a good possibility of being due to diabase dikes since the values are greater than 1600 gammas.

Respectfully submitted,

GEOTRONICS SURVEYS LTD.

  
DAVID G. MARK, B.Sc.  
Geophysicist

DGM:ly  
Oct. 20, 1970

SELECTED BIBLIOGRAPHY

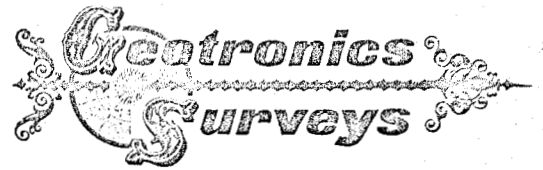
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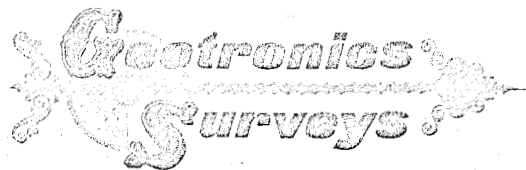
RESUME OF TECHNICAL AND FIELD EXPERIENCE  
of  
DAVID MARK, B.Sc.

EDUCATION

Graduate of University of British Columbia in Science (B.Sc.)  
in Geophysics.

EXPERIENCE IN INDUSTRY

1. Prospecting and geological evaluation for New Taku Mines Ltd. during exploration season of 1965.
2. Field supervisor for geophysical and geochemical work and prospecting for Mastadon - Highland Bell Mines Ltd. during exploration season of 1966.
3. Field supervisor in geochemical work and geological mapping for Anaconda (Canada) Company during exploration season of 1967.
4. Field geophysicist for Geo-X Surveys Ltd. during exploration season of 1968.
5. Presently geophysicist for Geotronics Surveys Ltd., Vancouver, B. C.
6. Experience in various geophysical instrument surveys: magnetometer, electromagnetic, self potential, gravity, induced polarization, resistivity and seismic methods.
7. Member of British Columbia Geophysical Society and Vancouver Branch of The Canadian Institute of Mining and Metallurgy.
8. P. Eng. applied for with Association of Professional Engineers of B. C.



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RESUME OF TECHNICAL AND FIELD EXPERIENCE OF T. W. ROLSTON

1. Eleven years with the R.C.A.F. as Instrument and Electronic Technician with crew supervisory capacity in various electronic and instrumentation systems.
2. Two years with Kerr-Addison Mines Ltd. as Electronic Technician servicing, repairing and maintaining various types of geophysical instruments. Also 2 seasons as Field Supervisor and Geophysical Instrument Operator in mining exploration, including airborne and ground geophysical surveys, geochemical surveys, geophysical and geochemical drafting and mapping.
3. Three years as Field Supervisor of geophysical and geochemical surveys and Instrument Operator of various geophysical instruments, such as airborne and ground systems magnetometer, electromagnetic, gravity meter, self potential meter, scintillometer and induced polarization.
4. Three years contracting geophysical/geochemical surveys in close association with mining engineers for various mining companies.
5. President and Manager of Geotronics Instruments Ltd., geophysical instrument design, manufacture and distribution.
6. President and Project Manager of Geotronics Surveys Ltd., mining exploration, geophysics and services.
7. Electronics Engineering understudy with Cleveland Institute of Electronics.
8. Member of the B.C. Geophysical Society.

E. P. SHEPPARD & ASSOCIATES LTD.

CONSULTING GEOLOGISTS

314-402 WEST PENDER STREET,  
VANCOUVER 3, B.C.

October 20, 1970

Mr. T. W. Rolston  
Geotronics Surveys Ltd.  
514 - 602 W. Hastings St.  
Vancouver 2, B.C.

Dear Mr. Rolston:

At your request I have reviewed the references cited below and examined the report prepared by employees of your Company, "Airborne Magnetic Survey," R. W. Shaw, JOAN and BE claim groups, Churchill Copper Area, Liard M.D., B.C.

The 78 claim group is located approximately 100 miles S80°W of Fort Nelson, B.C. at 58° 125' SE near Churchill Copper Mines. They are accessible by Churchill Copper Mines Road, which leaves the Alaska Highway at Mile 401.

The topography is rugged and elevation varies from less than 3000 feet in the broad U-shaped river valleys to over 9000 feet on the mountain peaks.

Geology: The area is underlain by Windermere type grey-black argillite shale, cut by near vertical green basic dikes trending southwest-northeast. The series exhibits 3 sets of fracturing. The principal deposits of the area - Churchill Copper, Davis-Keays, Largo Mines - are vein deposits containing chiefly chalcopyrite in quartz-calcite veins. They are associated with basic dikes over 100 feet in width, striking SW-NE which is the direction of one set of fracturing.

Airborne magnetic survey was carried out over the claims group in September 1970. It was anticipated that the diabase dikes associated with copper mineralization in the Racing River Area contained sufficient magnetite to be detected by airborne magnetic equipment. Then any anomalous condition found would be a target for intensive prospecting and perhaps narrow the target area for copper mineralized veins.



Oct. 20, 1970

The overall magnetic relief in the survey area is from a minimum of 800 gammas to 1600 gammas or 800 gammas. This is a relatively low relief and is due to the sedimentary rocks underlying the area containing low amounts of magnetite.

The survey encountered noisy readings over the whole area. This was attributed to the extremely rough terrain. Along Delano Creek, where loose talus slopes and overburden masking the rocks reduced the noise level the magnetic results are probably normal. The large, broad magnetic low in the north part of the JOAN claims is over grey limestones which underlie that part of the claims. Areas with argillite-shales overlying the limestones show somewhat higher magnetics.

The relatively high anomaly on center western edge of the JOAN claims is possibly due to presence of basic dikes, as values are over 1600 gammas.

It was expected that the dikes being lineal and somewhat steep-dipping would show more definite magnetic relief. However, the terrain effects may well have masked these effects.

Prospecting the high anomalous areas is necessary in the hope that dikes may be exposed on surface.

The geophysical report and maps submitted by your Company show careful preparation and professional presentation. I am satisfied that the field work performed was of the same high quality as that carried out on assignments where your crews were under my direct supervision.



Respectfully submitted,

*E. Percy Sheppard*

E. Percy Sheppard, P.Eng.  
Consulting Geologist

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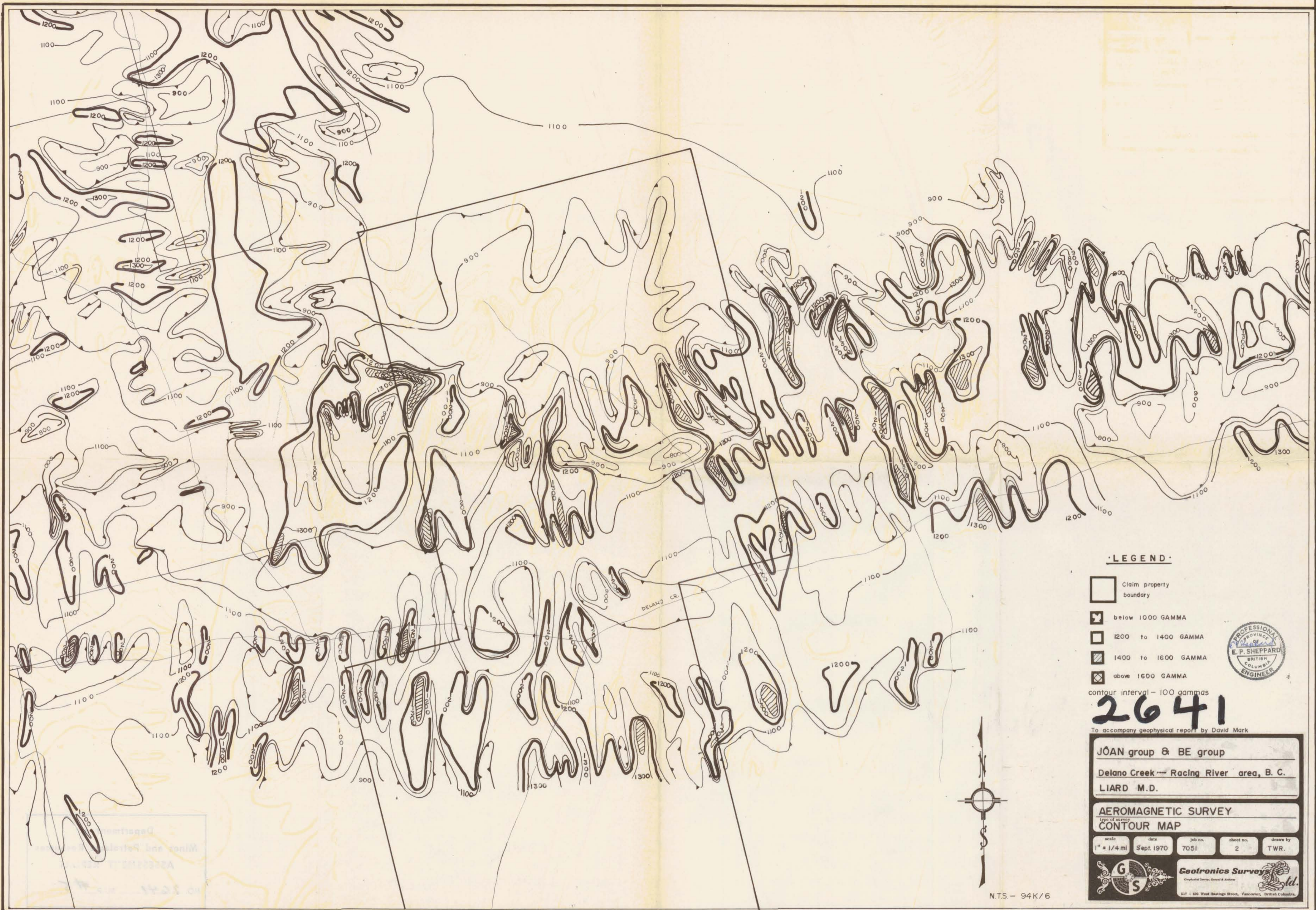
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Williams, M.Y.: Geology Along the Alaska Highway, Fort Nelson to Watson Lake; 1944, Geological Survey of Canada, paper 44.28



**LEGEND**

- Claim property boundary
- below 1000 GAMMA
- 1200 to 1400 GAMMA
- 1400 to 1600 GAMMA
- above 1600 GAMMA



contour interval - 100 gammas

**2641**

To accompany geophysical report by David Mark

JÖAN group & BE group  
 Delano Creek - Racing River area, B. C.  
 LIARD M.D.

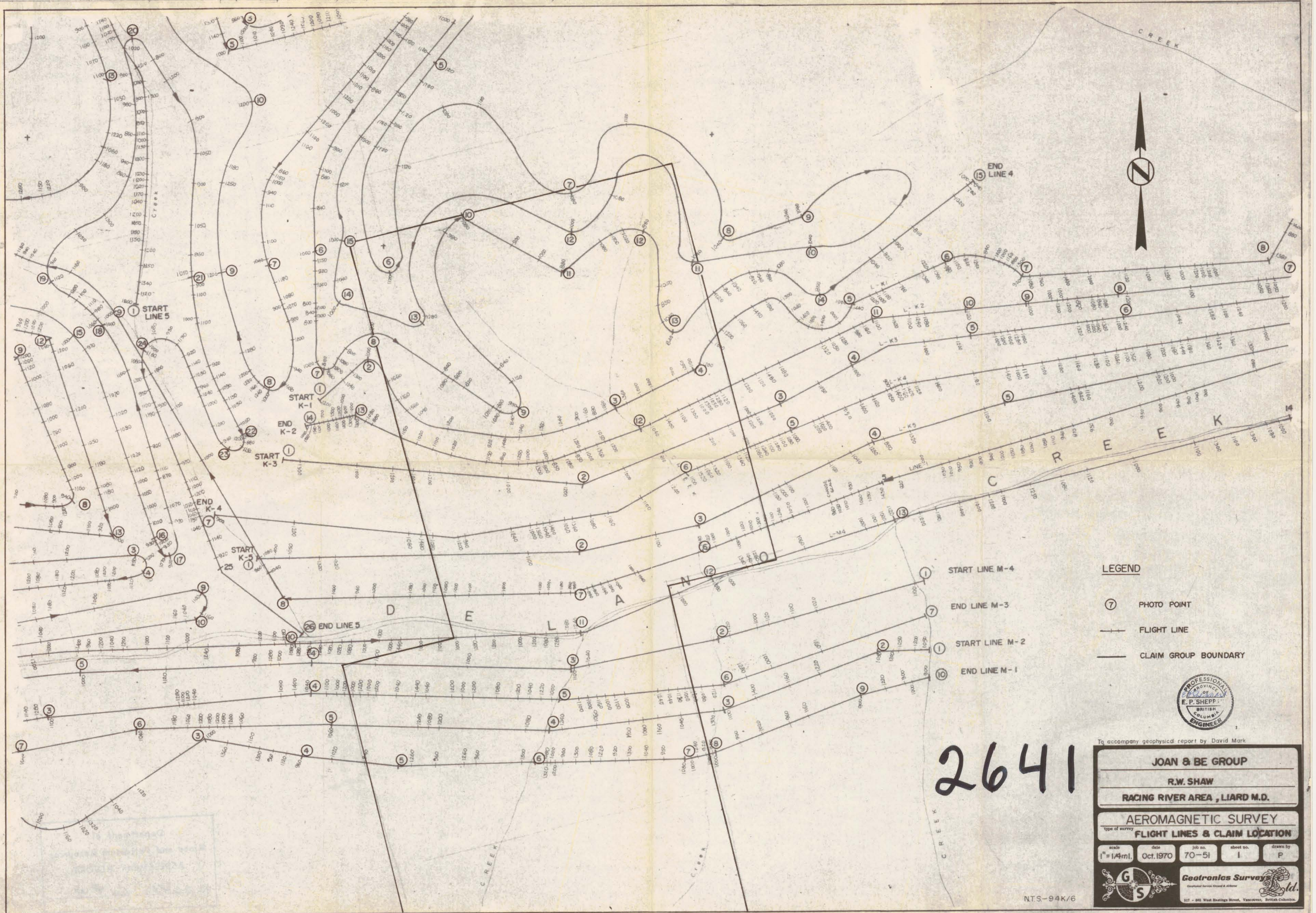
**AEROMAGNETIC SURVEY**  
 type of survey  
**CONTOUR MAP**

scale 1" = 1/4 mi	date Sept. 1970	job no. 7051	sheet no. 2	drawn by TWR.
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**Geotronics Surveys Ltd.**  
 Geophysical Surveys, General & Airborne  
 537 - 602 West Hastings Street, Vancouver, British Columbia.

N.T.S. - 94K/6



- LEGEND**
- ⑦ PHOTO POINT
  - FLIGHT LINE
  - CLAIM GROUP BOUNDARY



To accompany geophysical report by David Mark

2641

<b>JOAN &amp; BE GROUP</b>			
R.W. SHAW			
RACING RIVER AREA, LIARD M.D.			
<b>AEROMAGNETIC SURVEY</b>			
<b>FLIGHT LINES &amp; CLAIM LOCATION</b>			
scale	date	job no.	sheet no.
1" = 1/4 mi.	Oct. 1970	70-51	1
drawn by		P	
		<b>Geonics Surveys Ltd.</b>	
<small>Geophysical Services, Ground &amp; Airborne</small>			
<small>617 - 602 West Hastings Street, Vancouver, British Columbia</small>			