VALLEY EXPLORATION (HOLDINGS) PTY. LTD.

GEOLOGICAL REVIEW
OF
EL.53/70
STANLEY RIVER AREA
WESTERN TASMANIA
AND
PROPOSAL & COST ESTIMATE
FOR
FURTHER EXPLORATION

CONTECH PTY. LTD.
CONSULTING TECHNOLOGISTS
MIDLAND WESTERN AUSTRALIA

AMG REFERENCE POINTS ADDED

TABLE OF CONTENTS

LIST OF FIGURES:

LIST OF ENCLOSURES:

SUMMARY

EL.53/70 covers 41 square miles in the Zeehan district of Tasmania. It covers mainly Upper Proterozoic Oonah Quartzite and Slate and some Devonian Meredith Granite. The sedimentary lithologies are mainly sandstones, siltstones and shales, containing minor felspar and sulphides and reflecting a lagoonal or near shore environment. No tuffs or volcanics were identified within the area although exposure is very poor (<5%). Analogy studies in the district show volcanics occur elsewhere near the top of the Oonah unit, and that the top of the Oonah through into the Lower Cambrian is the main mineralized zone in the West Coast district of Tasmania. EL.53/70 apparently includes several miles of strike length of the Upper Oonah, but whether it is conformable, unconformable or faulted against the Lower Cambrian Crimson Creek Argillite is uncertain.

Geochemical panned concentrate drainage sampling has outlined at least five anomalous zones containing copper, lead and zinc sulphides, cassiterite and chrome up to and over 1%. Silver up to 60 ppm was also found. Brief geological traverses into two of these areas did not find any source for the anomalies.

The geochemical anomalies indicate the area is mineralized and further work is warranted. A staged programme is suggested costing a minimum of $90,000 over two years. The first stage is detailed airborne geophysics over the prospects and would cost around $10,000.

1. INTRODUCTION.

Exploration Licence 53/70 granted to Valley Exploration Pty. Ltd. covers approximately 41 square miles centred about 12 miles NNW of Zeehan, Western Tasmania. About 50% of the area is undulating open peneplain covered by buttongrass, but deeply dissected by numerous streams with dense vegetation in the valleys. The valleys and rugged areas in the north and south east contain extremely dense vegetation and account for the remaining half of the area. Natural barriers to access are the Pieman River along the southern edge, and the Stanley River which runs nearly N-S through the middle of the area.

Elevations range from 200 ft. ASL on the banks of the Pieman to 2564 ft. on the summit of Mt. Livingstone.

Access is poor and consists only of two walking tracks from cages across the Pieman River to the Stanley Reward workings. Renison Ltd. are constructing a road from the Wilson River cage to Mt. Lindsay; this track is just outside EL53/70 but would be a useful starting point for access tracks into the E.L.

2. HISTORY OF EXPLORATION.

Prospectors in the late 19th century located the Stanley Reward tin prospect and slucing was carried out until about 1910. Some shafts and adits were put into a nearby ferruginous gossan but no production resulted. The Mt. Lindsay lode tin prospect on the eastern edge of the area was also located at this time. Alluvial platinum // osmiridium was also worked further east on the banks of the Wilson River. The early work is described in detail by L.L. Waterhouse (1911). // (1914)

Little was done again until 1956 when the Rio Tinto-E.Z partnership included the area in a regional survey of the West Coast of Tasmania. Photogeological maps and aeromag charts were produced at scale 1" = 1 mile.

Since Valley Exploration took up the area in 1970 it has carried out photogeology and a geochemical drainage survey based on panned concentrates. Subsequently it joint ventured with Research and Exploration Management Pty. Ltd. who continued this work and brought total expenditure up to about $80,000. R.E.M. increased the sampling density and also carried out detailed mapping of the iron gossan near the Stanley Reward. Geological observations were made during the sampling but no systematic regional mapping was done. Reports are available in Valley Exploration's office.

3. AIM OF PRESENT SURVEY:

The panned concentrate surveys disclosed numerous areas of anomalous copper, zinc, lead, tin and silver, in the Oonah Slate and Quartzite. This unit is generally regarded as "unprospective". ?

This latest survey was aimed at locating the source of the sulphides found in the panned concentrate samples in the two main anomalous zones.

A secondary aim was to examine the uppermost units of the Oonah 'Formation' and look for volcanic components such as are recorded in the Success Creek Group. (Taylor, 1954).

4. METHOD:

Timing was mainly governed by the availability of a helicopter in the district, and this was used to drop and pick up the crew. Two local labourers were employed, C. Blacklow and D. McGraw, to assist in the traversing, and to read a Jalander magnetometer and a McPhar scintillometer. Traverses were planned mainly along ridges to be able to cover more ground.

5. RESULTS:

5.1 Paradise River Area

Previous reconnaissance suggested there was appreciable exposure in this area, particularly along the E-W "airstrip" ridge 600' ASL at the southern tributary headwaters of Paradise River. The traverse is shown on Figure 2.

Outcrop was generally poor and consisted of monotonous grey quartz wackes, sometimes stained brown, and thin bedded, slatey siltstones and shales, sometimes spotted and pock marked. No volcanics were seen. Strike is fairly consistent around 120° with steep N. dip in the south east, and about 050° and steep S. dip in the northern half. An E.N.E. trending linear feature on the photos is inferred as a fault. Minor folding is common and crenulations are evident on photos in the western half of the area. The western half of the area traversed is covered by quartzose gravel with few outcrops.

Thin section analysis shows the rock type to be well sorted, slightly metamorphosed sandstones, siltstones and shales containing appreciable clay, sericite and chlorite. Felspars and sulphides were identified in two specimens out of the eight submitted from this area. The rocks are not mature enough to be called quartzite and were probably deposited in a continental to lagoonal or estuarine environment. (cf. Adelaide Geosyncline Parkin 1969, P81). No carbonates were seen.

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Geochemistry: Three rock chip samples and 14 scree soil samples were collected. It was anticipated that the soil samples might show a very low metal content because they were mostly thin soils between the peat surface and bed-rock and have been subjected to intense leaching by humic acid (cf. Baker W.E. 1972). Analyses confirmed this but two of the three rock chip samples PS 2010R & 2012R which had slightly gossanous? crusts gave slightly anomalous copper 35 and 55 ppm, and for 2012R slightly anomalous zinc, 65 ppm. These figures are very low but all other samples show less than 15 ppm and commonly 5 ppm or less. The two anomalous rock samples are from the northern slopes of the "Airstrip Ridge", due S. of REM sample point A13. They are also in a zone of magnetic 'lows' -400 to -1000 gammas (cf. a general level of -200 to -400 gammas) which extends more than half way down the northern slope of Airstrip Ridge. No geological explanation was observed for the magnetic variation and the gossanous crusts are the only unusual feature observed.

plan shows numbers as 2510R 2512R

Geophysics: The magnetic readings were at approximately 100 ft. intervals throughout the traverse but as no base station control was practicable they are purely of a reconnaissance nature. The Jalander was set at -200 gammas at the start and remained constant between 0 and -200 with a maximum of -300 on 5th March. Thus the upper catchment of Paradise River is mostly magnetically "flat".

On 6th March a broad zone of magnetic lows approximately 3000 ft. wide was recorded due south of REM sample A13 from mid slope to the summit of Airstrip Ridge. Values ranged from -400 to -1000 (see above). Thereafter all readings were in the range -200 to -500 from the Airstrip Ridge SE to to the Stanley Reward Track and down the track to the old workings. Some lower values were recorded near the old workings and may reflect contact metamorphic effects adjacent to the granite.

The scintillometer remained fairly constant throughout the Paradise River traverse and down the track to the old workings. Count levels were 1000 - 1500 cpm and rarely 2000 cpm when on outcrop or suboutcrop, dropping to 500 cpm over thick peat and swampy ground. At the Stanley Reward workings the reading was constantly above 2000 ppm and up to 5000 ppm, possibly due to monazite associated with the tin. Consequently airborne radiometric data may be useful in locating tin centres in the district.

Some copper wire was found in the vicinity of the Stanley Reward suggesting some party has carried out Turair surveys recently.

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5.2 Pieman-Wilson River Area - SE ~~Corner of EL.~~53/70.

This survey was carried out on 7th and 8th and was hampered by bad weather and thick undergrowth. Again copper wire from Turair surveys was found, particularly in the eastern half of the area. This traverse was particularly disappointing in that practically no outcrops were found in the main target area in the headwaters of streams A47 and A48 (REM sample points). A47 - 1500 ppm Cu, 1% Pb & Cr >1% Zn, 60 ppm Ag. In retrospect it may have been more effective to traverse the streams from top to bottom, even though vegetation would have made this very slow.

Outcrops throughout the traverse were quartz sandstone, siltstone and sericitic shales, schistose when tightly crenulated. Some chert and purple tuff were found on the ridge immediately west of the Wilson River-Pieman River junction but outside of EL.53/70. The purple rock type in this section is siliceous with small pisoliths (radiolaria) but in hand specimen it is blocky and has a distinctly tuffaceous texture. It may represent tuff referred to by previous workers e.g. B.L. Taylor (1954, P.21 & 22) near the mouth of the Wilson River.

Attitudes observed near the start of the traverse are roughly E-W strike with steep N. dip. As one goes N.E across the 1850' feature and collapsed trig station, the strikes swing to around N.E. (030-060°) with steep S. dips and minor folding. E-W strikes were also observed further east in the creek of REM sample A41. These regional trends are almost directly towards the NW-SE boundary between the Oonah 'Formation' and the Crimson Creek Argillite and suggest this may be unconformable or faulted.

Once the creek of REM samples A40 and A42 is crossed, strikes generally parallel the formation boundary i.e. NW-SE. However this is an area of more variable lithologies and may constitute a new unit - the Success Creek Group. More detailed mapping is needed to resolve this matter but at this stage it seems to be an academic problem.

Geochemical: Six scree soil samples were collected in the first half of the traverse but showed very low metal values. Chrome was also low, yet in the panned concentrate it was usually 1% or better. No samples were taken in the basin of stream A41 and the original pan samples showed low values.

Geophysical: Magnetometer readings were taken up to the headwaters of stream A41 when the combination of heavy rain and dense undergrowth made further readings impractical. Traverses around a square grid at the headwaters of stream A47 and A48 showed variations from -240 to -800 gammas but closure showed instrument drift of 240 gammas within an hour making the results suspect. Thereafter no major anomalies were found and results ranged from -200 to -500 gammas with a few readings in the -600 to -700 range, and a 1000 ft. wide zone of highs (-20 to -140 gammas) centred

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on Pieman sheet grid reference 339400yE, 858300yN. Contorted siltstones and shales were recorded in this zone, as well as sandstones.

Scintillometer readings were in the range 500-1500 cps with higher readings coinciding with outcrop. The lower reaches of stream A41 gave counts of 2000 to 4000 cps, suggesting analogies with the Stanley Reward; however the results of A41 are not encouraging (only 200 ppm tin).

5.3 Tin Gossan:

C. Blacklow reported a 'tin gossan' found by his father near the western edge of the area. The area description was briefly checked and confirmed but no gossan was found. Brown stained sandstone was evident nearby but is unlikely to explain the rumour. The Pieman grid reference for the locality is 331,800yE, 863,800yN.

6. CORRELATION DISCUSSION:

The Oonah 'Formation is generally regarded as Upper Proterozoic and it is interesting that Blissett (1962, p.19) marks the "stratigraphic level of chief mineralization" is at the top of the Oonah and the base of the Cambrian Crimson Creek Formation. The mineralised zone coincides with lavas and thin dolomites as well as clastic sediments. This horizon coincides with the Success Creek Group of Taylor (1954) and Campana and King (1963). Although no volcanics or carbonate rocks have been found within EL53/70 evidence suggests they should be present: T.H. Green (1966) records thin, pale green, basic amygdaloidal volcanics near the top of the Oonah 'Formation' at Montagu Creek, Trial Harbour.

Blissett (p.23) records that "spilitic lava flows and pyroclastic bands occur near Zeehan also in the upper part of the" Oonah sequence, and dark grey limestone and dolomitic limestone occur north and west of Zeehan and in the Dundas district.

Loftus Hills etal (1967, p.337) concluded "that at least part of the Mount Read Volcanics is older than the Rosebery "Series". If these sediments are correctly correlated with the Success Creek phase (Solomon, 1965), then the Mount Read Volcanics may be in part equivalent to the Oonah Quartzite and Slate".

All of these correlations suggest the top of the Oonah is a favourable zone for mineralisation, and this inference is supported by the finding of copper, lead and zinc as sulphides constituting 1% or more of panned concentrates at several places within the Oonah. This certainly belies the apparently barren aspect of the Oonah Formation generally and undoubtedly warrants considerable expenditure on follow up work.

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On a regional scale the Ooonah Quartzite and Slate shows similarities with the Upper Proterozoic of the Barrier Ranges, Western N.S.W., (Thompson 1969), and the upper-part of Billy Springs Beds (Marinoan) of the Adelaide Geosyncline. Neither of these units contain volcanics though the latter has dolomite nodules and appreciable marble and dolomite in the lower sections (Parkin 1969).

The miogeosynclinal to estuarine depositional environment and lithologies of the Oonah Formation fulfil several of the prerequisite conditions for sandstone-type uranium deposits Grutt (1972, p.73), but once again the humic acid environment would preclude surface expression of such deposits. The steep dips will also complicate the model.

7. DISCUSSION:

The traversing did not locate or explain the origin of the sulphides in the panned concentrates, nor were any volcanics positively identified within the E.L. Quartzites are mostly sandstones in the strict sense and some do contain felspar. The main problem is the very limited bedrock exposure available. This can only be overcome by traversing along creek beds which is slow and laborious, by bulldozing trenches or roadcuttings, or diamond drilling.

Soil geochem seems not particularly helpful possibly because of the humic conditions. However the technique should be tested across definite mineralization as soon as possible. //?

Creek traverses combined with detailed pan sampling should locate the source of anomalies fairly precisely and allow the more expensive tools of dozing and drilling to be maximised. Another alternative is airborne geophysics, such as Turair or VLFem, though detailed ground follow up is still required.

Access remains a major problem and Mr. Irving's plan to put an airstrip in near Mt. Livingstone largely overcomes this problem for the western half of the area. The south eastern sector could be best tackled by dozing a track along the northern bank of the Pieman and this has to be more than ¼ mile from the river to comply with environmental regulations.

National Park ?

8. FORWARD WORK PROGRAMME:

1. Aerial Photography.
   Detailed aerial photography at a scale of 1:10000 over each prospect is desirable, but not absolutely essential. The Lands & Surveys Department might undertake this work with their new camera. Cost: less than $1000.

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2. Geophysics.

As target areas have been defined within drainage basins by geochemical work, airborne geophysics offers the next best follow-up technique prior to solving the expensive access problem.

Helicopter Turair could be applied over the main anomalies in a short space of time and should provide specific targets for trenching, sampling, mapping and drilling. Targets are -

1. Headwaters of Paradise River.
2. North Pieman Bank, - SE corner of EL. (REM A.47)
3. SW Corner of EL. REM Samples B58, C19-21.
4. Gossan NW of Stanley Reward.
5. Single samples adjacent to Lower Stanley River.
6. Area of granite contact between Stanley Reward and Mt. Lindsay (geological target only).

Each would require a ground loop of 2 km x 3 km approx., and surveying in the centre of the loop. At 200m flight line spacings 20 line km of survey would adequately cover each area. Anomalies should be located to within ±70m on the ground.

Costs would be of the order of $40 km per line kilometer, plus positioning. As it is a small survey positioning could exceed the survey cost. A budget figure of $8000 is realistic.

Airborne VLF e.m and input e.m are other techniques to be considered, and could be obtained with detailed airmag.

Sphalerite has a very high thermal conductivity making it amenable to search employing the thermal scanning (far infra-red) scanning technique. Most of the anomalous zones are high in zinc and this technique should be tried. Flying is normally done pre-dawn which would present problems in such a rugged area. Canadian Aero Services, Sydney, or C.G.G. - Qasco, Brisbane, could provide more information on costs.

Some ground geophysics may also be necessary to plan drill holes accurately. This would be a combination of proton magnetics and e.m. techniques, of which VLF e.m. would be lowest cost.

3. Geochemical-Geological.

Geochemistry of panned concentrates has proved effective in the past on a reconnaissance basis and should be effective in detail to cut down the search area, in the same manner as following gold 'trains' with a pan. It would require a junior geologist and assistant for at least a week on each prospect and would not be more specific than the Turair. Costs would be of the order

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of $800-1000 per week, including cost of lab work and helicopter transport to and fro.

On this cost basis it seems preferable to do airborne geophysics next and perhaps use ground traversing and sampling of panned concentrates and stream water for specific detailed follow-up and to plan bulldozer access for ground geophysics, costeaning and drill pad preparation. Even on this basis a minimum budget of $2500 is required.

Once dozing access is established a budget of $3000 per prospect is required for surveying, mapping, line cutting, and costean/gossan sampling.

4. <u>Access.</u>
Access is still the biggest problem in the area. Assuming airborne results are encouraging, priority should be given to getting a dozer into the area to make an airstrip and to cut tracks and costeans. This can only be done when the Pieman River is low, (February) and once across the river the dozer would probably have to be left there for the full year. Consequently dozer purchase may be preferable to hire.

A D6 would be adequate and would normally cost about $17 per hour to hire, or $20,000-30,000 to purchase reconditioned, or $40-45,000 new. Fuel supplies would be a problem, at least until the airstrip was built and it could be flown in by Islander. The initial dump may have to be ferried by helicopter from the Pieman Gage at the Stanley River mouth to the airstrip site. Suggested dozing requirements are;

Positioning after across Pieman	50	hours
Airstrip construction	100	"
Miscellaneous track cutting, drill benches, trenches	200	"
	350	

Allowing $17 per hour plus $15,000 for depreciation and capital tied up, the dozing budget is $21,000 for the first year.

Once the dozer is established in the area a "Bombadier" type vehicle would suffice for general access. It may be economic to fly the crew in each day from Zeehan at least until results justify an elaborate camp within the area.

5. <u>Drilling.</u>
Too little is known at this stage to predict requirements. However it is likely that at least 10 diamond holes averaging 300 ft. long will be required.

= 3000 ft. - all up cost $12.50 per ft. = $37,500.

8.6 Summary of Exploration Costs & Timing.

The following are listed in order of priority:

	Cost	Time elapsed	
Aerial Photography	$1000	1-2 Months	
Airborne Geophysics	$8000 min.	2 Months	(1)
Ground Checking (geol & geochem)	$2500	1 Month	
Access bulldozing	$20,000	2-3 Months Start Feb.	(2)
Detailed geol & geochem- 4 prospects	$12,000	3-6 Months	(3)
Ground geophysics	$8,000	2-4 Months	
Drilling	$37,500	2-6 Months	
Transport, freight, air charters	$5,000		
TOTAL:	$93,000	19 Months	

Thus thorough exploration will cost at least $93,000 and take at least 2 years assuming favourable results at each stage. Acceleration of the programme would probably increase costs substantially at risk of sacrificing efficiency.

Notes:

1. In order to minimise costs it will be desirable to wait until a suitable unit is near the area, i.e. up to 12 months.

2. Governed by Feb. as most likely time for dozer to cross Pieman and dozer remains in area for 12 months.

3. Ground follow-up would be split between geology geochem and geophysics and would average at least $5000 per prospect.

9. CONCLUSIONS:

1. Copper, lead, zinc, chrome and tin values of up to 1% or more and silver up to 60 ppm. in panned concentrate samples from streams draining the Oonah Quartzite and Slate indicate the unit is mineralised. Analogy studies suggest the uppermost horizons are most favourable.

2. Further work is needed and is warranted to determine the source of the anomalies.

3. Brief geological, ground magnetic and scintillometer traverses mainly along ridges in two anomalous areas did not locate any mineralization, though two tiny gossanous crusts were noted in one area.

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4. Stream bed traversing though much slower might have been more effective.

5. 17 Scree soil samples show very low (<10 ppm) metal content consistent with the humic environment. This does not prove the technique ineffective but it is suspect until it can be tested over known mineralization.

6. Although the topography and bush are gentle compared to much of western Tasmania, the Pieman River remains a major obstacle to ground access and therefore increases operating costs.

7. The two areas traversed show relatively small magnetic variation (0-1000 gammas) consistent with the aeromagnetic results of Rio Tinto. One of the major magnetic lows found in Paradise Creek coincides with the locality of the two tiny gossan crusts.

8. Scintillometer results were uniform throughout the area -500-1000 cps over swamps and thick soil or scree cover and 1000-2000 cps on outcrop. Values from 2000-5000 were obtained in the Stanley Reward workings and a gully in the south east. This probably reflects monazite and suggests radiometrics may be useful in locating tin deposits.

9. Airborne geophysics over known prospects seems to be the most effective next stage.

10. A minimum budget of $50,000 is required to bring the project to the drilling stage.

10. RECOMMENDATIONS:

1. Detailed aerial photography should be obtained at 1:10,000 over each prospect.

2. Staged exploration commencing with airborne geophysics costing about $10,000 is recommended as the next stage.

3. Further work only should be planned when the geophysical results are available.

D O Zimmerman
5 Apr 73

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Field Sheet No:—

Line No.:—

Project/Charge/Despatch Note No.:— C1297-STR.

Date:— 15-MAR-73

Any queries please quote Lab. Sheet Number:— 5693/1

SAMPLE	CR	CU	NI	PB	ZN
PS2500S	15	BLD	10	5	10
PS2501S	10	BLD	10	5	5
PS2502S	10	BLD	10	5	10
PS2503S	5	5	10	5	5
PS2504S	5	5	10	5	5
PS2505S	5	BLD	5	5	5
PS2506S	5	5	5	5	5
PS2507S	5	BLD	5	5	5
PS2508S	5	BLD	5	10	5
PS2509S	5	BLD	5	10	5
PS2510R	15	35	15	20	10
PS2511S	10	5	5	5	5
PS2512R	5	55	5	65	25
PS2513R	15	15	15	15	10
PS2514S	10	5	5	10	10
PS2515S	10	5	BLD	5	5
PS2516S	5	5	BLD	10	10
PS2517S	5	BLD	BLD	5	10
PS2518S	5	BLD	BLD	5	5
PS2519S	10	BLD	BLD	5	5
.... NO QUALITY CONTROL ON CHROMIUM					
METHOD	101B	101B	101B	101B	101B
PS2520	10	5	10	20	10
PS2521.	10	5	15	20	10

PS 2500 - 2509 & Points Z1 - Z18 = standard

PS 2510R = heavily pocked & iron stained rock at S end of a zone of magnetic lows gossanous? ≡ Z19 petrology & quartz ... c ... chlorite

PS 2512R - 100' N downslope from athletic ridge - brown stained gossanous crust - or quartz ... .

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688016

SCINTREX

TURAIR®*

AIRBORNE ELECTROMAGNETIC SYSTEM

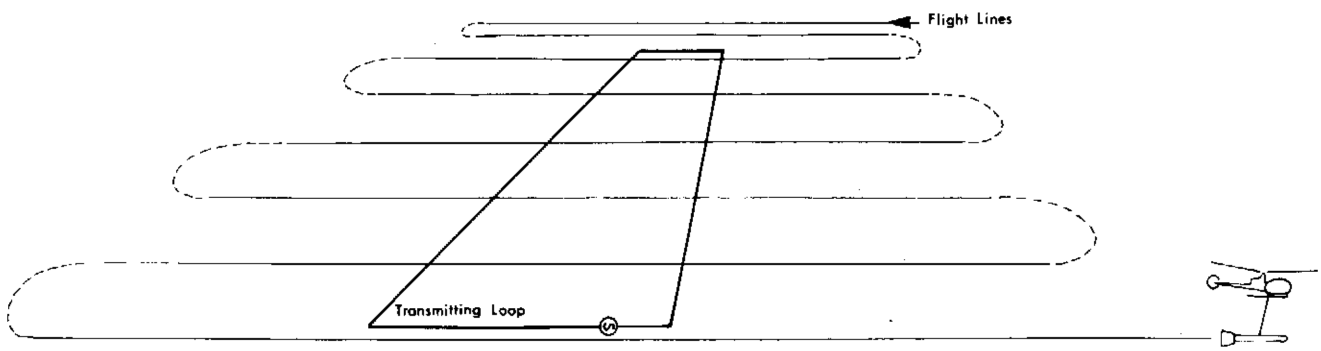


FIG. 1 FLIGHT LINES AND LOOP LAYOUT

General:

In the application of electromagnetic prospecting methods, it has long been recognized that, other things being equal, much greater exploration depths can be attained with systems employing a fixed source than with systems where both source and receiver are moved in unison. For example, a large conducting body which would already be undetectable at a depth of 60 m by any surface moving source (horizontal loop) system, could be detectable by a fixed-source method to a depth of as much as 200 m.

Most present-day airborne electromagnetic systems are of the moving source type,[1] and although such systems have tangible advantages over the ground versions, it appears difficult to increase their useful penetration substantially beyond their present range. Under very favourable conditions the better moving source AEM systems may reach exploration depths of as much as 100 m or in exceptional cases 125 m below the ground surface.[2] This is sufficient for many search problems but in some areas the geologic and topographic conditions necessitate a much deeper penetration to conduct meaningful mineral surveys.

The foregoing considerations have led to the development of the Turair method for the purpose of deep electromagnetic exploration. The system, which can be described as a fixed-source, semi-airborne, gradient measuring device, employs a large transmitting loop on the ground as a primary source. The horizontal gradients of amplitude and phase of the vertical or horizontal magnetic field are measured from the air, along traverse lines across the source (Fig. 1) and perpendicular to the regional geological strike.

(1) Bosschart, Pemberton. Mining in Canada. May 1969

(2) Tikkanen. Ann. C.I.M.M. Meeting. Toronto 1970

Primary Field:

The transmitting loop is laid out by the survey helicopter, or, if the terrain permits, by vehicle. The loop dimensions are guided by geologic conditions and the character of the survey. A typical loop size would be e.g. 4 km x 3 km. For airborne placement a special cable dispensing device is used which can feed out continuously 15 km of wire (Fig. 2). A motor driven generator supplying 200, 400 or 800 Hz current of 2 - 4 amps is used to energize the loop. Other frequencies may be employed to suit special geologic conditions in certain areas.

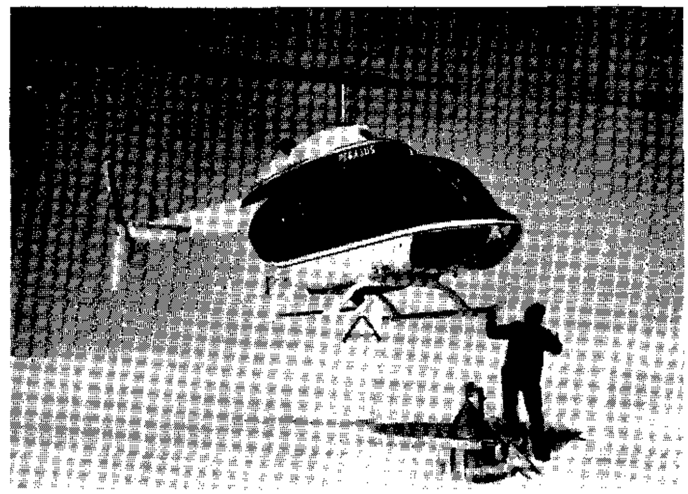


Fig. 2

Receiving System:

The receiving system comprises two coils (or two sets of coils) rigidly mounted in a coaxial and/or coplanar configuration in a "bird" which is towed on a 30 m cable below a helicopter. (Fig. 3). The ratio of the field strengths and the phase differences of the alternating magnetic field at the two coils are measured by means of a compensator and recorded in analogue form on a multi-channel recorder and/or in digital form on magnetic tape, together with a continuous record of the terrain clearance, intervalometer time marks and, usually, a record of the total magnetic intensity as well. The intervalometer is synchronized with a positioning camera to relate recorded anomalies to their ground location.

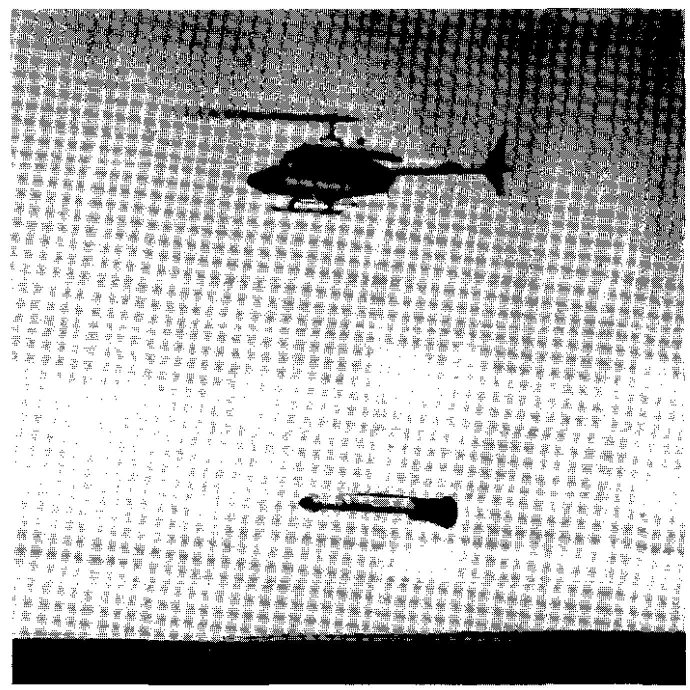


Fig. 3

Field Survey Results:

Typical results of a TURAIR survey are shown in Figures 4 and 5. Figure 4 is the record of a traverse across a 3 km x 3 km source, the location of which is marked by the strong field changes and resulting "blind" zone. Of significance are the low noise levels (0.1% ratio and 0.1° phase difference), which indicate that the sensitivity and thus the depth of exploration of the TURAIR system is considerably better than the Turam ground EM system. Among the recorded anomalies #2 indicates a current source at a depth of approximately 200 m with high conductivity ($\sigma t \approx 80$ mhos). The coincident magnetic response indicates a magnetic source at a comparable depth.

Figure 5 shows the Turam and magnetometer ground follow-up results over the above anomaly as well as the results of subsequent diamond drilling. Remarkable are the clearer response and better signal to noise ratio of the airborne results compared to the ground EM measurements, which are distorted by near-surface conduction. The drill hole intersected a 10 foot wide zone of massive sulphides at a depth of 200 m. The mineralized formations are covered by 170 m of barren limestone and glacial tilt.

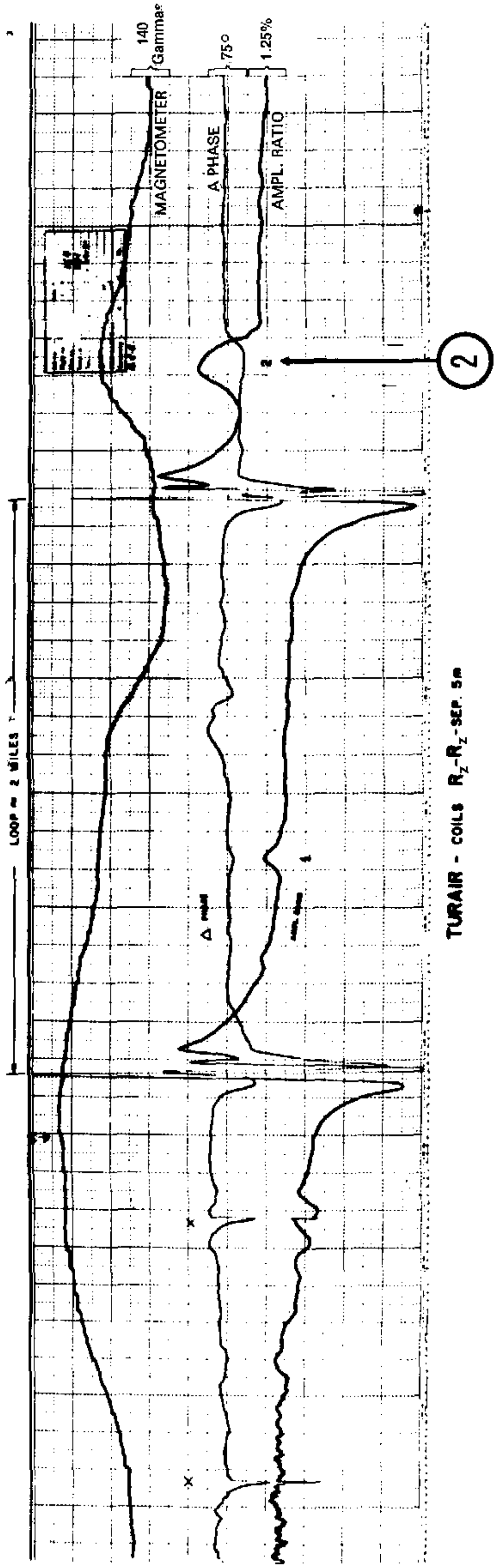


Fig. 4

Most significant is the strong TURAIR response (1.8%) and high signal to noise ratio (10-1) which indicate that this conductor would be detectable to at least twice the present depth, i.e. under 1000 ft. of cover. In fact, experience to date supports the conclusion that under favourable conditions steeply dipping tabular conductors of good conductivity can be detected to a subsurface depth equal to their strike length.

Preferred Application:

The TURAIR method, because of its semi-airborne character, is particularly suitable for the detailed, deep investigation of structures having geologically favourable characteristics, or a magnetic expression suggesting favourable geology. Because of its potential depth of exploration, it can be successfully employed in areas of deep sedimentary cover, deep weathering, or tall tree cover (tropical areas), or in areas where shallower exploration has established the presence of ore deposits and a deeper search is desired. It is, because of its fixed source configuration, less affected by near- surface conduction and can be applied with a very low exciting frequency (e.g. 200 Hz or less). Finally, as a helicopter-borne system it can operate in mountainous topography. Terrain clearance variations have far less effect on the exploration depth of the TURAIR system than they have in moving source methods and the system will penetrate deep talus cover and valley fillings.

Operational Efficiency:

Economic ore deposits may have strike lengths less than 200 m (see Fig. 6). If we want to search for such targets, particularly at greater depths, line spacing should not be much greater than 200 m and for the average survey a line spacing of 200 m (or one-eighth mile) could be considered optimum. In fact, larger line spacings do not represent significant savings, because of the reduction of measurable profile from one loop layout. The average primary loop that is usually laid out (by helicopter) is 3x5 km. Under average conditions some 400 - 500 line km of profile at 200 m intervals can be surveyed from this source, the total operation covering approximately one days field work.

TURAIR*

* A SCINTREX DEVELOPMENT
PATENTS PENDING IN ALL MAJOR COUNTRIES

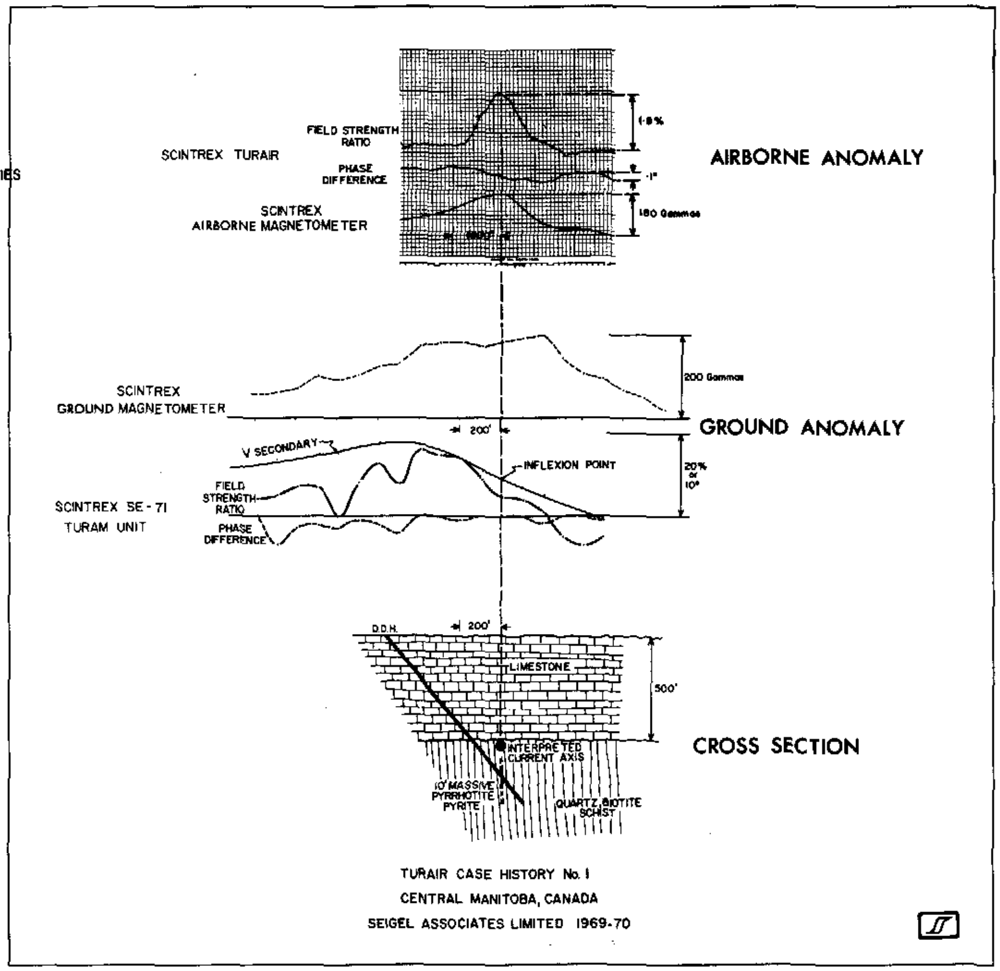


Fig. 5

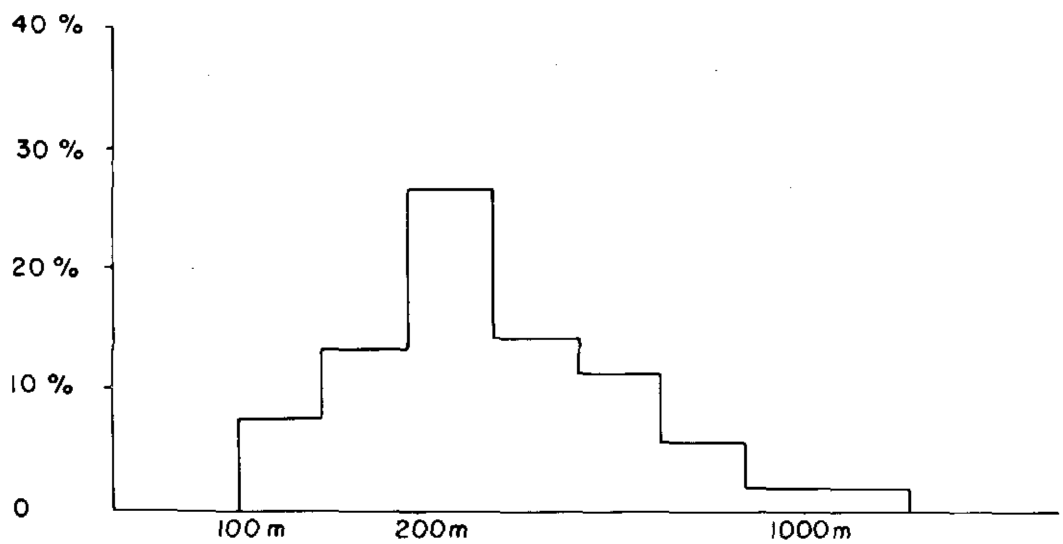
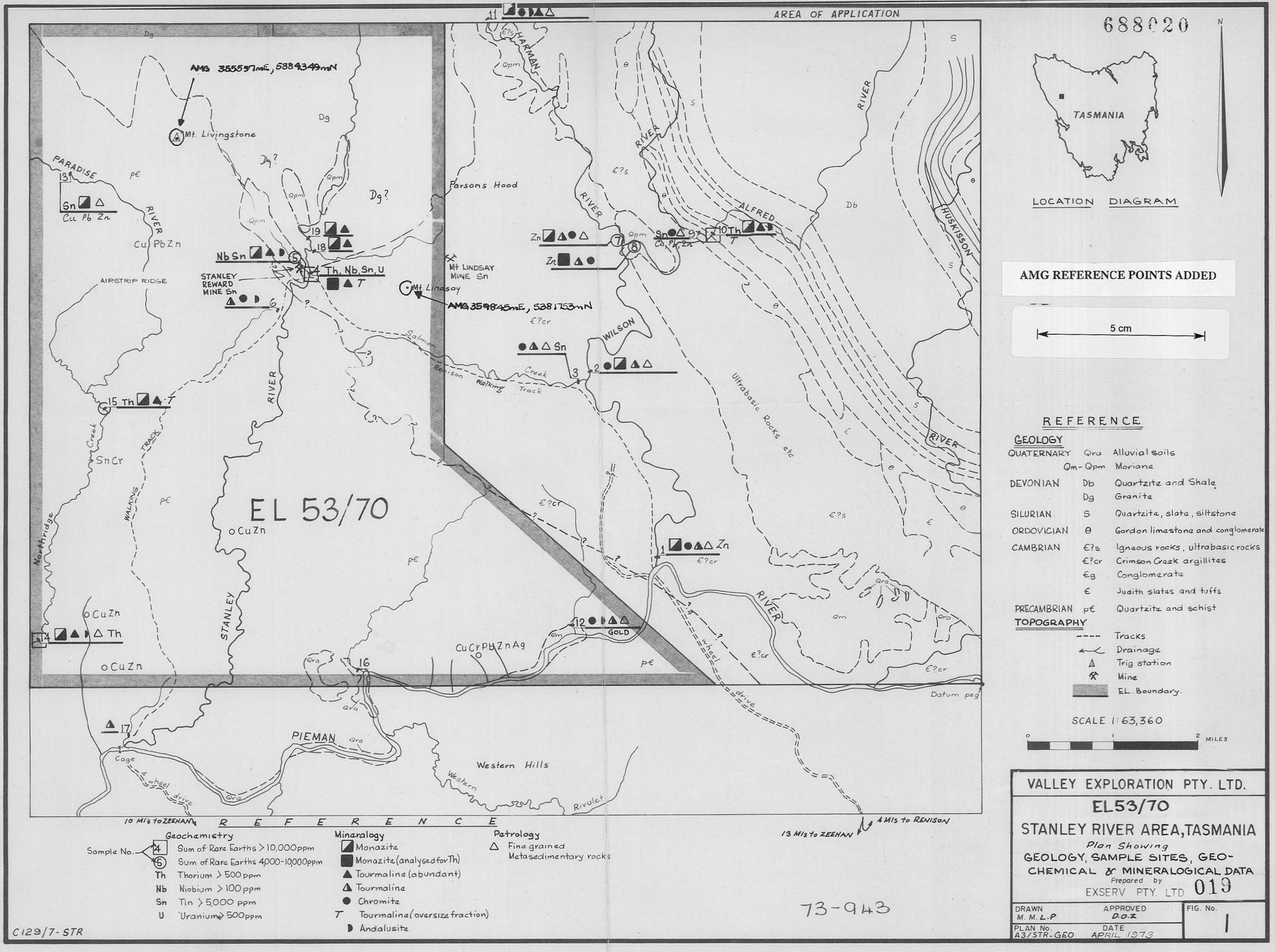


FIG. 6 STRIKE LENGTH HISTOGRAM OF 50 PRODUCING OREBODIES

MAY 1971

SCINTREX LIMITED
222 Snidercroft Road · Concord, Ontario, Canada


688020
AREA OF APPLICATION
LOCATION DIAGRAM
TASMANIA
AMG REFERENCE POINTS ADDED
5 cm
AMG 355597mE, 5384349mN
Mt. Livingstone
AMG 359845mE, 5381753mN
Mt Lindsay
Mt LINDSAY MINE Sn
STANLEY REWARD MINE Sn
Parsons Hood
PARADISE RIVER
AIRSTRIP RIDGE
HARMAN RIVER
ALFRED
HUSKISSON RIVER
WILSON
Salmon Creek
Renison Walking Track
Ultrabasic Rocks etc
Northridge
Creek
WALKING TRACK
STANLEY RIVER
EL 53/70
PIEMAN
Western Hills
Western Rivulet
Cage
4 wheel drive
Datum peg
GOLD
10 Mis to ZEEHAN
13 Mis to ZEEHAN
4 Mis to RENISON
REFERENCE
GEOLOGY
QUATERNARY Qra Alluvial soils
Qm-Qpm Moriane
DEVONIAN Db Quartzite and Shale
Dg Granite
SILURIAN S Quartzite, slate, siltstone
ORDOVICIAN Θ Gordon limestone and conglomerate
CAMBRIAN €?s Igneous rocks, ultrabasic rocks
€?cr Crimson Creek argillites
€g Conglomerate
€ Judith slates and tuffs
PRECAMBRIAN p€ Quartzite and schist
TOPOGRAPHY
Tracks
Drainage
Trig station
Mine
EL. Boundary.
SCALE 1: 63,360
0 1 2 MILES
R E F E R E N C E
Geochemistry
Sample No.
4 Sum of Rare Earths > 10,000 ppm
5 Sum of Rare Earths 4000-10000 ppm
Th Thorium > 500 ppm
Nb Niobium > 100 ppm
Sn Tin > 5,000 ppm
U Uranium > 500 ppm
Mineralogy
Monazite
Monazite (analysed for Th)
Tourmaline (abundant)
Tourmaline
Chromite
T Tourmaline (oversize fraction)
Andalusite
Petrology
Δ Fine grained Metasedimentary rocks
VALLEY EXPLORATION PTY. LTD.
EL53/70
STANLEY RIVER AREA, TASMANIA
Plan Showing
GEOLOGY, SAMPLE SITES, GEO-CHEMICAL & MINERALOGICAL DATA
Prepared by
EXSERV PTY. LTD
019
DRAWN M. M. L. P
APPROVED D.O.Z
FIG. No. 1
PLAN No. A3/STR-GEO
DATE APRIL 1973
73-943
C129/7-STR

N

SCALE

0 1/4 1/2 3/4 1 mile

1 inch = 1 quarter mile

5 cm

LEGEND

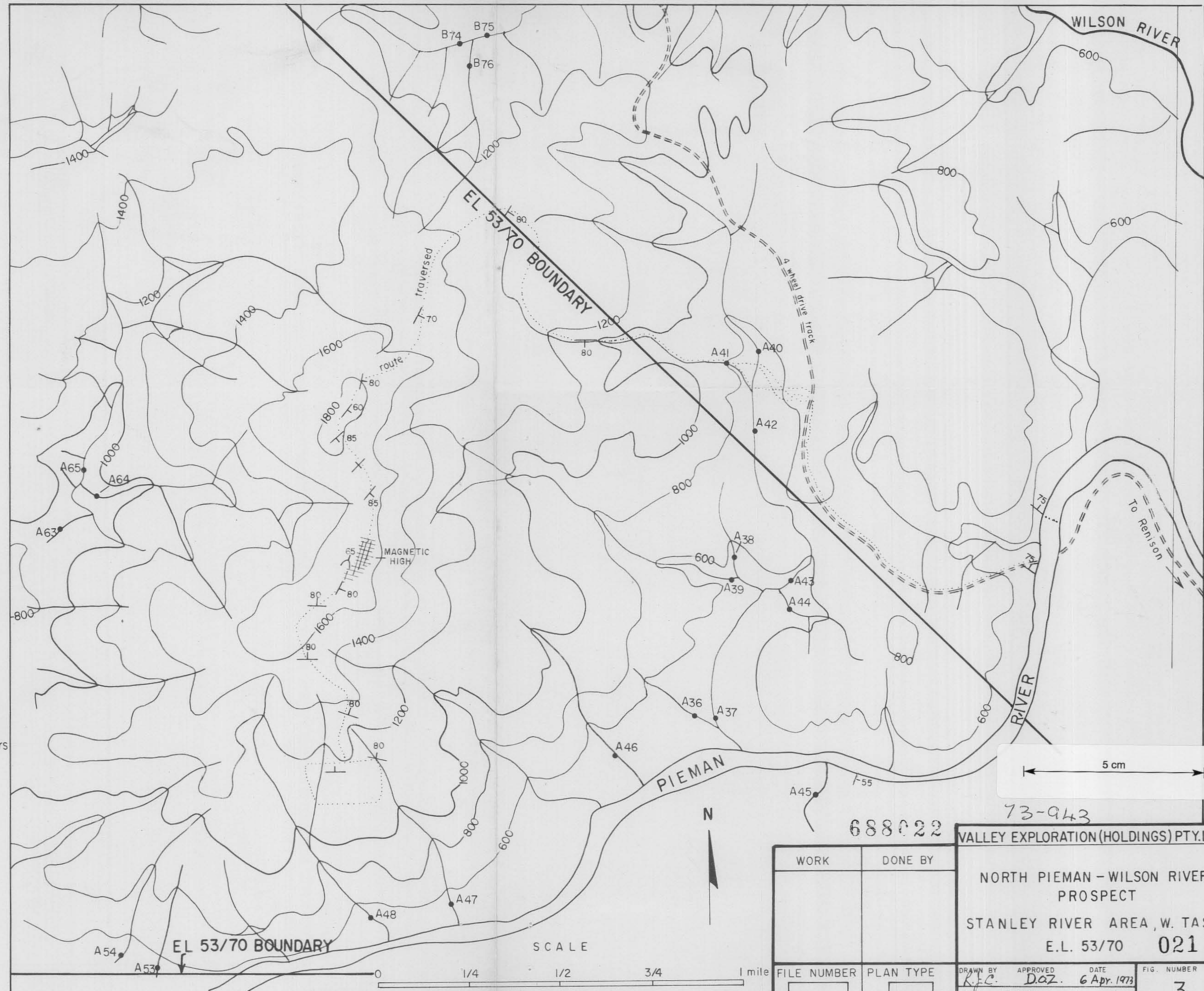
Contour interval = 200 feet
'X' indicates gossanous crust
Zone of magnetic low
A16, etc. — REM sample numbers

688021

73-943

WORK	DONE BY	VALLEY EXPLORATION (HOLDINGS) PTY. LTD
		UPPER PARADISE RIVER PROSPECT STANLEY RIVER AREA, W. TAS. E.L. 53/70 020
FILE NUMBER	PLAN TYPE	DRAWN BY: R.J.C. APPROVED D.O.Z. DATE 5 Apr 1973 PLAN NUMBER — FIG. NUMBER 2

PREPARED BY EXSERV PTY. LTD.



LEGEND

Contour interval = 200 feet

A41, etc. - REM sample numbers

Magnetic high

5 cm

73-943

688022

WORK	DONE BY

VALLEY EXPLORATION (HOLDINGS) PTY. LTD.

NORTH PIEMAN - WILSON RIVER PROSPECT

STANLEY RIVER AREA, W. TAS.

E.L. 53/70 021

FILE NUMBER | PLAN TYPE

DRAWN BY K.E.C. APPROVED D.O.Z. DATE 6 Apr. 1973 FIG. NUMBER 3

PLAN NUMBER

C 129/7 - STR

PREPARED BY EXSERV PTY. LTD. MIDLAND, W.A.