

AIRBORNE ELECTROMAGNETIC-MAGNETIC GEOPHYSICAL SURVEY

OLD GOLD AREA, YUKON TERRITORY

March 12 - April 3, 1966

LOCATION: LIARD RIVER AREA  
130° - 30' W. Long.  
61° - 00' N. Lat.

Claim Sheet 105B-15 & 105G-2

Val-Rabo M.C. Group

Submitted By: John S. Brock  
June 3, 1966

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

D. C. Gillen  
RESIDENT GEOLOGIST

Approved as to cost in the amount  
of: \$ 4800.00

R. G. Healy  
RESIDENT MINING ENGINEER

Accepted as representation work  
under Section 63(4) Yukon Quartz  
Mining Act

[Signature]  
COMMISSIONER OF YUKON

AIRBORNE ELECTROMAGNETIC-MAGNETIC GEOPHYSICAL SURVEY

OLD GOLD AREA, YUKON TERRITORY

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## INTRODUCTION

The Val-Rabo mineral claims are located at the northeast end of an area laid out for airborne geophysical survey by Atlas Explorations. The survey was designed as Phase 1 of an intensive exploration program, east of the Liard River and centered between Old Gold Creek and Rainbow Creeks. The airborne program was initiated in the hopes that magnetic and electromagnetic results obtained would provide preliminary information on geology and possible extensions of known mineral deposits in the area. All airborne results obtained are to be followed up by a comprehensive ground program consisting of geology, geochemistry and geophysics.

## LOCATION AND ACCESS

The Old Gold properties are located east of the headwaters of the Liard River, five miles southwest of the Tintina Trench. Much of the area is on the southwest sloping east limit of the Liard River and is between elevation of 3000 and 5000 feet above sea level.

Access at the time of survey was by helicopter under contract from Klondike-Foothills Helicopters Limited. The survey crew was based at Tyre Lake, some fourteen miles northeast of Old Gold and all mobilization was with the aid of helicopter support.

Aircraft equipped with floats may land on certain sections of the Liard River in summer months near the mouth of Rainbow Creek. Wasson Lake, twenty miles southeast of the survey area is also suitable for float equipped aircraft and access may be made to the survey area from Wasson Lake via an old tote trail.

## METHOD OF SURVEY

### Instrumentation

A Gulf Flungote Magnetometer Mark 111 and a Mark 111 electromagnetic unit consisting of a vertical coaxial transmitter and receiver coils mounted on a thirty foot boom were used for the entire survey. The instruments and operator were provided under a contract agreement with Lockwood Survey Corporation. The survey was conducted with a Bell G3 helicopter as fixed wing aircraft were judged to be unsuitable for some of the regions of more rugged terrain.

For the electromagnetic apparatus amplitudes of in-phase and out of phase response of the resultant field are measured in parts per million of the primary field, the frequency of the primary current is 4000 cycles per second. The magnetometer has a sensitivity of 1200 gammas and measures total magnetic field.

### Survey Methods

The geophysical instruments were towed at a mean terrain clearance of 100 feet over flight lines of 1000 foot spacing which was narrowed to 500 foot spacing over areas of known mineralization in order that more survey detail might be obtained. Effective ground control was maintained by the use of aerial photographs with pre-determined flight lines for navigational purposes. The helicopter was equipped with APN-1 radio altimeter and stop motion 35 mm camera for further ground control and recording of fiducial points. All flight lines were orientated perpendicular to geologic strike.

### PLOTTING OF RESULTS

Flight records were processed in the field by the staff of Atlas Explorations as no plotting of results is done by the contractor during the actual survey. All airborne information was plotted on plastic overlaps showing drainage, existing claim group locations and photo-geologic interpretation to a scale of one inch to one-quarter mile. Flight lines and fiducial points are shown on the compilation. Magnetic data was contoured for all results above regional background.

Electromagnetic data was shown by contoured in-phase and quadrature response. At a later date Atlas Explorations will receive a final plot of all geophysical results prepared by Lockwood Survey Corporation.

### INTERPRETATION OF RESULTS

#### Liard Mineral Claim Area

All magnetic anomalies obtained in this area are of isolated nature and have apparent relation to fault control. The magnetics are of low magnitude but may be significant of mineralization as reported on the original Liard Claims. At the northern end of the claim group two electromagnetic anomalies occur in areas of recently discovered galena float. Some spot electromagnetic response is recorded in coincidence with the magnetics. No geophysical anomalies were obtained over the Liard mineral showing.

#### General Survey Area

To the northwest of the Liard Claims, continuous and well defined electromagnetic results were obtained, no magnetic coincidence is apparent. The anomalies appear to be of formational nature and in coincidence with what has been described as an area of graphitic schists. The area, however, warrants geochemical prospecting and further mapping in the event that major fault structures in the graphitic formations may provide ore bearing zones. A high in-phase electromagnetic anomaly centered in a parallel fault system on Old Gold Creek requires further ground investigation.

At a later date the boundaries of the Old Gold survey should be extended west to the Dome Creek area in order that sedimentary formations in which mineralization has been reported may be surveyed.

To the south of the survey area a coincident magnetic-electromagnetic anomaly was recorded over Quartz Creek while the airborne equipment was being ferried to base camp. This area also requires ground follow-up as it may be in the vicinity of reported sulphides.

#### Summary and Conclusions

The Old Gold area warrants a ground follow-up program based on airborne geophysical results obtained to date. Electromagnetic and magnetic anomalies obtained in the vicinity of the LIARD and VAL-RABO mineral claims should be protected by additional staking of mineral claims. Coincident Mag-EM anomalies centered within northwest - northeast cross faults and magnetic and electromagnetic anomalies in the vicinity of known mineralization are of immediate interest.

Further treatment and interpretation of airborne data will be carried out upon receipt of final data reductions from Lockwood Survey Corporation.

AIRBORNE ELECTROMAGNETIC-MAGNETIC GEOPHYSICAL  
SURVEY

OLD GOLD AREA -- YUKON TERRITORY

APPENDIX

APPENDIX 1PERSONNEL

John S. Brock,	Geophysicist	Box 3050 Whitehorse, Y.T.
Harold Sandau,	Geophysical Operator	Lockwood Survey Corp. 1450 O'Conner Drive Toronto, Ont.
George Kerr,	Helicopter Pilot	Klondike Helicopters Whitehorse, Y.T.
George Milan,	Engineer	Klondike-Foothills Helicopters Calgary, Alta.
Lavina Carson	Cook	Teslin, Y.T.
William Carson	Camp Attendant	Teslin, Y.T.
E.O. Chisholm	Explorations Manager	Box 3050 Whitehorse, Y.T.

APPENDIX 11

Distribution of Costs

Airborne Geophysical Survey  
Old Gold Area, Yukon Territory

Equipment Rental	\$ 6,250.00
Helicopter	4,100.00
Gasoline	640.00
Camp Costs	960.00
Supervision	750.00
Lockwood Data Reduction	5,000.00
Fixed-Wing Aircraft Support	1,600.00
Wages, Atlas Personnel	1,000.00

Total	\$ 20,400.00
	3

Airborne Survey, cost/line mile = \$ 41.00

? how is this figure obtained? Ray

Representation work required to hold mineral claims

RABO 1 - 8 and VAL 1 - 8

for three (3) years ..... \$ 4,800.00

or ..... 117 line miles.

- A) Line miles survey over Val-Rabo ..... 38.25 line miles (Group A)  
Cost survey over Group A ..... \$ 1,568.00
- B) Line miles survey off Group A applied as assessment work ..... 78.25 line miles  
Cost Survey this Area ..... \$ 3,392.00

APPENDIX 111

Affidavit supporting statement of costs - Airborne Geophysical Survey  
Old Gold Area.


I, John S. Brock of Whitehorse, Yukon Territory, have compiled the  
statement of costs, Airborne Geophysical Survey -- Old Gold area.

I make oath and say to the best of my knowledge and belief, the  
statement of costs as presented in this report, is both true and an  
accurate representation of expenditure to be applied as assessment  
work on the 'B' mineral claim group.

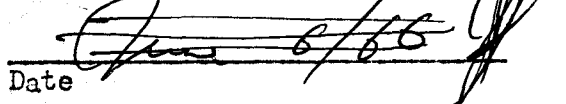
Sworn before me at Whitehorse ~~in~~ the Yukon Territory this 10th day  
of June 1966.



A Commissioner for taking Affidavits  
in and for the Yukon Territory.



John S. Brock



Date

APPENDIX IV

REPORT:

Geology, Old Gold Area, Yukon Territory

GEOLOGY  
OLD GOLD AREA  
YUKON TERRITORY  
ATLAS EXPLORATION LIMITED

-by-

W. WALKER, F.G.A.C.

Chew-Walker Associates  
164 Nipigon Avenue,  
Willowdale, Ontario.

24th. February, 1966

## GEOLOGY

### OLD GOLD AREA, YUKON TERRITORY

-by-

W. WALKER, F.G.A.C.

#### SUMMARY

The Old Gold area is crossed by the Liard River which follows the north end of the Rocky Mountain Trench. Southwest of the break is a sequence of Lower Cambrian quartzites and limestones, dipping uniformly 20 to 30 degrees S.S.W. and crossed by many minor faults. Northeast of the break is a uniform series of Middle Cambrian to Middle Silurian beds, now largely phyllites and argillites with limy interbeds. A normal pattern of wrench faulting was imposed on these beds. N.W. faults are anomalous and may indicate a change in direction of pressures.

Mineralisation is principally replacement type. The intersections of major N.W. and left hand (E.N.E.) faults appears to be the favoured structure, and investigation of these at stratigraphic traps, e.g. argillite over limestone, is recommended.

## INTRODUCTION

The Old Gold area is one of several selected for exploration by Atlas. The present photogeologic study is based on published data.

### The area, location and access

Two mineral deposits are known in the area, a chalcopyrite deposit at the head of Old Gold Creek, and a deposit on the north bank of the Liard, between the mouths of Old Gold and Rainbow Creeks. The Liard River divides the Simpson Range of the Pelly Mountains from the north end of the Cassiar Mountains. The area straddles the  $61^{\circ}\text{N}$  line at  $130^{\circ} 45'\text{W}$ . Aerial photographs have been studied for the area between the Black River (E), hills on the west bank of the Liard (W), Wasson Lake (S) and the main N.E. to S.E. bend in the Liard.

The Alaska Highway at Pine Lake airstrip is about 60 air miles to the south, the Watson Lake to Ross River road is about 50 miles to the east, and the road from Ross River to Carcross and the railway is about 75 miles to the west.

### Previous work

Newmont Corporation explored the property at the head of Old Gold Creek from 1955 to 1957, but no records are available to the writer.

Work in preparation for the 4 mile series of

maps of the southern Yukon, begun by Bostock in the 1930's, was started in the Wolf Lake area by Poole in 1951 and completed by Roddick and Green in 1959 (G.S.C. Map 10-1960). The 1959 workers also helped complete work in the Finlayson Lake area to the north, started by Wheeler in 1958. The data were not available therefore for the 1957 map of the Yukon Territory (1048A), but are incorporated on the 1963 compilation of the Yukon and Northwest Territories (Map 30-1963) and Gabrielse and Wheeler's Tectonic Framework of Southern Yukon and N.W. British Columbia (Paper 60-24).

Aeromagnetic sheets 1349G to 1351G and 1360G to 1362G, at the one mile scale, and the 4 mile compilations, 7001G and 7006G, cover the area.

The history of the prospect on the north bank of the Liard is not known.

Conwest's Tintina Silver Mines Ltd. prospect is about 10 miles to the northwest (W.W. Moorhouse, Proceedings Geol. Assoc. Canada, Vol.15 part 2, May, 1964).

#### GENERAL GEOLOGY (after Gabrielse and Wheeler)

That part of the Cordilleran region which includes the southern Yukon Territory, may be divided into three northwesterly trending belts of relatively unmetamorphosed stratified rocks separated by two

zones of crystalline metamorphic and granitic rocks.

### Lithology

The Old Gold area falls within the eastern belt of stratified rocks which embodies the Pelly, Cassiar, and northern Rocky Mountains. This belt is underlain mainly by Mississippian and older rocks in regularly bedded formations traceable for many miles.

The eastern belt was mainly miogeosynclinal during the late Proterozoic and early Palaeozoic. Non-volcanic marine sediments deposited in late Proterozoic time are probably more than 7,500 feet thick and those deposited between early Cambrian and pre-late Devonian time probably total no more than 9,000 feet in thickness.

A relatively thick and widespread quartzite member was deposited as the basal member of the Cambrian succession. Perhaps the quartzite represents the basal beds of an easterly transgressing sea. A relatively thin unit of shale commonly overlies the quartzite sequence and is in turn overlain by fossiliferous limestone of early Cambrian age. The limestone was apparently deposited in shallow, well-aerated seas. Minor green volcanic breccia and tuff interbedded with Middle and Upper Cambrian phyllites indicate some volcanism at this time.

Granitic rocks probably represent intrusions accompanying successive disturbances throughout much

of late Palaeozoic and Mesozoic time.

### Structure

The middle Cambrian to middle Silurian rocks are generally highly folded and commonly form the loci of major faults. Within the map area, the Liard River follows the north end of the Rocky Mountain Trench, and the south end of the Tintina Fault lies just northeast of the area.

The Palaeozoic sediments form a flanking syncline to the Cassiar batholith anticlinal area. A short distance northwest of the Old Gold area thrusting parallels the Tintina Fault. The Porcupine thrust is mapped in the Finlayson Lake area and Moorhouse has described thrusting at the Tintina Silver property. Southwest of the Porcupine thrust the structure is characterized by moderate dips and extensive low-angle thrusts, some apparently folded. Northeast of the Porcupine thrust the structures are featured by steep dips, tight upright folds, and fault slices, bounded by steep faults.

### LOCAL GEOLOGY

#### Lithology

The oldest known relatively unmetamorphosed rocks in the Old Gold area are to the southwest of the Liard River (Rocky Mountain Trench). Thick-bedded, reddish, grey, and white-weathering quartzites (1a) contain interbeds of phyllite and slate. The sequence appears to be several thousand feet thick. The unit is acc-

ompanied by thick-bedded, light gray limestone (lc), and it is not clear whether it is above or below unit la.

The sediments to the northeast of the Liard are probably Middle and Upper Cambrian, thin-bedded buff and gray phyllite and limestone (Unit 2) in part hornfels, limestone and skarn. They have been intruded, at the north boundary of the Old Gold area, by one of the granitic bosses which lie on the south flank of the Tintina Trench.

This much is evident from published data: to it one may add evidence from aerial photographs.

The hills within the right-angled bend of the Liard in the N.W. corner of the area give good exposures of the lower Cambrian formations. These appear to dip more or less uniformly S.S.W. at 20 to 30 degrees, with much minor faulting: one may envisage a series of limestone-quartzite cyclothem, and anticipate that some of the lower ground is occupied by shale.

The western outcrops of the phyllites of unit 2 are on the west bank of the Liard, i.e., west of the main break, and one has the impression that they were deposited against a fault-scarp shoreline. The implication is that the Rocky Mountain Trench was already in existence in Cambrian times.

In the Liard plain, although outcrop is scarce,

the effect of bedrock control on the terrain is clearly evident in the southeast trending ridges, which follow the bedding, broken up by cross-faulting. Glacial scouring and deposition, along this readily travelled southeast valley, has obscured much detail. The few recognisable bedding surfaces dip S.E., and there is probably repetition of beds by bedding-plane faulting.

To the northeast, where the granite has hornfelsed the sediments, and the terrain is mountainous, there is no perceptible change in the structural pattern.

One may nevertheless consider that the sediments in the lower ground were principally faulted by horizontal pressures, and that the sediments in the hills, while also subjected to these movements, were also jiggled by the more or less vertical intrusion of the granitic stock: the form of the stock, both as mapped and as outlined by the aeromagnetic data, suggests forceful emplacement.

Most of the faults can be readily reconciled with a system of wrench fault tectonics acting under N.E-S.W. pressures. Bedding and strike faults trend N.W. right hand faults trend N-S (and are followed by the lower parts of Old Gold and Rainbow creeks, for example) and left hand faults trend E.N.E. (see Dome Creek). N.E. faults are presumably tensional.

BS!

A strong N.W. set of faults is anomalous to this strike and primary wrench fault pattern, and may well reflect a later changed direction of pressure. Several reaches of the Liard, Quartz Creek and depressions between Rainbow and Old Gold creeks provide examples.

#### ECONOMIC GEOLOGY

The main impression one gets of the geology of the area is of regularity. In such an environment one would expect that mineral deposits would be of the replacement type, where faults provide channelways and shales provide traps so that underlying limestones and sandstones can be replaced.

At the Tintina Silver deposit Moorhouse (p.74 op. cit.) noted "The silver-bearing lead zinc mineralization occurs in the limestone units as lenses, streaks and disseminations immediately below an argillite contact, in highly sheared zones in the argillaceous unit close to the thrust planes, in faults in the argillaceous limestone, and in shears in the two lower limestones".

And: "Chalcopyrite has replaced hornfels at the head of Old Gold Creek on a property explored by Newmont Corp., from 1955 to 1957 (J.O. Wheeler et al, Map 8-1960).

The Old Gold deposit appears to be associated with one of the many left hand (E.N.E.) wrenches; the deposit on the north bank of the Liard between Old Gold and Rainbow creeks is associated with a N.W.

fault and minor tension faults. These structures are far from unique, and appears that in utilising geology in the search for deposits we must next look for stratigraphic traps, either by mapping on the ground or by using geophysics to differentiate rock types.

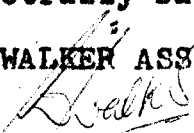
As much of the drainage is structure-controlled, the writer would wish to utilize stream sediment sampling to direct attention to the more important areas. Testing directly for copper and zinc is recommended, bearing in mind that because of mechanical weathering, the dispersion pattern of zinc is likely to be smaller than in warmer, chemically weathered areas.

On the evidence of the Keno Hill and Anvil Mountains areas, E.N.E. faults control ore deposition. Rose Creek at the foot of the Anvil Mountains follows a N.W. parallel subsidiary of the Tintina fault, and has several deposits along it at the junction with E.N.E. faults. Several of the principal creeks of the area, Little Scurvy, Quartz, Dome, etc., have lower reaches on E.N.E. faults which intersect the N.W. Rocky Mountain trench (and its subsidiaries) followed by the Liard.

It is therefore recommended that the airborne geophysical programme about to commence be studied not only for direct guidance to sulphide deposits,

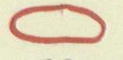

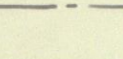
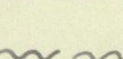
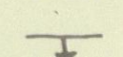


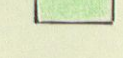
but also to map potential stratigraphic traps, e.g., shale and argillite over limestone, and the stream sediments be sampled for analysis initially for zinc and copper.

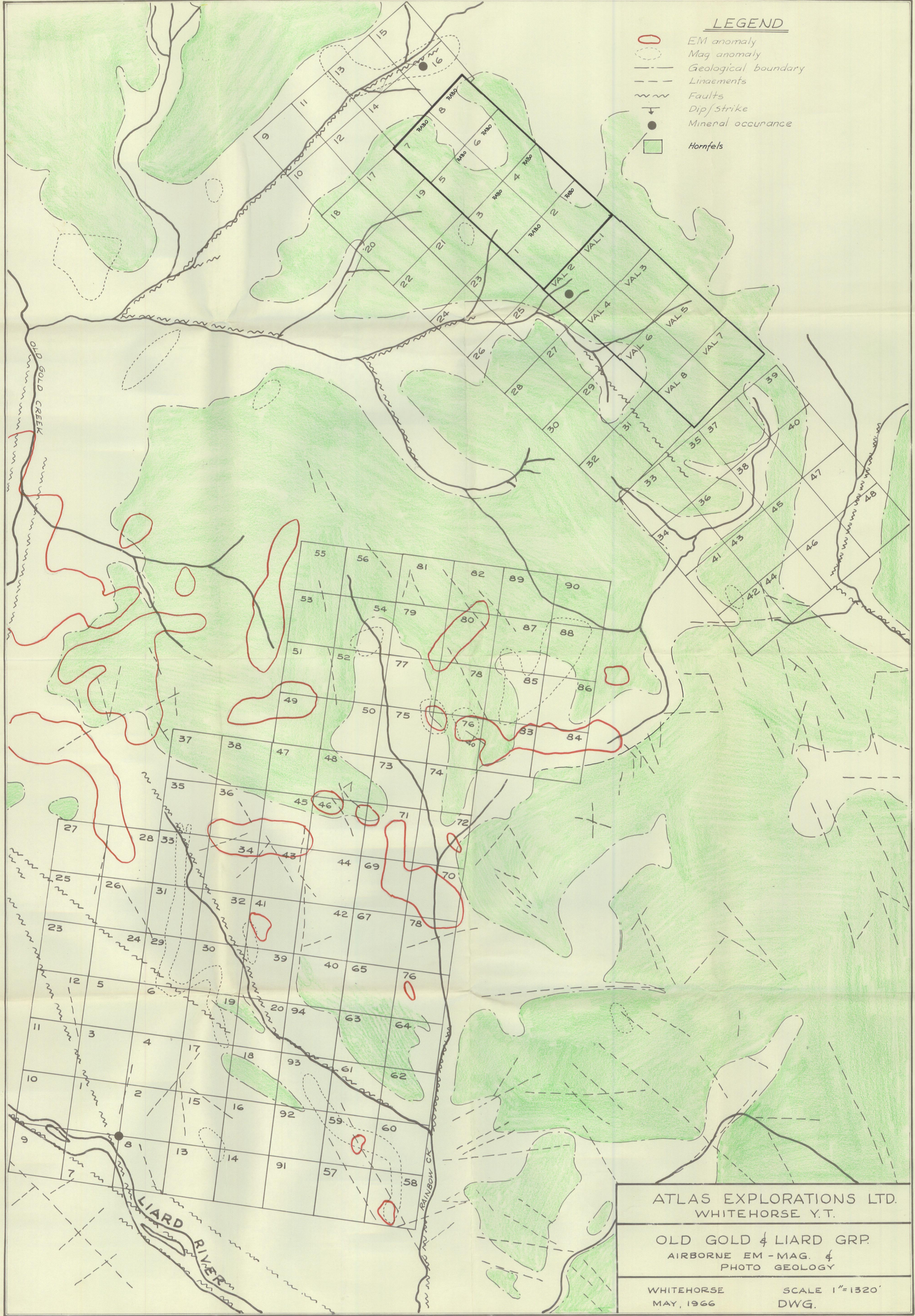
Respectfully submitted,  
CHEW-WALKER ASSOCIATES,

  
W. WALKER, F.G.A.C.

WW:S

LEGEND

-  EM anomaly
-  Mag anomaly
-  Geological boundary
-  Lineaments
-  Faults
-  Dip/Strike
-  Mineral occurrence
-  Hornfels



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WHITEHORSE Y.T.

OLD GOLD & LIARD GRP.  
AIRBORNE EM-MAG. &  
PHOTO GEOLOGY

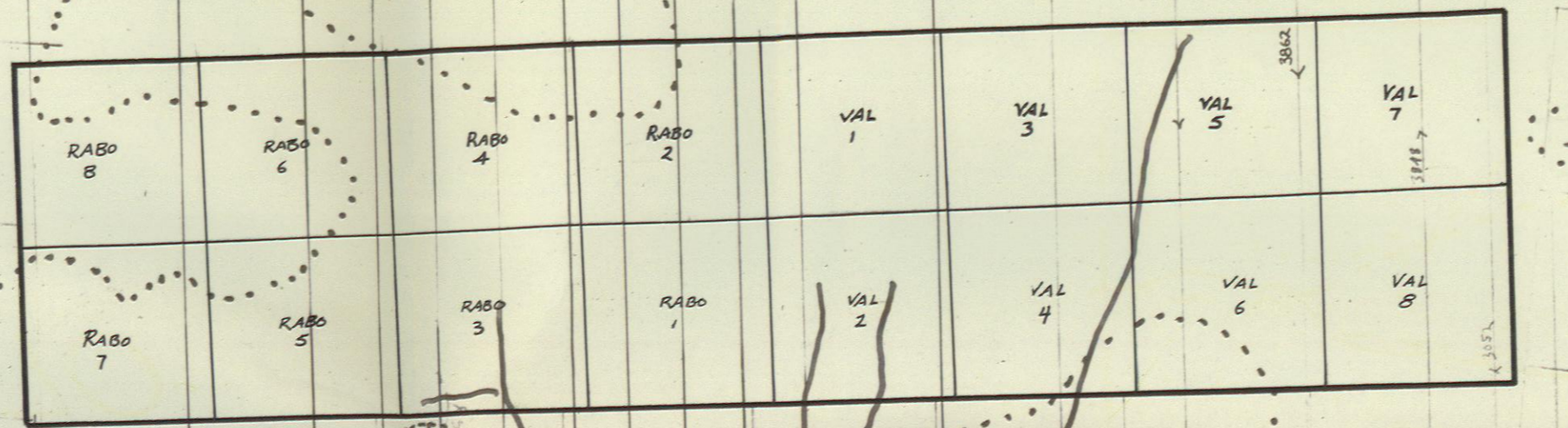
WHITEHORSE  
MAY, 1966

SCALE 1"=1320'  
DWG.

ATLAS EXPLORATIONS  
**OLD GOLD AREA**

PRELIMINARY; AIRBORNE EM-MAG, PHOTO GEOLOGY 1" = 1320'

- |  |                                 |  |
|--|---------------------------------|--|
| <p><b>A</b> LOWER CAMBRIAN<br/>QUARTZITE WITH PHYLLITE + SLATE<br/>INTERBEDS</p> <p><b>B</b> MIDDLE-LOWER CAMBRIAN<br/>BUFF + GREY PHYLLITE AND LIMESTONE</p> <p><b>C</b> ORDNOVIAN + SILURIAN<br/>BLACK SLATE, LIMESTONE + PHYLLITE</p> | <p><b>150</b><br/><b>20</b></p> | <p>GEOLOGICAL BOUNDARY</p> <p>LINEMENTS</p> <p>FAULTS</p> <p>STRIKE AND DIP</p> <p>MINERAL SHOWING</p> |
|--|---------------------------------|--|



*Handwritten notes:*  
 20-25 is a section of the  
 ridge in the  
 20-25 from a photo (red)  
 20-25 from a photo