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# 95-3783

**VOLUME 1 OF 2**
PASMINCO - TULLAH EL 22/90 & STERLING RIVER
EL 24/91 ANNUAL REPORT 1994-95 - PURVIS J G

MICROFILMED
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## PASMINCO EXPLORATION

## TULLAH EL 22/90
## &
## STERLING RIVER EL 24/91

## ANNUAL REPORT
## SEPTEMBER 1994 - SEPTEMBER 1995

**Volume 1 of 2**

OPEN FILE

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1995

754002

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## SUMMARY

Exploration activity continued at a high level on Tullah EL 22/90 and Sterling River EL 24/91 during 1994-95. The Tullah EL is to be reduced from 24 to 18 sq km in October 1995 with the relinquishment of much of the Farrell Range (mainly Owen Conglomerate).

Work was principally directed at testing the VHMS potential associated with the hydrothermal alteration on the Farrell Slates / Murchison Volcanics contact, with lesser programmes at magnetic anomaly 'C' and at Farrell Mines.

Four diamond drill holes totalling 1789m were put down, and 3350m of old drill core relogged and sampled. This was augmented by geological mapping and rock sampling, as well as analyses of the structure and aeromagnetics. A DHEM survey was carried out on hole SR2.

The results have validated and enhanced the geological concept behind the targeting of the Farrell/Murchison contact for VHMS, confirming the Cambrian volcanogenic nature of the alteration, and the favourability of the acid volcanic facies and stratigraphic setting. The contact remains the focus of the VHMS exploration effort on the EL's.

Three holes (SR2-3 & TF1) tested the contact. While no mineralization of significance was intersected, a zone of intense quartz-sericite-pyrite alteration was delineated at Sterling Valley Mine. The 1.5km of untested contact south of the mine is a prime target for further drilling.

Potential was also identified in two further areas: at Mackintosh Dam, where the known basemetal massive sulphides may be associated with up to 2km of structurally-disturbed contact, and in the northern Sterling Valley where 2km of prospective contact remains untested. A site for drilling has been selected here, while mapping and rock sampling is recommended at Mackintosh Dam.

The 2-3km of contact between Murchison Gorge and Farrell Mines appears to have little or no potential, with hole TF1 (and 1993 hole MM1a) showing low levels of alteration and mineralization.

Magnetic anomaly 'C', within the mafic Sterling Valley Volcanics, was partially tested by a short hole (SR1) which intersected barren magnetic basalt. No further work is planned in this area.

An initial evaluation of the old Farrell Mines has identified potential for a shallow open-cuttable resource based on the concept of a swarm of zinc-rich lodes/veins. A full evaluation of all available data is required ahead of shallow drilling across the lode channels above and between the old mine workings.

A comprehensive programme of rock sampling is recommended to test the Cu-Au potential of the intensely-altered zones on the margin of the Murchison granite in the Murchison Gorge.

Testing of the Au-Sn-Cu mineralization associated with the Devonian granite beneath the Sterling Valley is again urged. This is potentially the largest and strongest mineralizing system on the EL areas.

# 1 INTRODUCTION

This report details exploration undertaken on Tullah EL 22/90 and the adjoining Sterling River EL 24/91, between September 1994 and September 1995.

As per statutory requirements, the Tullah EL is to be reduced from 24 sq km to 18 sq km on 20th October 1995. All work by Pasminco on the relinquished ground is the subject of a separate report.

The two EL's cover units of the Cambrian Mt Read Volcanics centred on a 16km long section of the Henty Fault in Western Tasmania. The ground is highly mineralized, with numerous showings and sub-economic deposits of base metals and precious metals. See Figures 3 & 4.

The area has a long history of previous mining (mainly small-scale Pb-Ag) and is one of the more-heavily explored parts of the Mt Read Volcanics, with over 100 surface diamond drill holes and a further 78 drilled underground in the old Farrell Mines. Much of the drilling, as well as geophysical and geochemical surveys, has been concentrated along the Henty Fault. More-inaccessible zones such as the southern and eastern parts of the Sterling River licence and east of the Farrell Mines, have received minimal attention.

The main target of the present exploration programme is a volcanogenic auriferous basemetal massive sulphide deposit.

In the September 1994-95 year work completed by Pasminco included:

- # Four diamond drill holes totalling 1789m: SR1-3 in the Sterling Valley and TF1 east of the Farrell Mines.
- # DHEM survey of SR2.
- # Relogging and sampling of over 1400m of old drill core.
- # Mapping of alteration zone along Farrell Slates/Murchison Volcanics contact,

including rock sampling and structural/aeromagnetic interpretations.

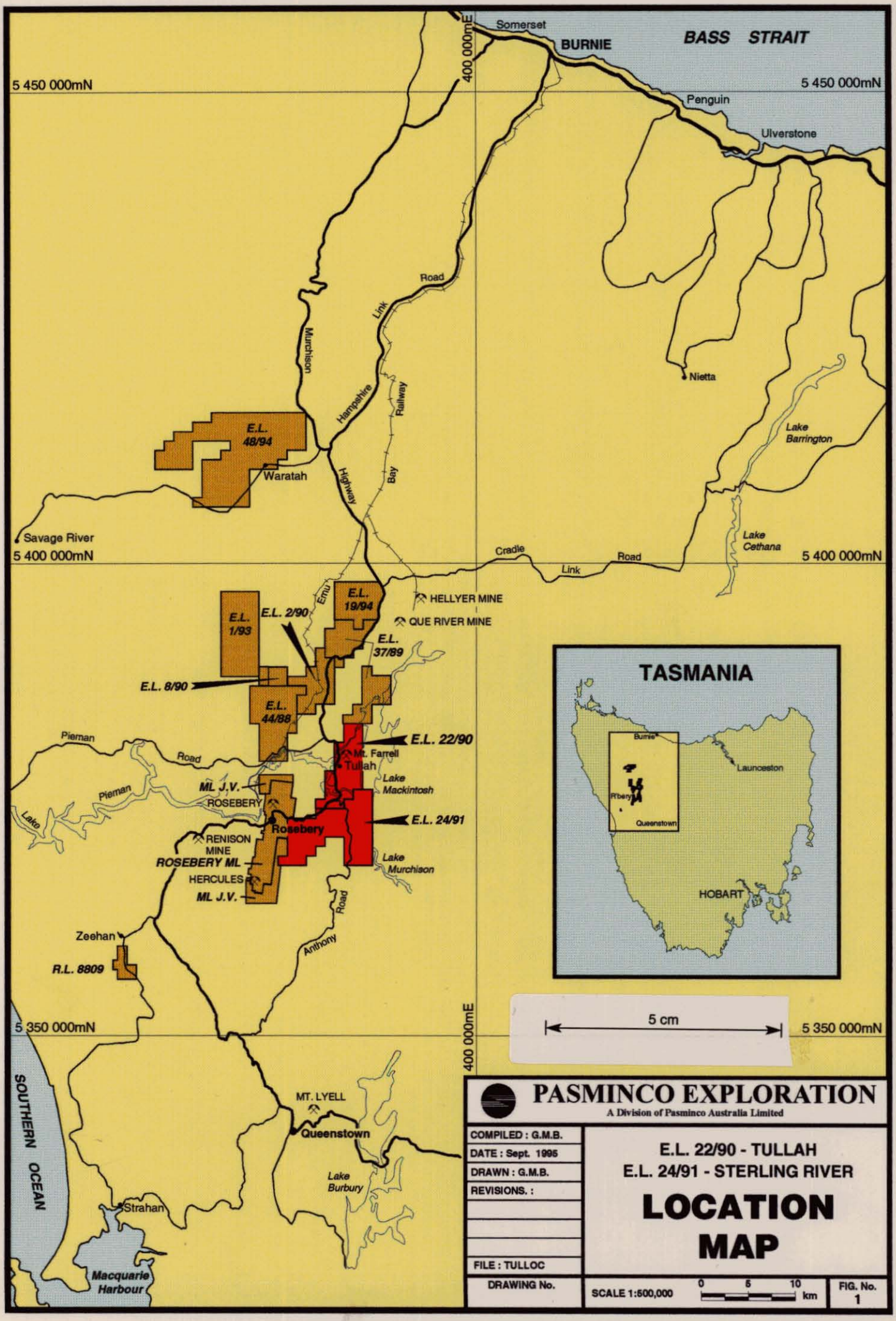
# Ground magnetics, mapping and rock sampling over magnetic anomaly 'C' in the Sterling Valley Volcanics.

# Initial evaluation of the Farrell Mines and surrounding area.

# Mapping of geological section across Sterling Valley by Consultant Rod Allen, including relogging of 1935m of old drill core.

# Supported Honours Thesis on Structure and Mineralization of the Farrell Slates and Murchison Volcanics (Uren, 1994).

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| | |
|---|---|
| COMPILED : G.M.B. | E.L. 22/90 - TULLAH<br>E.L. 24/91 - STERLING RIVER |
| DATE : Sept. 1995 | **LOCATION MAP** |
| DRAWN : G.M.B. | |
| REVISIONS. : | |
| FILE : TULLOC | |
| DRAWING No. | SCALE 1:500,000 (0 5 10 km) — FIG. No. 1 |

## 2 TENURE

Tullah EL 22/90 covers 27 sq km. The granted area is 24 sq km, as 3.4 sq km vested in the HEC has been excluded from the EL. During the 1994-95 year the 1.35 sq km Farrell Mine Leases, previously held by Pasminco Mining, were relinquished and incorporated into EL 22/90.

The Tullah EL was applied for in August 1990 by Peko Exploration Limited, a subsidiary of North Broken Hill Limited. In September 1990 the EL application was transferred to Pasminco Australia Limited (of which NBH then owned 45%). The EL was granted on 20th October 1990.

On 20th October 1995, the Tullah EL will be reduced to 18 sq km as per the statutory requirements. The reduced area and the various land categories within it, as well as the ground to be relinquished, is shown in Figure 2. The relinquished area comprises part of the Farrell Range and a small section of the Murchison Gorge.

Sterling River EL 24/91 covers 48 sq km around Mt Murchison south of the Tullah EL. The granted area is 42 sq km, as 2.7 sq km of Pasminco's Rosebery Mine Lease and 2.4 sq km vested in the HEC, are excluded from the EL.

Sterling River was originally applied for by Pasminco Exploration as 42 sq km in August 1991, but 6 sq km to the SE of Mt Murchison was added to the application in October 1991. The EL was granted on 10th January 1992. In 1992 the renewal and reporting date for Sterling River was made the same as that for Tullah EL 22/90.

The land categories on Sterling River are shown in Figure 2. About 75% of the EL is covered by the Mt Murchison RAP (Crown Land).

E.340111

## KEY

- HEC Vested Land – excluded from E.L.
- HEC Vested Land – included in E.L.
- RAP – Recommended Area for Protection
- Private Freehold Land
- Crown Reserve
- Deferred Forest
- Multiple Use Forest
- Mine Lease
- Nomination for National Estate
- Unallocated Crown Land (within EL only)
- Area for Relinquishment (October 1995)

380 000mE
385 000mE
5 380 000mN
5 375 000mN
5 370 000mN
E.L. 37/89
Railway
Bay
Emu
Ck
Farm
MURCHISON
HIGHWAY
Transmission Lines
HEC
Road
Pieman
Dam
Mackintosh
New North Mt. Farrell
North Mt. Farrell
LAKE
ROSEBERY
TULLAH
MACKINTOSH
Mt. Sale
MT. FARRELL
AREA FOR RELINQUISHMENT
Murchison Mine
63M/80
Murchison
MT. BLACK
E.L. 22/90
NOMINATION FOR NATIONAL ESTATE
ROSEBERY MINE
ROSEBERY
HIGHWAY
Anthony
River
Lake Bull
Dalmeny
Rosebery Lodes
Stitt
Sterling
MT. MURCHISON
RAP
Koonya
Williamsford
Mt. Read
ROSEBERY MINE LEASE
E.L. 24/91
5 cm

*NOTE – The Land Tenure is only shown within E.L. 22/90 and E.L. 24/91*

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| | |
|---|---|
| COMPILED : G.M.B. | E.L. 2/90 - TULLAH<br>E.L. 24/910 - STERLING RIVER |
| DATE : Sept., 1995 | **LAND TENURE** |
| DRAWN : | |
| REVISIONS : | |
| FILE : 50_TSRLT | |
| DRAWING No. | SCALE 1:50,000 (500 0 500 m) — FIG. No. 2 |

## 3 EXPENDITURE

Expenditure on **Tullah EL 22/90** in the year ending 31st August 1995 was **$195 802**, bringing total expenditure on the EL since its granting in October 1990 to **$723 131.**

Expenditure on the **Sterling River EL 24/91** in the year ending 31st August 1995 was **$293 390.** Total expenditure on the EL since initial granting in January 1992 is **$542 884.**

1994-95 expenditure details on both EL's are as follows:

| | EL 22/90 | EL 24/91 |
|---|---|---|
| Personnel | 35 542 | 54 746 |
| Travel & Accommodation | 2 598 | 4 950 |
| Geological Consultants | 23 243 | 31 489 |
| Geochemical Consultants & Assays | 705 | 13 377 |
| Geophysical Consultants | 5 200 | 5 920 |
| Geophysical Surveys | 2 075 | 22 206 |
| Other Consultants & Contractors | 0 | 6 897 |
| Drilling | 83 884 | 90 428 |
| Stores & Supplies | 3 469 | 5 394 |
| Vehicles, Plant & Equipment | 4 809 | 7 144 |
| Tenement Rentals | 949 | 942 |
| Computing | 2 100 | 3 717 |
| Office Expenses | 13 428 | 19 508 |
| Administration Fee | 17 800 | 26 672 |
| **TOTAL** | **195 802** | **293 390** |

## 4 GEOLOGY

The Tullah and Sterling River licences cover units of the Cambrian Mt Read Volcanics extending either side of a 16km length of the Henty Fault. The latter is a major NNE-trending and steeply west-dipping structure located towards the eastern margin of the volcanic belt (Figures 3 & 4).

Within the EL's the volcanics range from rhyolitic to basaltic in composition but are predominantly rhyolitic to dacitic. They include lavas, intrusives, pyroclastics, volcanomict epiclastics and sediments.

West of the Henty Fault the dacitic to andesitic volcanics of the Mt Black Volcanics are dominated by lavas and unreworked volcaniclastics. On the western side of the Sterling Valley there is a large wedge of andesitic and basaltic lavas, sills and clastics - the Sterling Valley Volcanics (Allen, 1995).

Lying along the eastern side of the Henty Fault there is an extensive unit of west-dipping and facing fine sediments including black shales - the Farrell Slates. East of and stratigraphically below the Farrell Slates are the rhyolitic to dacitic Murchison Volcanics, which comprise lavas, intrusives and volcaniclastics. These are intruded by the chemically-similar Murchison Granite (Cambrian), and unconformably overlain by Ordovician Owen Conglomerate.

Most of the volcanics are hydrothermally altered to some degree. In particular, the Murchison Volcanics contain intensely-altered zones, most significantly and extensively along their upper contact with the overlying Farrell Slates.

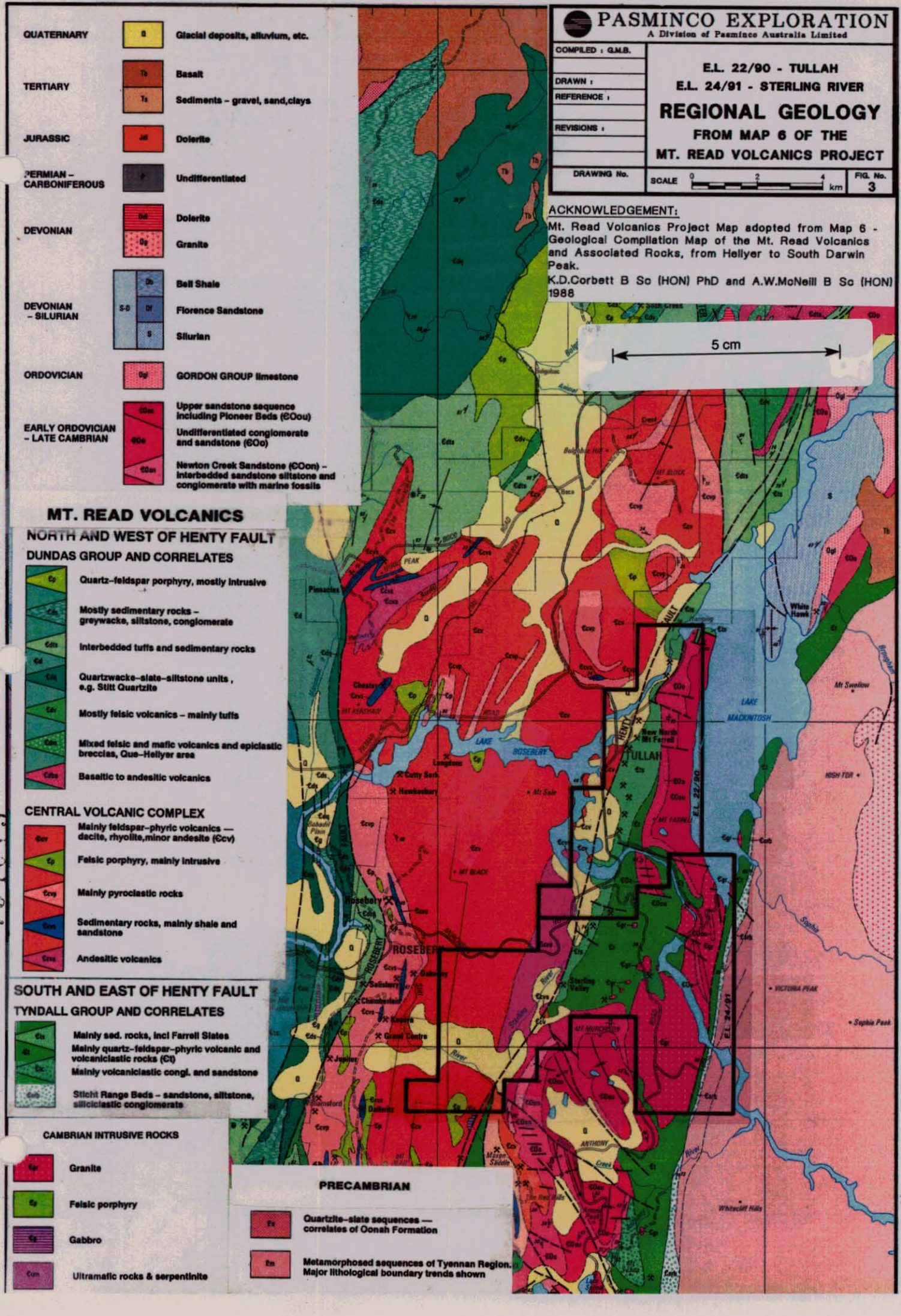
The whole area is underlain by a broad NE-trending ridge of Devonian granite, the axis of which passes beneath the northern part of the Sterling Valley at an estimated depth of $<500$m (Leaman, 1993, - see Figure 5, although experience suggests the depth is more likely to be nearer 1000m). Superimposed on the buried ridge are north-south cupolas of granite one of which intrudes the Henty Fault and may actually reach the surface at one locality in the Sterling Valley.

Lead, zinc, copper, silver, gold, tin and arsenic mineralization is widespread, most particularly in the Farrell Slates and Murchison Volcanics east of the Henty Fault. The only known mineralization west of the fault is the Au-As-Cu-Sn at the 'Arsenic Resource' part of which occurs within the mafic Sterling Valley Volcanics.

Most of the known mineralization is of a structurally-controlled lode and vein style, occupying sites that were formed during the Devonian. Many lodes are conformable with the primary layering in the enclosing rocks, with lodes closest to the Henty Fault tending to parallel the steep west dip of this structure (as does bedding). Small, apparently volcanogenic, massive basemetal sulphide boudins occur in the Farrell Slates near Mackintosh Dam.

The presence of gold-tin mineralization, as well as evidence from lead and sulphur isotopes, suggests that much of the mineralization in the Tullah-Sterling River area is a Cambrian-Devonian hybrid (Purvis, 1992). The gold, as well as some of the base metals and silver, are apparently of Cambrian volcanogenic origin and were remobilised in the Devonian largely due to the influence of the granite intrusion, with inputs at that time of tin, arsenic, further base metals and silver. Gold is a notable absentee from the Pb-Zn-Ag Farrell orebodies at Tullah - the largest (now 80% mined out) of the known resources on the EL's (908,000t @ 12.5% Pb, 2.6% Zn, 410 g/t Ag).

The main known mineral showings are shown on Figure 4. Two of the larger mineralized bodies (the Lakeside gold deposit with 750,000t @ 2.1g/t Au, and the 'Arsenic Resource' with 480,000t @ 5% As & 1g/t Au), are not exposed at surface and were found by drilling in the 1980's.


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COMPILED : G.M.B.
DRAWN :
REFERENCE :
REVISIONS :
DRAWING No.
E.L. 22/90 - TULLAH
E.L. 24/91 - STERLING RIVER
REGIONAL GEOLOGY
FROM MAP 6 OF THE
MT. READ VOLCANICS PROJECT
SCALE 0 2 4 km
FIG. No. 3
ACKNOWLEDGEMENT:
Mt. Read Volcanics Project Map adopted from Map 6 - Geological Compilation Map of the Mt. Read Volcanics and Associated Rocks, from Hellyer to South Darwin Peak.
K.D.Corbett B Sc (HON) PhD and A.W.McNeill B Sc (HON) 1988
QUATERNARY
Glacial deposits, alluvium, etc.
TERTIARY
Basalt
Sediments – gravel, sand, clays
JURASSIC
Dolerite
PERMIAN – CARBONIFEROUS
Undifferentiated
DEVONIAN
Dolerite
Granite
DEVONIAN – SILURIAN
Bell Shale
Florence Sandstone
Silurian
ORDOVICIAN
GORDON GROUP limestone
EARLY ORDOVICIAN – LATE CAMBRIAN
Upper sandstone sequence including Pioneer Beds (€Oou)
Undifferentiated conglomerate and sandstone (€Oo)
Newton Creek Sandstone (€Oon) – interbedded sandstone siltstone and conglomerate with marine fossils
MT. READ VOLCANICS
NORTH AND WEST OF HENTY FAULT
DUNDAS GROUP AND CORRELATES
Quartz–feldspar porphyry, mostly intrusive
Mostly sedimentary rocks – greywacke, siltstone, conglomerate
Interbedded tuffs and sedimentary rocks
Quartzwacke–slate–siltstone units, e.g. Stitt Quartzite
Mostly felsic volcanics – mainly tuffs
Mixed felsic and mafic volcanics and epiclastic breccias, Que–Hellyer area
Basaltic to andesitic volcanics
CENTRAL VOLCANIC COMPLEX
Mainly feldspar–phyric volcanics — dacite, rhyolite, minor andesite (€cv)
Felsic porphyry, mainly intrusive
Mainly pyroclastic rocks
Sedimentary rocks, mainly shale and sandstone
Andesitic volcanics
SOUTH AND EAST OF HENTY FAULT
TYNDALL GROUP AND CORRELATES
Mainly sed. rocks, incl Farrell Slates
Mainly quartz–feldspar–phyric volcanic and volcaniclastic rocks (€t)
Mainly volcaniclastic congl. and sandstone
Stichi Range Beds – sandstone, siltstone, siliciclastic conglomerate
CAMBRIAN INTRUSIVE ROCKS
Granite
Felsic porphyry
Gabbro
Ultramafic rocks & serpentinite
PRECAMBRIAN
Quartzite–slate sequences — correlates of Oonah Formation
Metamorphosed sequences of Tyennan Region. Major lithological boundary trends shown
5 cm
E.L. 22/90
E.L. 24/91
HENTY FAULT
LAKE ROSEBERY
LAKE MACKINTOSH
TULLAH
ROSEBERY
Mt Sedgwick
Mt Swallow
High Tor
Victoria Peak
Sophia Peak
Whitecliff Hills
Pinnacles
Chester
Hawkesbury
Cutty Sark
Jupiter
Grand Centre
Salisbury
Chamberlain
Oakbury
Dalkeith
Stanford
Sterling Valley
Mt Black
Mt Murchison
Mt Farrell
New North
Mt Farrell
White Hawk
Bulgobine Hill
Anthony Creek
Sophia
Brougham
Mt Block
Peak
Rosebery
Tullah
Sterling River
Anthony
Mt Read
Mt Read Volcanics
Dundas Group
Tyndall Group
Precambrian
Cambrian
Devonian
Silurian
Ordovician
Tertiary
Quaternary
Jurassic
Permian – Carboniferous

# 95-3783

**VOLUME 1 OF 2**

PASMINCO - TULLAH EL 22/90 & STERLING RIVER
EL 24/91 ANNUAL REPORT 1994-95 - PURVIS J G

## LEGEND

**QUATERNARY**

- Qc — Cultural features - waste dumps, dams, etc
- Qt — Talus and scree deposits.
- Qa — Alluvium and marsh deposits.
- Qg — Glacial deposits, mostly till. Moraine ridge crests indicated (▪ ▪). Occurences of granite erratics indicated (Qgg ⊕ /)

**EARLY ORDOVICIAN - LATE CAMBRIAN**

- EOs — Interbedded siltstone and sandstone
- EOcs — Interbedded sandstone and conglomerate.
- EOc — Dominantly siliciclastic conglomerate
- EOsm — Interbedded siltstone, sandstone and grey conglomerate, with Late Cambrian fossils – Newton Creek Sandstone Member
- EOv — Volcaniclastic conglomerate, sandstone, breccia, minor siltstone – correlate of Jukes Conglomerate.

Angular unconformity.

## CAMBRIAN

### WEST AND NORTH OF HENTY FAULT ZONE

**CENTRAL VOLCANIC SEQUENCE–HERCULES–MT.BLOCK**

- Cvx — Felsic porphyry, generally intrusive. Quartz - feldspar porphyry (Cp); cataclastic feldspar – quartz porphyry (Cpz)
- Cvcl — Felsic pyroclastic rocks, including tuff, breccia, vitric ash. Generally feldspar-phyric (Cvvt).
- Cvvt — Flamme-bearing eutaxitic tuff of ignimbrite type. Some block- and -ash flow units shown (Cvsb).
- Cvsb — Lithic breccia and agglomerate.
- Cvvt — Crystal tuff, crystal-lithic tuff, commonly bedded.
- Cvvt — Fine grained vitric tuff.
- Cvp — Quartz - feldspar - phyric tuff, often with lithic clasts.
- Cvm — Shale, siltstone, sandstone, minor tuff. Units of chert or chert – pyrite rock as indicated (Cvrx)
- Cvm — Dominantly feldspar-phyric lava of rhyolitic, dacitic or andesitic composition (Cvv) Some units of andesitic lava (Cvw) and quartz-feldspar-phyric lava (Cvw) shown. Sequence of hornblende – phyric lava and minor tuff at Mackintosh Bridge area indicated (Cvvlm)
- Cvb — Basaltic lava.

### EAST AND SOUTH OF HENTY FAULT ZONE

**FARRELL–MURCHISON SEQUENCE**

- Cfs — Shale, sandstone and tuff sequence of Farrell Slates (Cf). Some dominantly shale units (Cfs) and dominantly felsic tuff units (Cft) indicated.
- Cfv — Felsic volcanics, dominantly quartz-feldspar-phyric, of Murchison Gorge area (Cmv). Some units of dominantly tuff (Cmvt) and dominantly lava (Cmvl) indicated.

**TYNDALL GROUP**

- Ct — Volcaniclastic conglomerate and sandstone.
- Ct — Crystal tuff, lithic tuff, agglomerate -generally quartz -feldspar -phyric
- Ct — Shale, siltstone, sandstone.
- Ct — Dominantly quartz -feldspar -phyric lava with minor intrusives in some areas
- Ct — Andesitic tuff and breccia with lenses of shale, jasper and carbonate

**STICHT RANGE BEDS**

- Csb — Siliciclastic conglomerate and sandstone with interbedded siltstone, shale and minor tuff.

Angular unconformity on Tyennan Precambrian rocks

- Cqp — Quartz - feldspar porphyry.
- Cpx — Felsic intrusive, commonly spherulitic, feldspar - quartz - phyric
- Cg — Gabbro, dolerite
- Cb — Basalt
- Cu — Ultramafic rocks and serpentinite
- Cgr — Granitic rocks.

**CENTRAL VOLCANIC SEQUENCE – RED HILLS – BASIN LAKE**

- Cv — Quartz - feldspar ( ± pyroxene ± muscovite) porphyry, mostly intr
- Cvs — Shale, siltstone, sandstone, minor tuff.
- Cvcl — Felsic pyroclastic rocks, dominantly feldspar -phyric, inclu-ding ignimbritic units.
- Cvvt — Dominantly feldspar -phyric lava of rhyolitic to dacitic composition.
- Cvv — Andesitic lavas, breccias, tuffs and intrusives.

**WESTERN VOLCANO–SEDIMENTARY SEQUENCE–LANGDON RIVER**

- Cv — Quartz - feldspar ( ± pyroxene ± muscovite) porphyry, mostly intr
- Cvcl — Dominantly felsic pyroclastic rocks, including vitric ash and quartz - feldspar - phyric crystal - vitric - lithic tuff.
- Cvvt — Dominantly interbedded siltstone, shale and lithicwacke with minor tuff.

**PRECAMBRIAN**

- Cr — Quartzite,schist, phyllite, minor dolomites of Tyennan Region.

### OVERPRINTS AND MINERALISATION

- pyr — Alteration in volcanic rocks, usually with strong schistosity. ser = sericite, pyr = pyrite. chl = chlorite. qtz = quartz
- Area of strongly cleaved or disrupted rocks, usually associated with fault zones
- Massive sulphide lens
- Operating mine; prospect or abandoned mine.

- Geological boundary - accurate or approximate
- Geological boundary - inferred or concealed.
- Fault - accurate or approximate ( dip indicated).
- Fault - inferred.
- Fault - concealed.
- Major fold - axial surface trace
- Early fold.
- Later fold
- Cambrian fossil locality

- Strike and dip of bedding - facing known; overturned; facing unknown; vertical
- Banding in volcanic or igneous rock; vertical banding
- Strike and dip of cleavage; vertical cleavage.
- Minor fold with plunge - antiform, synform, unspecified.
- Lineation

---

MASSIVE SULPHIDE BOUDINS IN SANDSTONE
1% Pb, 16% Zn,
80 g/t Ag, 0.1g/t Au

AREA OF POSSIBLE DISMEMBERED FARRELL MURCHISON CONTACT

GROUND RELINQUISHED OCTOBER 1995

E.L. 37/89

MACKINTOSH DAM

Metropolitan Mine

Farrell Blocks

NEW NORTH MT. FARRELL DEPOSIT
MINED: 299,000t @ 14.9% Pb, 2.5% Zn, 506 g/t Ag
RESERVES: 71,000t @ 12.2% Pb, 4.8% Zn, 278 g/t Ag

FARRELL DEPOSITS
Estimated Combined Resource Incl. NEW NORTH MT. FARRELL RESERVE
177,000t @
11.3 % Pb, 4.1% Zn, 345 g/t Ag

NORTH MT.FARRELL DEPOSIT
MINED
420,00t @
11.4 % Pb, 2% Zn, 370 g/t Ag

TULLAH

TULLAH FLATS

MURCHISON MINE DEPOSIT
ESTIMATED REMAINING RESOURCE
+12,000t @
10 % Pb, 10% Zn, 380 g/t Ag, 2g/t Au

LAKESIDE DEPOSIT
INDICATED RESOURCE
750,000t @
20 g/t Ag, 3.1g/t Au,
4% As, 0.2% Sn, 0.2% Cu

ARSENIC RESOURCE
INFERRED RESOURCE
480,000t @
15 g/t Ag, 1g/t Au,
5% As, 0.2% Cu

STERLING VALLEY MINE
POSSIBLE Pb-Zn-Ag-Au RESOURCE ?

ALTERED AREAS WITH POTENTIAL FOR Cu - Au

FARRELL FAULT
Prospective for *VHMS DEPOSITS*

Magnetic low 'spike'

MAGNETIC ANOMALY 'C'

STERLING VALLEY MAGNETIC LOW

INTENSE HYDROTHERMAL ALTERATION OF MURCHISON VOLCANICS

E.L. 24/91

MOUNT BLACK

MOUNT MURCHISON

ROSEBERRY MINE LEASE

MINE LEASE EXT

HENTY FAULT

SOUTH STITT ZONE

LAKE MACKINTOSH

LAKE MURCHISON

5 cm

| PASMINCO EXPLORATION | |
|---|---|
| A Division of Pasminco Australia Limited | |
| COMPILED : J.G.P. | E.L. 22/90 - TULLAH |
| DATE : Sept., 1993 | E.L. 24/91 - STERLING RIVER |
| DRAWN : G.M.B. | **GEOLOGY** |
| REVISIONS : J.G.P. | |
| DATE : Sept., 1995 | |
| REF: Maps 2,3 &4 Mt. Read Volanicaes Project | |
| DRAWING No. | SCALE 1:25,000 — 0 500 m — FIG. No. 4 |

754016

# 5 TESTING OF MAGNETIC ANOMALY 'C'

754017

## 5.1 Introduction

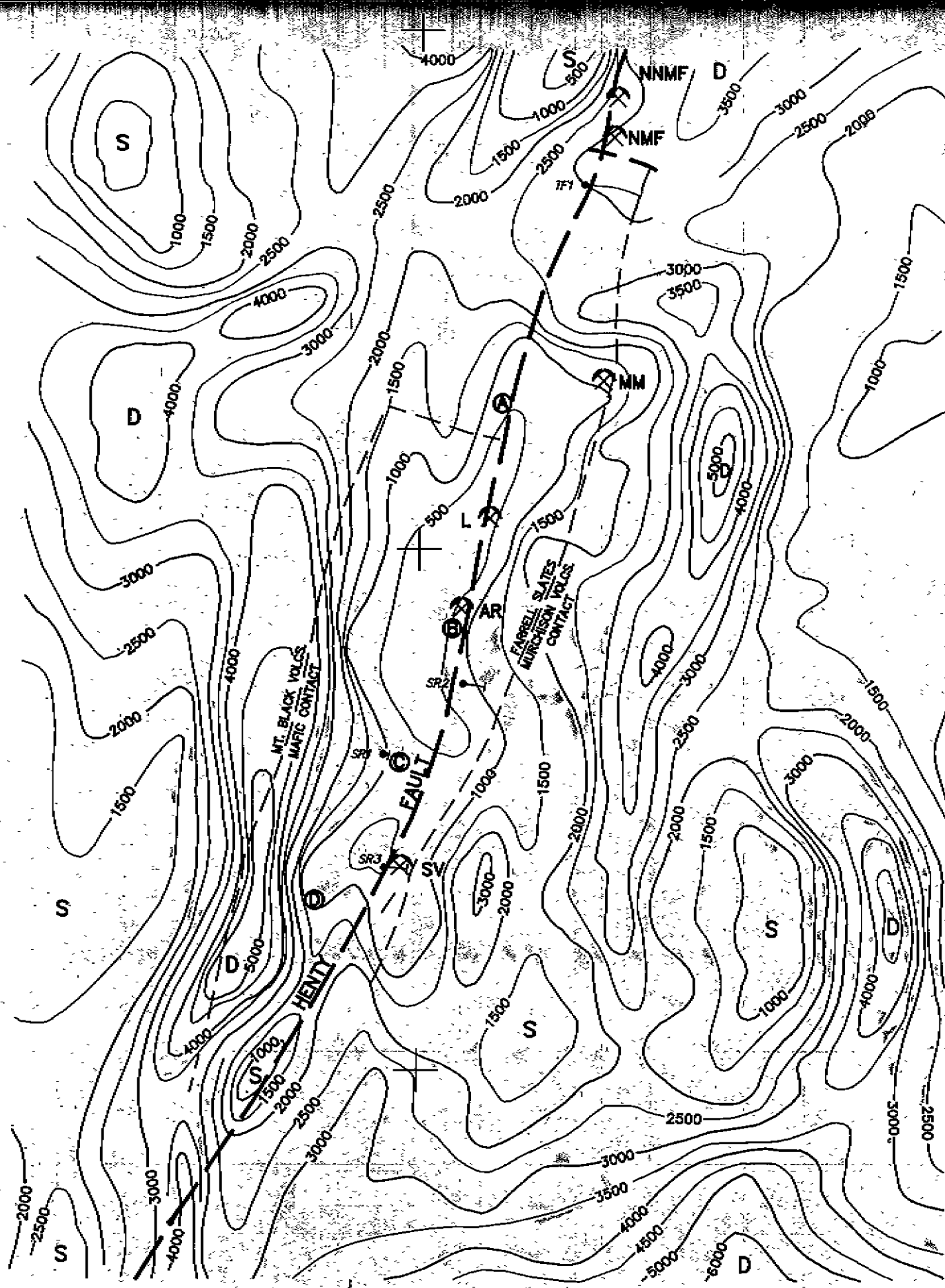
On the aeromagnetic coverage of the Tullah-Sterling area four discrete anomalies are delineated extending along the Devonian granite crest centred beneath the Sterling Valley. These anomalies are designated A-D, of which only B had previously been drilled (partially), yielding the 'Arsenic Resource' - a pyrrhotite-hosted body of 480,000t @ 1 g/t Au, 5% As & 0.3% Cu (Purvis, 1994). See Figure 5.

Anomaly C, centred over the Sterling Valley Volcanics 1.5km south of B, is not quite as strong as B but is areally larger, being about 1km long and up to 400m wide. An EZ ground magnetic survey in 1982 showed that in detail Anomaly 'C' is an irregular linear zone with several magnetic peaks (see Figure 6).

The geophysical coverage of Anomaly 'C' is reviewed in Appendix 9. IP coverage, particularly over the western half of the anomaly, is poor and incomplete. Where there is coverage the magnetic zone generally does not coincide with anomalous IP effects. However, as shown on Figure 6 there is some scattered discrete IP anomalism along the eastern side of the magnetic zone and also at its far northern tip (lines 3260N & 3320N).

This latter target was drilled by EZ with hole STP283 in 1985 after they got values to 27g/t Au from quartz-arsenopyrite-pyrrhotite veining in brecciated sediments in a costean over the IP/magnetic anomaly peak. STP283 got similar veining in altered basalts and sediments, but the best intersections were only 0.45m @ 2g/t Au, and 0.85m @ 1.2g/t Au, 4% As. Although the style of mineralization is the same as at the 'Arsenic Resource', EZ did no further work on Anomaly C.

However, the results of STP283 and the presence of IP effects on the northern and eastern margins of C, coupled with the incomplete IP coverage, mean that at least part of the anomaly could be due to auriferous sulphide mineralization of the type seen at B.




# GRANITE ROOF DEPTH CONTOURS

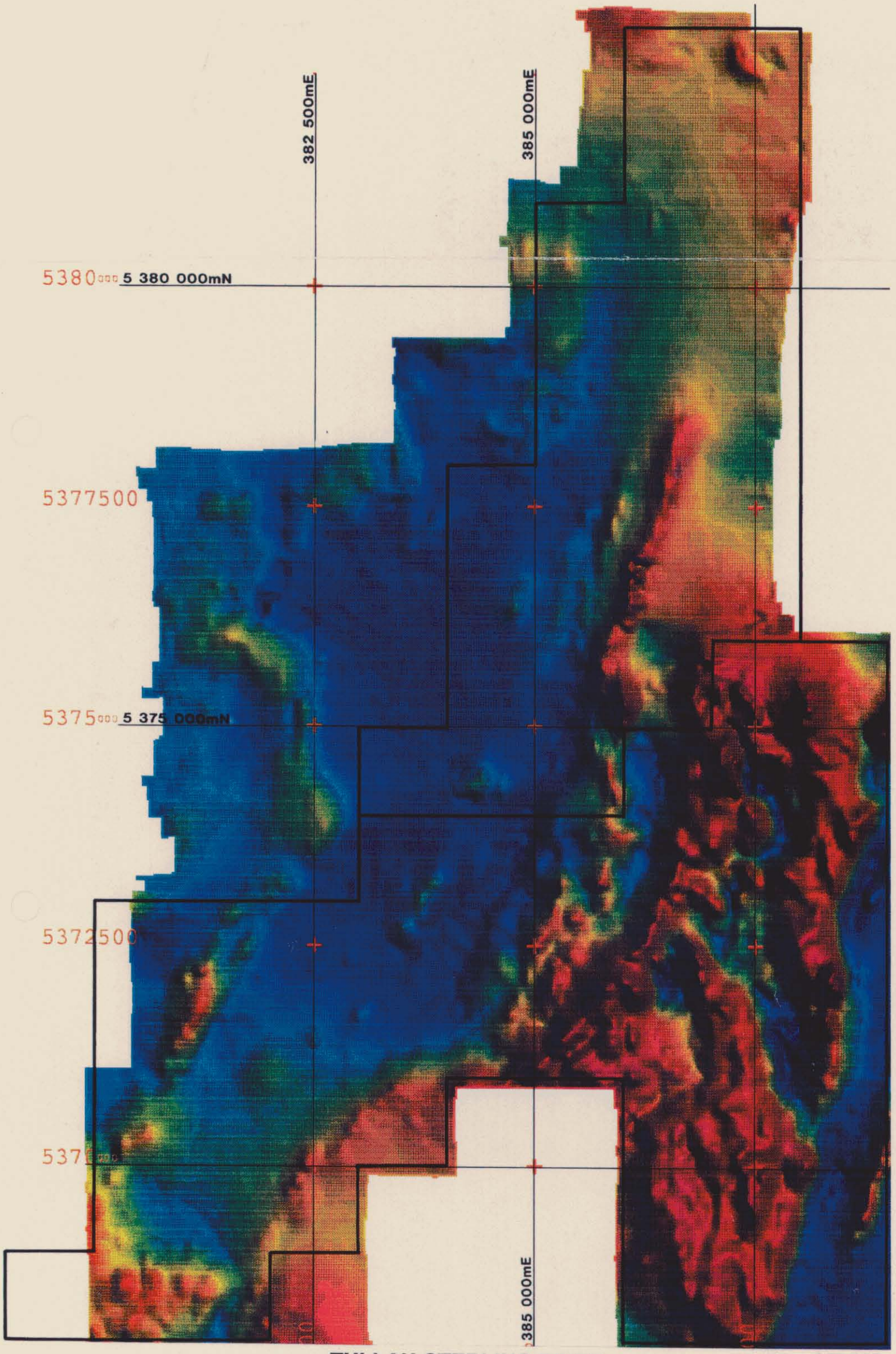
Leaman, 1993

**LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| S | Shallow granite (spine or cupola) | NNMF | New North Mt. Farrell Mine (Pb–Ag–Zn) | L | Lakeside (Au–As–Sn–Cu) |
| D | Deep Granite | NMF | North Mt. Farrell Mine (Pb–Ag–Zn) | AR | Arsenic Resource (Au–As–Cu) |
| | | MM | Murchison Mine (Zn–Pb–Ag–Au) | SV | Sterling Valley (Pb–Ag–Zn–Au) |

Ⓐ–Ⓓ Magnetic anomalies considered due to pyrrhotitic Au–Cu–Sn deposits

754018



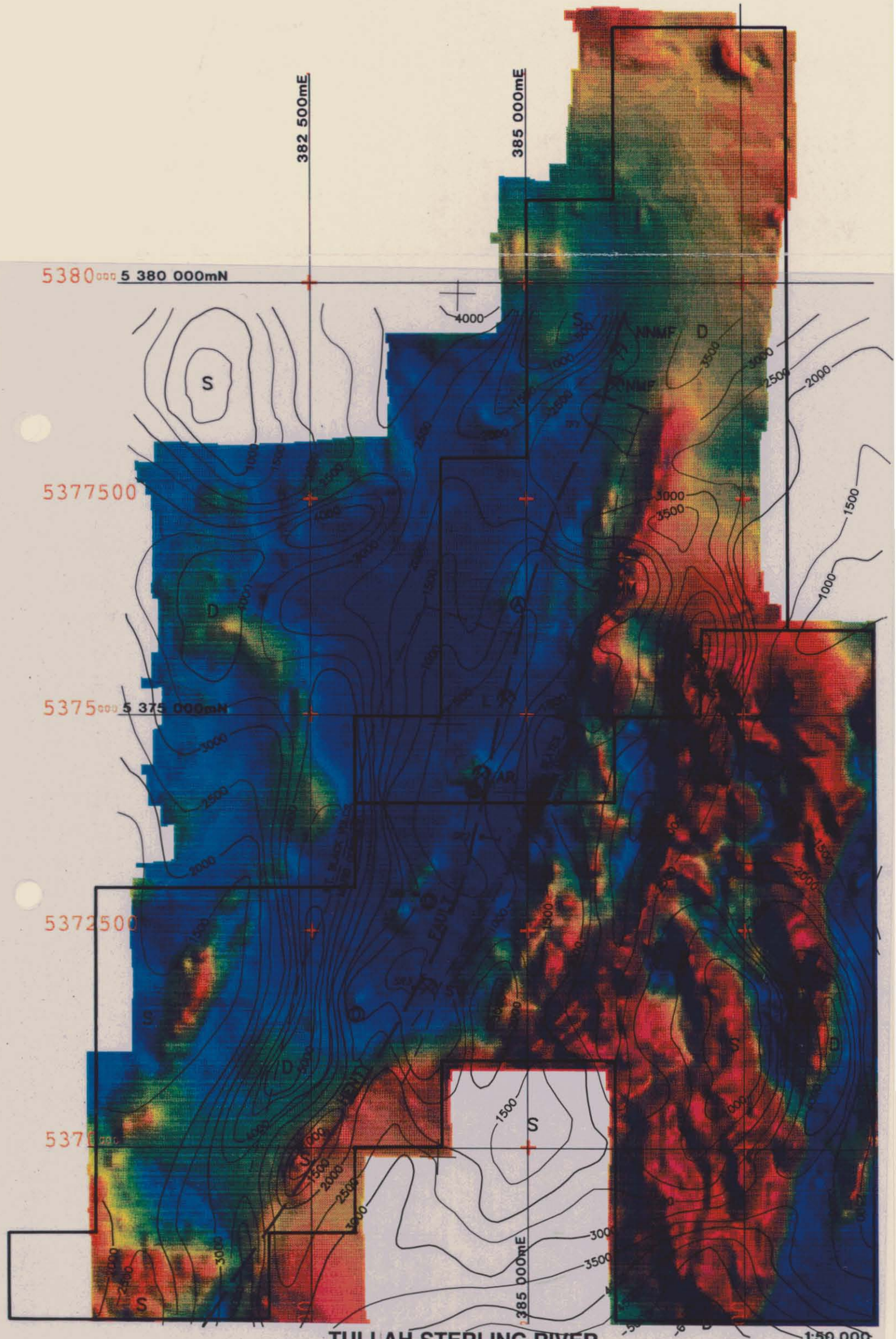

TULLAH-STERLING RIVER

1:50,000

# IMAGED AEROMAGNETICS

754019

Figure 5




TULLAH-STERLING RIVER

1:50,000

# IMAGED AEROMAGNETICS

## GRANITE ROOF DEPTH CONTOURS

Leaman, 1993

**LEGEND**

| | |
|---|---|
| S | Shallow granite (spine or cupola) |
| D | Deep Granite |
| Ⓐ-Ⓓ | Magnetic anomalies considered due to pyrrhotitic Au–Cu–Sn deposits |

| | |
|---|---|
| NNMF | New North Mt. Farrell Mine (Pb–Ag–Zn) |
| NMF | North Mt. Farrell Mine (Pb–Ag–Zn) |
| MM | Murchison Mine (Zn–Pb–Ag–Au) |
| L | Lakeside (Au–As–Sn–Cu) |
| AR | Arsenic Resource (Au–As–Cu) |
| SV | Sterling Valley (Pb–Ag–Zn–Au) |

754019
754018

## KEY

**INDUCED POLARIZATION COVERAGE**

*Dipole - Dipole*

- McPhar 1961 Freq. Domain a = 300 ft
- McPhar 1961 Freq. Domain a = 200 ft
- Scintrex 1979 Time Domain a = 200 ft
- McPhar 1982 Freq. Domain a = 60m

*Gradient Array*

- Scintrex 1987 Time Domain a = 20m
- ⊗ I.P. Response

**MAGNETIC CONTOUR VALUES**
From EZ Survey - 1982

- > 62,600nT
- 62,500nT
- 62,400 - 62,500nT

383 500mE · 384 000mE · 384 500mE

5 373 500mN · 5 373 000mN · 5 372 500mN

MODERATE STP283 · MODERATE · WEAK · STRONG

SVD87-1 · SVD87-1A · SV2 · SV3 · STPI05 · STPI01 · SVD89-1 · SRI

(24S) · (28S) · (32S) · (36S) · (44S)

PASMINCO GRIDLINES (1995)

Murchison Highway

HEC Transmission Lines

BASELINE 5000E

5 cm

| | |
|---|---|
| COMPILED : P.W.B. | PASMINCO EXPLORATION<br>A Division of Pasminco Australia Limited |
| DATE : Jan., 1995 | E.L. 24/91 - STERLING RIVER |
| DRAWN : G.M.B. | STERLING VALLEY |
| REF: Ground Magnetics from EZ 1982. I.P. from EZ and Billiton Surveys 1961 - 1987 | I.P. COVERAGE AND MAGNETIC CONTOURS OF ANOMALY 'C' |
| FILE : | |
| DRAWING No. | SCALE 1:5000 (0 – 100 m) · FIG. No. 6 |

754020

## 5.2 Ground Work

Anomaly C lies on a very steep east-facing slope overlooking the Sterling Valley. The Murchison Highway cuts along the western edge of the anomaly. The local geology dips steeply west.

In January 1995, a three-line 1.6km grid was cut over the anomaly, parallel to the old EZ grid (108° AMG) and using the old line co-ordinates. Later surveying found the new lines are 65m south of their intended position. See Figure 6.

The new grid was geologically mapped, rock sampled and covered with a detailed ground magnetic survey using the Pasminco 'walking' magnetometer with a sampling interval of 0.5 seconds. Diurnal readings were recorded using a Scintrex OMNI IV magnetometer. Data was diurnally corrected and spikes removed. Care was taken to avoid corruption of data when crossing the Murchison Highway. Results are displayed on profiles of the three lines, 2885N, 2935N and 2985N, in Figure 13.

The local geology is dominated by andesites (to the west) and basalts/dolerites (to the east), of the Sterling Valley Volcanics unit. There are minor lenses of mafic siltstone and andesitic epiclastic breccia. Most rocks are chloritised. Quartz±limonite veins are quite common, but visible sulphides are rare.

Near the eastern end of lines 2885N and 2935N there is a foliated alteration zone about 70m wide, within which the mafics in places have been thermally metamorphosed to silica-sericite-epidote-chlorite hornfels. Quartz-limonite veining is common within the zone and some outcrops contain minor pyrite and arsenopyrite. Rock sampling detected only traces of As (to 2830ppm), Pb, Zn and Sn (all less than 600ppm), and no Au or Ag. The hornfels zone is not present on line 2985N.

The magnetic survey provided three traverses across Anomaly C at intervals of 50m. On 2885N the anomaly is strongest (peak of 2000nT), is centred at 4520E just east of the highway and clearly dips steeply west. It coincides with a zone of no outcrop. A further 100m east the hornfels zone is a magnetic low.

On line 2935N the magnetic peak at 4480E is broader with an amplitude of 500nT. Again, it coincides with a zone of no outcrop except for oxidised andesite exposed in the road cut just west of the anomaly peak. The hornfels zone, 130m further east, is a magnetic low more pronounced than on 2885N.

On 2985N the main anomaly is a broad magnetic crest with maximum amplitude of only 250nT. The peak at 4495E lies in a zone of no outcrop immediately east of the highway. The road cut is oxidised andesite. To the east there is a major change compared to the two southern lines, with the sudden appearance of a sharp 1100nT high centred at 4670E. On the ground this is a 30m zone of no outcrop, flanked by exposures of mildly magnetic weakly silicified quartz-veined basalt. This eastern anomaly is one of a series of bulls-eye magnetic highs along the eastern flank of the main anomaly - see Figure 6.

## 5.3 Hole SR1

The location of Anomaly C makes it difficult to drill. Using a small portable diamond drill rig (maximum capacity 160m BQ), the main magnetic peak at 4520E on line 2885N was tested from a site beside the highway at 2890N / 4475E. It was impossible to get the rig further east down the steep slopes to also test the hornfels zone.

SR1, angled at -60° to 108° AMG, spudded in on 31st January 1995 and finished at 96m on 7th February. The log is Appendix 2 and the section is on Figure 13.

SR1 intersected a uniform unit of magnetite-bearing basalt throughout its length, with magnetite content and magnetic character increasing strongly towards the bottom of the hole. There is no doubt the magnetite is the cause of the magnetic anomaly peak on line 2885N. Chemically and petrologically the basalt is typical of the Henty Dyke Swarm.

The hole encountered minor sulphides, mainly pyrite with trace chalcopyrite. The best pyrite (3%) was in a quartz-tourmaline annealed fault at 59-60m. No metal values of significance were recorded, the highest basemetal value being 664ppm Zn. The fault at 59-60m assayed 0.09g/t Au & 151ppm As.



754022

# 6 VHMS SEARCH ALONG FARRELL/MURCHISON CONTACT

## 6.1 Preliminary Studies

The major work programme on the Tullah / Sterling River licences in 1994-95 aimed to test the VHMS potential along the Farrell Slates / Murchison Volcanics contact (the Farrell Fault). This potential was first remarked on by Blackwell (1992, in Purvis, 1992).* The rationale for the programme was outlined in last year's annual report (Purvis, 1994), and is shown graphically in Figures 7 & 8.

[*Part of Blackwell's enthusiasm for the Farrell/Murchison contact stemmed from his misidentification (confirmed by assaying) of oxidised siderite veining as sphalerite, in the basal part of the Farrell Slates sequence in holes STP105 & 101. The same error has been made by Allen (1995) in his relogging.]

The 1994-95 testing programme involved mapping, lithogeochemical sampling and drilling. This was assisted by specific studies to elucidate aspects of the geology, particularly the facies in the upper part of the Murchison Volcanics and the amount of movement on the Farrell Fault.

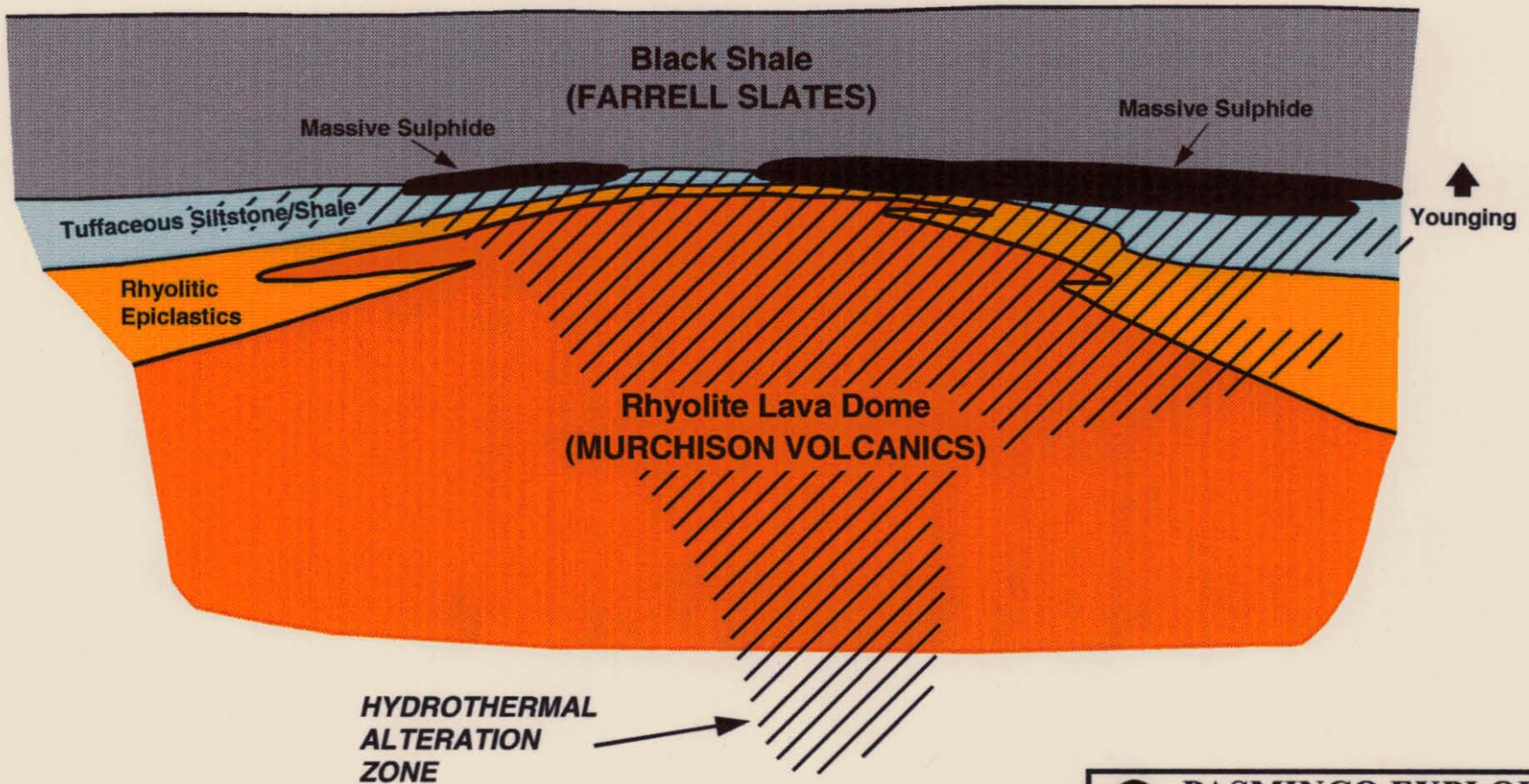
### *6.1.1 Transect Across The Sterling Valley*

Consultant Dr. Rod Allen was asked to map a geological section across the Sterling Valley, from the Mt Black Volcanics in the west to the Murchison Granite in the east. The main aim was to identify facies in the altered top of the Murchison Volcanics and to put them into regional context. The transect was based on road cut mapping and logging of selected drill holes. A summary of Allen's findings appears below, while his full report is in Appendix 13.

Refer particularly to Figure 2 in Appendix 13.

754023

# TULLAH - STERLING AREA



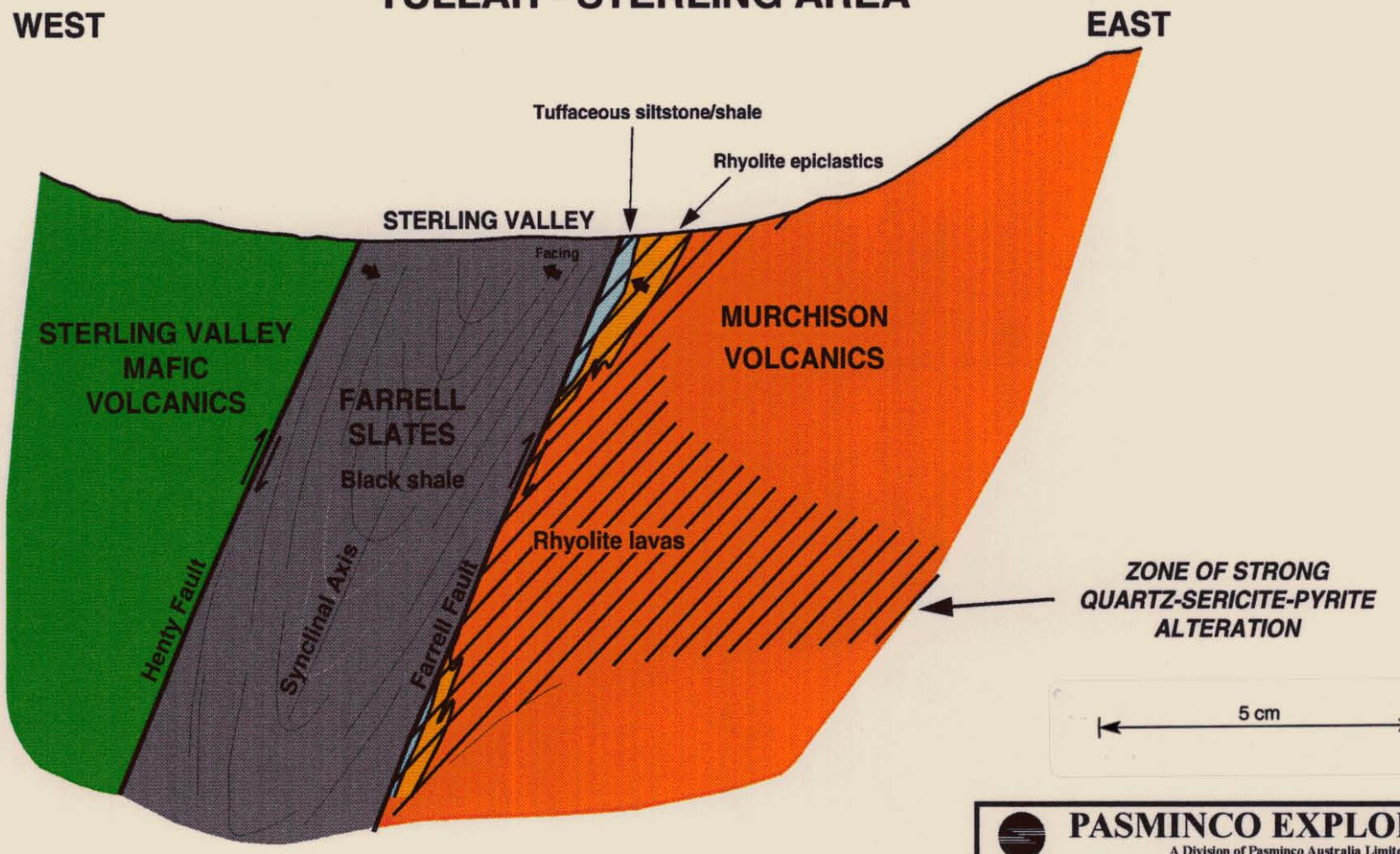

Incorporating the ideas of
BLACKWELL (1992)
ALLEN (1995)
PURVIS (1992-95)

**PASMINCO EXPLORATION**
A Division of Pasminco Australia Limited

| | |
|---|---|
| COMPILED : J.G.P. | E.L. 22/90 - TULLAH<br>E.L. 24/91 - STERLING RIVER<br>**FARRELL SLATES/<br>MURCHISON VOLCANICS<br>CONTACT<br>CAMBRIAN** |
| DATE : August 1995 | |
| DRAWN : G.M.B. | |
| REVISIONS : | |
| FILE: FSMVCC | |
| DRAWING No. | SCALE NOT TO SCALE — FIG. No. 7 |

154024

# TULLAH - STERLING AREA




Incorporating the ideas of
BLACKWELL (1992)
ALLEN (1995)
PURVIS (1992-95)

**PASMINCO EXPLORATION**
A Division of Pasminco Australia Limited

| | |
|---|---|
| COMPILED : J.G.P. | E.L. 22/90 - TULLAH<br>E.L. 24/91 - STERLING RIVER<br>FARRELL SLATES/MURCHISON VOLCANICS CONTACT<br>PRESENT DAY |
| DATE : August 1995 | |
| DRAWN : G.M.B. | |
| REVISIONS : | |
| | |
| | |
| | |
| FILE: FSMVCP | |
| DRAWING No. | SCALE / FIG. No. 8 |

154025

The more significant conclusions made by Allen are:

1. The Farrell Fault is a ductile shear, in contrast to the brittle Henty Fault.
2. Both faults are slightly oblique to bedding in dip and strike. The Farrell Fault appears steeper and to strike more easterly, than bedding.
3. Little displacement is interpreted across the Farrell Fault, with the Farrell Slates reflecting the waning end of the Murchison Volcanics eruptive cycle.
4. The top of the Murchison Volcanics is interpreted as a strongly hydrothermally altered subaqueous rhyolite dome-sill-tuff cone package, very prospective for massive sulphides.
5. Best areas for VHMS occur at the coincidence of: (1) a 400m stratigraphic interval straddling the original Murchison/Farrell depositional boundary, (2) proximal facies of the rhyolite-dome-tuff cone volcano at the top of the Murchison Volcanics, and (3) the most intense alteration at the top of the Murchison Volcanics.
6. Initial indications are that this prospective area lies around hole STP105 and further south.
7. Further east, rhyolite porphyry sills and Murchison granite have potential for structurally-controlled chlorite-pyrite-chalcopyrite mineralization.
8. The Sterling Valley Volcanics and Mt Black Volcanics appear to be in primary stratigraphic contact, and petrologically and chemically related.

### *6.1.2 Structural Review*

Analysis of overall structural relationships, particularly the amount and sense of movement on the Farrell Fault, was undertaken by Dr. Barry Murphy of Pasminco Exploration, Melbourne. Murphy's study included interpretation of the aeromagnetics, drill core logging and field mapping. His report is Appendix 12, while a summary of some of the findings is as follows:

1. The magnetic low on the Farrell/Murchison contact in the Sterling Valley is one of the deepest seen by Pasminco in the Mt Read Volcanics.

2. The low is segmented and terminated by NW trending cross-faults which evidence suggests were syn-volcanic.
3. The low is absent north of a major transfer zone in the Murchison Gorge and may be occluded in this area by the Farrell Fault. The Farrell Mines may be remobilised from a mineralised system in Murchison Volcanics beneath the Farrell Slates (see 6. below).
4. The Farrell Fault is a west dipping syn-cleavage shear zone with west- block-up thrust movement. Strike-slip component is minor. This means the most-prospective parts of the Farrell / Murchison contact zone lie opposite the areas of strongest alteration in the Murchison Volcanics.
5. Vertical displacement on the Farrell Fault is clearly less than the thickness of the Farrell Slates. Movement in the order of 300-500m is envisaged.
6. The fault occupies the limb of a major isoclinal fold and cannot maintain parallelism with bedding throughout its dip extent. Murchison Volcanics should lie beneath the Farrell Slates west of the Farrell Fault.
7. Alteration in the Murchison Volcanics is syn-deformational or earlier. It is unlikely to be related to the Devonian granite, which appears post-cleavage.

### *6.1.3 Magnetic Interpretations*

Consultant Geoff Dickson undertook analysis of the aeromagnetics and radiometrics over specific problem areas in the Sterling Valley and near Farrell Mines. His reports are in Appendices 10 & 11.

He was asked to evaluate the lowest part of the Sterling Valley magnetic anomaly, an unusual low 'spike' on two adjacent flight lines, centred at 5373650mN / 384950mE. A marked potassium channel radiometric high coincides with the magnetic low 'spike' and surrounding area.

Dickson concluded the 'spike' was due to a cultural feature. This is highly unlikely given its location on the forested lower slopes of the cliffs on the east side of the Sterling Valley. No powerlines or other man-made features are in the vicinity. The

potassic anomaly is explained by the intense K-feldspar alteration of the Murchison Volcanics in the cliffs (see section **6.2.4**).

Magnetics over the Tullah area were examined to determine the location of the Farrell Fault east of the Farrell Mines. Ground mapping had shown the fault was several hundred metres west of its position on Government maps (see Figure 4).

Dixon's interpretation is shown in Figure 3 in Appendix 11. He agrees the Farrell Fault lies west of the published position, but interprets this as a splay off the main fault. He also maps several NW trending structural breaks, a major one of which (F2) provides the northern termination of the Murchison Volcanics east of the North Mt Farrell Mine, in approximately the area where field mapping suggests the volcanics are either faulted or folded off. To the west, he interprets F2 as passing through the North Mt Farrell Mine.

Dickson does not see any magnetic evidence for Murchison Volcanics beneath the Farrell Slates west of the Farrell Fault in this area.

## 6.2 Delineation of the Alteration Zone

Lithogeochemical rock and drill core sampling was the main tool employed to define the extent of hydrothermal alteration along the Murchison Volcanics / Farrell Slates contact. This was accompanied by drill core relogging and limited surface mapping, to try and identify facies in the Murchison Volcanics within and around the alteration zone.

The programme was not completed - more sampling and mapping could be done.

### *6.2.1 Mapping*

The surface mapping was not systematic and was undertaken during rock sampling traverses and planning for the drill holes. The mapping is shown on Figures 18-23.

Points of interest to come from the mapping include:

# North of Murchison Mine the Farrell/Murchison contact is up to 400m west of its position on Government maps. It is terminated east of the North Mt Farrell Mine by either a WNW-trending cross-fault(s) or a large fold closure.

Evidence for cross-faulting includes aligned topographic lows, especially in the Owen Conglomerate at 5 378 300N and 5 379 000N. The former coincides with Dickson's F2 structure through North Mt Farrell Mine, the latter would pass between the two Farrell Mines. Evidence for a fold closure includes an exposure of Farrell Slates east of the Murchison Volcanics at 5 378 500N/386300E (see Figure 16).

# The cliffs overlooking the eastern side of the Sterling Valley are composed of rhyolitic lavas of the Murchison Volcanics that are intensely silica-K feldspar altered, with characteristic brick red colouration. Petrologically, the K-feldspar alteration is seen to be late-stage and overprinting the albitisation normally typical of such "red rocks" in the Mt Read Volcanics. The $Na_2O$ values in these cliff rhyolites are extremely low (0.08-0.2%).

# An unusual 20mx20m leached bleached mineralised capping occurs at 5 373710mN / 385080mE, within the cliffs sequence mentioned above. Assays showed elevated As (to 1256 ppm) and traces of Pb, Ag & Sn. This capping occurs 150m NE of the plotted position of the low magnetic 'spike' mentioned in section **6.1.3.**

### *6.2.2 Rock Sampling*

Fifty geochemical rock samples were taken in 1994-95, most during the programme along the Farrell/Murchison contact. Sample results are listed in Appendix 6. Twelve rock samples (many coincident with geochemical samples) were also taken for petrological description - see Appendix 7. All rock sample locations appear on Figures 18-23.

The alteration significance of the rock sample results is discussed in section **6.2.4** below and shown in Figure 17.

### *6.2.3 Old Drill core*

Six old drill holes totalling 1414m and intersecting the Farrell/Murchison contact in the Sterling Valley, were relogged. The intervals of Murchison Volcanics were lithogeochemically sampled.

Holes treated included STP105, STP101, STP100, STP98, STP96 and MM1a. Logs, geochemical sample results and petrological descriptions, are in Appendix 5. STP105 was also relogged by Allen, 1995 (Appendix 13), and Murphy (1995) logged the Farrell/Murchison contact zone in holes MM1a, STP105 and STP101 (Appendix 12).

The results as they pertain to the alteration zone are discussed in section **6.2.4** below. Correlation between the drill holes and surface mapping shows the Farrell/Murchison contact (the Farrell Fault) while generally dipping about 70° west, does vary in attitude and that these variations can occur within short distances. Attitude varies from 83° east at Sterling Valley Mine to 55° west at Murchison Mine. See Figure 17.

### *6.2.4 Discussion of Results*

Because of poor surface exposure, the old drill core provided the best data on the mineralization, hydrothermal alteration and facies in the upper section of the Murchison Volcanics. The most intense alteration, comprising quartz-sericite-pyrite-bleaching and with $Na_2O$ values typically $<0.2\%$, occurs in bands interspersed with more weakly altered zones containing some chlorite and carbonate.

Logging, backed up by petrology, of the old holes and subsequent holes SR2 & SR3, shows that in the Sterling Valley the upper part of the Murchison Volcanics is a complex of glassy rhyolite lavas and volcaniclastics (including tuffaceous epiclastics), intrusive dacites (probable sills), and mafic (andesite to basalt) dykes/sills. The

strongest alteration occurs in the rhyolitic rocks ("white rhyolite"). There is some evidence that the alteration is preferentially concentrated in tuffaceous bands (eg: in hole SR3).

These observations concur with those of Allen (1995, see Appendix 13), who stresses that the facies and alteration in the Murchison Volcanics are a "classic" VHMS setting. More relevantly perhaps, such strong hydrothermal alteration zones at the top of acid volcanic sequences, at the point where volcanism gives way to quiescent sedimentary conditions, are the sites of massive sulphide deposition elsewhere in the Mt Read Volcanics themselves (eg: Rosebery and Hercules).

However, basemetal and precious metal values in the altered Murchison Volcanics and immediately adjacent Farrell Slates, while commonly anomalous, are generally modest. This is despite statements to the contrary (Blackwell, 1992; Allen, 1995), caused by the misidentification of oxidised siderite as sphalerite.

Much of the basemetal mineralization in the Farrell Slates is in Devonian lodes or veins, and associated with elevated values of Sn and As.

To date, known zones with basemetal values exceeding 0.1% for Pb or Zn are restricted in distribution and width. SR3 at Sterling Valley Mine is the most mineralized, with an intersection of 1m @ 1% Zn in the Murchison Volcanics and intervals of 5.5m @ 0.2% Pb & 0.4% Zn, and 1m @ 0.9% Pb & 0.4% Zn, in the Farrell Slates a few metres above the contact (the latter two are Devonian lode zones).

Other better basemetal intersections from the Murchison Volcanics close to the contact are 2m @ 0.3% Pb+Zn in SR2, and 3m @ 0.2% Zn in TF1. While STP105 is not as mineralized as described by Allen & Blackwell, it is better than most: the Murchison Volcanics consistently average around 600ppm Zn and the Farrell Slates average <250ppm until 100m above the Farrell Fault, where a 15m interval of Devonian veining assays 0.1-0.3% Zn & 0.1% Pb.

Marked sodium depletion is a feature common to the footwall alteration zones of all volcanogenic massive sulphide bodies in the Mt Read Volcanics. The most widespread and intense sodium loss occurs in the central parts of such alteration zones and this is generally directly beneath the orebodies. The features are well documented by Green (1990).

Figure 17 plots $Na_2O$ values for all rock and drill core samples taken from the Murchison Volcanics along the Farrell/Murchison contact. With the exception of the basal part of hole SR3 and the cliff rhyolites in the Sterling Valley (discussed below), the sodium results broadly mirror mapping/logging observations and the petrological data.

Alteration is most intense at the Sterling Valley Mine. Interestingly, this lies at the southern end of the magnetic low considered to be due to the alteration effect (see Figure 5). To the south of the Sterling Valley Mine the Murchison Volcanics are poorly exposed and have not been drilled or effectively covered by ground-based geophysics.

Strong alteration also occurs in the upper part of hole STP105, midway down the Sterling Valley and in parts of SR2 500m further north.

North of the Murchison Gorge there is strong alteration on surface in the vicinity of Murchison Mine. However, hole MM1a 250m beneath is essentially unaltered. Two kilometres further north in the area of the Farrell Mines the surface rocks are likewise unaltered and there is only patchy moderate alteration in hole TF1 600m beneath.

A few hundred metres E of SR2 and NE of hole STP105, the rhyolites forming prominent cliffs on the eastern side of the Sterling Valley show marked sodium depletion. These rocks are characterised by reddish-brown colouration and intense silicification. They contain visible feldspar. Normally, such red rocks in the Mt Read Volcanics contain several percent sodium and are commonly described by field geologists as being "albitised".

Geochemistry, petrology and the radiometrics, show the cliff rhyolites are intensely K-feldspar altered. Petrologically, the K-feldspar is seen to be replacing earlier albite. Such K-feldspar alteration is typical of the effects around the Cambrian granites in the Mt Reads (A. Crawford, pers comm). It would seem clear that the low sodium in these rhyolites is due to the Murchison Granite, which intrudes the Murchison Volcanics immediately east of the cliffs, rather than to any volcanogenic alteration effect.

The zone of stronger alteration along the Farrell/Murchison contact broadly coincides with the crest of the buried ridge of Devonian Granite. There has to be some question as to whether the alteration is Cambrian volcanogenic or Devonian granite-related.

Because rubidium forms extensive halos around some of the Devonian granite-related tin deposits in western Tasmania, Green (1990) successfully used the ratio 10 000 $Rb/K_2O$ to define areas of Devonian alteration at Rosebery Mine, with values above 70 indicating substantial Devonian effects.

Applying the 10 000 $Rb/K_2O$ ratio to the sampling of altered Murchison Volcanics along the Farrell Fault, almost all values are remarkably consistent in the 35-55 range, indicating no significant Devonian input. For example, in the most intensely-altered hole, SR3 at Sterling Valley Mine, values range from 35 to 53. Values for other holes are:

| **Hole/Locality** | **10 000$Rb/K_2O$ Values** |
|---|---|
| STP105 | 39-55 |
| SR2 | 36-61 |
| Rocks - Murchison Mine Area | 34-44 |
| MM1a | 39-53 |
| TF1 | 42-57 |

The zone of potassic alteration in the cliff rhyolites has 10 000 $Rb/K_2O$ values of 19-38. While low values could have been expected because of the high $K_2O$ (up to 10.36%), the low Rb levels (182-277ppm) confirm the alteration here is Cambrian and not Devonian.

There is clearly some Devonian influence in the Tullah-Sterling area as evidenced by the widespread significant tin-arsenic mineralization and siderite±tourmaline veining. But it must be concluded that in the areas sampled to date at least, the Devonian overprint has not been strong enough to modify the pre-existing Cambrian alteration.

## 6.3 Hole SR2

### *6.3.1 Geological Results*

Hole SR2 was sited beside the Sterling Valley track at 5 373 707N / 384 425E, angled AMG east at -70°. The hole was the first in the 1994-95 three-hole testing programme of the alteration zone along the Farrell/Murchison contact. It was designed to test the contact adjacent to the most intense part of the aeromagnetic low, 500m north along strike from the strong alteration on the contact in hole STP105.

SR2 spudded in on 3rd April 1995 and was completed at 367.6m on 2nd May. The Farrell Fault was intersected at 252m, but only traces of base metals were present (2m @ 0.2% Pb, 0.1% Zn). Alteration in the foliated rhyolites of the Murchison Volcanics is patchy and locally strong, and about on a par with STP105. However, unlike STP105, the strongest alteration is in a zone 20-50m east of the contact (Na20 values down to 0.07%).

The log of SR2 is in Appendix 3 and the drill section is Figure 14. Both were compiled by Nicola McGunnigle.

There are numerous mineralized veins and lode zones in the Farrell Slates in the hole.

Intersections included:

2m @ 2.2% Pb, 1.2% Zn, 100g/t Ag (11.5 - 13.5m, sulphide veinlets in sandstone)
4.25m @ 0.3% Zn, 0.4% As, 0.2% Sn (84 - 88.25m, deformed zone in black shale)
2.9m @ 0.4% Sn (197.6 - 200.5m, quartz-sulphide lode zone).

The latter appears to be the depth extension of the greisenous quartz-sulphide lode in Turley's working, which outcrops 20m south of the hole and 30-40m west of the Farrell Fault. Samples taken from the dump assayed up to 13% As, 1.4 g/t Au, 0.3% Sn and 0.3% Cu.

One interesting aspect of SR2 is that barium levels in the upper part of the Murchison Volcanics are noticeably higher than in most other holes along the Farrell Fault. In SR2 the 70m of Murchison rhyolites below the contact average 1730ppm Ba, with a maximum of 2400ppm. Most other holes in the Murchison Volcanics average 600-1200ppm Ba. Barium values in the Farrell Slates are generally <500ppm.

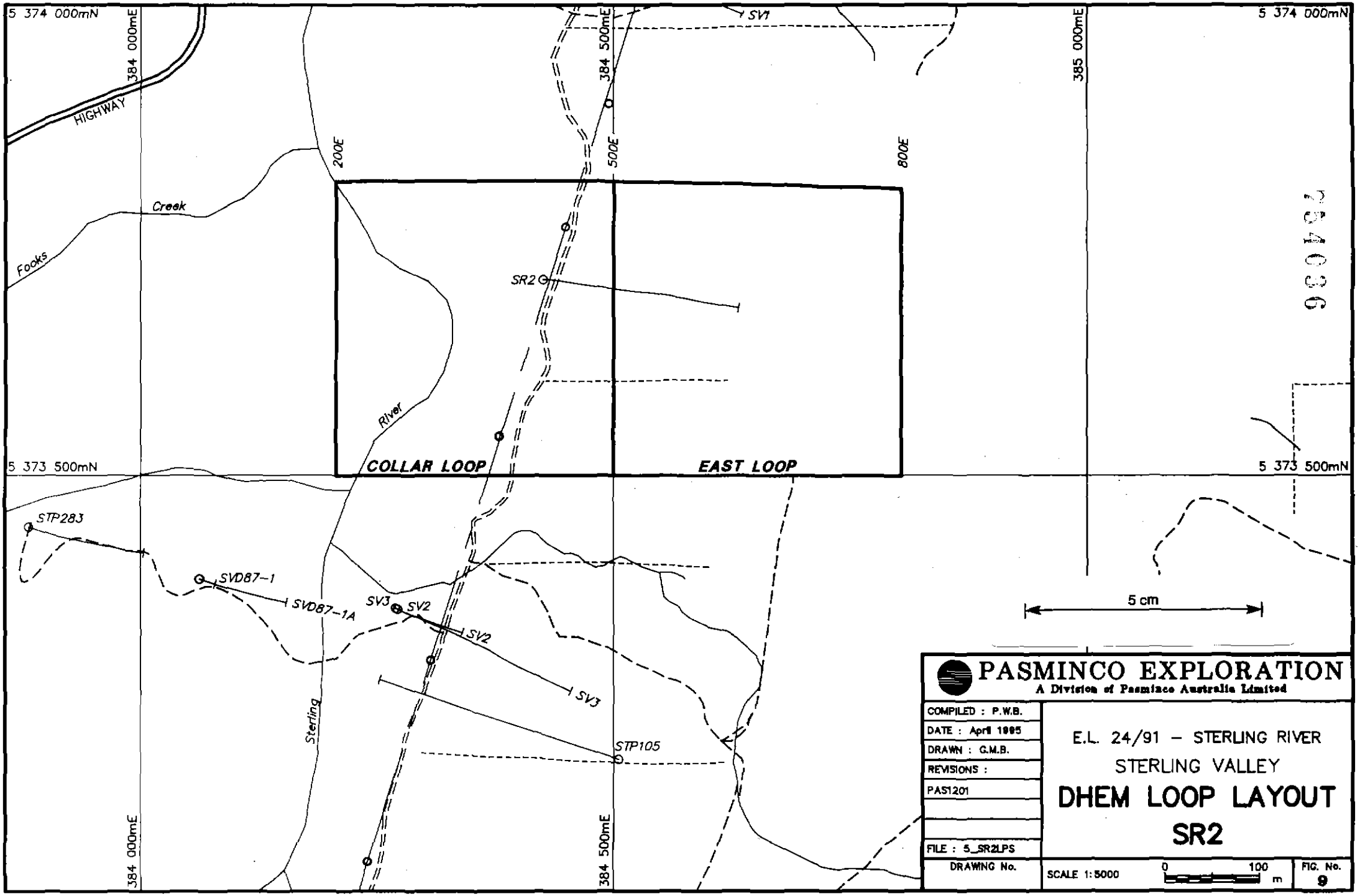
### *6.3.2 DHEM Survey*

Following completion of the drilling, SR2 was surveyed with the CRONE PEM system in May 1995. The loop layout used is shown in Figure 9 and the data is presented in Appendix 8 along with P. Basford's interpretation report.

Two in-hole EM responses were recorded from both loops, at 88m and 200m downhole. Both anomalies correlate with the mineralized zones within the Farrell Slates noted in section **6.3.1.** The lower zone is the depth extension of Turley's quartz-sulphide lode. See Figure 14.

The upper anomaly has an off-hole response centred north and below the hole, implying the mineralised zone at 84-88m has some degree of continuity and may be stronger off-hole. Whether the metal values are significantly better is a matter for conjecture (and possible drill-testing).

The off-hole data for the lower zone is swamped by a large response considered by Basford to be due to black shale. This assumption may be correct as the mineralization in this part of the hole sits within a 10m thick mildly graphitic black shale band. But the possibility that the response is due to a body of sulphide between Turley's working and the hole, cannot be discounted.


5 374 000mN
384 000mE
384 500mE
385 000mE
HIGHWAY
Creek
Fooks
River
Sterling
200E
500E
800E
SV1
SR2
COLLAR LOOP
EAST LOOP
5 373 500mN
STP283
SVD87-1
SVD87-1A
SV3
SV2
STP105
5 cm
PASMINCO EXPLORATION
A Division of Pasminco Australia Limited
COMPILED : P.W.B.
DATE : April 1995
DRAWN : G.M.B.
REVISIONS :
PAS1201
FILE : 5_SR2LPS
DRAWING No.
E.L. 24/91 – STERLING RIVER
STERLING VALLEY
DHEM LOOP LAYOUT
SR2
SCALE 1:5000
0 100 m
FIG. No.
9

## 6.4 Hole SR3

Hole SR3 was drilled to test for massive sulphides associated with the intense quartz-sericite-pyrite alteration in the Murchison Volcanics in hole STP96 at Sterling Valley Mine. Similar alteration was discovered on surface when the drill section for SR3 was cut. The hole was sited on the old Sterling Valley Tramway at 5 371 941N / 383 688E, angled at -70° to AMG east. The hole started on 5th May 1995 and was completed at 512m on 19th June.

The log of SR3 is in Appendix 4 and the drill section is Figure 15.

SR3 collared (unintentionally!) immediately west of the Henty Fault, in a complex of mafic dykes, flows and clastics, of the Sterling Valley Volcanics. The steeply west-dipping Henty Fault was intersected as a major brittle fault zone at 65-74m.

From 74m to 339m the hole intersected sandstones, siltstones and graphitic shales of the Farrell Slates. Facings in this sequence are to the west, apart from two east-facings adjacent to the Farrell Fault at its base. The Farrell Slates in SR3, particularly the shales, display a greater degree of deformation than seen elsewhere in these rocks. There are numerous large faults, apparently steeply-dipping as most parallel the foliation. The faults are mineralized with lodes of quartz-carbonate (±tourmaline)-sulphides (py, gn, sp, aspy). The better intersections from these lodes in SR3 were:

| Interval | Intersection | Pb% | Zn% | Sn% | As% | Ag g/t | Au g/t |
|---|---|---|---|---|---|---|---|
| 182.2 - 184.3m: | 2.1m | 2.65 | 2.9 | | 1.11 | 41 | 0.23 |
| 235.75 - 237.25m: | 1.5m | 0.69 | 0.42 | | | 11 | |
| 278.0 - 279.0m: | 1m | | | 0.07 | 5.0 | | 0.63 |
| 301.0 - 302.0m: | 1m | 0.86 | 0.37 | | | 10 | |
| 307.0 - 307.75m: | 0.75m | | 0.12 | 0.28 | | | |
| 312.5 - 318.0m: | 5.5m | 0.21 | 0.41 | | | | |

The Farrell Fault on the Farrell Slates/Murchison Volcanics contact at 338.75m downhole, is a ductile shear 0.7m wide dipping 85° west. As seen in Figure 15, the contact is displaced over 100m to the west compared to its position in STP96 higher on the same section and there must be a major, probably low-angle, structure between the two holes.

From 339m to EOH at 512m, SR3 intersected the Murchison Volcanics, comprising a complex of glassy rhyolites, volcaniclastics and tuffaceous epiclastics, cut by dacitic and mafic (andesitic to basaltic) dykes and sills. Above 426m the volcanics contain bleached zones of intense silica-sericite-pyrite alteration, similar to the alteration in STP96 and on surface. These altered zones appear to be restricted to the more acid rocks, particularly the tuffaceous bands, and are interspersed with chlorite-carbonate-pyrite altered zones that correlate with the mafic intrusives.

The lithogeochemical values confirm the extensive zones of intense alteration with 5 of the 15 samples (9m intervals each) returning $Na_2O$ values of 0.05% or less (see Figure 17). However, these zones do not always correlate exactly with the alteration defined by visual logging, with low $Na_2O$ values extending down to at least 474m. Some of the higher than expected $Na_2O$ values among the visually-altered section closer to the Farrell Fault appear due to the number of lesser-altered mafic dykes in the sequence here.

The average pyrite content in the Murchison Volcanics is around 3-5% but base metals are minor, the best intersection being 1m @ 0.97% Zn & 0.15% Pb @ 470-471m.

## 6.5 Hole TF1

TF1 was sited 300m south of the old North Mt Farrell Mine workings (see Figure 10). The principal aim of the hole was to test the VHMS potential at depth on the Farrell Slates/Murchison Volcanics contact in the poorly-known area east of the Farrell Mines.

Reconnaissance mapping in this vicinity had found sericitised epiclastics in the top of the Murchison Volcanics and determined that the contact is several hundred metres further west than its position on Government maps (see Figure 4). Because the Farrell Slates are only a little over 400m wide at this point, it became feasible to design a single drill hole to test the Henty Fault, Farrell Lode position and Farrell/Murchison contact.

Hole TF1, sited at 5 378 507mN / 385 562mE and angled at -62.5° to AMG east, spudded in on 25th May 1995 and was completed at 813.1m on 11th July. The hole did not encounter any significant mineralization, the best intersection being 1m @ 2.2% Pb & 50g/t Ag from a quartz-siderite lode zone within the Farrell Slates sequence.

Compared to holes SR2 and SR3 in the Sterling Valley, there is a notable lack of sulphides in both the Farrell Slates and Murchison Volcanics in TF1. The detailed geological section of the hole is Figure 16 and the log is in Appendix 1.

TF1 commenced in dacites of the Mt Black Volcanics west of the Henty Fault and passed through this structure at 125m. From 125m to 750m the hole traversed sandstones, siltstones and shales of the Farrell Slates sequence. The Farrell is dominated by thin, graded, rhythmic sandstone turbidites and is very similar to the sequence intersected in hole MM1a at the Murchison Mine, 2km further south (Purvis, 1993). It is also notable for its calcareous character and thin beds of impure limestone are common in places.

The sequence is folded, but overall is believed to face west. For example, sandstones in the basal part of the sequence become noticeably quartz-crystal rich, presumably derived from the underlying quartz-phyric Murchison Volcanics.

At 219 - 231m downhole, a zone of brecciated and siderite-veined black shale marks the along-strike position of the Farrell Lodes 300m further north. Apart from minor pyrite, this position in TF1 is unmineralized. Structurally, the orientated bedding measurements in the hole show the Farrell Lode position occurs in the faulted crest of an anticline.

At 655 - 673m, a massive west-facing crystal-sandstone unit is the same rock which hosts the sulphide lode at the Murchison Mine. A brecciated and siderite-sulphide veined shale band within the crystal sandstone gave the best basemetal intersection in the hole: 1m @ 2.2% Pb & 50g/t Ag. The 18m true thickness of the crystal sandstone in TF1 is remarkably consistent with that at Murchison Mine 2km to the south. However, even allowing for the effects of folding it is evident there is a greater thickness of Farrell Slates between the crystal sandstone and the Murchison Volcanics contact in TF1 than in hole MM1a at Murchison Mine.

Below 750m in TF1 the Murchison Volcanics are silicified and moderately sericitised pumiceous epiclastic mass-flows. These rocks are very quartz crystal rich and fine towards the west. They contain minor disseminated pyrite and sphalerite (3m @ 0.2% Zn). Na20 values ranged from 0.31% to 3.99%, indicating genuine hydrothermal alteration is patchy and moderate at best (see Figure 17).

The Farrell Slates / Murchison Volcanics contact at 750m is conformable and unbroken, although marked by a 1.5m wide zone of strong ductile shearing. A brittle fault occurs 1m above the contact. The fine top on the underlying pumiceous mass flow appears largely intact. For this reason it is believed TF1 may be the first drill hole in which the facies on the Murchison Volcanics / Farrell Slates contact have been substantially preserved (ie: not removed by the Farrell Fault). Correlation between the surface mapping and TF1 shows the contact dips approximately 85° west.

# 7 PRELIMINARY EXAMINATION OF FARRELL MINES

During 1994-95 a brief examination was made of the zinc potential of the old Farrell Mines at Tullah. Angela Lorrigan (pers comm, 1993), had uncovered data on some unmined zinc mineralization on No. 6 Level in the New North Mt Farrell Mine. This data is re-presented in Figure 11.

Selected old mine plans and sections, drill records and Mine Manager's reports, were examined. Field traverses were also made with Mr Les Johnson of Tullah, who had worked underground in the New North Mt Farrell Mine.

The Farrell Mines comprise quartz-sulphide fault-fillings within grey-black shales of the Farrell Slates, located 100m east and parallel to the Henty Fault. Individual mined lodes were up to 6m wide but the average was <2m. Recent data from hole TF1 suggests the lodes occur in the faulted axis of an anticline.

Between 1899 and 1973 the two Farrell Mines produced 731,000t at a grade of 13% Pb, 2% Zn & 425g/t Ag. Mining extended to almost 400m below surface. The current resource estimate, including 71,000t of proven reserves, is put at 177,000t @ 11.3% Pb, 4.1% Zn and 345g/t Ag (EZ, 1989). See Figure 10.

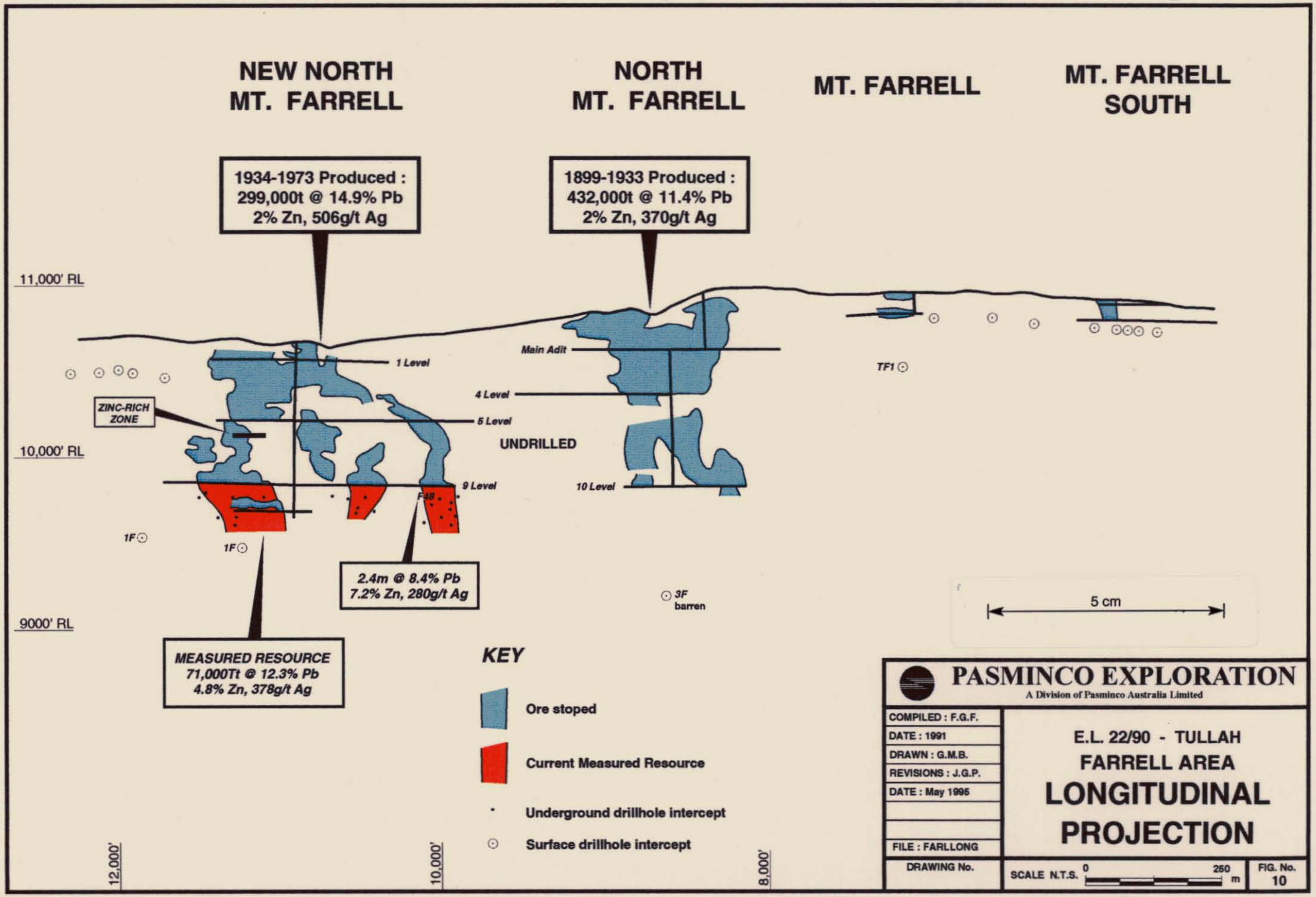
Examination of the data, especially drilling records, shows the mining history at Farrell gives a distorted view of the mineralization there. It is clear the old miners were very adept at keeping any zinc-rich ore out of the mill (the price was low and it fouled up the lead recoveries). It was left behind or used for stope-fill (particularly in the older upper levels of the North Mt Farrell Mine). The mined grade of 2% Zn understates the zinc grade and while the 4-5% Zn in the reserves gives a fairer picture, it is considered the overall zinc grade of the pre-mining resource may have been as much as 7-8%.

The Farrell Mines were not confined to single strong lodes, but comprised a series of pods some of which were branches from "main" lodes, while others marked parallel

lode channels that ran for hundreds of metres along strike. In the southern mine (North Mt Farrell) three main parallel lode channels were spaced over a width of 100m. A few hundred metres to the north, the New North Mt Farrell Mine's major producer was the extension of one of the less-important channels in the southern mine. On some levels and sections there were as many as 11 separate productive lodes.

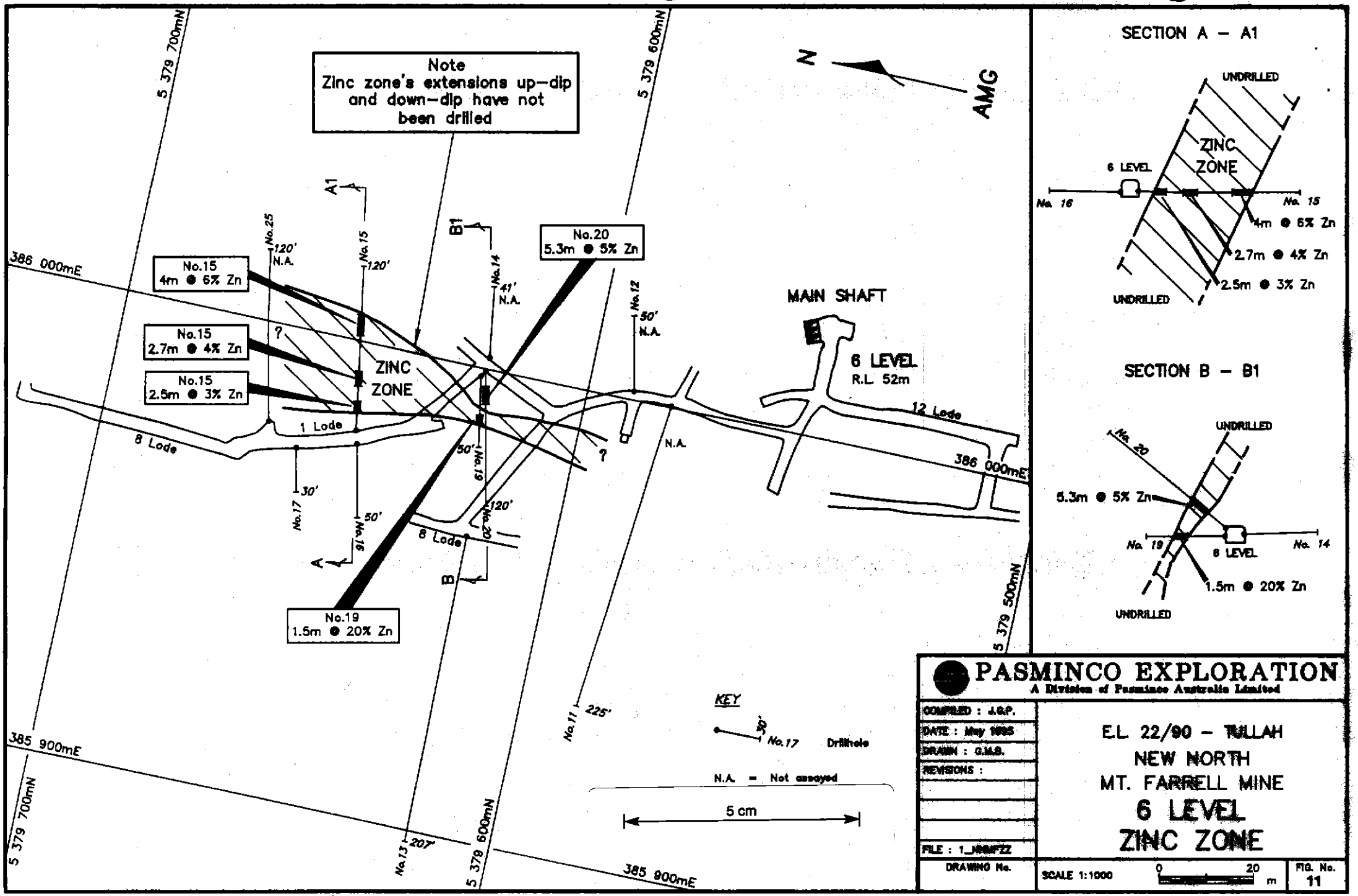
Figure 11 gives some idea of the situation and also illustrates the zinc potential. A series of close-spaced zinc lodes (1.5-5.3m wide and 3-20% Zn) intersected in drill holes, were not touched by the miners, neither were their likely extensions tested by further drilling. It is highly probable this situation is repeated throughout the Farrell system - the example on 6 Level seems to have been fortuitously intersected.

In conclusion, the Farrell mineralization appears to be a vein swarm with the zinc-rich lodes remaining largely unmined.


NEW NORTH MT. FARRELL
NORTH MT. FARRELL
MT. FARRELL
MT. FARRELL SOUTH
1934-1973 Produced : 299,000t @ 14.9% Pb 2% Zn, 506g/t Ag
1899-1933 Produced : 432,000t @ 11.4% Pb 2% Zn, 370g/t Ag
11,000' RL
10,000' RL
9000' RL
1 Level
Main Adit
4 Level
5 Level
9 Level
10 Level
ZINC-RICH ZONE
UNDRILLED
TF1
1F
1F
F48
2.4m @ 8.4% Pb 7.2% Zn, 280g/t Ag
3F barren
MEASURED RESOURCE 71,000Tt @ 12.3% Pb 4.8% Zn, 378g/t Ag
5 cm
KEY
Ore stoped
Current Measured Resource
Underground drillhole intercept
Surface drillhole intercept
12,000'
10,000'
8,000'
PASMINCO EXPLORATION
A Division of Pasminco Australia Limited
COMPILED : F.G.F.
DATE : 1991
DRAWN : G.M.B.
REVISIONS : J.G.P.
DATE : May 1995
FILE : FARLLONG
DRAWING No.
E.L. 22/90 - TULLAH
FARRELL AREA
LONGITUDINAL PROJECTION
SCALE N.T.S. 0 250 m
FIG. No. 10

754043

754044










**PASMINCO EXPLORATION**
A Division of Pasminco Australia Limited

| | |
|---|---|
| COMPILED : J.G.P. | E.L. 22/90 – TULLAH |
| DATE : May 1995 | NEW NORTH |
| DRAWN : G.M.B. | MT. FARRELL MINE |
| REVISIONS : | **6 LEVEL** |
| | **ZINC ZONE** |
| FILE : 1_NNMFZZ | |
| DRAWING No. | SCALE 1:1000 0 20 m |
| | FIG. No. 11 |

# 8 DISCUSSION

## Farrell Fault VHMS Search

The results of the 1994-95 VHMS search along the Farrell Fault point to the untested area south of the Sterling Valley Mine as being of interest, while the zone between the Murchison Gorge and the Farrell Mines appears to have little or no potential.

There is noticeably more sulphides and deformation in the Farrell Slates and more alteration in the Murchison Volcanics, south of the Murchison Gorge compared to north of it. With the exception of the Mackintosh Dam area mentioned below, future VHMS search along the contact should concentrate in the Sterling Valley.

## Sterling Valley Mine Area

At Sterling Valley Mine the Murchison Volcanics are the most strongly altered known to date and further testing is definitely warranted. The planned DHEM survey of SR3 may provide some direction for further work, but the +1.5km of undrilled Farrell/Murchison contact south of SR3 is the obvious target. While immediate drilling is favoured, the use of IP to map the pyritic alteration in the poorly-exposed volcanics here could be investigated.

The use of EM is not recommended, because the graphitic nature of the Farrell Slates adjacent to the contact here would undoubtably mask any sulphide responses in the volcanics.

## Sterling Valley

The 2km gap between hole SR2 and the Murchison Gorge also warrants drilling. A hole (SR4) was designed this year to test the contact at 5 374 650N, but was cancelled when funds ran low. An apparently-synvolcanic NW-trending cross fault, interpreted by Barry Murphy (see Appendix 12 and Figure 17), intersects the contact in this

vicinity. Alteration of the volcanics at surface is patchy and the target is not as good as at Sterling Valley Mine.

**North of Murchison Gorge**

The results of hole TF1 near Farrell Mines are disappointing - there is a lack of alteration and sulphides in the sequence. This mirrors the results in hole MM1a at Murchison Mine, 2km to the south, and downgrades the potential of the section of contact in between. While surface mapping and examination of this 2km length of contact would be wise rather than ignoring it completely, this is not a high priority. The old Central Mine workings close to the contact 1.3km north of Murchison Mine should be examined (see Figure 4).

**Mackintosh Dam Area**

At Mackintosh Dam (north of Farrell Mines), basemetal massive sulphide boudins occur in Farrell Slates adjacent to a body of felsic volcanics wholly enclosed by the sediments (Purvis, 1994). This may well be an exposure of dismembered Farrell/ Murchison contact as felsic volcanics are unknown elsewhere within the Farrell Slates. The Mackintosh Dam area is also notable for its degree of structural disturbance (being adjacent to the Henty Fault) and such dismemberment is possible here.

If this scenario is correct, the fact that massive sulphide boudins occur within a few metres of the contact makes the Mackintosh Dam area well worthy of re-examination (three short holes were drilled there in 1993-94). To the south of the massive sulphide outcrop there is 2km of poorly-explored ground in which the prospective contact may be present. Mapping and rock sampling is the first requirement here.

**SR2 Follow-Up**

The off-hole DHEM response at 88m in hole SR2 suggests the mineralized zone in the Farrell Slates at this point in the hole (4.25m @ 0.3% Zn, 0.4% As & 0.2% Sn,

including 1m @ 0.46% Sn), is stronger north and below the hole. The chance is for better tin grades and some gold. A 150m hole sited 50m north of SR2 would test this potential.

**Farrell Mines**

The brief evaluation at Farrell Mines has turned up some unexpected potential for an open-cuttable resource based on a zinc-rich vein-swarm concept. A proper evaluation of the existing data and drill core is needed, but if the concept held up the best method of testing it would be to drill a series of shallow holes right across the known lode positions. The most prospective areas are directly above the two old mine workings and in the 400m gap between them.

**Murchison Gorge**

Intensely silica-chlorite altered Murchison Volcanics occur on the contact with altered Murchison Granite in the Murchison Gorge. Pyritization is widespread and several small copper showings are known. Magnetite-pyrite rich zones are also present. In the 1970's Asarco tested limonite draining from HEC drill holes in these rocks (the holes were put in to test the route of the Sophia Tunnel), and found them to contain anomalous levels of Pb & Zn.

The alteration in the gorge area is well described by Polya (1981).

Mapping and rock sampling was commenced in the gorge this year but was quickly curtailed due to other work pressures. There is clearly potential here for economic basemetal (mainly Cu-Au) mineralization either in thermally-metamorphosed volcanics adjacent to the granite contact, or porphyry-style within the granite itself. The possibilities have also been pointed out by Allen (1995).

Initial testing requires a rock chip sampling programme utilizing all the HEC-made exposures on roads, old work sites, quarries etc, and including sampling of available old HEC drill core.

**Granite-Related Mineralization**

The potential for Au-Sn-Cu mineralization associated with the ridge of Devonian granite beneath the Sterling Valley was emphasized last year (Purvis, 1994). The shape of the granite, interpreted from gravity by Leaman (1993), is shown in Figures 5 & 12. Based on experience at Rosebery Mine, Leaman's depth estimate of 500m can safely be doubled.

The 1994-95 work has highlighted the calcareous nature of the Farrell Slates, much of which appears to be primary as thin impure limestone beds are very common in places. Such rocks could well provide reactive hosts for granite-associated mineralized fluids.

While Au-Sn-Cu are not the most desirable commodities for Pasminco it is probable the granite-related mineralized system, of which the Lakeside and 'Arsenic Resource' bodies (as well as the widely-distributed quartz-sulphide lodes), are regarded as small manifestations, is the largest and strongest of any type on the EL's.

Exploration of this granitic system is again urged, with initial drill testing at depth in the Lakeside - 'Arsenic Resource' area (see Figure 4). Consideration should be given to finding some sort of targeting mechanism (detailed gravity?, geochemistry?, isotopes?). Electrical geophysics is not favoured because of the depth and presence of the Farrell Slates, although DHEM should be done on any deep drill holes put down.

# LONGITUDINAL PROJECTION ALONG HENTY FAULT

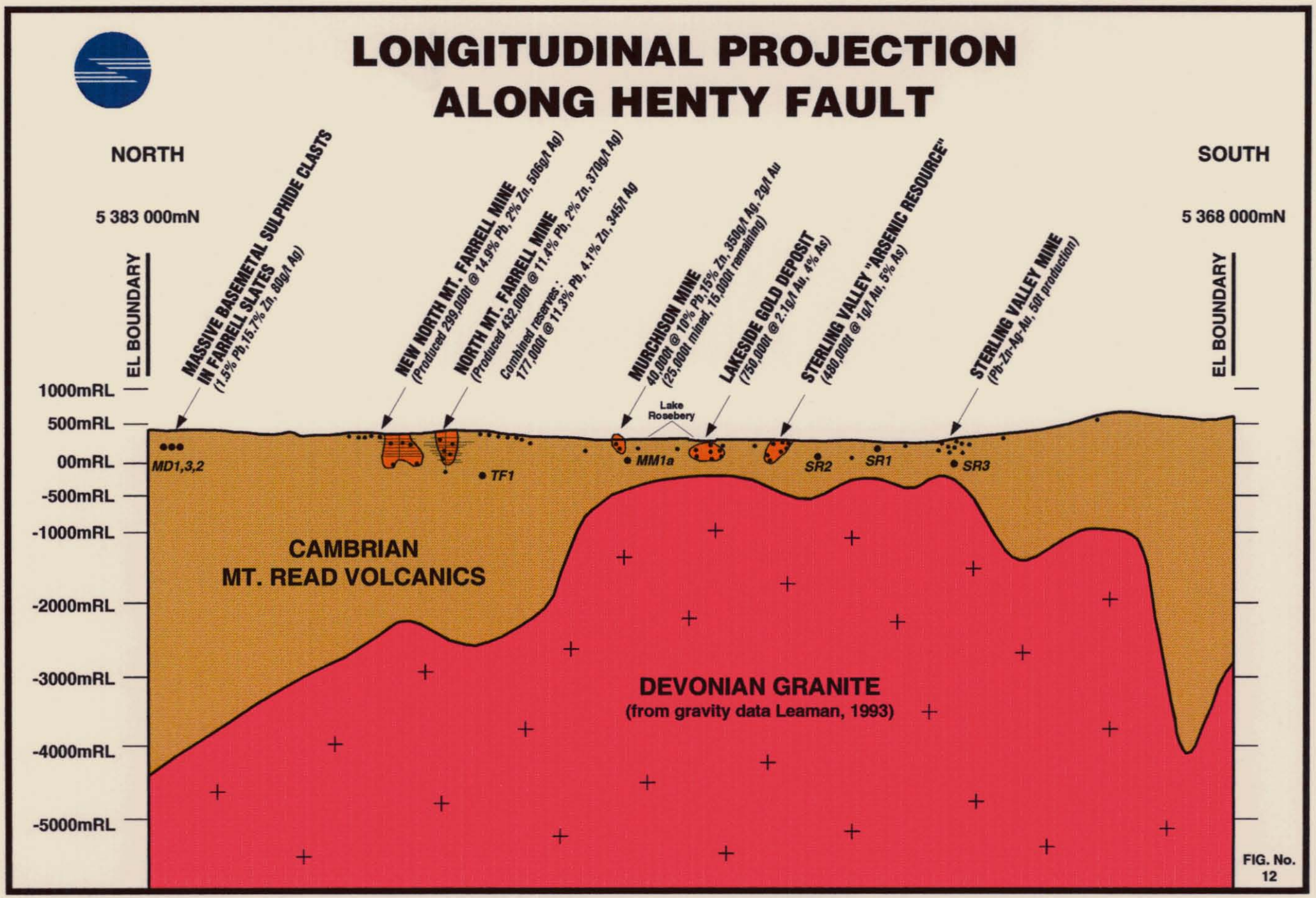



FIG. No. 12

2540 49

# 9 CONCLUSIONS

1. Results of the VHMS search along the Farrell Slates /Murchison Volcanics contact have confirmed and enhanced the validity of the geological concept. The alteration, facies and overall setting are similar to known massive sulphide producing systems in the Mt Read Volcanics and elsewhere. The contact remains the primary VHMS target on the EL's.

2. The volcanics at the Sterling Valley Mine are the most intensely altered and prospective along the contact. The +1.5km of untested ground south of the mine is the best identified target for further work.

3. Other target areas on the contact are the untested 2km at the northern end of the Sterling Valley, and potentially 2km of structurally-disturbed contact in the Mackintosh Dam area, where the known basemetal massive sulphide boudins are inferred to lie on a dismembered contact fragment.

4. The 2-3km of contact between Murchison Gorge and the Farrell Mines appears to have little or no VHMS potential.

5. At Farrell Mines there is potential for an open-cuttable resource based on the concept of a swarm of zinc-rich lodes/veins left behind by the old miners. This potential is best directly above the old mine workings and in the 400m gap between them.

6. The intense alteration and basemetal showings associated with the margins of the Murchison Granite in the Murchison Gorge have as-yet-untested possibilities for economic Cu-Au (±Pb-Zn) mineralization.

7. The widespread significant showings of Au-Sn-Cu-As suggest the mineralized system associated with the Devonian granite ridge beneath the Sterling Valley, is probably the largest and strongest of any system on the EL's.

# 10 RECOMMENDATIONS

1. Immediate drilling to test the Farrell/Murchison contact south of hole SR3 at Sterling Valley Mine. The efficacy of using IP to map the pyritic alteration zone in the volcanics here should be investigated. The use of EM is not recommended.

2. Drilling of hole SR4 to test the contact in the Sterling Valley at 5 374 650N.

3. Mapping and rock sampling along the contact zone immediately south of Mackintosh Dam (high priority), and between Murchison Mine and Farrell Mines (low priority).

4. Comprehensive evaluation of the mineralization and geology at the Farrell Mines using all available data. Followed by a series of short diamond drill holes across the lode channels in the area above and between the old mine workings, to test for a zinc-rich lode swarm.

5. A large programme of rock chip sampling in the altered/mineralized volcanics and granite in the Murchison Gorge, utilizing the excellent man- made exposures. Sampling also of selected available HEC drill core.

6. A deep drill hole (500m+) in the Lakeside - 'Arsenic Resource' area as an initial test of the granite-related mineralized system beneath the Sterling Valley. Development and use of targeting methods to guide future drill testing of this system.

754052

## 11 REFERENCES

Allen, R.W. 1995. Geological Transect Across the Sterling Valley and Murchison Volcanics, Tasmania. Unpub Report to Pasminco Exploration, January 1995.

Blackwell, J.D. 1992. Summary Report, Sterling Valley and Tullah Area, Tasmania. Unpub Rep to Pasminco Exploration, March 1992.

Green, G.R. 1990. Alteration Mineralogy, Whole Rock Geochemistry and Oxygen Isotope Zonation in the Area North of the Grand Centre Prospect, Rosebery Mine Leases. Unpub Rep for Pasminco Mining Rosebery, May 1990.

Leaman, D.E. 1993. Tullah - Sterling River Area, EL 22/90 - 24/91, Interpretation, Gravity and magnetic Data. Unpub Rep for Pasminco Exploration, October 1993.

Murphy, B. 1995. Tullah Sterling Structural Review. Unpub Pasminco Expln Memo, 17th February 1995.

Polya, D.A. 1981. The Geology of the Murchison Gorge. BSc Honours Thesis, Uni of Tas, November 1981.

Purvis, J.G. 1992. Tullah EL 22/90 & Sterling River EL 24/91, Western Tasmania. Annual Report October 1991 - September 1992. Unpub Pasminco Expln Report No. T92-13.

Purvis, J.G. 1994. EL 22/90 Tullah & EL 24/91 Sterling River, Annual Report. September 1993 - September 1994. Unpub Pasminco Exploration Report No. T94-8.

Uren, J.A.W. 1994. Structure and Mineralization of the Farrell Slates and Murchison Volcanics, Tullah Area, Tasmania. BSc Honours Thesis, Monash University, November 1994.

754053

# 12 KEYWORDS & LOCALITY

## KEYWORDS

ZINC, LEAD, GOLD, SILVER, ARSENIC, TIN, VOLCANOGENIC, ALTERATION, STRUCTURE, DRILLING, GEOCHEMISTRY, AEROMAGNETICS, GRANITE

## LOCATION

BURNIE SK55-3 & QUEENSTOWN SK55-5:
TULLAH, STERLING RIVER, MT MURCHISON

754054

# APPENDICES

754055

# Appendix 1

## Log of Hole TF1

# PASMINCO EXPLORATION
# DIAMOND DRILL CORE RECORD

HOLE No. TF1

754056

Page 1 of

| | |
|---|---|
| LOCATION | TULLAH |
| PROJECT | EL 22/90 |
| PROSPECT | FARRELL |
| DESIGNED BY | J.G. PURVIS |
| LOGGED BY | J.G. PURVIS |
| RELOGGED | |
| COMMENCED | 25.5.95 |
| COMPLETED | 11.7.95 |
| DRILLED BY | L. LORRIGAN |
| DRILL RIG | LONGYEAR 44 |

## OBJECTIVE

TO TEST HENTY FAULT, FARRELL LODE POSITION, AND FARRELL SLATES/MURCHISON VOLCANICS CONTACT IN POORLY-KNOWN AREA EAST OF FARRELL MINES.

## RESULT

NO SIGNIFICANT MINERALIZATION INTERSECTED. FARRELL SLATES/MURCHISON VOLCANICS CONTACT CONFORMABLE AND COMPLETE, ALTHOUGH SHEARED.

## LOCATION/SURVEY DATA (AMG)

| | | | |
|---|---|---|---|
| Grid | AMG | | RL Collar m 284.8 |
| Northing m | 5378507.2 | | Bearing Collar 090° |
| Easting m | 385562.3 | | Dip Collar −62.5° |
| DH Survey Type | EASTMAN CAMERA | | Length Hole m 813.1 |

## SIGNIFICANT INTERSECTIONS

| From m | To m | Interval m | Cu | Pb | Zn | Ag | | Comments |
|---|---|---|---|---|---|---|---|---|
| 127 | 129 | 2 | | | 0.17% | | | HENTY FAULT - Crushed Zone |
| 255 | 257 | 2 | | 0.1% | 0.33% | | | Black shale ± carb-sp veinlets |
| 666.95 | 668 | 1.05 | | 2.23% | | 50 g/t | | Qtz-siderite-gn lode (Farrell Slates) |
| 798 | 801 | 3 | | | 0.21% | | | Disseminated sp in epiclastics of Murchison Volcanics |

## SIGNIFICANT CORE LOSS

| From m | To m | % Lost |
|---|---|---|
| NO SIGNIFICANT CORE LOSS | | |

## POOR GROUND CONDITION ZONES

| From m | To m | Condition |
|---|---|---|
| 125.25 | 128.7 | Broken, with pug zones (HENTY FAULT). |
| 226.3 | 227.5 | Fault with bx + pug (FARRELL LODE POSITION) |
| 733 | 750 | Fissile + broken along foliation (shale). |

## HOLE SIZE

| Size | Depth m |
|---|---|
| HQ | 119.9 |
| NQ | 813.1 |

## HOLE CONDITIONS AFTER COMPLETION

| | |
|---|---|
| Collar | STEEL CAP PUT ON HW CASING, COLLAR CEMENTED. |
| Steel Casing | 6m HW CASING LEFT IN TOP OF HOLE |
| PVC Casing | 40mm ID PVC PLACED TO BASE |
| Ground Water | |
| Wedge | |
| Drill Pad | |

| Depth m | Bearing | Dip | Depth m | Bearing | Dip |
|---|---|---|---|---|---|
| 30 | 092.8° | −61.4° | 750 | 112.5° | −30.5° |
| 60 | 094.5° | −61° | 780 | 114° | −29.3° |
| 90 | 092.5° | −60.3° | 800 | 115° | −28.8° |
| 126 | 099.5° | −59° | | | |
| 150 | 096° | −58.3° | | | |
| 180 | 095.5° | −57.4° | | | |
| 210 | 095.5° | −56.3° | | | |
| 240 | 095° | −55.3° | | | |
| 270 | 091.5° | −54° | | | |
| 300 | 091.5° | −53° | | | |
| 330 | 092° | −51.8° | | | |
| 360 | 095° | −50° | | | |
| 390 | 094.8° | −48.5° | | | |
| 420 | 097° | −47° | | | |
| 450 | 098.3° | −45.6° | | | |
| 480 | 100.5° | −44° | | | |
| 510 | 102° | −42.8° | | | |
| 540 | 104° | −41° | | | |
| 600 | 106° | −38° | | | |
| 630 | 107° | −37° | | | |
| 660 | 108.5° | −35.3° | | | |
| 690 | 110° | −33.8° | | | |
| 714 | 111° | −32.3° | | | |

Project : TULLAH
Logged by: J.G. PURVIS
Date : JULY 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. TF1



754057

| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 0 | | | Tricone | MT BLACK VOLCANICS | Rare py, gen assoc with chl veinlets |
| | ↑ minor ox on fracts | Mod fract + broken ↓ | | MASSIVE FELDSPAR-PORPHYRITIC DACITE WITH MINOR MAFIC DYKES | |
| | sil-alb>ser (2-3) chl-co (1) | Gen hard & unbroken | | | |
| 10 | Abund co ± chl veinlets Lesser qtz>co±chl veins (often comb-struct) | 70mm mafic dyke 45° | Irreg pods mafic dyke material | Pinkish-fawn, pale red to reddish-brown. (Mafics green) | |
| | Leucoxenisation of opaques | Weakly foliated ↓ | Mafic Dyke (sub-ophitic) 35° | Common feld laths (white or pink) to 4mm, av 2-3mm. In fi gr felsic groundmass. | |
| | chl-co (2-3) | | Mafic dyke (amygdaloidal) 50° 45° | | |
| 20 | | C: 40° | | | |
| | | Small fault 40° (// fol) | | | V minor py disseme in co-chl veinlets |
| | | | | | ← minor mag in co-chl vein |
| 30 | | C: 43° (Dips 27° to 062° AMG) | | | Rare py |
| 40 | ↓ co veinlets highly abund | C: 45° | Andesitic dyke 45° | | |
| | | Strongly Foliated f 60° (30mm cataclasite) | Andesitic dyke 45° (chl) 300mm chl mafic dyke 50° | | ← minor py in & around dykes |
| 50 | | | | | |

Project : TULLAH
Logged by: J.G. PURVIS
Date : JULY 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. TF1



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 50 | sil-alb>ser (3-4) Almost no chl | Strong foliation ↓ Strong F: 50° F: 45° Mod foliated C: 45° | | 10mm fvg with black shale material. DACITE As before. | Rare py ↓ |
| 60 | sil-alb>ser (4) | fract & bx Strong F 60° | | | ← sp-gn in co-qtz veinlet |
| | sil-alb-ser (3) chl (1) (chl in abund veinlets ± co) Common leucoxene after opaques ↗ pink calcite veins | Weakly foliated ↓ | | | |
| 70 | | C: 45° | | | |
| | chl-co (3) | All // fol 30° 20° 25° | | Basalt dykes (non-mag) | |
| | sil-alb>chl (3-4) | inreg ↓ Not foliated ↑ 25° // fol 25° | | Blotchy texture due to 2° feld overgrowths on feld phenos | |
| | chl-co (3) | | | Basalt Dyke weakly sub-ophitic, non mag | |
| 80 | sil-alb>chl (3) ↑ Leucoxene ↓ qtz-chl veins (sil-alb, 4) | Shear 50° C: 35° | | | ← py stringers Minor py |
| | | | | | Rare py ↓ |
| 90 | | C: 47° (Dips 41° to 157° AMG) 55° (// fol) | | 90.3m | |
| | co>chl (3) Abund calcite veinlets. Leucoxene. sil-alb (1) ↑ | | | MAFIC DYKE Green, med gr, massive. Weakly sub-ophitic. Non mag. Some pink felds to 1-2mm (2°?) | |

TF1 0058

Project : TULLATH
Logged by: J.G. PURVIS
Date : AUGUST 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. TF1



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding c = cleavage f = fault Angles to LCA | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32 max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 100 | co>chl (3) | | | Mafic Dyke | Rare py |
| | | 50° | | 102.4m | |
| | sil-alb>>ser (3) chl (1) Numerous co>chl veinlets | Hard, largely unbroken. Weakly foliated C: 40° | | DACITE As before. Feld phenos v indistinct due to alteration | |
| 110 | | | | | |
| | | Foliation Increasing C: 50° | | 100mm sheared mafic dyke material in foliation. | |
| 120 | | (Dips 83° to 274° Mag) C: 40° C: 33° | | | |
| | ser>sil-alb-ble (2-3) | Strongly foliated + sheared | | | Minor to 1% py, dissem + stringers. Rare sp-gn. |
| | | 45° Broken + sheared + pug 55° | 45° qtz lavgen 45-55° | 125.25m HENTY FAULT Crushed qtz, minor black shale + mafic material (ser>fuc) 125.7m HENTY FAULT | |
| | CO (2-3) Dispersed + in abund veinlets. sil (1) | FAULT ZONE Cataclasite zones, brecciated + broken, 60° | sst/sh Foliated Dacite sst/sh | FARRELL SLATES 128.7m MAINLY FINE CALCAREOUS SANDSTONE/SILTSTONE Qtz-feldspathic. Carbonaceous. Minor interbeds of grey siltstone and black shale | 1-2% py, dissem Rare gn. |
| 130 | Minor patchy sil assoc with thin qtz veins | Mod-Strongly Foliated Bk: 65° Faulted 55° (// fol) | shale | | 1% dissem py |
| | | C: 70° | | | |
| 140 | | | | | Minor py |
| | | Soft-sed disruption Weakly foliated B: 71° | | 90% sst 10% black shale | |
| 150 | | | | | |

P54059

Project : TULLAH
Logged by: J.G. PURVIS
Date : AUGUST 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. TF1



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 150 | co (2-3) Patchy sil(1) assoc/c qtz veinlets. ↑ Abund co ± qtz veinlets throughout ↓ | ↑ Weakly foliated ↓ soft-sed disruption | sericitic siltstone | MAINLY SANDSTONE AS BEFORE Minor thin black shale interbeds. Minor detrital mica in sst. | Minor dissem py ↓ |
| | | B: 73° (Dip: 10° to 268° AMG) | | | |
| 160 | | B: 71° | | | |
| | ↓ carbonate increasingly & Mn-type | small f: 60° (//b) ↓ Stronger fol Minor kinks //LCA | siltstone/shale | | |
| | 0.4m broken qtz vein | Fuzzy cataclasite ///on vein margins | 60–70°//fol | 168.7m QUARTZ LODE (FAULT) 169.3m | Minor to 1% py |
| 170 | ↑ Abund irreg co (siderite?) veinlets ± qtz (some pre-date fol) ↑ Minor chl veinlets ↓ | Strongly foliated ↓ B: 55° ↑ | | STRONGLY FOLIATED BLACK SHALE Partly graphitic. Carbonate-veined. | 2% py dissem & veinlet. Trace sp-gn in shale & co veinlets. |
| | | | | | 3% py. Trace sp-gn. |
| | | | | | 2% py. Trace sp-gn. |
| 180 | | C: 65° f: 65° Strong f: 47° (Dips 79° to 275° AMG) Contact: irreg | B: 55° (Dips 2° to 107° AMG) | 183.0m | 1% py. Trace sp-gn. |
| | co veinlets (some sid) less than above | B: 75° ↑↑ Weak-mod foliation ↓ | sericitic shale | TURBIDITIC QUARTZ-CRYSTAL-LITHIC SANDSTONE MASS FLOW Below 184.3m appears to be single up-hole fining mass-flow. Grey. Massive & uniform. Qtz xtl grains & common black shale frags, in sl vitric matrix. | Minor to 1% py. Trace sp-gn. - dissem & in siderite veinlets |
| 190 | Qtz veinlets | C: 70° | | | |
| | | Fold kink //LCA | | | |
| | co (1-2) pervasive Also co veinlets as above | C: 72° f: 65° (//b) | | | |
| 200 | | | | | |

RC4660

Project : TULLAH
Logged by: J.G. PURVIS
Date : AUGUST 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** TF1



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 200 | co (1-2) as above | C: 68° | | ↓ Increasing black shale frags | Minor dissem py. Rare sp-gn. |
| | | ↓ Moderate foliation | | AS ABOVE ← stretched black shale frags to 5mm long | |
| 210 | | C: 70° (Dips 18° to 034° AMG) (questionable measurement) | | ↓ Lithic component increasing (black shale + fi gr tuffaceous seds) some feld xyl grains also (1-2mm) ← 70 x 25mm black shale clast ↓ stretched lithics av 10mm, to 30mm vólc qtz xyls to 2-3mm (abraded) (abundant) | |
| | | Contact B/c: 75° small f: 80° (// fol) | | Black shale rip-ups 218.65m | |
| 220 | Abund spidery siderite (± qtz ± chl) veinlets Common qtz-co ± chl veins, commonly brecciated & disrupted | // fol ↑ [ strong f: 75° f: 60° | | BLACK SHALE Carbonaceous Strongly graphitic in places, esp around faults & on foliation planes. FARRELL LODE POSITION? Highly graphitic shale disrupted & brecciated | ← 1mm aspy veinlet 1-2% py (conc in co veinlets) |
| | | Strongly foliated contorted in places f: 60° | Puggy cataclasite | | 2-3% py Dissem & veinlet |
| 230 | | major fault 65° | | | 1-2% py. Rare aspy. |
| | | v strong f: 70° | cataclasite | | |
| | co (Fe/Mn type) ± qtz ± chl veinlets in fol. dispersed co (1) around co veinlets. | Moderately foliated C: 55° ↓ | | | 2-3% py Dissem & veinlet. common 1mm py veinlets in fol |
| | | f: 20°? | Pug | | |
| 240 | | B/C: 70° (Dips 58° to 292° AMG) | | | |
| | co (1-2) - dispersed + co (Fe/Mn type) (± qtz) veinlets. | B/c: 62° Folds | | ↓ small co-rich laminae | ↓ py conc in co-rich lam in co veinlets |
| 250 | | | | | |

RC4061

Project : TULLAH
Logged by: J.G. TURVIS
Date : AUGUST 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. TF1



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 250 | As before<br>co (1-2) dispersed, co ± qtz veinlets<br>↓ occasional qtz veins to 100mm. | Fold noses<br>f: 65° (// Fol) | Thin co-rich laminae | BLACK SHALE | ← 70 x 8 mm broken massive py bed in fol<br>co-sp veinlets to 10mm<br>2-3% py dissem > veinlets. Rare as py + sp |
| 260 | | B/C : 50°<br>Mod foliated<br>f: 60°<br>f: 25° (// Fol) | sulph vein (70mm) in fault. | | ← 70mm qtz-py vein |
| 270 | | B/C: 52° (Dips 33° to 145° AMG) (Questionable measurement) | | | ← minor sp in co > chl veinlets |
| | ↓ Trace chl in co-qtz veinlets<br>Common qtz > co veins to 100mm | Lode 45° // Fol<br>B: 43° | 0.55m qtz vein with black shale frags<br>qtz-xyl sst beds | | 1% py. Rare sp assoc c ← qtz lode barren.<br>co-chl veinlets. |
| 280 | Much less veining. Patchy co (1) | Contact 50° (// Fol) | 283.2m<br>qtz vein to 300mm (barren) | | 2-3% dissem py |
| | co (2) - Fe/Mn type. Sev (1-2) Some chl veinlets | Mod foliated | qtz veinlets sericitic<br>shale | THINLY-INTERBEDDED TURBIDITIC SANDSTONE/ SILTSTONE + SHALE<br>Grey<br>Downhole - fining sst beds (calcareous) 30-200mm thick, with dark grey siltstone + shale.<br>All rocks sl carbonaceous.<br>Sst = qtz-feld-lithic (incl small flecks of black shale)<br>Unit comes more shaley with depth. | ↑ V minor sp-qn veinlets<br>Minor to 1% py Dissem. |
| 290 | co (2) (calcite, not Fe/Mn type as above). Persistent veinlets of calcite ± qtz | ↑ V weakly foliated<br>B: 55° (c: 15° off sense) | sst 0.1-0.2m thick<br>shale<br>shale | | ← py veinlets in shale<br>Trace po ↓ |
| 300 | | | | | 2-3% po >> py Dissem. |

RC4062

Project : TULLAH
Logged by: J.G. PURVIS
Date : AUGUST 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No. TF1**



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding c = cleavage f = fault Angles to LCA | GRAPHIC LOG 0.06 mud, 0.5, 2, 8, 32, max mm | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 300 | As before | ⇓ ⇓ ⇓ | qtz vein | SANDSTONE SILTSTONE & SHALE As above | 2–3% po >> py, dissem + veinlets. Rare sp + cp in co veinlets ↓ |
| | co(2) Calcite ± qtz veinlets more common. Minor qtz > co-chl veins to 120mm. 200mm qtz > co-chl vein, chl (1) around vein | More silt/shale and more thinly-bedded. B: 53° | | | |
| 310 | | V regular bedding B: 58°. C: 15° (same sense) | | | |
| | | B: 57°. C: 27° (same sense) | | | |
| 320 | co(2) Calcite ± qtz veinlets less common. No qtz veins | B: 48° ↓ Moderately foliated | | Thin limestone beds sandstone with shaley matrix. Vol qtz to 5mm, felds to 3mm. Qtz commonly deformed to augen by foliation of matrix. 329.0m | |
| 330 | ser > chl-sil-co (1-2) ↓ qtz > co ± chl veins to 400mm, gen irreg ↓ | Contact: B 55° Contorsable. B/c: 60° (Dips 60° to 28° SW) Moderately foliated ↓ C: 57° | shaley bands | ± qtz-porphyry frags (± cp + sp). PUMICEOUS QUARTZ–CRYSTAL SANDSTONE Greenish-grey. Massive, lineated. Abundant abraded (sub-rounded to rounded) + fractured, qtz xyls to 7mm, av 2–3mm. In, sericitic finely pumiceous matrix (av < 5mm). Abund small angular qtz xyl frags. 342.45m | Minor to 1% dissem py. ∨ minor dissem py |
| 340 | | | qtz, qtz, qtz, qtz | | |
| 350 | co ± qtz veinlets ↓ qtz-co ± chl veins to 250mm ↗ qtz vein | Contact B: 50° Contorsable ⇓ ⇓ Weakly foliated (bedding //) B: 57 Regular bedding from 1mm to 1m (sst) ⇓ | lst beds | MONOTONOUS INTERBEDDED TURBIDITIC SANDSTONE SILTSTONE + SHALE Grey to dark grey. Strongly calcareous – some beds are impure limestone | Minor to 2% po > py. Dissem ← 100m qtz vein ± po + trace cp. |
| 360 | | | | | |

TS4063

Project : TULLAH
Logged by: J.G. PURVIS
Date : AUGUST 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. TF1



RS4064

| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding c = cleavage f = fault Angles to LCA | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 350 | Minor chl veinlets (± co) | V weakly foliated<br>B: 55°<br>C: 45° (opp sense) | (some lst) | AS BEFORE: MONOTONOUS CALCAREOUS SANDSTONE, SILTSTONE + SHALE<br>Rocks are "dirty" ie: strong lithic component. Sst composed of lithic > qtz-feld + mica. Sl carbonaceous. Lithics in sst include cherty frags and black shale | V minor po > py dissem + lesser veinlets |
| | | | siltstone turbidites 50-100mm | | |
| | | | fine sst turbidite | | |
| 360 | Minor co ± qtz veinlets | B: 41°, C: 62°<br>(B dips 88° to 325° AMG<br>C dips 65° " " ) | strongly foliated black shale | | |
| | | | ungraded sst & silt | | |
| | | B: 65° | unraded sst | Rocks much more micaceous | |
| 370 | | | | | |
| | | Fold | sst turbidites 50 ± 150 mm | | |
| | chl (2-3) assoc ± zone of qtz-chl-co veining | | qtz vein<br>qtz<br>qtz | | |
| | | B: 41° | sst turbidites 50-200mm | | |
| 380 | | | | | ← po veinlets |
| | chl (1) assoc with irreg qtz > chl-co veins | Strongly foliated qtz with some brecciation | qtz | | 1% po > py Dissem + stringers.<br>← Trace cp in qtz veins |
| | | Weakly foliated | | | |
| 390 | | B: 48°, C: 75°<br>(B dips 7° to 062° AMG, C dips 32° to 242° AMG) | some thin impure lst beds | | Po conc in silst/shale as v fi gr dissem. |
| | | | sst turbidites 100-300mm | | |
| | | B: 27°, C: 60° (same sense) | Limey siltstone | | |
| 400 | | | | | |

Project : TULLAH
Logged by: J.G. PURVIS
Date : AUGUST 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. TF1



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding c = cleavage f = fault Angles to LCA | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 400 | Minor qz veinlets<br>Lesser qtz > cc ± chl veins to 200mm | V weakly foliated<br>Thinly bedded<br>B : 75° | Fold<br>some lst<br>limey<br>sst 50–400mm<br>Fold<br>sst 100–200mm<br>sst 100–200mm<br>impure lst beds<br>qtz<br>some lst<br>v limey<br>?Fold axis - B gen almost // LCA. Much intra-formational folding of limey siltstone<br>v limey<br>chl veinlet (+ py)<br>More thinly bedded<br>Ungraded sst<br>some limey siltstone beds<br>lst interbeds | MONOTONOUS SANDSTONE, SILTSTONE & SHALE<br>As before.<br>Rocks strongly calcareous (except shale)<br>Lithic & micaceous.<br>Minor carbonaceous material<br>Visible volc qtz grains in base of sst turbidites - otherwise, rocks not very siliceous.<br>Common creamy, finely-laminated limey siltstone and impure limestone (av <30mm).<br>B: 45° C: 70° (B Dips 75° to 327° AMG, C dips 59° to 327° AMG)<br>Deformed Zone: - common small-scale folding esp of limey beds<br>More shale, less sst. | Minor to 2%<br>py > py<br>Po mainly as v fi gr dissem in shaley beds<br>Minor veinlets (rare cp in these) |
| 410 | | | | | |
| 420 | | | | | |
| 430 | | | | | |
| 440 | | | | | |
| 450 | | | | | |

254065

Project : TULLAH
Logged by: J.G. PURVIS
Date : AUGUST 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** TF1



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32 max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 450 | V minor co 1qtz veinlets | B/c: 54° (Dips 80° to 306° ATHG) Fold ↑ Weakly foliated ↓ Thin regular bedding. Fine intraformational slumping B: 50° folding of limey beds. | impure lst beds | SANDSTONE, SILTSTONE SHALE AS BEFORE Less calcareous because more shaley. Thin creamy impure limestone and limey siltstone beds, v common. | Minor to 2% po > py as before |
| 460 | | | | | Minor po > py Mainly dissem. |
| 470 | | b: 50° c: 70° (same sense) ↓ Weak-mod foliated | sst has lithic-rich bases; sst turbidite 200–300mm; some lst beds < 20mm | | |
| 480 | 130mm → 1½-co vein (minor chl veinlets around vein) | Fold; B: 54°, C: 68° (B dips 82° to 300° ATHG; C dips 64° to 300° ATHG). Zone of mod-strong foliation f: 70° (11 RL) | siltstone/shale beds av < 50mm; Limey siltstone beds common. | | Minor to 2% po > py Mainly dissem. |
| 490 | ↓ carbonate becomes Fe-type | B: 62° B: 65° | sandy lst < 20mm; Common beds of limey siltstone. Silt/sh av < 50mm. | | ↓ py > po |
| 500 | | | | | |

75406

Project : TULLAH
Logged by: J.G. PURVIS
Date : AUGUST 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. TF1



RB4067

| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding c = cleavage f = fault Angles to LCA | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 500 | Scattered co-qtz±chl veinlets | Beds av <30mm B: 60° Contact: irreg | numerous (very silty) beds | AS BEFORE 504.45m | Minor to 1% py>>po. 1-2% py, dissem & veinlet. Rare cp. |
| | Massive white dog-tooth qtz veins & minor co(fe type). co-chl(1) of host rock | Lithological change box-cong fines downhole Contact: 35°(sub//B) | Black shale frags in qtz | ZONE OF QUARTZ VEINING Containing lumps & bands of host lithic breccio-conglomerate (frags/clasts av 5-10mm of qtz-phyric volc, tuff sds, black shale), also lithic sst. 509.75m | Qtz barren except: clots of py>sp-gn in qtz. Minor dissem py in host rocks. |
| 510 | co(1-2) Rare spots of fuc. zone of qtz veins | Moderately foliated B/c: 60° (Dips 78° to 307° AMG) Contact: 60°(//B/c) | qtz qtz | BRECCIO-CONGLOMERATE + SANDSTONE WITH QUARTZ VEINS sub-angular to sub-rounded stretched clasts of tuff-seds, black shale, qtz, "chert," 514.5m qtz-phyric volcs, rare pumice + magn?s. | Minor dissem py. Rare sp. |
| 520 | co(1) V minor qtz-co veins 10-100mm | B: 72° Moderately Foliated Thick regular bedding (av 0.5-1m) | Ungraded | FINE LITHIC SANDSTONE + SILTSTONE Grey. V minor thin beds of grey-black shale. Rocks are micaceous and sl carbonaceous. Only v sl calcareous. | Trace dissem py |
| | | B: 68° fold | | | |
| 530 | V minor co veinlets | | Ungraded | | |
| | | Fold? (Disrupted bedding //LCA) | | | |
| 540 | | B/c: 82° (Dips 58° to 310° AMG) | | | |
| | | B: 69° | lithic-rich base & qtz-xyl grains. minor shale interbeds | | |
| 550 | | | | | |

Project : TULLAH
Logged by: J.G. PURVIS
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# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. TF1



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding c = cleavage f = fault Angles to LCA | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 550 | As before | Moderate foliation ↓ Contact: B: 87° | ↑↑ qtz xyl grains > lithics SS4-45m | As Before | Trace dissem py. |
| | co (2) (sl fe type) → co augen | Mod foliation (// to B) ↓ B: 84° Contact: B: 84° | ↑ qtz xyl sst ↑ | INTERBEDDED GREY-BLACK SHALE, SILTSTONE + SANDSTONE Sandstone becoming cleaner and more ghose. | Minor dissem py |
| 560 | ser-sil (1-2) irreg qtz > co veins | Contact: irreg & qtz veined | PUMICEOUS QTZ-FELD XYL SST 561.05m | PUMICEOUS QTZ-FELD XYL SST | Minor py |
| | Minor qtz-co veins 10-200mm ↓ | ↑ Weakly Foliated ↓ Thin regular rhythmic bedding (av 5-15mm max 150mm) | | THINLY BEDDED GREY-BLACK SHALE Lesser calcareous siltstone | Minor dissem py (rare veinlets) ↓ some py bedded (locally 1%) |
| 570 | | crenulation cleavage visible B/c: 82° Dips 43° to 299° Mag Fold | | | ↕ |
| | | | ← sericitic siltstone | | ← py veins in vitric siltst. |
| 580 | | Contact: B: 75° | 583.0m | | |
| | V minor co ± qtz veinlets ↓ | ↑ Weak-Mod Foliation ↓ B: 77° | ↓↓↑↑ thinly bedded shale/siltstone | MONOTONOUS INTERBEDDED SANDSTONE, SILTSTONE + GREY-BLACK SHALE Rocks weak-mod calcareous (strongest in siltst). Rocks sl carbonaceous, micaceous, qtz-feldspathic, + lithic rich. Sst "dirty", turbiditic, uniform. | V minor dissem py. ↓ |
| 590 | | Bedding fine + regular (av < 100mm) sst up to 1m. | mainly shale ↑ ↑ ↑ ↑ ↑ ↑ silty/sh beds | | |
| | | B: 73° current bedding | ↓↓ | | |
| 600 | | | | | |

RS4068

Project : TULLAH
Logged by: J.G. PURVIS
Date : AUGUST 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** TF1



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 600 | V minor qtz-co (dol?) veins to 100mm. | B: 73°, C: 82° (B dips 70° to 310° AMG, C dips 61° to 310° AMG). | Fold in shale; Thin-bedded siltstone + shale; Fold | As before. SANDSTONE, SILTSTONE + GREY-BLACK SHALE | V minor dissem py |
| | | Weak-mod foliation | | Siltstone/shale beds av < 30mm | |
| | | B: 80° | ungraded | Sandstone 30-300mm, av 100-200mm. | |
| 610 | | | | | sp in qtz veinlet |
| | | Weakly foliated | Mainly black shale | | Minor to 1% py, mainly dissem. Trace dissem cp. |
| | | B: 75° | sericitic siltst (1% py, trace cp, sp, gn) | | |
| 620 | | | | | |
| | | f: 40° (same sense as B) | Black shale; sst (100-200mm) turbidite; sst (30-300mm) turbidites. | | |
| | | No sign of fold | | | |
| 630 | Trace chl around qtz-co veinlets | f: 70° (// B) Fold | | | |
| | | B/C: 76° (Dips 71° to 287° AMG) | sst 50-300mm; Thinly bedded shale > siltstone av 5-10mm. | | Trace dissem py. Rare cp in co-qtz veinlets. |
| 640 | | | | | |
| | Ser (1-2) Trace chl | | sericitic (vitric) shale bed. | | ← Rare cp-sp-gn in co-qtz veinlets; ← Rare sp-gn in tiny gash veinlets |
| | | B: 77° | Mainly siltstone beds 50-200mm. | | |
| 650 | | | | | |

75069

Project : TULLAH
Logged by: J.G. PURVIS
Date : AUGUST 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. TF1



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32 max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 650 | Minor qtz-co veinlets | Contact: B: 74° | Beds 10–180mm; Thinly bedded (< 50mm) | As before. Rocks micaceous. 654.75m | Trace py (mainly in co-qtz veinlets) |
| | co (1) - in bands up to 250mm gen assoc c co > qtz veinlets; ser (2-3) chl-sil (1) | Mod-strong foliation; C: 74° (Dips 72° to 288° AMG) | vole lithics; black shale with py-sp; carbonaceous shale matrix | VITRIC QUARTZ-CRYSTAL SANDSTONE (the Murchison Mine Host Rock). Light grey. Massive. Uniform. Coarsens downhole from sericitic siltstone at top to v coarse xyl sst at base, with rounded vdc qtz to 9mm, av 2–3mm. Rock composed of larger rounded + fract qtz xyls and smaller angular xyl frags, in vitric, partly pumiceous, matrix. Altered grains (< 1mm) of leucoxenised biotite. Minor clasts, av 5mm, of qtz-phyric volcs. | Rare dissem py |
| 660 | | | | | Trace dissem py + rare cp-sp-gn |
| | qtz-co (siderite)-sulph veinlet swarm // LCA + bx fill | Strongly foliated | Bx zone; Calcareous shale | | 5% gn > py-cp > sp |
| 670 | co (1-2) ser-chl >> sil (2-3) | C: 65° | very pumiceous; shale matrix; calc shale xiphuiges. 673.3m | | Minor dissem py, rare cp |
| | Common tiny qtz-co gash veinlets gen at low angle to LCA | Weakly foliated; Kinks 70° (opp sense to B); shale-rich zones are fissile | some qtz xyls | INTERBEDDED CALCAREOUS SANDSTONE, SILTSTONE + SHALE. Grey to black. Zones of thinly rythmically bedded (av < 15mm) siltstone and shale, + thicker-bedded (av 100–300mm, to 800mm max) turbiditic lithic-rich sst. Rocks are calcareous, esp siltstone. Some beds of impure limestone. Rocks also micaceous and sl carbonaceous. | Minor dissem + veinlet py |
| 680 | Minor qtz-co veins + chl | B: 75° f: 75° (to fol) | Some impure lst beds; current bedding in siltst | | Persistent trace cp > sp dissem + in qtz-co gash veinlets; decreasing |
| 690 | qtz-co veins to 200mm + chl veinlets | B: 69° (Dips 77° to 307° AMG) | shale; sst 50–200mm non-graded; current bedding at top of turbidite | | Rare |
| 700 | | B: 70° c: 67° (opp sense) | | | |

15407O

Project : TULLAH
Logged by: J.G. PURVIS
Date : AUGUST 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** TF1



CR 4071

| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 700 | Minor qtz-co veins + veinlets (± chl) | Moderately foliated | Mainly shale. Beds 3-30mm. | AS BEFORE: SANDSTONE, SILTSTONE + SHALE | Rare py > cp. Dissem + veinlet (cp in qtz-co ± chl veinlets). |
| | Minor chl veinlets | Disruption of bedding by fol, esp in calc siltstone. Strong fol shale. | | | |
| 710 | massive 0.95m qtz > co vein // b/c: 60-70° | B: 81° Fold | Mainly shale. qtz. | Sandy section, increasingly micaceous | 1% py Dissem + veinlet. Rare cp. |
| | | B: 77° | Lithic-rich + qtz-xyl sst. | | Trace py. Rare cp-sp (in qtz-co ± chl veinlets). |
| 720 | Trace chl alteration. | current bedding. B/C: 87° (Dips 64° to 292° MAG) | | sst tending to become double-graded or ungraded. Also increasingly qtz-xyl rich! | |
| | | | Lithic-qtz xyl rich sst + black shale rip-ups | | |
| 730 | minor chl veinlets | fissile + broken along fol. B/C: 70° | impure sst beds | Thinly-bedded silty-shaley section with shale increasing with depth. Beds av 5-50mm. Siltstones very micaceous + calcareous (some impure limestone). | |
| 740 | chl (i) ± sst → | | | | |
| | | Zone of strong foliation with some boudinaging of siltstone beds. B/C: 85° f: 25° | Beds 5-10mm | | 1-2% dissem + veinlet py. Rare cp-gn. Minor py dissem. ← cp-gn in co veinlets |
| 750 | minor chl + ser | strong f: 75° (// fol) Contact: 70° (B/C). Conformable, abrupt. | 100mm sericitic Hunchison Vbles under fault. 750.0m. | | 1% py. Dissem. |

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# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. TF1



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 750 | ser > chl-co (2-3) co augen → | √ strong fol - some qtz + co augen; layering; B/c : 78° ↕ | black shale slivers | MURCHISON VOLCANICS<br>PUMICEOUS QUARTZ CRYSTAL-LITHIC EPICLASTICS<br>Grey-green. Wispy-textured. Massive, granular, uniform. Siliceous, sericitic, hard. | 1% dissem py, often conc in sooty py bands |
| | ser-chl > sil (2-3) co (1) Minor qtz-co veins + veinlets | Strongly foliated | Abund fine pumice + qtz-xyl grains; qtz xtls to 3mm | Up-hole fining mass flow, composed of abund pumice, volc qtz xyl grains, lesser feldspar grains, and sub-angular lithics of tuffaceous sediments, qtz-phyric volcs, + occasional black shale + limestone. | Minor dissem py-po, some veinlets in fol. Rare sp-gn + cp. |
| 760 | | | lithics 5-10mm, qtz xtls to 5mm | | |
| | sil increasing ↓ | C : 75° | fine lithics (to 25mm) | Sandy top and lithic clast-rich base. | |
| 770 | | | black shale rip-up | Minor leucoxene (prob after biotite). | ↓ minor dissem sp ← sp in qtz vein |
| | | C : 78° | | ↓ pumice increasing (packed) Black shale rip-ups to +50mm x 15mm. | 1% po >> py-sp Dissem, clots + small stringers in fol |
| 780 | | C : 77° | | ↓ lithic-rich section (to +50mm) incl minor lst ↕ | 2% po >> py. Po in slugs to 40 x 5mm, in fol Trace cp. |
| | | Contact: Bk. 80° | | 786.95m | 1% po > py as above |
| | ser > chl (1-2) (-chl in tiny veinlets) | ↑ Weakly foliated ↑ Thinly Bedded | Bedding disrupted in places | VITRIC TUFFACEOUS SHALE/ SILTSTONE<br>Dk grey ↓ Pale grey<br>Uniform. Finely comminuted volc. glass + minor small grains of qtz. | 1% po-py-sp-gn Dissem + veinlet. (sp in chl veinlets). |
| 790 | ser > co (1-2) Tiny co veinlets | ↓ B/c : 83° ↓ | | 794.25m | Minor py-po-sp (sp in co veinlets) ↓ Rare |
| | | Contact abrupt, broken | | Disrupted, much included black shale. | |
| | sil > ser (2-3) Minor chl. Co veinlets. | 55° (sub // fol) ↑ Mod foliated ↓ C : 80° | sp ↑ siltstone | MASS FLOW: QUARTZ-FELDSPAR SANDSTONE<br>Dark grey. Hard. Massive. Uniform. Siliceous. (see P17) ↓ | 2-3% py-sp > po (sp assoc ± black shale) |
| 800 | | | Black-shale rip-ups to 20mm thick | | 1-2% sp > py-po Dissem + veinlets (mostly assoc ± zones of sil) |

CSA 012

Project : TULLAH
Logged by: J.G. PURVIS
Date : AUGUST 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. TF1



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 800 | sil > ser (3) Minor chl. qtz > co veins to 200mm. Tiny co veinlets. qtz > chl veins to 200mm. | Moderately foliated ↓ C: 75° (Dips 82° to 301° AMS) | qtz. Texture indistinct due to alteration. | AS ABOVE: SANDSTONE. Composed of qtz xtls to 2-3mm (some euhedral), commonly with silica overgrowths, and minor pumice (3-5mm), in silica-sericite matrix. Some feldspars (2-3mm), visible in stylitic ser-chl patches. | 2% sp >> py Minor to 1% sp > py-gn ↓ Trace py-sp ↓ Rare |
| 810 | | | minor blk shale rip | 813.1m. EOH | |

154073

## TF1 GEOCHEMISTRY

754074

| SAMPLE | FROM | TO | Cu | Pb | Zn | Ag | Au | As | Ba | Sn | Rb | Sr | Zr | V | Nb | Y |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75154 | 123.0 | 125.0 | 5 | 57 | 151 | <1 | <0.008 | 6 | 413 | 6 | | | | | | |
| 75155 | 125.0 | 127.0 | 29 | 198 | 91 | <1 | <0.008 | 41 | 171 | <3 | | | | | | |
| 75156 | 127.0 | 129.0 | 8 | 41 | 1661 | <1 | <0.008 | 43 | 181 | <3 | | | | | | |
| 75157 | 168.7 | 169.3 | 16 | 701 | 313 | <1 | <0.008 | 147 | 171 | 11 | | | | | | |
| 75158 | 169.3 | 171.5 | 80 | 216 | 228 | <1 | <0.008 | 50 | 263 | <3 | | | | | | |
| 75159 | 171.5 | 173.5 | 79 | 107 | 176 | <1 | <0.008 | 62 | 287 | 6 | | | | | | |
| 75160 | 173.5 | 175.5 | 52 | 232 | 406 | <1 | <0.008 | 58 | 253 | 7 | | | | | | |
| 75161 | 175.5 | 177.5 | 84 | 384 | 524 | 2 | 0.01 | 72 | 248 | 9 | | | | | | |
| 75162 | 218.0 | 221.0 | 101 | 63 | 401 | <1 | <0.008 | 42 | 757 | <3 | | | | | | |
| 75163 | 221.0 | 223.0 | 84 | 24 | 56 | <1 | <0.008 | 44 | 571 | 4 | | | | | | |
| 75164 | 223.0 | 225.0 | 70 | 35 | 46 | <1 | <0.008 | 50 | 582 | 4 | | | | | | |
| 75165 | 225.0 | 227.0 | 87 | 63 | 109 | <1 | <0.008 | 68 | 525 | <3 | | | | | | |
| 75166 | 227.0 | 229.0 | 93 | 71 | 185 | <1 | <0.008 | 50 | 626 | <3 | | | | | | |
| 75167 | 229.0 | 231.0 | 74 | 77 | 158 | <1 | <0.008 | 66 | 512 | <3 | | | | | | |
| 75168 | 231.0 | 233.0 | 118 | 75 | 126 | <1 | <0.008 | 33 | 600 | <3 | | | | | | |
| 75169 | 233.0 | 235.0 | 110 | 98 | 177 | <1 | <0.008 | 29 | 548 | <3 | | | | | | |
| 75170 | 249.0 | 251.0 | 61 | 126 | 527 | <1 | <0.008 | 36 | 755 | <3 | | | | | | |
| 75171 | 255.0 | 257.0 | 111 | 1027 | 3316 | <1 | <0.008 | 31 | 798 | <3 | | | | | | |
| 75172 | 261.0 | 263.0 | 107 | 451 | 1164 | <1 | <0.008 | 32 | 647 | 6 | | | | | | |
| 75173 | 624.5 | 625.5 | 60 | 30 | 70 | <1 | 0.01 | 10 | 429 | 4 | - | - | - | - | - | - |
| 75174 | 667.0 | 668.0 | 427 | 22300 | 309 | 50 | 0.01 | 17 | 629 | <3 | - | - | - | - | - | - |
| 75175 | 688.5 | 689.5 | 67 | 92 | 98 | <1 | <0.008 | 22 | 423 | 8 | - | - | - | - | - | - |
| 75176 | 748.0 | 750.2 | 60 | 111 | 186 | 1 | <0.008 | 43 | 1160 | 5 | - | - | - | - | - | - |
| 75177 | 750.2 | 752.0 | 12 | 18 | 82 | <1 | <0.008 | 10 | 1767 | 7 | 166 | 84 | 182 | 63 | 11 | 30 |
| 75178 | 760.0 | 762.0 | 10 | 19 | 110 | <1 | 0.01 | 5 | 682 | 7 | 96 | 135 | 200 | 63 | 12 | 24 |
| 75179 | 770.0 | 772.0 | 13 | 35 | 148 | <1 | <0.008 | 16 | 872 | <3 | 126 | 115 | 178 | 64 | 10 | 32 |
| 75180 | 780.0 | 782.0 | 23 | 90 | 207 | <1 | <0.008 | 40 | 422 | 8 | 173 | 68 | 157 | 139 | 10 | 25 |
| 75181 | 786.9 | 789.4 | 18 | 152 | 1010 | <1 | <0.008 | 32 | 964 | 5 | - | - | - | - | - | - |
| 75182 | 794.3 | 796.0 | 17 | 269 | 1018 | 1 | <0.008 | 59 | 1248 | 9 | - | - | - | - | - | - |
| 75183 | 796.0 | 798.0 | 11 | 129 | 354 | <1 | <0.008 | 20 | 1321 | 10 | - | - | - | - | - | - |
| 75184 | 798.0 | 800.0 | 15 | 352 | 1746 | <1 | <0.008 | 10 | 1318 | 7 | - | - | - | - | - | - |
| 75185 | 800.0 | 801.0 | 11 | 172 | 2739 | <1 | <0.008 | 5 | 1430 | 7 | 180 | 60 | 119 | 6 | 14 | 33 |
| 75186 | 810.0 | 812.0 | 6 | 16 | 126 | <1 | <0.008 | 2 | 1887 | 7 | 185 | 91 | 128 | <5 | 13 | 38 |
| | | | | | | | | | | | | | | | | |

# TF1 GEOCHEMISTRY

754075

| SAMPLE | FROM | TO | Al2O3 | SiO2 | TiO2 | Fe2O3 | MnO | CaO | K2O | MgO | P2O5 | SO3 | Na2O | LOI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75154 | 123.0 | 125.0 | | | | | | | | | | | | |
| 75155 | 125.0 | 127.0 | | | | | | | | | | | | |
| 75156 | 127.0 | 129.0 | | | | | | | | | | | | |
| 75157 | 168.7 | 169.3 | | | | | | | | | | | | |
| 75158 | 169.3 | 171.5 | | | | | | | | | | | | |
| 75159 | 171.5 | 173.5 | | | | | | | | | | | | |
| 75160 | 173.5 | 175.5 | | | | | | | | | | | | |
| 75161 | 175.5 | 177.5 | | | | | | | | | | | | |
| 75162 | 218.0 | 221.0 | | | | | | | | | | | | |
| 75163 | 221.0 | 223.0 | | | | | | | | | | | | |
| 75164 | 223.0 | 225.0 | | | | | | | | | | | | |
| 75165 | 225.0 | 227.0 | | | | | | | | | | | | |
| 75166 | 227.0 | 229.0 | | | | | | | | | | | | |
| 75167 | 229.0 | 231.0 | | | | | | | | | | | | |
| 75168 | 231.0 | 233.0 | | | | | | | | | | | | |
| 75169 | 233.0 | 235.0 | | | | | | | | | | | | |
| 75170 | 249.0 | 251.0 | | | | | | | | | | | | |
| 75171 | 255.0 | 257.0 | | | | | | | | | | | | |
| 75172 | 261.0 | 263.0 | | | | | | | | | | | | |
| 75173 | 624.5 | 625.5 | - | - | - | - | - | - | - | - | - | - | - | - |
| 75174 | 667.0 | 668.0 | - | - | - | - | - | - | - | - | - | - | - | - |
| 75175 | 688.5 | 689.5 | - | - | - | - | - | - | - | - | - | - | - | - |
| 75176 | 748.0 | 750.2 | - | - | - | - | - | - | - | - | - | - | - | - |
| 75177 | 750.2 | 752.0 | 13.6 | 63.1 | 0.45 | 4.44 | 0.16 | 4.25 | 3.75 | 1.48 | 0.08 | 0.41 | 0.57 | 6.82 |
| 75178 | 760.0 | 762.0 | 13.7 | 66.6 | 0.48 | 5.36 | 0.19 | 2.42 | 1.69 | 1.48 | 0.1 | 0.27 | 3.99 | 3.61 |
| 75179 | 770.0 | 772.0 | 13.4 | 64.5 | 0.48 | 5.27 | 0.29 | 3.72 | 2.43 | 1.49 | 0.1 | 0.35 | 2.73 | 4.7 |
| 75180 | 780.0 | 782.0 | 12.6 | 61.6 | 0.5 | 5.43 | 0.18 | 6.23 | 3.67 | 1.45 | 0.09 | 1.57 | 0.31 | 6.09 |
| 75181 | 786.9 | 789.4 | - | - | - | - | - | - | - | - | - | - | - | - |
| 75182 | 794.3 | 796.0 | - | - | - | - | - | - | - | - | - | - | - | - |
| 75183 | 796.0 | 798.0 | - | - | - | - | - | - | - | - | - | - | - | - |
| 75184 | 798.0 | 800.0 | - | - | - | - | - | - | - | - | - | - | - | - |
| 75185 | 800.0 | 801.0 | 12.9 | 74.3 | 0.14 | 1.65 | 0.11 | 0.83 | 3.95 | 0.63 | 0.01 | 0.41 | 2.34 | 1.88 |
| 75186 | 810.0 | 812.0 | 13 | 73.8 | 0.14 | 2.01 | 0.14 | 0.73 | 4.38 | 0.54 | 0.01 | 0.05 | 2.45 | 1.94 |
| | | | | | | | | | | | | | | |

754076

**CORE PROCESSING RESULTS** | **DRILL HOLE NUMBER** TF1

| CORE RECOVERY | | | | mag sus S.I units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| 1.50 | 2.80 | 1.30 | 100.00 | 2.80 | 0.17 | | | | 0.00 | | | | |
| 2.80 | 4.40 | 1.30 | 81.25 | 4.40 | 0.20 | | | | 0.00 | | | | |
| 4.40 | 7.40 | 2.90 | 96.67 | 7.40 | 0.10 | | | | 0.00 | | | | |
| 7.40 | 10.40 | 2.95 | 98.33 | 10.40 | 0.13 | | | | 0.00 | | | | |
| 10.40 | 13.40 | 3.00 | 100.00 | 13.40 | 0.13 | | | | 0.00 | | | | |
| 13.40 | 16.30 | 2.70 | 93.10 | 16.30 | 0.16 | | | | 0.00 | | | | |
| 16.30 | 19.40 | 3.00 | 96.77 | 19.40 | 0.18 | | | | 0.00 | | | | |
| 19.40 | 22.40 | 3.00 | 100.00 | 22.40 | 0.14 | | | | 0.00 | | | | |
| 22.40 | 25.40 | 3.00 | 100.00 | 25.40 | 0.13 | | | | 0.00 | | | | |
| 25.40 | 28.40 | 3.00 | 100.00 | 28.40 | 0.11 | | | | 0.00 | | | | |
| 28.40 | 31.40 | 3.00 | 100.00 | 31.40 | 0.19 | 30.00 | 1050.0 | 385.00 | 2.73 | | | | |
| 31.40 | 34.40 | 3.00 | 100.00 | 34.40 | 0.14 | | | | 0.00 | | | | |
| 34.40 | 37.40 | 3.00 | 100.00 | 37.40 | 0.14 | | | | 0.00 | | | | |
| 37.40 | 40.40 | 3.00 | 100.00 | 40.40 | 0.04 | | | | 0.00 | | | | |
| 40.40 | 43.40 | 3.00 | 100.00 | 43.40 | 0.14 | | | | 0.00 | | | | |
| 43.40 | 46.40 | 3.00 | 100.00 | 46.40 | 0.16 | | | | 0.00 | | | | |
| 46.40 | 49.40 | 3.00 | 100.00 | 49.40 | 0.16 | | | | 0.00 | | | | |
| 49.40 | 52.40 | 3.00 | 100.00 | 52.40 | 0.16 | | | | 0.00 | | | | |
| 52.40 | 55.40 | 3.00 | 100.00 | 55.40 | 0.25 | | | | 0.00 | | | | |
| 55.40 | 58.40 | 3.00 | 100.00 | 58.40 | 0.24 | | | | 0.00 | | | | |
| 58.40 | 61.40 | 3.00 | 100.00 | 61.40 | 0.19 | 60.00 | 604 | 221.50 | 2.73 | | | | |
| 61.40 | 64.40 | 3.00 | 100.00 | 64.40 | 0.13 | | | | 0.00 | | | | |
| 64.40 | 67.40 | 3.00 | 100.00 | 67.40 | 0.17 | | | | 0.00 | | | | |
| 67.40 | 70.40 | 3.00 | 100.00 | 70.40 | 0.06 | | | | 0.00 | | | | |
| 70.40 | 73.40 | 3.00 | 100.00 | 73.40 | 0.39 | | | | 0.00 | | | | |
| 73.40 | 76.40 | 3.00 | 100.00 | 76.40 | 0.27 | | | | 0.00 | | | | |
| 76.40 | 79.40 | 3.00 | 100.00 | 79.40 | 0.20 | | | | 0.00 | | | | |
| 79.40 | 82.40 | 3.00 | 100.00 | 82.40 | 0.13 | | | | 0.00 | | | | |
| 82.40 | 85.40 | 3.00 | 100.00 | 85.40 | 0.05 | | | | 0.00 | | | | |
| 85.40 | 88.40 | 3.00 | 100.00 | 88.40 | 0.15 | | | | 0.00 | | | | |
| 88.40 | 91.40 | 3.00 | 100.00 | 91.40 | 0.31 | 90.00 | 821 | 304.10 | 2.70 | | | | |
| 91.40 | 94.40 | 3.00 | 100.00 | 94.40 | 0.34 | | | | 0.00 | | | | |
| 94.40 | 97.40 | 3.00 | 100.00 | 97.40 | 0.25 | | | | 0.00 | | | | |
| 97.40 | 100.40 | 3.00 | 100.00 | 100.40 | 0.27 | | | | 0.00 | | | | |
| 100.40 | 103.40 | 3.00 | 100.00 | 103.40 | 0.04 | | | | 0.00 | | | | |
| 103.40 | 106.40 | 3.00 | 100.00 | 106.40 | 0.15 | | | | 0.00 | | | | |
| 106.40 | 109.40 | 3.00 | 100.00 | 109.40 | 0.16 | | | | 0.00 | | | | |
| 109.40 | 112.40 | 3.00 | 100.00 | 112.40 | 0.16 | | | | 0.00 | | | | |
| 112.40 | 115.40 | 3.00 | 100.00 | 115.40 | 0.19 | | | | 0.00 | | | | |
| 115.40 | 118.40 | 3.00 | 100.00 | 118.40 | 0.20 | | | | 0.00 | | | | |

754077

**CORE PROCESSING RESULTS** | **DRILL HOLE NUMBER** TF1

| CORE RECOVERY | | | | mag sus S.I units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| 118.40 | 119.90 | 1.50 | 100.00 | 119.90 | 0.16 | | | | 0.00 | | | | |
| 119.90 | 121.30 | 1.30 | 92.86 | 121.30 | 0.14 | 120.00 | 618 | 224.80 | 2.75 | | | | |
| 121.30 | 124.30 | 3.00 | 100.00 | 124.30 | 0.13 | | | | 0.00 | 123.00 | 125.00 | 75154 | NQ SPLIT CORE |
| 124.30 | 127.10 | 2.80 | 100.00 | 127.10 | 0.08 | | | | 0.00 | 125.00 | 127.00 | 75155 | NQ SPLIT CORE |
| 127.10 | 128.60 | 1.20 | 80.00 | 128.60 | 0.09 | | | | 0.00 | 127.00 | 129.00 | 75156 | NQ SPLIT CORE |
| 128.60 | 130.30 | 1.80 | 105.88 | 130.30 | 0.04 | | | | 0.00 | | | | |
| 130.30 | 133.30 | 3.00 | 100.00 | 133.30 | 0.13 | | | | 0.00 | | | | |
| 133.30 | 135.60 | 1.90 | 82.61 | 135.60 | 0.11 | | | | 0.00 | | | | |
| 135.60 | 138.60 | 3.20 | 106.67 | 138.60 | 0.08 | | | | 0.00 | | | | |
| 138.60 | 140.80 | 2.20 | 100.00 | 140.80 | 0.24 | | | | 0.00 | | | | |
| 140.80 | 142.30 | 1.50 | 100.00 | 142.30 | 0.12 | | | | 0.00 | | | | |
| 142.30 | 145.30 | 3.00 | 100.00 | 145.30 | 0.13 | | | | 0.00 | | | | |
| 145.30 | 148.30 | 3.00 | 100.00 | 148.30 | 0.13 | | | | 0.00 | | | | |
| 148.30 | 151.30 | 3.00 | 100.00 | 151.30 | 0.10 | 150.00 | 685 | 248.40 | 2.76 | | | | |
| 151.30 | 154.30 | 3.00 | 100.00 | 154.30 | 0.10 | | | | 0.00 | | | | |
| 154.30 | 157.30 | 2.95 | 98.33 | 157.30 | 0.08 | | | | 0.00 | | | | |
| 157.30 | 160.30 | 3.00 | 100.00 | 160.30 | 0.08 | | | | 0.00 | | | | |
| 160.30 | 163.30 | 3.00 | 100.00 | 163.30 | 0.10 | | | | 0.00 | | | | |
| 163.30 | 166.30 | 3.00 | 100.00 | 166.30 | 0.04 | | | | 0.00 | | | | |
| 166.30 | 169.30 | 2.80 | 93.33 | 169.30 | 0.19 | | | | 0.00 | 168.70 | 169.30 | 75157 | NQ SPLIT CORE |
| 169.30 | 172.30 | 3.00 | 100.00 | 172.30 | 0.27 | | | | 0.00 | 169.30 | 171.50 | 75158 | NQ SPLIT CORE |
| 172.30 | 175.30 | 3.00 | 100.00 | 175.30 | 0.19 | | | | 0.00 | 171.50 | 173.50 | 75159 | NQ SPLIT CORE |
| 175.30 | 178.30 | 2.90 | 96.67 | 178.30 | 0.17 | | | | 0.00 | 173.50 | 175.50 | 75160 | NQ SPLIT CORE |
| 178.30 | 181.30 | 3.05 | 101.67 | 181.30 | 0.05 | 180.00 | 535 | 184.90 | 2.89 | 175.50 | 177.50 | 75161 | NQ SPLIT CORE |
| 181.30 | 184.20 | 2.90 | 100.00 | 184.20 | 0.02 | | | | 0.00 | | | | |
| 184.20 | 187.30 | 3.05 | 98.39 | 187.30 | 0.02 | | | | 0.00 | | | | |
| 187.30 | 190.30 | 3.00 | 100.00 | 190.30 | 0.05 | | | | 0.00 | | | | |
| 190.30 | 193.30 | 2.95 | 98.33 | 193.30 | 0.11 | | | | 0.00 | | | | |
| 193.30 | 196.30 | 3.05 | 101.67 | 196.30 | 0.02 | | | | 0.00 | | | | |
| 196.30 | 199.30 | 3.00 | 100.00 | 199.30 | 0.06 | | | | 0.00 | | | | |
| 199.30 | 202.30 | 3.00 | 100.00 | 202.30 | 0.02 | | | | 0.00 | | | | |
| 202.30 | 205.30 | 3.00 | 100.00 | 205.30 | 0.08 | | | | 0.00 | | | | |
| 205.30 | 208.30 | 3.00 | 100.00 | 208.30 | 0.02 | | | | 0.00 | | | | |
| 208.30 | 211.30 | 3.00 | 100.00 | 211.30 | 0.03 | 210.00 | 580 | 213.70 | 2.72 | | | | |
| 211.30 | 214.30 | 3.00 | 100.00 | 214.30 | 0.09 | | | | 0.00 | | | | |
| 214.30 | 217.30 | 3.00 | 100.00 | 217.30 | 0.05 | | | | 0.00 | | | | |
| 217.30 | 220.30 | 2.95 | 98.33 | 220.30 | 0.16 | | | | 0.00 | 219.00 | 221.00 | 75162 | NQ SPLIT CORE |
| 220.30 | 221.80 | 1.50 | 100.00 | 221.80 | 0.07 | | | | 0.00 | 221.00 | 223.00 | 75163 | NQ SPLIT CORE |
| 221.80 | 224.30 | 2.35 | 94.00 | 224.30 | 0.23 | | | | 0.00 | 223.00 | 225.00 | 75164 | NQ SPLIT CORE |
| 224.30 | 227.40 | 3.10 | 100.00 | 227.40 | 0.15 | | | | 0.00 | 225.00 | 227.00 | 75165 | NQ SPLIT CORE |

754078

**CORE PROCESSING RESULTS** | **DRILL HOLE NUMBER** TF1

| CORE RECOVERY | | | | mag sus S.I units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| 227.40 | 229.30 | 2.00 | 105.26 | 229.30 | 0.14 | | | | 0.00 | 227.00 | 229.00 | 75166 | NQ SPLIT CORE |
| 229.30 | 231.00 | 1.70 | 100.00 | 231.00 | 0.16 | | | | 0.00 | 229.00 | 231.00 | 75167 | NQ SPLIT CORE |
| 231.00 | 232.70 | 1.80 | 105.88 | 232.70 | 0.14 | | | | 0.00 | 231.00 | 233.00 | 75168 | NQ SPLIT CORE |
| 232.70 | 235.30 | 2.60 | 100.00 | 235.30 | 0.12 | | | | 0.00 | 233.00 | 235.00 | 75169 | NQ SPLIT CORE |
| 235.30 | 237.90 | 2.45 | 94.23 | 237.90 | 0.11 | | | | 0.00 | | | | |
| 237.90 | 241.00 | 3.10 | 100.00 | 241.00 | 0.12 | 240.00 | 410 | 149.40 | 2.74 | | | | |
| 241.00 | 244.10 | 3.10 | 100.00 | 244.10 | 0.14 | | | | 0.00 | | | | |
| 244.10 | 247.20 | 3.10 | 100.00 | 247.20 | 0.12 | | | | 0.00 | | | | |
| 247.20 | 249.70 | 2.60 | 104.00 | 249.70 | 0.32 | | | | 0.00 | 249.00 | 251.00 | 75170 | NQ SPLIT CORE |
| 249.70 | 252.80 | 3.10 | 100.00 | 252.80 | 0.12 | | | | 0.00 | | | | |
| 252.80 | 254.40 | 1.50 | 93.75 | 254.40 | 0.10 | | | | 0.00 | | | | |
| 254.40 | 256.30 | 1.85 | 97.37 | 256.30 | 0.10 | | | | 0.00 | 255.00 | 257.00 | 75171 | NQ SPLIT CORE |
| 256.30 | 259.30 | 3.10 | 103.33 | 259.30 | 0.40 | | | | 0.00 | | | | |
| 259.30 | 262.30 | 3.00 | 100.00 | 262.30 | 2.42 | | | | 0.00 | 261.00 | 263.00 | 75172 | NQ SPLIT CORE |
| 262.30 | 265.00 | 2.70 | 100.00 | 265.00 | 0.10 | | | | 0.00 | | | | |
| 265.00 | 266.20 | 1.20 | 100.00 | 266.20 | 0.23 | | | | 0.00 | | | | |
| 266.20 | 267.90 | 1.70 | 100.00 | 267.90 | 0.18 | | | | 0.00 | | | | |
| 267.90 | 270.20 | 2.20 | 95.65 | 270.20 | 0.10 | 268.80 | 580 | 214.00 | 2.71 | | | | |
| 270.20 | 271.30 | 1.20 | 109.09 | 271.30 | 0.13 | | | | 0.00 | | | | |
| 271.30 | 274.10 | 2.70 | 96.43 | 274.10 | 0.05 | | | | 0.00 | | | | |
| 274.10 | 275.60 | 1.60 | 106.67 | 275.60 | 0.15 | | | | 0.00 | | | | |
| 275.60 | 277.70 | 1.90 | 90.48 | 277.70 | 0.12 | | | | 0.00 | | | | |
| 277.70 | 280.00 | 2.30 | 100.00 | 280.00 | 0.16 | | | | 0.00 | | | | |
| 280.00 | 282.70 | 2.60 | 96.30 | 282.70 | 0.09 | | | | 0.00 | | | | |
| 282.70 | 285.80 | 3.10 | 100.00 | 285.80 | 0.03 | | | | 0.00 | | | | |
| 285.80 | 288.90 | 3.05 | 98.39 | 288.90 | 0.20 | | | | 0.00 | | | | |
| 288.90 | 291.90 | 3.10 | 103.33 | 291.90 | 0.23 | | | | 0.00 | | | | |
| 291.90 | 295.00 | 3.10 | 100.00 | 295.00 | 0.26 | | | | 0.00 | | | | |
| 295.00 | 298.10 | 3.10 | 100.00 | 298.10 | 0.28 | | | | 0.00 | | | | |
| 298.10 | 301.20 | 3.10 | 100.00 | 301.20 | 0.49 | 300.00 | 565 | 206.50 | 2.74 | | | | |
| 301.20 | 304.30 | 3.00 | 96.77 | 304.30 | 0.69 | | | | 0.00 | | | | |
| 304.30 | 307.30 | 3.00 | 100.00 | 307.30 | 0.20 | | | | 0.00 | | | | |
| 307.30 | 310.30 | 3.00 | 100.00 | 310.30 | 0.35 | | | | 0.00 | | | | |
| 310.30 | 313.30 | 3.00 | 100.00 | 313.30 | 0.86 | | | | 0.00 | | | | |
| 313.30 | 316.30 | 3.00 | 100.00 | 316.30 | 2.08 | | | | 0.00 | | | | |
| 316.30 | 319.30 | 3.00 | 100.00 | 319.30 | 0.25 | | | | 0.00 | | | | |
| 319.30 | 322.30 | 3.00 | 100.00 | 322.30 | 0.23 | | | | 0.00 | | | | |
| 322.30 | 325.30 | 3.00 | 100.00 | 325.30 | 0.25 | | | | 0.00 | | | | |
| 325.30 | 328.30 | 3.00 | 100.00 | 328.30 | 0.18 | | | | 0.00 | | | | |
| 328.30 | 331.30 | 3.00 | 100.00 | 331.30 | 0.11 | | | | 0.00 | | | | |

754079

**CORE PROCESSING RESULTS** | **DRILL HOLE NUMBER** TF1

| CORE RECOVERY | | | | mag sus S.I units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| 331.30 | 334.30 | 3.00 | 100.00 | 334.30 | 0.09 | 330.00 | 464 | 169.70 | 2.73 | | | | |
| 334.30 | 337.30 | 3.00 | 100.00 | 337.30 | 0.06 | | | | 0.00 | | | | |
| 337.30 | 340.30 | 3.00 | 100.00 | 340.30 | 0.04 | | | | 0.00 | | | | |
| 340.30 | 343.30 | 3.00 | 100.00 | 343.30 | 0.09 | | | | 0.00 | | | | |
| 343.30 | 346.30 | 3.00 | 100.00 | 346.30 | 0.16 | | | | 0.00 | | | | |
| 346.30 | 349.30 | 3.00 | 100.00 | 349.30 | 0.16 | | | | 0.00 | | | | |
| 349.30 | 352.30 | 3.00 | 100.00 | 352.30 | 0.28 | | | | 0.00 | | | | |
| 352.30 | 355.30 | 3.00 | 100.00 | 355.30 | 0.20 | | | | 0.00 | | | | |
| 355.30 | 358.30 | 3.00 | 100.00 | 358.30 | 0.19 | | | | 0.00 | | | | |
| 358.30 | 361.30 | 3.00 | 100.00 | 361.30 | 0.18 | 360.30 | 477 | 171.10 | 2.79 | | | | |
| 361.30 | 364.30 | 3.00 | 100.00 | 364.30 | 0.22 | | | | 0.00 | | | | |
| 364.30 | 367.30 | 3.00 | 100.00 | 367.30 | 0.18 | | | | 0.00 | | | | |
| 367.30 | 370.30 | 3.00 | 100.00 | 370.30 | 0.16 | | | | 0.00 | | | | |
| 370.30 | 373.30 | 3.00 | 100.00 | 373.30 | 0.16 | | | | 0.00 | | | | |
| 373.30 | 376.30 | 3.00 | 100.00 | 376.30 | 0.26 | | | | 0.00 | | | | |
| 376.30 | 379.30 | 3.00 | 100.00 | 379.30 | 0.11 | | | | 0.00 | | | | |
| 379.30 | 382.30 | 3.00 | 100.00 | 382.30 | 0.16 | | | | 0.00 | | | | |
| 382.30 | 385.30 | 3.00 | 100.00 | 385.30 | 0.31 | | | | 0.00 | | | | |
| 385.30 | 388.30 | 3.00 | 100.00 | 388.30 | 0.17 | | | | 0.00 | | | | |
| 388.30 | 391.30 | 3.00 | 100.00 | 391.30 | 0.51 | | | | 0.00 | | | | |
| 391.30 | 394.30 | 3.00 | 100.00 | 394.30 | 0.23 | 391.30 | 537 | 192.60 | 2.79 | | | | |
| 394.30 | 397.30 | 3.00 | 100.00 | 397.30 | 0.18 | | | | 0.00 | | | | |
| 397.30 | 400.30 | 3.00 | 100.00 | 400.30 | 0.19 | | | | 0.00 | | | | |
| 400.30 | 403.30 | 3.00 | 100.00 | 403.30 | 0.14 | | | | 0.00 | | | | |
| 403.30 | 406.30 | 3.00 | 100.00 | 406.30 | 0.21 | | | | 0.00 | | | | |
| 406.30 | 409.30 | 3.00 | 100.00 | 409.30 | 0.23 | | | | 0.00 | | | | |
| 409.30 | 412.30 | 3.00 | 100.00 | 412.30 | 0.12 | | | | 0.00 | | | | |
| 412.30 | 415.30 | 3.00 | 100.00 | 415.30 | 0.08 | | | | 0.00 | | | | |
| 415.30 | 418.30 | 3.00 | 100.00 | 418.30 | 0.21 | | | | 0.00 | | | | |
| 418.30 | 421.30 | 3.00 | 100.00 | 421.30 | 0.33 | 420.00 | 552 | 199.80 | 2.76 | | | | |
| 421.30 | 424.30 | 3.00 | 100.00 | 424.30 | 0.15 | | | | 0.00 | | | | |
| 424.30 | 427.30 | 3.00 | 100.00 | 427.30 | 0.31 | | | | 0.00 | | | | |
| 427.30 | 430.30 | 2.95 | 98.33 | 430.30 | 0.11 | | | | 0.00 | | | | |
| 430.30 | 433.30 | 3.05 | 101.67 | 433.30 | 0.39 | | | | 0.00 | | | | |
| 433.30 | 436.30 | 3.00 | 100.00 | 436.30 | 0.20 | | | | 0.00 | | | | |
| 436.30 | 439.30 | 3.00 | 100.00 | 439.30 | 0.55 | | | | 0.00 | | | | |
| 439.30 | 442.30 | 3.00 | 100.00 | 442.30 | 0.21 | | | | 0.00 | | | | |
| 442.30 | 445.30 | 3.00 | 100.00 | 445.30 | 0.20 | | | | 0.00 | | | | |
| 445.30 | 448.30 | 3.00 | 100.00 | 448.30 | 0.18 | | | | 0.00 | | | | |
| 448.30 | 451.30 | 3.00 | 100.00 | 451.30 | 0.21 | 450.00 | 411 | 150.40 | 2.73 | | | | |

754080

**CORE PROCESSING RESULTS** | **DRILL HOLE NUMBER** TF1

| CORE RECOVERY | | | | mag sus S.I units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| 451.30 | 454.30 | 3.00 | 100.00 | 454.30 | 0.20 | | | | 0.00 | | | | |
| 454.30 | 457.30 | 3.00 | 100.00 | 457.30 | 0.19 | | | | 0.00 | | | | |
| 457.30 | 460.30 | 3.00 | 100.00 | 460.30 | 0.31 | | | | 0.00 | | | | |
| 460.30 | 463.30 | 3.00 | 100.00 | 463.30 | 0.15 | | | | 0.00 | | | | |
| 463.30 | 466.30 | 3.00 | 100.00 | 466.30 | 0.10 | | | | 0.00 | | | | |
| 466.30 | 469.30 | 3.00 | 100.00 | 469.30 | 0.59 | | | | 0.00 | | | | |
| 469.30 | 472.30 | 3.00 | 100.00 | 472.30 | 0.37 | | | | 0.00 | | | | |
| 472.30 | 475.30 | 3.00 | 100.00 | 475.30 | 0.19 | | | | 0.00 | | | | |
| 475.30 | 478.30 | 3.00 | 100.00 | 478.30 | 0.18 | | | | 0.00 | | | | |
| 478.30 | 481.30 | 3.00 | 100.00 | 481.30 | 0.12 | | | | 0.00 | | | | |
| 481.30 | 484.30 | 3.00 | 100.00 | 484.30 | 0.16 | 479.95 | 646 | 231.80 | 2.79 | | | | |
| 484.30 | 487.30 | 3.00 | 100.00 | 487.30 | 0.29 | | | | 0.00 | | | | |
| 487.30 | 490.30 | 3.00 | 100.00 | 490.30 | 0.21 | | | | 0.00 | | | | |
| 490.30 | 493.30 | 3.00 | 100.00 | 493.30 | 0.23 | | | | 0.00 | | | | |
| 493.30 | 496.40 | 3.10 | 100.00 | 496.40 | 0.12 | | | | 0.00 | | | | |
| 496.40 | 499.30 | 2.90 | 100.00 | 499.30 | 0.19 | | | | 0.00 | | | | |
| 499.30 | 502.30 | 3.00 | 100.00 | 502.30 | 0.21 | | | | 0.00 | | | | |
| 502.30 | 505.30 | 2.95 | 98.33 | 505.30 | 0.00 | | | | 0.00 | | | | |
| 505.30 | 508.30 | 3.05 | 101.67 | 508.30 | 0.22 | | | | 0.00 | | | | |
| 508.30 | 511.30 | 3.00 | 100.00 | 511.30 | 0.12 | | | | 0.00 | | | | |
| 511.30 | 514.30 | 3.00 | 100.00 | 514.30 | 0.06 | 510.00 | 542 | 196.10 | 2.76 | | | | |
| 514.30 | 517.30 | 3.00 | 100.00 | 517.30 | 0.08 | | | | 0.00 | | | | |
| 517.30 | 520.30 | 3.00 | 100.00 | 520.30 | 0.14 | | | | 0.00 | | | | |
| 520.30 | 523.30 | 3.00 | 100.00 | 523.30 | 0.17 | | | | 0.00 | | | | |
| 523.30 | 526.30 | 3.00 | 100.00 | 526.30 | 0.18 | | | | 0.00 | | | | |
| 526.30 | 529.30 | 3.00 | 100.00 | 529.30 | 0.16 | | | | 0.00 | | | | |
| 529.30 | 532.30 | 3.00 | 100.00 | 532.30 | 0.19 | | | | 0.00 | | | | |
| 532.30 | 535.30 | 3.00 | 100.00 | 535.30 | 0.07 | | | | 0.00 | | | | |
| 535.30 | 538.30 | 3.00 | 100.00 | 538.30 | 0.13 | | | | 0.00 | | | | |
| 538.30 | 541.30 | 3.00 | 100.00 | 541.30 | 0.14 | | | | 0.00 | | | | |
| 541.30 | 544.30 | 3.00 | 100.00 | 544.30 | 0.17 | 540.00 | 601 | 214.20 | 2.81 | | | | |
| 544.30 | 547.30 | 3.00 | 100.00 | 547.30 | 0.10 | | | | 0.00 | | | | |
| 547.30 | 550.30 | 3.00 | 100.00 | 550.30 | 0.10 | | | | 0.00 | | | | |
| 550.30 | 553.30 | 3.00 | 100.00 | 553.30 | 0.09 | | | | 0.00 | | | | |
| 553.30 | 556.30 | 3.00 | 100.00 | 556.30 | 0.17 | | | | 0.00 | | | | |
| 556.30 | 559.30 | 3.00 | 100.00 | 559.30 | 0.13 | | | | 0.00 | | | | |
| 559.30 | 562.30 | 3.00 | 100.00 | 562.30 | 0.04 | | | | 0.00 | | | | |
| 562.30 | 565.30 | 3.00 | 100.00 | 565.30 | 0.15 | | | | 0.00 | | | | |
| 565.30 | 568.30 | 3.00 | 100.00 | 568.30 | 0.21 | | | | 0.00 | | | | |
| 568.30 | 571.30 | 3.00 | 100.00 | 571.30 | 0.15 | | | | 0.00 | | | | |

754081

**CORE PROCESSING RESULTS** | **DRILL HOLE NUMBER** TF1

| CORE RECOVERY | | | | mag sus S.I units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| 571.30 | 574.30 | 3.00 | 100.00 | 574.30 | 0.10 | 570.00 | 399 | 142.00 | 2.81 | | | | |
| 574.30 | 577.30 | 3.00 | 100.00 | 577.30 | 0.15 | | | | 0.00 | | | | |
| 577.30 | 580.30 | 3.00 | 100.00 | 580.30 | 0.12 | | | | 0.00 | | | | |
| 580.30 | 583.30 | 3.00 | 100.00 | 583.30 | 0.17 | | | | 0.00 | | | | |
| 583.30 | 586.30 | 3.00 | 100.00 | 586.30 | 0.15 | | | | 0.00 | | | | |
| 586.30 | 589.30 | 3.00 | 100.00 | 589.30 | 0.17 | | | | 0.00 | | | | |
| 589.30 | 592.30 | 3.00 | 100.00 | 592.30 | 0.09 | | | | 0.00 | | | | |
| 592.30 | 595.30 | 3.00 | 100.00 | 595.30 | 0.11 | | | | 0.00 | | | | |
| 595.30 | 598.30 | 3.00 | 100.00 | 598.30 | 0.15 | | | | 0.00 | | | | |
| 598.30 | 601.30 | 3.00 | 100.00 | 601.30 | 0.20 | | | | 0.00 | | | | |
| 601.30 | 604.30 | 3.00 | 100.00 | 604.30 | 0.19 | 600.00 | 473 | 166.60 | 2.84 | | | | |
| 604.30 | 607.30 | 3.00 | 100.00 | 607.30 | 0.19 | | | | 0.00 | | | | |
| 607.30 | 610.30 | 3.00 | 100.00 | 610.30 | 0.12 | | | | 0.00 | | | | |
| 610.30 | 613.30 | 3.00 | 100.00 | 613.30 | 0.18 | | | | 0.00 | | | | |
| 613.30 | 616.30 | 3.00 | 100.00 | 616.30 | 0.11 | | | | 0.00 | | | | |
| 616.30 | 619.30 | 3.00 | 100.00 | 619.30 | 0.04 | | | | 0.00 | | | | |
| 619.30 | 622.30 | 3.00 | 100.00 | 622.30 | 0.14 | | | | 0.00 | | | | |
| 622.30 | 625.30 | 3.00 | 100.00 | 625.30 | 0.15 | | | | 0.00 | 624.50 | 625.50 | 75173 | |
| 625.30 | 628.30 | 3.00 | 100.00 | 628.30 | 0.10 | | | | 0.00 | | | | |
| 628.30 | 631.30 | 3.00 | 100.00 | 631.30 | 0.11 | | | | 0.00 | | | | |
| 631.30 | 634.30 | 3.00 | 100.00 | 634.30 | 0.16 | 630.00 | 594 | 211.60 | 2.80 | | | | |
| 634.30 | 637.30 | 3.00 | 100.00 | 637.30 | 0.19 | | | | 0.00 | | | | |
| 637.30 | 640.30 | 3.00 | 100.00 | 640.30 | 0.19 | | | | 0.00 | | | | |
| 640.30 | 643.30 | 3.00 | 100.00 | 643.30 | 0.22 | | | | 0.00 | | | | |
| 643.30 | 646.30 | 3.00 | 100.00 | 646.30 | 0.16 | | | | 0.00 | | | | |
| 646.30 | 649.30 | 3.00 | 100.00 | 649.30 | 0.17 | | | | 0.00 | | | | |
| 649.30 | 652.30 | 3.00 | 100.00 | 652.30 | 0.16 | | | | 0.00 | | | | |
| 652.30 | 655.30 | 3.00 | 100.00 | 655.30 | 0.03 | | | | 0.00 | | | | |
| 655.30 | 658.30 | 3.00 | 100.00 | 658.30 | 0.05 | | | | 0.00 | | | | |
| 658.30 | 661.30 | 3.00 | 100.00 | 661.30 | 0.14 | | | | 0.00 | | | | |
| 661.30 | 664.30 | 3.00 | 100.00 | 664.30 | 0.12 | 660.00 | 731 | 267.20 | 2.74 | | | | |
| 664.30 | 667.30 | 3.00 | 100.00 | 667.30 | 0.08 | | | | 0.00 | 666.95 | 668.00 | 75174 | |
| 667.30 | 670.30 | 3.00 | 100.00 | 670.30 | 0.06 | | | | 0.00 | | | | |
| 670.30 | 673.30 | 3.00 | 100.00 | 673.30 | 0.11 | | | | 0.00 | | | | |
| 673.30 | 676.30 | 3.00 | 100.00 | 676.30 | 0.18 | | | | 0.00 | | | | |
| 676.30 | 679.30 | 3.05 | 101.67 | 679.30 | 0.18 | | | | 0.00 | | | | |
| 679.30 | 682.30 | 2.95 | 98.33 | 682.30 | 0.18 | | | | 0.00 | | | | |
| 682.30 | 685.30 | 3.00 | 100.00 | 685.30 | 0.09 | | | | 0.00 | | | | |
| 685.30 | 688.30 | 3.00 | 100.00 | 688.30 | 0.21 | | | | 0.00 | | | | |
| 688.30 | 691.30 | 3.00 | 100.00 | 691.30 | 0.23 | | | | 0.00 | 688.50 | 689.50 | 75175 | |

754082

**CORE PROCESSING RESULTS** | **DRILL HOLE NUMBER** TF1

| CORE RECOVERY | | | | mag sus S.I units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| 691.30 | 692.10 | 0.80 | 100.00 | 692.10 | 0.15 | 690.00 | 706 | 251.40 | 2.81 | | | | |
| 692.10 | 694.30 | 2.20 | 100.00 | 694.30 | 0.15 | | | | 0.00 | | | | |
| 694.30 | 697.30 | 3.00 | 100.00 | 697.30 | 0.20 | | | | 0.00 | | | | |
| 697.30 | 700.30 | 3.00 | 100.00 | 700.30 | 0.18 | | | | 0.00 | | | | |
| 700.30 | 703.30 | 3.00 | 100.00 | 703.30 | 0.13 | | | | 0.00 | | | | |
| 703.30 | 706.30 | 3.00 | 100.00 | 706.30 | 0.15 | | | | 0.00 | | | | |
| 706.30 | 709.30 | 3.00 | 100.00 | 709.30 | 0.28 | | | | 0.00 | | | | |
| 709.30 | 712.30 | 3.00 | 100.00 | 712.30 | 0.22 | | | | 0.00 | | | | |
| 712.30 | 715.30 | 3.00 | 100.00 | 715.30 | 0.09 | | | | 0.00 | | | | |
| 715.30 | 718.30 | 3.00 | 100.00 | 718.30 | 0.17 | | | | 0.00 | | | | |
| 718.30 | 721.30 | 3.00 | 100.00 | 721.30 | 0.13 | | | | 0.00 | | | | |
| 721.30 | 724.30 | 3.00 | 100.00 | 724.30 | 0.17 | 720.00 | 278 | 99.30 | 2.79 | | | | |
| 724.30 | 727.30 | 3.00 | 100.00 | 727.30 | 0.11 | | | | 0.00 | | | | |
| 727.30 | 730.30 | 3.00 | 100.00 | 730.30 | 0.09 | | | | 0.00 | | | | |
| 730.30 | 733.30 | 3.00 | 100.00 | 733.30 | 0.15 | | | | 0.00 | | | | |
| 733.30 | 736.30 | 3.00 | 100.00 | 736.30 | 0.15 | | | | 0.00 | | | | |
| 736.30 | 739.30 | 3.00 | 100.00 | 739.30 | 0.15 | | | | 0.00 | | | | |
| 739.30 | 742.30 | 3.00 | 100.00 | 742.30 | 0.13 | | | | 0.00 | | | | |
| 742.30 | 745.30 | 3.00 | 100.00 | 745.30 | 0.19 | | | | 0.00 | | | | |
| 745.30 | 748.30 | 3.00 | 100.00 | 748.30 | 0.16 | | | | 0.00 | | | | |
| 748.30 | 751.30 | 3.00 | 100.00 | 751.30 | 0.12 | | | | 0.00 | 748.00 | 750.20 | 75176 | |
| 751.30 | 754.30 | 3.00 | 100.00 | 754.30 | 0.35 | 751.00 | 265 | 96.40 | 2.74 | 750.20 | 752.00 | 75177 | |
| 754.30 | 757.30 | 3.00 | 100.00 | 757.30 | 0.15 | 752.00 | 598 | 214.80 | 2.78 | | | | |
| 757.30 | 760.30 | 3.00 | 100.00 | 760.30 | 0.14 | | | | 0.00 | | | | |
| 760.30 | 763.30 | 3.00 | 100.00 | 763.30 | 0.14 | | | | 0.00 | 760.00 | 762.00 | 75178 | |
| 763.30 | 766.30 | 3.00 | 100.00 | 766.30 | 0.11 | | | | 0.00 | | | | |
| 766.30 | 769.30 | 3.00 | 100.00 | 769.30 | 0.17 | | | | 0.00 | | | | |
| 769.30 | 772.30 | 3.00 | 100.00 | 772.30 | 0.39 | | | | 0.00 | 770.00 | 772.00 | 75179 | |
| 772.30 | 775.30 | 3.00 | 100.00 | 775.30 | 0.14 | | | | 0.00 | | | | |
| 775.30 | 778.30 | 3.00 | 100.00 | 778.30 | 0.13 | | | | 0.00 | | | | |
| 778.30 | 781.30 | 3.00 | 100.00 | 781.30 | 0.11 | | | | 0.00 | 780.00 | 782.00 | 75180 | |
| 781.30 | 784.30 | 3.00 | 100.00 | 784.30 | 0.70 | 780.00 | 665 | 240.70 | 2.76 | | | | |
| 784.30 | 787.30 | 3.00 | 100.00 | 787.30 | 0.06 | | | | 0.00 | 786.90 | 789.40 | 75181 | |
| 787.30 | 790.30 | 3.00 | 100.00 | 790.30 | 0.04 | | | | 0.00 | | | | |
| 790.30 | 793.10 | 2.90 | 103.57 | 793.10 | 0.03 | | | | 0.00 | | | | |
| 793.10 | 796.20 | 2.75 | 88.71 | 796.20 | 0.03 | | | | 0.00 | 794.25 | 796.00 | 75182 | |
| 796.20 | 799.30 | 3.00 | 96.77 | 799.30 | 0.04 | | | | 0.00 | 796.00 | 798.00 | 75183 | |
| 799.30 | 802.30 | 3.00 | 100.00 | 802.30 | 0.04 | | | | 0.00 | 798.00 | 800.00 | 75184 | |
| 802.30 | 805.30 | 3.00 | 100.00 | 805.30 | 0.10 | | | | 0.00 | 800.00 | 801.00 | 75185 | |
| 805.30 | 808.30 | 3.00 | 100.00 | 808.30 | 0.05 | | | | 0.00 | | | | |

754083

**CORE PROCESSING RESULTS**

**DRILL HOLE NUMBER** TF1

| CORE RECOVERY | | | | mag sus S.I units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| 808.30 | 811.30 | 3.00 | 100.00 | 811.30 | 0.05 | | | | 0.00 | 810.00 | 812.00 | 75186 | |
| 811.30 | 813.10 | 1.80 | 100.00 | 813.10 | 0.06 | 810.00 | 543 | 202.30 | 2.68 | | | | |

# Appendix 2

## Log of Hole SR1

# PASMINCO EXPLORATION
# DIAMOND DRILL CORE RECORD

754085

HOLE No. SR1



| | |
|---|---|
| LOCATION | EL 24/91 |
| PROJECT | STERLING RIVER |
| PROSPECT | MAGNETIC ANOMALY 'C' |
| DESIGNED BY | J.G. PURVIS |
| LOGGED BY | J.G. PURVIS |
| RELOGGED | |
| COMMENCED | 31·1·95 |
| COMPLETED | 7·2·95 |
| DRILLED BY | A.T.E. |
| DRILL RIG | GOPHER |

## OBJECTIVE

TO TEST CAUSE OF MAGNETIC ANOMALY 'C', WITHIN STERLING VALLEY MAFIC VOLCANICS.

## RESULT

HOLE INTERSECTED MAGNETIC BASALT 0 – 96m.

## LOCATION/SURVEY DATA (AMG)

| | | | |
|---|---|---|---|
| Grid | AMG | | RL Collar m 361·1 |
| Northing m | 5373030·2 | | Bearing Collar 108° |
| Easting m | 383676·6 | | Dip Collar −60° |
| DH Survey Type | EASTMAN CAMERA | | Length Hole m 96·0 |

| Depth m | Bearing | Dip | Depth m | Bearing | Dip |
|---|---|---|---|---|---|
| 49 | 104° | −59° | | | |
| 96 | 104·5° | −60° | | | |

## SIGNIFICANT INTERSECTIONS

| From m | To m | Interval m | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | NIL – ALL BASEMETALS |
| | | | | | | | | < 700 ppm. |

## SIGNIFICANT CORE LOSS

| From m | To m | % Lost |
|---|---|---|
| 0 | 20·8 | 25 |
| 30 | 33 | 47 |
| | | |

## POOR GROUND CONDITION ZONES

| From m | To m | Condition |
|---|---|---|
| 0 | 19 | OXIDIZED, FRACTURED + BROKEN. |
| 31·5 | 32·1 | CLAYEY OXIDIZED ZONE |
| 50 | 63 | FRACTURED, WITH OXIDIZED ZONES |

## HOLE SIZE

| Size | Depth m |
|---|---|
| BQ | 96 |
| | |
| | |
| | |
| | |

## HOLE CONDITIONS AFTER COMPLETION

| | |
|---|---|
| Collar | STEEL CAP ON NQ CASING |
| Steel Casing | NQ TO 4·5m. |
| PVC Casing | |
| Ground Water | |
| Wedge | |
| Drill Pad | |

PASMINCO EXPLORATION

PROJECT: STERLING RIVER

# DIAMOND DRILL CORE ASSAY DATA

754086

HOLE No. SR1



| SAMPLE | | | | | | ASSAYS (ppm unless specified) | | | | | | | | | | | | | | | | | | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number | Type | From m | To m | Interval m | Recovered m | Cu / Pb | Zn / Ag | Au / As | Ba / Sn | W / Rb | Sr / Zr | V / Nb | Y | $Al_2O_3$ / $SiO_2$ % | $TiO_2$ / $Fe_2O_3$ % | MnO / CaO % | $K_2O$ / MgO % | $P_2O_5$ / $SO_3$ % | $Na_2O$ / LOI % | |
| 39904 | BQ | 33·1 | 33·3 | 0·2 | 0·2 | 129 / 31 | 192 / <1 | <·008 / 5 | 404 / 5 | 7 / 22 | 262 / 74 | 334 / <3 | 24 | 15·6 / 51·8 | 0·93 / 13·49 | 0·34 / 5·18 | 1·00 / 4·82 | 0·151 / 0·02 | 4·23 / 2·27 | chlorite-epidote altered basalt |
| 39905 | SPLIT BQ | 43·5 | 45·5 | 2·0 | | 131 / 15 | 193 / <1 | <·008 / 7 | 479 / 4 | 6 | | | | | | | | | | Basalt. Minor py, trace cp. |
| 39906 | " " | 55·5 | 58·0 | 2·5 | | 133 / 496 | 664 / 1 | <·008 / 67 | 458 / 71 | 22 | | | | | | | | | | Chloritic basalt. 1% py, rare qn |
| 39907 | " " | 59·0 | 60·0 | 1·0 | | 52 / 92 | 201 / 1 | 0·088 / 151 | 184 / 72 | 23 | | | | | | | | | | Qtz-tourm fault bx c 3% py. |
| 39908 | BQ | 75·7 | 75·95 | 0·25 | 0·25 | 244 / 18 | 224 / <1 | <·008 / 9 | 358 / 4 | 14 / 52 | 266 / 74 | 361 / 4 | 22 | 15·2 / 49·8 | 0·92 / 14·23 | 0·38 / 5·29 | 1·27 / 4·92 | 0·143 / 0·20 | 4·32 / 3·00 | Basalt. |
| 39909 | SPLIT BQ | 65·0 | 67·0 | 2·0 | | 287 / 25 | 149 / 1 | <·008 / 7 | 207 / 4 | <5 | | | | | | | | | | Basalt. Minor py + cp. |
| 39910 | " " | 86·0 | 88·0 | 2·0 | | 145 / <3 | 248 / <1 | <·008 / 5 | 201 / 6 | <5 | | | | | | | | | | " " " " |
| 39911 | " " | 88·0 | 90·0 | 2·0 | | 101 / <3 | 215 / <1 | <·008 / 14 | 299 / 7 | 11 | | | | | | | | | | " " " " |
| 39912 | " " | 94·5 | 96·0 | 1·5 | | 108 / 3 | 229 / <1 | 0·010 / 16 | 204 / 4 | 17 | | | | | | | | | | Basalt. Minor py. |
| Laboratory | ANALABS | 111310.60.10735 | Analytical-Method | | | AAS | AAS | FA/AAS | XRF401 | XRF401 | XRF401 | XRF401 | XRF401 | XRF408 | XRF408 | XRF408 | XRF408 | XRF408 | XRF408 | |
| Job-No | 0276 | Date | 24·2·95 | Detection-Limit | | 2 / 3 | 2 / 1 | 008 / 0·5 | 10 / 3 | 5 / 5 | 5 / 5 | 5 / 3 | 3 | 0·05 / 0·05 | 0·01 / 0·01 | 0·01 / 0·01 | 0·01 / 0·01 | 0·005 / 0·01 | 0·05 / 0·01 | |

SAMPLE NUMBER: Tullah SR1 39908

## SUMMARY DESCRIPTION:

This sample is an aphyric, texturally well-preserved basaltic dyke rock composed of a subophitic to intersertal-textured intergrowth of albitized plagioclase laths, smaller more equant to bladed former augite crystals, and abundant interstitial equant FeTi oxide grains. The augite is entirely replaced by fibrous green actinolite and minor epidote. Granular yellow epidote is an abundant secondary phase, occurring in albite, and in chlorite patches that are common through the rock. FeTi oxides show at least marginal alteration to leucoxene. Fine-grained epidote occurs along several fractures, and has apparently been grainsize-reduced by continuing deformation-related recrystallization on these microshears. The mineralogy, texture and wholerock composition are all absolutely typical of the Henty Dyke Swarm basalts, especially the high Ti/Zr (75) and aphyric nature of the evolved basalt.

Project: DIERUNG RIVER
Logged by: J.G. PURVIS
Date: 15·2·95

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. SR 1



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.063 mm, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 0 | OX (2-3)<br>chl (2)<br>Fe/Mn stains and on fracts.<br>Minor clay bands | ↑ Moderately fractured + broken ↓<br>C 58° (weak) | | BASALT<br>Green.<br>Fine - medium grained.<br>Sub-ophitic texture.<br>Massive, uniform, even-grained.<br>Magnetic. | |
| 8 | OX (1-2, patchy).<br>chl (2), incl veinlets of chl. | | | | Several % fine dissem magnetite ↓ |
| 12 | clayey seam | C 58° (weak) | | | |
| 14 | 20mm qtz-chl vein<br>+25mm broken qtz-chl vein<br>↓ Epi veinlets (1)<br>Minor qtz veinlets | 8·7m core loss → | | | |
| 18 | clayey seams | | | | |
| 20 | OX (1) +25m qtz-chl vein →<br>chl (2-3)<br>epi (1) (as veinlets) | C 58° (weak) | | | |
| 24 | chl (2)<br>epi (2, veinlets 58°)<br>ox (1) | | | | |
| 28 | many epi veinlets | | | | |
| 32 | clayey OX band | 0·5m core loss | | | |
| 34 | chl (2)<br>epi (2)<br>common vuggy qtz-chl veinlets (wt epi veinlets) | 50mm qtz-chl vein<br>C 70° (weak) | | | Trace dissem py. |
| 38 | OX (1-2) | flow lineation 50° | | contact 39·25m 50° | |
| 40 | | contact 40·7m, 30° | | ANDESITE DYKES<br>Med gr, feld + ferromag phenos to 1·5mm. | Minor dissem py. |
| 42 | ivveg qtz-chl veins with Isil (1) | | | contact 56°, 41·2m | Trace dissem py, rare dissem cp.<br>← malachite on fract. |
| 44 | co (3)<br>chl (2)<br>epi (1-2)<br>calcite veinlets > epi veinlets | ← 360mm zone of calcite-epi-py veining 65° → | | BASALT Fine grained.<br>Green, as above. Hard.<br>Sub-ophitic texture.<br>Magnetic. | 1% py, trace cp. |
| 48 | chl (2), epi (1-2)<br>Epidote in veinlets, + thin bands (± qtz)<br>55-65° | 10mm vuggy qtz veins | | | Trace py |
| 50 | | | | | |

15408?

Project : STERLING RIVER
Logged by: J.G. PURVIS
Date : 16·2·95

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** SR1



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 50 | chl (2), epi (2), ox (1) | | | BASALT as above | No py |
| 52 | Numerous vuggy fracts after co. Minor qtz-limonite veinlets | mod fractured | | | |
| 54 | | | | | |
| 56 | chl (3), ox (2) Many chl veinlets | c: 35° cleaved | | ← fi gr chloritic zones | 1% dissem + veinlet py ← qtz in calcite veinlet |
| 58 | | c: 55° | | 59.0m - contact 55° Minor frags of amygdaloidal basalt 60.0m - contact 35° | 1-2% py, dissem + 1mm veinlets |
| 60 | sil (3), chl (3), tourm (2) (tourmalinization of frags + matrix) | Quartz-annealed Fault Breccia 0.15m rubble (Fault?) (oxidised) mod broken | | | 3% py, coarse gr dissem |
| 62 | chl (2-3) epi (2-3) co (1-2) | c: 50° | | Basalt increasingly magnetic ↓ | Minor dissem + veinlet py-cp, often associated with qtz-epidote veinlets or chl alt fine dissem mag, increasing with depth |
| 64 | Common irreg calcite veinlets. Abund epi qtz veinlets (pre-date co veinlets) | | | | |
| 66 | | | | | |
| 68 | Much of veining sub // cleav. | | | | |
| 70 | 100mm qtz-chl vein | | | | |
| 72 | | c: 35° | | | |
| 74 | | | | | cp stringers |
| 76 | | | | | |
| 78 | | | | | |
| 80 | | | | ← Minor calcite amygdales | |
| 82 | epi (3) - abund veinlets + qtz, + bands of epi to 400mm chl (2) sil (1) co (1-2) epi bands | | | | Trace py-po, rare cp. |
| 84 | | | | ← calcite amygdales | Minor dissem py-cp |
| 86 | chl (3) - many veinlets epi (3) no co ox (1) | | | | |
| 88 | | b/c: 60° cleaved | 87.7m 88.0m | chloritic Mafic Siltstone Band FOLIATED + ALTERED BASALT Dark green, fine grained, strongly magnetic. Veined. | 1% fi gr py Minor dissem + stringer py>cp Much fi gr mag conc in bands + patches |
| 90 | chl (3) epi (2) co (3) Abund veinlets sil (1) esp assoc with epi | | | | |
| 92 | | weakly cleaved | | | |
| 94 | | | | | |
| 96 | | c: 45° strong cleavage | EOH 96.0m | | 1% py, trace cp |

25408

754089

**CORE PROCESSING RESULTS**

**DRILL HOLE NUMBER** SR1

| CORE RECOVERY | | | | mag sus S.I units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| 0.00 | 3.00 | 0.30 | 10.00 | 3.00 | 0.15 | | | | 0.00 | | | | |
| 3.00 | 4.50 | 1.40 | 93.33 | 4.00 | 12.70 | | | | 0.00 | | | | |
| 4.50 | 6.00 | 1.30 | 86.67 | 5.00 | 9.05 | | | | 0.00 | | | | |
| 6.00 | 7.50 | 1.30 | 86.67 | 6.00 | 8.87 | | | | 0.00 | | | | |
| 7.50 | 9.00 | 1.60 | 106.67 | 7.00 | 17.20 | | | | 0.00 | | | | |
| 9.00 | 10.50 | 1.30 | 86.67 | 8.00 | 25.80 | | | | 0.00 | | | | |
| 10.50 | 12.00 | 1.45 | 96.67 | 9.00 | 22.30 | | | | 0.00 | | | | |
| 12.00 | 13.50 | 1.30 | 86.67 | 10.00 | 27.60 | | | | 0.00 | | | | |
| 13.50 | 15.00 | 1.20 | 80.00 | 11.00 | 20.30 | | | | 0.00 | | | | |
| 15.00 | 16.50 | 0.80 | 53.33 | 12.00 | 16.10 | | | | 0.00 | | | | |
| 16.50 | 18.00 | 1.50 | 100.00 | 13.00 | 21.10 | | | | 0.00 | | | | |
| 18.00 | 19.20 | 0.80 | 66.67 | 14.00 | 13.90 | | | | 0.00 | | | | |
| 19.20 | 20.80 | 1.40 | 87.50 | 15.00 | 11.50 | | | | 0.00 | | | | |
| 20.80 | 21.60 | 0.70 | 87.50 | 16.00 | 17.80 | | | | 0.00 | | | | |
| 21.60 | 22.50 | 1.00 | 111.11 | 17.00 | 25.50 | | | | 0.00 | | | | |
| 22.50 | 23.90 | 1.40 | 100.00 | 18.00 | 27.10 | | | | 0.00 | | | | |
| 23.90 | 24.50 | 0.60 | 100.00 | 19.00 | 22.60 | | | | 0.00 | | | | |
| 24.50 | 25.10 | 0.60 | 100.00 | 20.00 | 26.30 | | | | 0.00 | | | | |
| 25.10 | 25.50 | 0.40 | 100.00 | 21.00 | 29.00 | | | | 0.00 | | | | |
| 25.50 | 27.00 | 1.50 | 100.00 | 22.00 | 36.70 | | | | 0.00 | | | | |
| 27.00 | 28.50 | 1.50 | 100.00 | 23.00 | 32.90 | | | | 0.00 | | | | |
| 28.50 | 30.00 | 1.50 | 100.00 | 24.00 | 28.80 | | | | 0.00 | | | | |
| 30.00 | 31.50 | 0.50 | 33.33 | 25.00 | 39.50 | | | | 0.00 | | | | |
| 31.50 | 33.00 | 1.10 | 73.33 | 26.00 | 36.90 | | | | 0.00 | | | | |
| 33.00 | 34.50 | 1.55 | 103.33 | 27.00 | 18.30 | | | | 0.00 | | | | |
| 34.50 | 36.00 | 1.50 | 100.00 | 28.00 | 32.10 | | | | 0.00 | | | | |
| 36.00 | 37.50 | 1.50 | 100.00 | 29.00 | 6.57 | | | | 0.00 | | | | |
| 37.50 | 39.00 | 1.50 | 100.00 | 30.00 | 14.40 | | | | 0.00 | | | | |
| 39.00 | 40.50 | 1.50 | 100.00 | 31.50 | 8.33 | | | | 0.00 | | | | |
| 40.50 | 42.00 | 1.40 | 93.33 | 32.00 | 20.80 | | | | 0.00 | | | | |
| 42.00 | 43.50 | 1.50 | 100.00 | 33.00 | 23.20 | | | | 0.00 | | | | |
| 43.50 | 45.00 | 1.50 | 100.00 | 34.00 | 26.30 | | | | 0.00 | 43.50 | 45.00 | 39905 | |
| 45.00 | 46.50 | 1.50 | 100.00 | 35.00 | 1.05 | | | | 0.00 | | | | |
| 46.50 | 48.00 | 1.50 | 100.00 | 36.00 | 25.30 | | | | 0.00 | | | | |
| 48.00 | 49.50 | 1.50 | 100.00 | 37.00 | 23.80 | | | | 0.00 | | | | |
| 49.50 | 51.00 | 1.50 | 100.00 | 38.00 | 21.30 | | | | 0.00 | | | | |
| 51.00 | 52.50 | 1.45 | 96.67 | 39.00 | 29.50 | | | | 0.00 | | | | |
| 52.50 | 54.00 | 1.50 | 100.00 | 40.00 | 10.00 | | | | 0.00 | | | | |
| 54.00 | 55.50 | 1.50 | 100.00 | 41.00 | 0.45 | | | | 0.00 | | | | |
| 55.50 | 57.00 | 1.50 | 100.00 | 42.00 | 33.50 | | | | 0.00 | 55.50 | 58.00 | 39906 | |

754090

**CORE PROCESSING RESULTS**

**DRILL HOLE NUMBER** SR1

| CORE RECOVERY | | | | mag sus S.I units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| 57.00 | 58.50 | 1.35 | 90.00 | 43.00 | 37.20 | | | | 0.00 | | | | |
| 58.50 | 60.00 | 1.30 | 86.67 | 44.00 | 34.50 | | | | 0.00 | 59.00 | 60.00 | 39907 | |
| 60.00 | 61.50 | 1.40 | 93.33 | 45.00 | 44.30 | | | | 0.00 | | | | |
| 61.50 | 63.00 | 1.50 | 100.00 | 46.00 | 44.20 | | | | 0.00 | | | | |
| 63.00 | 64.50 | 1.50 | 100.00 | 47.00 | 38.60 | | | | 0.00 | | | | |
| 64.50 | 66.00 | 1.50 | 100.00 | 48.00 | 35.90 | | | | 0.00 | 65.00 | 67.00 | 39909 | |
| 66.00 | 67.50 | 1.50 | 100.00 | 49.00 | 0.62 | | | | 0.00 | | | | |
| 67.50 | 69.00 | 1.50 | 100.00 | 50.00 | 38.80 | | | | 0.00 | | | | |
| 69.00 | 70.50 | 1.50 | 100.00 | 51.00 | 35.20 | | | | 0.00 | | | | |
| 70.50 | 72.00 | 1.40 | 93.33 | 52.00 | 32.30 | | | | 0.00 | | | | |
| 72.00 | 73.50 | 1.50 | 100.00 | 53.00 | 34.20 | | | | 0.00 | | | | |
| 73.50 | 75.00 | 1.30 | 86.67 | 54.00 | 20.80 | | | | 0.00 | | | | |
| 75.00 | 76.50 | 1.60 | 106.67 | 55.00 | 33.50 | | | | 0.00 | | | | |
| 76.50 | 78.00 | 1.50 | 100.00 | 56.00 | 0.72 | | | | 0.00 | | | | |
| 78.00 | 79.50 | 1.50 | 100.00 | 57.00 | 0.28 | | | | 0.00 | | | | |
| 79.50 | 81.00 | 1.50 | 100.00 | 58.00 | 34.50 | | | | 0.00 | | | | |
| 81.00 | 82.50 | 1.50 | 100.00 | 59.00 | 0.17 | | | | 0.00 | | | | |
| 82.50 | 84.00 | 1.50 | 100.00 | 60.40 | 45.60 | | | | 0.00 | | | | |
| 84.00 | 85.50 | 1.55 | 103.33 | 61.00 | 42.80 | | | | 0.00 | | | | |
| 85.50 | 87.00 | 1.40 | 93.33 | 62.00 | 29.40 | | | | 0.00 | 86.00 | 88.00 | 39910 | |
| 87.00 | 88.50 | 1.50 | 100.00 | 63.00 | 33.80 | | | | 0.00 | | | | |
| 88.50 | 90.00 | 1.50 | 100.00 | 64.00 | 33.30 | | | | 0.00 | 88.00 | 90.00 | 39911 | |
| 90.00 | 91.50 | 1.50 | 100.00 | 65.00 | 35.50 | | | | 0.00 | | | | |
| 91.50 | 93.00 | 1.50 | 100.00 | 66.00 | 47.70 | | | | 0.00 | | | | |
| 93.00 | 94.50 | 1.50 | 100.00 | 67.00 | 38.00 | | | | 0.00 | 94.50 | 96.00 | 39912 | |
| 94.50 | 96.00 | 1.50 | 100.00 | 68.00 | 27.10 | | | | 0.00 | | | | |
| | | | 0.00 | 69.00 | 33.00 | | | | 0.00 | | | | |
| | | | 0.00 | 70.00 | 43.40 | | | | 0.00 | | | | |
| | | | 0.00 | 71.00 | 34.60 | | | | 0.00 | | | | |
| | | | 0.00 | 72.00 | 37.00 | | | | 0.00 | | | | |
| | | | 0.00 | 73.00 | 24.40 | | | | 0.00 | | | | |
| | | | 0.00 | 74.00 | 39.80 | | | | 0.00 | | | | |
| | | | 0.00 | 75.00 | 32.50 | | | | 0.00 | | | | |
| | | | 0.00 | 76.00 | 43.30 | | | | 0.00 | | | | |
| | | | 0.00 | 77.00 | 14.20 | | | | 0.00 | | | | |
| | | | 0.00 | 78.00 | 42.10 | | | | 0.00 | | | | |
| | | | 0.00 | 79.00 | 40.50 | | | | 0.00 | | | | |
| | | | 0.00 | 80.00 | 15.90 | | | | 0.00 | | | | |
| | | | 0.00 | 81.00 | 37.30 | | | | 0.00 | | | | |
| | | | 0.00 | 82.00 | 42.00 | | | | 0.00 | | | | |

754091

**CORE PROCESSING RESULTS** | **DRILL HOLE NUMBER** SR1

| CORE RECOVERY | | | | mag sus S.I units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| | | | 0.00 | 83.00 | 5.37 | | | | 0.00 | | | | |
| | | | 0.00 | 84.00 | 37.50 | | | | 0.00 | | | | |
| | | | 0.00 | 85.00 | 28.60 | | | | 0.00 | | | | |
| | | | 0.00 | 86.00 | 31.80 | | | | 0.00 | | | | |
| | | | 0.00 | 87.00 | 0.36 | | | | 0.00 | | | | |
| | | | 0.00 | 88.00 | 0.30 | | | | 0.00 | | | | |
| | | | 0.00 | 89.00 | 37.90 | | | | 0.00 | | | | |
| | | | 0.00 | 90.00 | 26.90 | | | | 0.00 | | | | |
| | | | 0.00 | 91.00 | 41.90 | | | | 0.00 | | | | |
| | | | 0.00 | 92.00 | 42.80 | | | | 0.00 | | | | |
| | | | 0.00 | 93.00 | 30.50 | | | | 0.00 | | | | |
| | | | 0.00 | 94.00 | 26.90 | | | | 0.00 | | | | |
| | | | 0.00 | 95.00 | 10.60 | | | | 0.00 | | | | |
| | | | 0.00 | 96.00 | 21.70 | | | | 0.00 | | | | |

# Appendix 3

## Log of Hole SR2

HOLE No. SR 2

# PASMINCO EXPLORATION
# DIAMOND DRILL CORE RECORD

754093

Page 1 of

| | |
|---|---|
| LOCATION | EL 24/91 |
| PROJECT | STERLING RIVER |
| PROSPECT | STERLING VALLEY |
| DESIGNED BY | J.G. PURVIS |
| LOGGED BY | N. McGUNNIGLE |
| RELOGGED | |
| COMMENCED | 3·4·95 |
| COMPLETED | 2·5·95 |
| DRILLED BY | K. HOW |
| DRILL RIG | LONGYEAR 38 |

## OBJECTIVE

TO TEST THE FARRELL SLATES/MURCHISON VOLCANICS CONTACT FOR MASSIVE SULPHIDES, 500m NORTH OF STRONG HYDROTHERMAL ALTERATION ZONE IN HOLE STP 105.

## RESULT

NO MINERALIZATION ON FARRELL/MURCHISON CONTACT. ONLY PATCHY HYDROTHERMAL ALTERATION IN MURCHISON VOLCANICS BELOW THE CONTACT. ZONES OF SULPHIDE VEINING IN FARRELL SLATES, UP TO 2m @ 3.5% Pb+Zn.

## LOCATION/SURVEY DATA (AMG)

| | | | |
|---|---|---|---|
| Grid | AMG | RL Collar m | 188.4 |
| Northing m | 5 373707.0 | Bearing Collar | 090.5° |
| Easting m | 384425.4 | Dip Collar | −70° |
| DH Survey Type | EASTMAN CAMERA | Length Hole m | 367.6 |

| Depth m | Bearing | Dip | Depth m | Bearing | Dip |
|---|---|---|---|---|---|
| 30 | 096° | -67.5° | | | |
| 63 | 099.5° | -61.75° | | | |
| 90 | 099° | -59.4° | | | |
| 120 | 097.5° | -54.75° | | | |
| 150 | 098° | -54.25° | | | |
| 180 | 097° | -53° | | | |
| 210 | 095° | -53° | | | |
| 240 | 098.5° | -52.25° | | | |
| 270 | 100° | -51.4° | | | |
| 300 | 101.75° | -50° | | | |
| 330 | 099.25° | -47.75° | | | |
| 360 | 100° | -45.25° | | | |

## SIGNIFICANT INTERSECTIONS

| From m | To m | Interval m | Pb (%) | Zn (%) | Ag (g/t) | As (%) | Sn (%) | Comments |
|---|---|---|---|---|---|---|---|---|
| 11.5 | 13.5 | 2 | 2.2 | 1.2 | 100 | | | Sulphide veinlets in sandstone |
| 17.7 | 19.6 | 1.9 | 1.0 | 1.0 | 39 | | | " " " " |
| 84.0 | 88.25 | 4.25 | | 0.33 | | 0.36 | 0.22 | Veined & brecciated black shale |
| 197.6 | 200.5 | 2.9 | | | | | 0.41 | Qtz-sulphide veins. |
| | | | | | | | | |

## SIGNIFICANT CORE LOSS

| From m | To m | % Lost |
|---|---|---|
| 7.1 | 10.0 | 59 |
| 61.9 | 64.0 | 43 |
| 121.1 | 122.6 | 47 |

## POOR GROUND CONDITION ZONES

| From m | To m | Condition |
|---|---|---|
| 78 | 88 | Moderately broken |
| 119 | 123 | Fractured and broken |
| 175.5 | 178.5 | Fractured and broken |

## HOLE SIZE

| Size | Depth m |
|---|---|
| HQ | 18 |
| NQ | 367.6 |
| | |
| | |
| | |
| | |

## HOLE CONDITIONS AFTER COMPLETION

| | |
|---|---|
| Collar | STEEL CAP ON HQ STEMPIPE |
| Steel Casing | 3m HQ |
| PVC Casing | 40mm ID PVC PLACED TO BOTTOM |
| Ground Water | |
| Wedge | |
| Drill Pad | REHABILITATED — TOPSOIL + BUTTONGRASS REPLACED |

Project : STERLING RIVER
Logged by: J.G. PURVIS
Date : 4TH MAY 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. SR2



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding c = cleavage f = fault Angles to LCA | GRAPHIC LOG | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 0 | ox(2) Poor recovery | Mod fractured + broken at intervals throughout f:55 | silt/sst | **FARRELL SLATES** SILTSTONE – SANDSTONE Lesser interbedded grey-black shale. Grey. Fine-med gr. Varies from massive sst beds up to 1m, to finely bedded siltstone/sst. sst: qtzo-feldspathic ± mica. Generally calcareous + slightly carbonaceous. siltst: Sericitic/(vitric) +carbonaceous shale: carbonaceous. | 2-6% gn-sp-py > aspy in veinlets (some dissem py) |
| 2 | ser (1) Trace chl | | | | |
| 4 | Common irreg carb ± qtz veins + veinlets av < 10mm (rarely with sulphides) | | shale | | 2-5% py > gn-sp Dissem + veinlets |
| 6 | | Mod foliation (gen bedding //) B 48° C 25° | fracts | | 1-2% py, dissem. Minor veinlets sp-gn |
| 8 | | | sst | | Minor to 1% py, mostly dissem. |
| 10 | | | Black shale beds | | V minor sp-gn-asph-py veinlets 10 |
| 12 | | | ssl/silt sulphide veinlets (py-sp-gn) | | 1-2% py, dissem Minor sp-gn veinlets |
| 14 | Patchy co(2) Predom in sst | | py | | 3-5% py-sp-gn > cp in qtz veinlets to 8mm. |
| 16 | | kinks | | | 1% py, dissem |
| 18 | | f kinks // LCA | Marbly fine sst/silt HQ NQ | | 2-3% py-sp-gn in veinlets ± qtz |
| 20 | | B: 52° Kink // LCA | shale laminae | | 20 Minor to 1% py > sp, dissem. |
| 22 | | Kink 65° Kink // LCA | | | Minor sp-gn-py veinlets. |
| 24 | | | | | Minor dissem py |
| 26 | chl (1-2) ser (1) | | | | |
| 28 | | | | | |
| 30 | | B: 49° (Dips 64° to 270° AMG) f: 55° (// B) | | | 30 |
| 32 | | | | | |
| 34 | | | | | |
| 36 | | | | | |
| 38 | | | | | |
| 40 | | Fracts | | | 40 |
| 42 | | B: 40° | | | 1-2% py > sp-gn. Trace cp. Dissem veinlets + 5mm py-carb veins |
| 44 | | | | | Minor py-sp in veinlets + dissem py. |
| 46 | | | | | |
| 48 | | | | | |
| 50 | | Kink // LCA Fracts | | | |

RS4094

Project : STERLING RIVER
Logged by: NKM
Date : 9-5-95

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** SR2



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32 max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 50 | minor graphite on foliation planes<br>minor chl. (1-2) | B: 38° | v.f. zst & shale lam | | minor py > sp in veinlets & diss py. Patchy sp. in CO. |
| 52 | | small f: 50° // fol | | | |
| 54 | | fract. & broken | v.f. sst | 5mm dismembered lime green mafic (?) dyke, 25° (// fol) epi-fuc alt$^{d}$ | |
| 56 | | | | | |
| 58 | qtz-chl veinlets & veins | kink // LCA | sh / zst | | |
| 60 | CO (2-3) | | qtz-py vein<br>sh. lam | | CO-25 irregular minor qtz-py vein 5-50 mm |
| 62 | | kink // LCA | v.f. zst/sh lam | | |
| 64 | | B: 55° (dips 62° to 290° AMG) | v.f. zst/sh lam | | |
| 66 | | | silt/shale<br>silt/shale | | 1-2% diss & veinlet py > sp |
| 68 | | contact (B) 60° | | 67.9m | |
| 70 | CO (2-3) in patches esp. siltstone beds | moderate fol. B: 60° | | BLACK SHALE<br>· minor thin siltstone beds esp. in top 5m<br>· Carbonaceous shale with minor graphite on fol. planes | 2-3% py; minor sp diss. & in CO-qtz veinlets & stringers along fol. inc with depth |
| 72 | | small fold | | | |
| 74 | common irregular carb > qtz veinlets in fol | strong // fol inc. with depth<br>small folds | | | |
| 76 | | | | | |
| 78 | | C: 60°<br>mod. broken | | | |
| 80 | | | | | 2-3% py & sp diss & in veinlets |
| 82 | | contact gradational | | 82.4m | |
| 84 | Abundant chl-sulph net-veinlets<br>CO (1) in patches<br>→ patchy sil (2) | partly brecciated & chl-sulph net veining post dates fol. & qtz-chl veining in shales C: 65° P.T.O. | py veins<br>py-sp veinlets | DEFORMED & MINERALISED ZONE IN BLACK SHALE (84)<br>· very strongly foliated & incipiently brecciated<br>· minor graphite on fol. planes (86.4) | 3-5% py; min sp diss. & in CO veinlets & stringers<br>3-5% py-sp-po diss. & veinlets minor aspy-cp<br>5-10% py-sp-aspy-cp-po (vein-veinlets) |
| 86 | | | | | |
| 88 | | contact gradational | | 88.05-88.25 annealed cataclasite (87.9)<br>BLACK SHALE, minor deformation, + minor thin siltst beds | 20-25% py > sp-aspy-cp-po<br>3-4% py > sp diss & in veinlets |
| 90 | chl-qtz veins & veinlets<br>CO (1) in veins & patches | fol 25° | | 90.6 ↓ incr fol. away from def$^{d}$ zone | |
| 92 | CO (2-3) in veinlets & patches esp. in fol. in siltst. beds | 91.6m (dips 78° C: 36° to 292° AMG) | v.f. sst<br>shale<br>zst<br>py-sp veinlets | INTERCALATED SILTSTONE-SHALE<br>· beds of dark-med grey shale & siltst<br>· finer beds strongly fol$^{n}$<br>· minor graphite on fol planes (shale) (95.5)<br>· some v.f. bedding between zst/shale (96.7) | 1% py: diss + veinlets + minor po-aspy-cp min$^{n}$ in thin stringers along 1-3% fol planes<br>3-5% py-sp-po-cp in veinlets, fol, diss<br>2-3% py-po-sp-cp diss + in CO veinlets & thin stringers // fol |
| 94 | | | | | |
| 96 | | | | | |
| 98 | | C: 50° | | | |
| 100 | | | | | |

15409.5

Project : STERLING RIVER
Logged by: NKM
Date : 12-5-95

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. SR2



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding c = cleavage f = fault Angles to LCA | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 100 | | | | | |
| 102 | | sm F: 10° | | cleaved coarser grained bedding with CO clasts (≤20mm long) & intercalated with v.f silt & shale laminae | |
| | | 102.1 – 102.35 ↑↑ | | | 1(-2)% py > sp-cp po clots & in veinlets of CO + stringers // fol |
| 104 | 104.6: 80mm qtz vein with chl. & subp. mm 104.7: 80mm qtz vein | ↑↑ Kink: 15° | cln gr | cleaved coarse gr. bedding (smaller gr. than above) + qtz crystals | 104.1 26-30% py-po-cy in qtz vein |
| 106 | | Kinks // LCA | | | 1-3% py-sp-po-cp (all a bore) |
| | 107.05: qtz-CO vein 60mm with subph. | ?F fold fine fol" 107.6 alongside qtz vein C: 60° | | 107.6 coarse gr. sst, ↑, cleaved | 107.05 10-15% py-sp-po-cp ± spy in qtz vein |
| 108 | 108.6: 40mm qtz-CO 109: 60mm qtz-CO vein (35° LCA) | micro-kink structures 10-15° LCA | cntr. cleaved | 107.8 extensively cleaved, pyggy & graphitic 108.5 | |
| 110 | | kink: 35° | | Fine shale "interfingers" with coarser sst - gravel (1-2 mm clasts in sst matrix) - has flame-like structures in defined boundary. - coarser sed. includes rd qtz & CO clasts + rip up clasts (≤ ~10mm) of laminated shale. | → py-sp-po-aspy in qtz-CO vein |
| 112 | | | | | |
| 114 | | C: 46° | | | 114.8 |
| 116 | | | | | 1% py-sp-po-cp clss & veinlets (// to fol) |
| 118 | | | | | 118.6 |
| 120 | 119.7 qtz-CO veining 121.5 | fractured and broken | qtz-py-po veins | | 1-3% po > py-sp-cp aspy in veinlets (CO), patches & clss, commonly // to fol |
| 122 | | mod. broken C: 55° | | 122.85 | → 5% py-po-sp-cp-aspy in qtz vein |
| 124 | chl-CO in veinlets (+ matrix) (2) ser (1-2) | C: 40° B: 46° | py-cpaspy(chl) vein | VOLCANICLASTIC MASS FLOW - moderate to strongly foliated, mid-grey coloured volcaniclastic mass flow deposit. - uphole fining, with finer matrix composed of sst sized clasts (1-5mm) v. minor qtz & feldspar, + rip-up clasts of shale | 1-2% py-aspy-po in veinlets + clss. - veinlets include CO & chl, commonly // fol v. minor sp |
| 126 | | | | | |
| 128 | | 127.4 cleavage "twisted" with 5° 129.3 variation along plane | ± sil/sh | | |
| 130 | chl 3-4 in strong cleavage | | qtz veins | | |
| 132 | | strongly fol. + sm. folds in sed. beds 40°-50° LCA | py-gal-aspy (1.5mm) | From 163.8m downhole, the matrix supported mass flow includes rip-up shale (≤ 80 x 20 mm), sub-angular abraded clasts of qtz & CO (≤ 20mm), abraded qtz & feldspar crystals, and stretched sericitic pumice (≤ 40mm) which contain crystals of quartz & feldspar | |
| 134 | | | | | |
| 136 | blotchy ser | C: 40-45° b: 30° fold c: 50° | | | |
| 138 | | broken | | | 138.8 vein |
| 140 | | | (qtz-chl) py-aspy | | |
| 142 | qtz-CO veinlets | | qtz vein | | 142.6 qtz vein: py-aspy-gal-sp-cp |
| 144 | | | qtz-CO vein | | |
| 146 | | C: 43° | | 146.2 pumice clasts observed | |
| 148 | qtz-CO veinlets & net veinlets | slightly brecciated 146.2 – 146.45 | | | |
| 150 | | | | | |

Project : STERLING RIVER
Logged by: NKM
Date : 16-5-95

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** SR2



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault; Angles to LCA) | GRAPHIC LOG (0.05 0.5 2 8 32 128 mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 150 | | | | | |
| 152 | | | | py-po-sp (qtz (co-chl) | |
| 154 | | | | | 153.5 py-po-sp in qtz-co vein |
| 156 | 155.5 qtz 50mm<br>156.1 qtz 50mm | C: 45-50° | | | |
| 158 | 157.5 qtz 40mm<br>157.65 qtz 40mm | | | | |
| 160 | | | | | |
| 162 | qtz-chl vein with sulphides | | | | 162.1 py-cp-po ± sp in 163.4 qtz-chl vein |
| 164 | | strongly foliated | | 163.8 increasing grainsize -clasts of carb. shale/siltst ? common + clasts of co, alt$^{d}$ feldspar | |
| 166 | | | | | |
| 168 | | | | | |
| 170 | | C: 35° | | | |
| 172 | | Kink: 86° | | | |
| 174 | co (2-3) esp in shale lam. | C: 50° at contact | | 175.55 1749 rip-up clasts of shale ≤60mm, intercalated with volcl. clast & co veinlets | 174.4 1-2% py-cp |
| 176 | co (1-2) in lam's. ser (1) on fol. plane 60mm qtz vein | C: 45-50° Fract + broken | | SHALE -moderately foliated black shale with intercalated siltst. (increasing uphole). + lam. of coarser grained volcaniclastic | 1-2% py > po - ±sp-cp diss. & in stringers parallel to fol. |
| 178 | weak chl (1) along some fol. planes | mod. broken | py = po (qtz) volcanic flow sh. | 179.5 beds. | - minor sp - |
| 180 | ser (1) along fol. planes (& in pumice) minor (1) chl co (1-2) in lam. & replacement of feldspar. | C: 25° at contact contact "feathered" sh. competent bedding? 184 34° (dips 84° stretched pebble to 254° AMG) | | HIGHLY CLEAVED PUMICEOUS VOLCANICLASTIC MASS FLOW -contains stretched ser. pumice av. 10-15 mm (≤ 30 mm), which contain abraded qtz + feld xstals. -ser. along fol. planes. -clasts include rip-up shale (≤ 15 x ? 100 mm), co, qtz, siltst. -apoeuis ungraded. | 1-2% py diss + v. minor ±py-sp |
| 182 | | | | | |
| 184 | | | | | |
| 186 | | kink 5° | | | |
| 188 | co-qtz in veinlets | kink ⊥ C: 45° Fract + broken Kink ⊥ | | 187.7 BLACK SHALE | 2-3% py-cp diss & in veinlets & net veinlets (qtz-co-chl) (? ab in veinlets) |
| 190 | co-qtz net veinlets. chl (1-2) in veinlets (// fol) | mod. foliated | | Finely bedded black shale with net veining. Graphite on foliation planes | |
| 192 | | | | | ↓ = diss sp & ±py-cp (min or) |
| 194 | | | py-(qtz-co) | 195.5 | minor sp-po-±py |
| 196 | qtz (4) with 2° co-chl (1) in veinlets | veinlets, some netted (exposed rocks (shale) ⊥ to core) | | QUARTZ VEIN - with network of veinlets infilled with co-chl-& sulph. some interbedded fol$^{n}$ shale (shale & veins, unbroken) 197.6 | 2-4% py - diss + diss in veinlets |
| 198 | net veinlets & qtz veins common | | | SILTSTONE SHALE | 1-2% py > cp > sp - gal at vein + min po. near contact<br>3-6% py-cp-po in veins/veinlets >> diss. minor sp |
| 200 | | | | | |

RS4097

Project : Sterling River
Logged by: NKM
Date : 16-5-95

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. SR2



RS4006

| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding c = cleavage f = fault Angles to LCA | GRAPHIC LOG (0.06 mud, 0.2, 2, 6, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 200 | - qtz vein 2° chl(1) CO(<1) infill in veinlets | C: 50-55° fold (sm) ⊥ fold (sm) Kink 65° | py-po (qtz) | uphole fining intercalated sand-siltstone shale to very finely bedded black shale. - moderately deformed, fol. 50-65° LCA and small folds common in sediments, perpendicular (⊥) to LCA | 200-0 200.5 5-8% py-cp-po |
| 202 | 200.2 | | | | + minor espy + minor sp. |
| 204 | | | | | |
| 206 | 205.8 70mm qtz vein | | py-po (qtz) | | |
| 208 | qtz + minor chl(1) in cement of bx. | | | 208.0 QUARTZ VEIN 209.0 PTO. | 15-20% py-cp-po espy in qtz vein |
| 210 | CO (1-2) esp. in sst/shale beds + replacement CO in cryst(1) (?F) minor chl (1) in patches & along some veins - qtz veins & veinlets (with 2° CO) | small kinks assoc. with qtz veinlets perp. 25° (5-10mm) C: 39° (dips 88° to 298° AMG) | (qtz) py + po-sp (8mm) | SANDSTONE with lesser interbedded siltstone & shale. - medium-coarse grained qtz-feld. sst (ser-glass matrix) with fine beds of siltst/shale - mod-strong foliation with stretched clasts (1-2mm) & slightly graphitic on foliation planes - increasing deformation downhole (esp. in finer sects). - abraded qtz (crystals) constitute 20-25% | 2-3% py-cp-po in qtz (CO) veinlets & veins + diss |
| 212 | | | bands of siltst/sh | | minor-1% py; diss & "diss" along fol. planes + in fine stringers // fol. in shale beds. V. minor po-cp-espy. -sp |
| 214 | | sm. kinks 30° LCA | | | |
| 216 | | increasing deformation 215.8 sm. folds ± ⊥ LCA 217.4 | | | |
| 218 | | sm. kinks 50-60° LCA sm. fold ⊥ LCA | ssst | | |
| 220 | | Fract + broken | shale | | |
| 222 | | C: 50° LCA | | | 221: py-cp-po-sp espy |
| 224 | | small kinks ⊥ LCA | siltst/sh | (qtz) - py - po (qtz) - po - py - espy | minor min° (") along kinks |
| 226 | | | | | |
| 228 | 228.2 CO (2°) clasts (1-2) 15mm qtz vein | small kinks and deformation ⊥ LCA | siltst/sh | sericitic alteration clearly in coarser grained sst (1-2) | 228.3 1% py > po 229.2 (in sh/silt) |
| 230 | | | | | minor espy in CO veinlets |
| 232 | | C: 50° | | | |
| 234 | | increasingly common deformation with small kinks, folds and faults, commonly ⊥ ± 10° LCA | kink ⊥ sm. kinks 80-90° | | |
| 236 | | | sm. k & folds ⊥ LCA | | |
| 238 | (approx) CO increasing (2-3) in bedding & fol° ser (2-3) | | kink: 80-90° | | |
| 240 | | | F: (fract + broken) sm f: 40° sm. fold ⊥ kinks: 35-50° | 239.8 240.4 sericitic coarse grained volcaniclastics with minor interbedded fine siltst. - abraded qtz gr. abundant graphitic & pyrrhotitic 240.8 241.3 | |
| 242 | | | | | |
| 244 | | | kinks: 30-50° | | |
| 246 | | | kink: 30° kinks: 40-50° | 246.0 Farrel fault zone - very finely bedded & foliated med-crs grained sst with siltst. sst contains abundant qtz (25%), ser. | |
| 248 | | Strongly foliated C: 40-50° | Kinks ⊥ ± 20° kink // kink ⊥ | | 248.4 1-3% po-py-cp-diss + diss in veinlets (// FOL) |
| 250 | | | | | |

Project : Sterling River
Logged by: N.K.M
Date : 17-5-95

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** SR2



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (clay, silt, sand, gran, peb, cob, boul) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 0 | | | | 250.5 Volcaniclastic sst & deformed zone - interbedded | |
| 252 | | c: 50° contact | | 252.4 volc. sst with siltst. | |
| 254 | ser (2) anastomising parallel foliation planes chl (1-2) along cleavage planes minor chl (≤1) | cleavage: | | MURCHISON VOLCANICS -cleaved and foliated, light grey volcanics. Anastomising cleavage has mineralisation (diss) along planes -stretched qtz (± feld) crystals // fol. | 1-3% py-po-cp diss + diss in veinlets // fol |
| 256 | | C: 50-65° | py-sp | | 256.4 py-sp veinlet |
| 258 | CO (2) in veinlets // fol | | | | 1-3% po-py-cp diss + diss in |
| 260 | CO (1-2) in veinlets & veins chl (2-3) sil (2-3) in patches | | | 259.6 ALTERED FELSIC VOLCANIC undetermined, uniform & massive felsic volcanic. -moderate foliation decreased downhole - light grey colour varies with alteration type, from dark green - bleached cream -chl-ser-sil alteration is common along anastomising cleavage planes - qtz crystals common, some fractured and sub-anhedral -sil alteration mod-strong in blotchy patches which are stretched with cleavage (some contain qtz crystals ∴ 2° feature) | veinlets (// fol) |
| 262 | | | | | |
| 264 | | C: 45°-50° kink: 60° | | | |
| 266 | chl (1-2) vfed + patchy ser (1) | fractures: 50°; 55° | | | 1% py-po-cp diss & diss in veinlets |
| 268 | CO (minor-1) in veinlets & micro-veinlets | | | | 1-3% py-po-cp |
| 270 | | | | | |
| 272 | | 271.6 58° (dips 76° to 256° AMG) | | | |
| 274 | | C: 60-70° | | | 274.1 1-3% po-py-cp ± aspy diss & diss in veinlets |
| 276 | qtz veins 274.85 common 5-70 mm (± chl-CO) 276.7 | | qtz-chl vein | | qtz-ch veins with py-po |
| 278 | | | | | |
| 280 | | | | | |
| 282 | | | | | |
| 284 | | | | | |
| 286 | | | | | |
| 288 | | | | | |
| 290 | 15 mm min° vein (+chl) chl stretches in patches (2-4 mm) | | py-po-cp (15 mm) | 289.6 pebs. | 289.0 py-po-cp vein |
| 292 | 292.0 qtz veins with 2° CO + chl + min | | | | 289.0 1-2% py-po-sp -gal in patches in veinlets (// fol) |
| 294 | 293.85 294.25 qtz vein: 30 mm 294.5 -294.9 qtz veins: ≤15 mm | | | | 2-3% py-aspy-sp-po-cp-gal 1-2% py-po-asp-cp minor-1% py-po ± cp |
| 296 | | C: 50-65° | | | |
| 298 | | | | | |
| 300 | 299.5 (see p. 7) | | | 299.5 increased bleaching | |

RC4099

Project : Sterling River
Logged by: NKM
Date : 23-5-95

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** SR2



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding c = cleavage f = fault Angles to LCA | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 300 | ser (2) esp. // fol | | | | |
| 302 | co (1-2) in veinlets + crystal replacement | 301.6 (dips 78° C: 56° to 257 AMG) | | | |
| 304 | 303.4 co-chl veins (≤10mm) | | qtz-py | -murky, ~20mm | diss py (1%) |
| 306 | qtz + $S_2$ min | C: 58-60° sm. f sm. kinks (⊥ LCA) | qtz-py-cp | | qtz-py veins (+cp) |
| 308 | | | | 308.5 - sil (2°) blotches, 309.2 (≤15mm) | minor (<1%) sp in veinlets + diss |
| 310 | | | | | |
| 312 | | | | | |
| 314 | 313.4 (not defined with boundary) | | | decreased bleaching: darker grey-green colour | |
| 316 | | | | | |
| 318 | | | | | 317.6 1-2% sp-cp-py in veinlets + 319.4 diss in vein |
| 320 | co vein, 10mm | | | transgressive increase in bleaching | 321.0 |
| 322 | 322.2 sil (1-2) 323.0 | sm. kinks ⊥ to LCA | | | 2-3% sp-gal-py-cp in veinlets (//fol) + diss py |
| 324 | chl assoc. with some veinlets | | | | 325.2 |
| 326 | | C: 59-62° | | | 325.4 2-3% sp-cp-py gal-po-py veinlets + gal veinlets |
| 328 | sil (1-2) in patches | | | | |
| 330 | | | | | |
| 332 | | 331.6 (dips 68° to 267° AMG) | | | 1% py-sp-po in patches in veinlets & in thin veinlets // fol. minor diss py |
| 334 | | | | | |
| 336 | | C: 65° | | | |
| 338 | | | | | |
| 340 | | | | | 341 |
| 342 | | | | | 2-3% py-po-cp-sp diss + diss in veinlets //fol |
| 344 | | | (co-chl) py-cpy-cp-sp veinlets | | 344 minor - 1% py-sp, diss + diss along fol. 344.9 po veinlets 345.3 py-cpy-cp-sp veinlets (co+chl) |
| 346 | | C: 55° 346.7 (10mm) f weaker cleavage (less defined) below fault | sp veinlets | min.° assoc with fault movement - sp band on upper contact - py in veinlet & diss within the bleached, recemented fault rock | 348.9 (not defined boundary) 349 1% py (diss) |
| 348 | | | | | |
| 350 | | 350 | | | |

Project : Sterling River
Logged by: NKM
Date : 1-6-95

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** SR2



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding c = cleavage f = fault Angles to LCA | GRAPHIC LOG (core mud, cs, f, m, c, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 350 | | | | | |
| 352 | | | | | 1% py (diss) minor - diss + in micro-stringers // fol |
| 354 | | C: 60° | | | |
| 356 | | | | | |
| 358 | | | | | 358.6 minor sp veinlet |
| 360 | CO (1-2) in veinlets chl (1-2) " " sil (1-2) in patches | C: 60° (dips 72° 361.5 to 278° AMS) | | 359.8 Tuffaceous siltstone interflow zone (see below)* 361.6 | 1-3% po-cp-aspy-sp in veinlets + diss in patches // fol |
| 362 | chl (2-3), pervasive & concentrated in wispy lenses // fol ser (1) in blebs (inc) CO (1) 2° + veinlets | | | MASSIVE VOLCANICS (? rhy) greenish-grey porphyritic volcanics, containing abundant qtz phenocrysts, 2-3mm (mostly anhedral, partly corroded, evenly distributed) 367.6 EOH - mod foliated, unbroken | minor - 1% py-sp diss + diss along cleavage (fractured) |
| 364 | | | | | |
| 366 | | C: 62° | | | |
| 368 | | | | | |
| 370 | | | | | |
| 372 | | | | | |
| 374 | | | | | |
| 376 | | | | * Mid-dark grey siltized tuffaceous zone -chl-co banding along cleavage (masks possible visible bedding or grading) -mid-light grey zones with alteration to chl- darker grey-green | |
| 378 | | | | | |
| 380 | | | | | |

541101

| HOLE_ID | SAMPLE | FROM | TO | Cu | Pb | Zn | Ag | Au | As | Ba | Sn | W | Rb | Sr | Zr | V | Nb | Al2O3 | SiO2 | TiO2 | Fe2O3 | MnO | CaO | K2O | MgO | P2O5 | SO3 | Na2O | LOI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SR2 | 40819 | 3 | 5 | 64 | 4252 | 2886 | 22 | <0.008 | 22 | 322 | 495 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40820 | 11.5 | 13.5 | 148 | 21700 | 12300 | 100 | 0.02 | 11 | 150 | 45 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40821 | 17.7 | 19.6 | 80 | 9700 | 9900 | 39 | 0.01 | 26 | 202 | 128 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40801 | 80 | 82.4 | 63 | 418 | 1470 | 3 | 0.01 | 65 | 348 | 10 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40802 | 82.4 | 84 | 205 | 136 | 256 | 4 | 0.03 | 423 | 170 | 121 | 15 | | | | | | | | | | | | | | | | | |
| SR2 | 40803 | 84 | 85 | 781 | 98 | 696 | 4 | 0.03 | 414 | 92 | 4550 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40804 | 85 | 86.5 | 203 | 84 | 355 | 4 | 0.04 | 1359 | 63 | 1520 | 30 | | | | | | | | | | | | | | | | | |
| SR2 | 40805 | 86.5 | 87.7 | 317 | 1002 | 10700 | 4 | 0.12 | 3034 | 119 | 97 | 35 | | | | | | | | | | | | | | | | | |
| SR2 | 40806 | 87.7 | 88.2 | 3023 | 242 | 149 | 11 | 0.17 | 16400 | 35 | 4050 | 65 | | | | | | | | | | | | | | | | | |
| SR2 | 40807 | 88.25 | 90 | 93 | 66 | 113 | 2 | 0.01 | 425 | 137 | 1570 | 15 | | | | | | | | | | | | | | | | | |
| SR2 | 40808 | 90 | 91.5 | 52 | 21 | 49 | | 0.01 | 48 | 213 | 188 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40809 | 95.4 | 97.3 | 87 | 38 | 410 | 2 | 0.01 | 88 | 327 | 71 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40810 | 97.3 | 99.3 | 66 | 153 | 502 | 2 | 0.01 | 42 | 432 | 6 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40811 | 110.5 | 112 | 121 | 1838 | 4551 | 3 | 0.02 | 794 | 683 | 7 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40812 | 112 | 113.1 | 123 | 12 | 69 | 2 | 0.02 | 633 | 770 | 19 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40813 | 120.5 | 121.5 | 35 | 28 | 82 | 2 | 0.02 | 959 | 459 | 54 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40814 | 162 | 163.5 | 31 | 64 | 155 | 2 | 0.03 | 4301 | 767 | 123 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40822 | 188.7 | 190.7 | 50 | 129 | 160 | 2 | 0.02 | 68 | 504 | 15 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40823 | 190.7 | 192.7 | 104 | 270 | 349 | | 0.02 | 58 | 527 | 37 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40824 | 192.7 | 194 | 54 | 164 | 323 | 2 | 0.03 | 50 | 646 | 41 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40825 | 194 | 195.5 | 48 | 15 | 62 | 2 | 0.03 | 52 | 652 | 31 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40826 | 195.5 | 196.6 | 15 | 123 | 371 | | <0.008 | 28 | 71 | 176 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40827 | 196.6 | 197.6 | 13 | 264 | 538 | | <0.008 | 11 | 270 | 87 | 15 | | | | | | | | | | | | | | | | | |
| SR2 | 40828 | 197.6 | 199 | 244 | 122 | 171 | 3 | 0.02 | 578 | 17 | 5460 | 55 | | | | | | | | | | | | | | | | | |
| SR2 | 40829 | 199 | 200.5 | 142 | 169 | 114 | 6 | 0.01 | 20 | 187 | 2800 | 20 | | | | | | | | | | | | | | | | | |
| SR2 | 40830 | 200.5 | 202 | 44 | 27 | 122 | 2 | 0.02 | 20 | 58 | 882 | 15 | | | | | | | | | | | | | | | | | |
| SR2 | 40831 | 202 | 204 | 61 | 9 | 98 | 2 | 0.01 | 1214 | 57 | 225 | 25 | | | | | | | | | | | | | | | | | |
| SR2 | 40832 | 204 | 206 | 31 | 11 | 154 | 2 | <0.008 | 32 | 43 | 198 | 25 | | | | | | | | | | | | | | | | | |
| SR2 | 40833 | 206 | 208 | 23 | 18 | 199 | 2 | <0.008 | 50 | 28 | 565 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40834 | 208 | 209 | 99 | 26 | 57 | 2 | <0.008 | 64 | <10 | 825 | 25 | | | | | | | | | | | | | | | | | |
| SR2 | 40835 | 209 | 210.5 | 39 | 424 | 1315 | 2 | <0.008 | 182 | 74 | 231 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40836 | 210.5 | 212 | 68 | 23 | 85 | 2 | <0.008 | 50 | 219 | 85 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40837 | 248.5 | 250.5 | 54 | 51 | 90 | 2 | <0.008 | 28 | 994 | 4 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40838 | 250.5 | 252.5 | 28 | 36 | 135 | 2 | <0.008 | 32 | 910 | <3 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40839 | 252.5 | 254.5 | 53 | 129 | 161 | 2 | <0.008 | 7 | 1230 | 11 | 10 | | | | | | | | | | | | | | | | | |
| SR2 | 40457 | 252.55 | 263 | 95 | 58 | 192 | <1 | <0.008 | 16 | 1850 | 17 | 20 | 200 | 71 | 257 | 40 | 10 | 13.3 | 67.6 | 0.36 | 5.1 | 0.14 | 2.64 | 4.17 | 1.09 | 0.08 | 1.33 | 1.03 | 3.04 |
| SR2 | 40840 | 254.5 | 256.5 | 156 | 1984 | 1019 | 5 | 0.02 | 22 | 1460 | 17 | 55 | | | | | | | | | | | | | | | | | |
| SR2 | 40841 | 256.5 | 258.5 | 192 | 117 | 1008 | 3 | 0.01 | 50 | 1430 | 37 | 15 | | | | | | | | | | | | | | | | | |
| SR2 | 40842 | 258.5 | 260.5 | 199 | 30 | 128 | | 0.01 | 14 | 1560 | 14 | 10 | | | | | | | | | | | | | | | | | |
| SR2 | 40458 | 263 | 273 | 54 | 12 | 64 | <1 | <0.008 | 2 | 2000 | 7 | 10 | 158 | 59 | 130 | 13 | 13 | 12.3 | 72.9 | 0.15 | 3.35 | 0.07 | 1.37 | 4.06 | 0.81 | 0.02 | 0.13 | 1.75 | 2.17 |
| SR2 | 40459 | 273 | 283 | 21 | 5 | 52 | <1 | <0.008 | 4 | 1060 | 15 | 10 | 188 | 39 | 141 | 9 | 13 | 13.1 | 73 | 0.16 | 3.56 | 0.06 | 0.74 | 3.84 | 0.95 | 0.01 | 0.07 | 1.64 | 2.21 |
| SR2 | 40460 | 283 | 293.2 | 30 | 211 | 249 | <1 | <0.008 | 39 | 1670 | 9 | <10 | 256 | 38 | 118 | 9 | 13 | 12.2 | 73.6 | 0.12 | 2.93 | 0.08 | 1.17 | 5.57 | 0.82 | 0.01 | 0.27 | 0.07 | 2.44 |
| SR2 | 40843 | 289.9 | 291.9 | 38 | 230 | 514 | | <0.008 | 381 | 2260 | 18 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40844 | 291.9 | 293.9 | 81 | 17 | 1251 | 2 | 0.01 | 762 | 2800 | 14 | 10 | | | | | | | | | | | | | | | | | |
| SR2 | 40461 | 293.2 | 303.23 | 19 | 50 | 112 | <1 | <0.008 | 5 | 2400 | <3 | <10 | 205 | 56 | 103 | 8 | 15 | 11.6 | 74.3 | 0.11 | 2.61 | 0.08 | 1.38 | 5.67 | 0.69 | <0.005 | 0.04 | 0.36 | 2.52 |
| SR2 | 40462 | 303.23 | 313 | 23 | 40 | 118 | <1 | <0.008 | 3 | 797 | 15 | 10 | 201 | 47 | 128 | 7 | 13 | 11.7 | 74.1 | 0.14 | 2.19 | 0.14 | 2.22 | 3.44 | 0.57 | 0.01 | 0.07 | 1.46 | 3.39 |
| SR2 | 40463 | 313 | 323 | 68 | 80 | 126 | <1 | <0.008 | 11 | 2320 | 5 | 10 | 236 | 69 | 134 | 20 | 16 | 12 | 71.3 | 0.17 | 3.05 | 0.11 | 1.79 | 6.85 | 0.86 | 0.02 | 0.24 | 0.12 | 2.54 |
| SR2 | 40857 | 321 | 323 | 9 | 291 | 287 | 2 | <0.008 | 24 | 1150 | 6 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40464 | 323 | 333 | 7 | 507 | 86 | <1 | <0.008 | 33 | 1020 | 6 | <10 | 204 | 55 | 166 | 6 | 11 | 12.7 | 73.6 | 0.2 | 1.65 | 0.07 | 1.5 | 4.19 | 0.54 | 0.02 | 0.09 | 2.48 | 2.16 |
| SR2 | 40858 | 323 | 325 | 44 | 172 | 83 | | <0.008 | 25 | 774 | 6 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40859 | 325 | 327 | 44 | 181 | 139 | | <0.008 | 126 | 882 | 9 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40860 | 327 | 329 | 23 | 947 | 245 | 2 | <0.008 | 6 | 1450 | 11 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40861 | 329 | 331 | 21 | 432 | 347 | 2 | 0.03 | 72 | 882 | 7 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40862 | 331 | 333 | 13 | 57 | 283 | 2 | <0.008 | 4 | 1100 | 13 | <10 | | | | | | | | | | | | | | | | | |
| SR2 | 40465 | 333 | 343 | 4 | 24 | 57 | <1 | <0.008 | 7 | 974 | 6 | <10 | 188 | 64 | 186 | 11 | 12 | 12.6 | 73.9 | 0.22 | 1.95 | 0.06 | 1.13 | 4.37 | 0.5 | 0.03 | 0.14 | 2.7 | 1.76 |
| SR2 | 40466 | 343 | 353 | 5 | 12 | 113 | <1 | <0.008 | 2 | 896 | 10 | <10 | 249 | 52 | 174 | 14 | 15 | 13 | 72.3 | 0.23 | 2.42 | 0.07 | 1.44 | 4.72 | 0.51 | 0.03 | 0.09 | 2 | 2.26 |
| SR2 | 40467 | 353 | 361.6 | 143 | 5 | 80 | 1 | 0.01 | 25 | 894 | 9 | <10 | 227 | 33 | 205 | 18 | 13 | 12 | 72 | 0.27 | 5.25 | 0.13 | 1.1 | 4.69 | 0.84 | 0.04 | 0.34 | 0.33 | 2.42 |
| SR2 | 40865 | 359.8 | 361.6 | 906 | 9 | 140 | 4 | 0.01 | 389 | 447 | 161 | 10 | | | | | | | | | | | | | | | | | |
| SR2 | 40468 | 361.6 | 367.6 | 4 | 4 | 59 | <1 | <0.008 | 2 | 779 | 4 | 10 | 228 | 50 | 348 | 60 | 14 | 12.7 | 68.3 | 0.5 | 4.32 | 0.14 | 2.64 | 3.76 | 1.36 | 0.09 | 0.13 | 1.74 | 3.52 |

254102

**CORE PROCESSING RESULTS**

**DRILL HOLE NUMBER** sr2

| CORE RECOVERY | | | | mag sus S.I units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| 0.00 | 3.00 | 0.30 | 10.00 | 3.00 | 0.10 | | | | 0.00 | | | | |
| 3.00 | 4.00 | 1.00 | 100.00 | 4.00 | 0.06 | | | | 0.00 | 3.00 | 5.00 | 40819 | |
| 4.00 | 5.20 | 1.20 | 100.00 | 5.20 | 0.08 | | | | 0.00 | | | | |
| 5.20 | 5.70 | 0.40 | 80.00 | 5.70 | 0.04 | | | | 0.00 | | | | |
| 5.70 | 5.80 | 0.15 | 150.00 | 5.80 | 0.06 | | | | 0.00 | | | | |
| 5.80 | 6.70 | 0.70 | 77.78 | 6.70 | 0.21 | | | | 0.00 | | | | |
| 6.70 | 7.10 | 0.46 | 115.00 | 7.10 | 0.21 | | | | 0.00 | | | | |
| 7.10 | 9.00 | 0.60 | 31.58 | 9.00 | 0.20 | | | | 0.00 | | | | |
| 9.00 | 10.00 | 0.60 | 60.00 | 10.00 | 0.00 | | | | 0.00 | | | | |
| 10.00 | 10.60 | 0.60 | 100.00 | 10.60 | 0.24 | | | | 0.00 | | | | |
| 10.60 | 11.20 | 0.60 | 100.00 | 11.20 | 0.25 | | | | 0.00 | | | | |
| 11.20 | 12.80 | 1.60 | 94.12 | 12.80 | 0.23 | | | | 0.00 | 11.50 | 13.50 | 40820 | |
| 12.80 | 14.10 | 1.10 | 91.67 | 14.10 | 0.12 | | | | 0.00 | | | | |
| 14.10 | 14.80 | 0.70 | 100.00 | 14.80 | 0.17 | | | | 0.00 | | | | |
| 14.80 | 15.90 | 1.10 | 100.00 | 15.90 | 0.13 | | | | 0.00 | | | | |
| 15.90 | 17.60 | 1.50 | 88.24 | 17.60 | 0.15 | | | | 0.00 | 17.50 | 19.60 | 40821 | |
| 17.60 | 18.00 | 0.40 | 100.00 | 18.00 | 0.19 | | | | 0.00 | | | | |
| 18.00 | 18.40 | 0.40 | 100.00 | 18.40 | 0.11 | | | | 0.00 | | | | |
| 18.40 | 19.60 | 1.00 | 83.33 | 19.60 | 0.08 | | | | 0.00 | | | | |
| 19.60 | 20.50 | 0.95 | 105.56 | 20.50 | 0.07 | | | | 0.00 | | | | |
| 20.50 | 21.40 | 0.95 | 105.56 | 21.40 | 0.10 | | | | 0.00 | | | | |
| 21.40 | 22.40 | 0.95 | 95.00 | 22.40 | 0.14 | | | | 0.00 | | | | |
| 22.40 | 24.30 | 1.90 | 100.00 | 24.30 | 0.42 | | | | 0.00 | | | | |
| 24.30 | 26.50 | 2.16 | 98.18 | 26.50 | 0.34 | | | | 0.00 | | | | |
| 26.50 | 27.30 | 0.90 | 112.50 | 27.30 | 0.16 | | | | 0.00 | | | | |
| 27.30 | 29.10 | 1.76 | 97.78 | 29.10 | 0.20 | | | | 0.00 | | | | |
| 29.10 | 30.30 | 1.20 | 100.00 | 30.30 | 0.21 | | | | 0.00 | | | | |
| 30.30 | 31.50 | 1.20 | 100.00 | 31.50 | 0.30 | | | | 0.00 | | | | |
| 31.50 | 33.10 | 1.70 | 106.25 | 33.10 | 0.33 | | | | 0.00 | | | | |
| 33.10 | 33.50 | 0.40 | 100.00 | 33.50 | 0.20 | | | | 0.00 | | | | |
| 33.50 | 34.60 | 1.20 | 109.09 | 34.60 | 0.31 | | | | 0.00 | | | | |
| 34.60 | 35.30 | 0.80 | 114.29 | 35.30 | 0.24 | | | | 0.00 | | | | |
| 35.30 | 35.80 | 0.50 | 100.00 | 35.80 | 0.25 | | | | 0.00 | | | | |
| 35.80 | 37.60 | 1.90 | 105.56 | 37.60 | 0.38 | | | | 0.00 | | | | |
| 37.60 | 39.50 | 2.00 | 105.26 | 39.50 | 0.35 | | | | 0.00 | | | | |
| 39.50 | 40.20 | 0.70 | 100.00 | 40.20 | 0.40 | | | | 0.00 | | | | |
| 40.20 | 41.00 | 0.90 | 112.50 | 41.00 | 0.05 | | | | 0.00 | | | | |
| 41.00 | 42.60 | 1.70 | 106.25 | 42.60 | 0.14 | | | | 0.00 | | | | |
| 42.60 | 45.70 | 3.10 | 100.00 | 45.70 | 0.26 | | | | 0.00 | | | | |
| 45.70 | 47.30 | 1.70 | 106.25 | 47.30 | 0.50 | | | | 0.00 | | | | |

254103

**CORE PROCESSING RESULTS**

**DRILL HOLE NUMBER** sr2

| CORE RECOVERY | | | | mag sus S.I units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| 47.30 | 49.60 | 2.30 | 100.00 | 49.60 | 0.33 | | | | 0.00 | | | | |
| 49.60 | 49.80 | 0.20 | 100.00 | 49.80 | 0.10 | | | | 0.00 | | | | |
| 49.80 | 51.30 | 1.50 | 100.00 | 51.30 | 0.22 | | | | 0.00 | | | | |
| 51.30 | 52.60 | 1.30 | 100.00 | 52.60 | 0.20 | | | | 0.00 | | | | |
| 52.60 | 53.40 | 0.70 | 87.50 | 53.40 | 0.16 | | | | 0.00 | | | | |
| 53.40 | 54.60 | 1.20 | 100.00 | 54.60 | 0.31 | | | | 0.00 | | | | |
| 54.60 | 55.20 | 0.50 | 83.33 | 55.20 | 0.18 | | | | 0.00 | | | | |
| 55.20 | 56.10 | 0.80 | 88.89 | 56.10 | 0.20 | | | | 0.00 | | | | |
| 56.10 | 57.10 | 1.00 | 100.00 | 57.10 | 0.10 | | | | 0.00 | | | | |
| 57.10 | 60.30 | 2.90 | 90.63 | 60.30 | 0.25 | | | | 0.00 | | | | |
| 60.30 | 60.70 | 0.60 | 150.00 | 60.70 | 0.32 | | | | 0.00 | | | | |
| 60.70 | 61.90 | 1.20 | 100.00 | 61.90 | 0.14 | | | | 0.00 | | | | |
| 61.90 | 64.00 | 1.20 | 57.14 | 64.00 | 0.18 | | | | 0.00 | | | | |
| 64.00 | 65.50 | 1.60 | 106.67 | 65.50 | 0.05 | | | | 0.00 | | | | |
| 65.50 | 66.10 | 0.60 | 100.00 | 66.10 | 0.13 | | | | 0.00 | | | | |
| 66.10 | 67.60 | 1.50 | 100.00 | 67.60 | 0.08 | | | | 0.00 | | | | |
| 67.60 | 70.60 | 3.00 | 100.00 | 70.60 | 0.09 | | | | 0.00 | | | | |
| 70.60 | 73.60 | 3.00 | 100.00 | 73.60 | 0.14 | | | | 0.00 | | | | |
| 73.60 | 76.60 | 3.00 | 100.00 | 76.60 | 0.24 | | | | 0.00 | | | | |
| 76.60 | 79.20 | 2.80 | 107.69 | 79.20 | 0.14 | | | | 0.00 | | | | |
| 79.20 | 80.10 | 0.88 | 97.78 | 80.10 | 0.15 | | | | 0.00 | 80.00 | 82.40 | 40801 | |
| 80.10 | 80.80 | 0.50 | 71.43 | 80.80 | 0.10 | | | | 0.00 | | | | |
| 80.80 | 82.10 | 1.20 | 92.31 | 82.10 | 0.18 | | | | 0.00 | | | | |
| 82.10 | 85.20 | 3.10 | 100.00 | 85.20 | 0.47 | | | | 0.00 | 82.40 | 84.00 | 40802 | |
| 85.20 | 88.30 | 3.10 | 100.00 | 88.30 | 0.21 | | | | 0.00 | 84.00 | 85.00 | 40803 | |
| 88.30 | 91.30 | 3.00 | 100.00 | 91.30 | 0.36 | | | | 0.00 | 85.00 | 86.50 | 40804 | |
| 91.30 | 93.60 | 2.30 | 100.00 | 93.60 | 0.13 | | | | 0.00 | 86.50 | 87.70 | 40805 | |
| 93.60 | 94.60 | 1.00 | 100.00 | 94.60 | 0.26 | | | | 0.00 | 87.70 | 88.25 | 40806 | |
| 94.60 | 97.60 | 3.00 | 100.00 | 97.60 | 0.22 | | | | 0.00 | 88.25 | 90.00 | 40807 | |
| 97.60 | 100.60 | 3.00 | 100.00 | 100.60 | 0.33 | | | | 0.00 | 90.00 | 91.50 | 40808 | |
| 100.60 | 103.60 | 3.00 | 100.00 | 103.60 | 0.23 | | | | 0.00 | 95.40 | 97.30 | 40809 | |
| 103.60 | 106.60 | 3.00 | 100.00 | 106.60 | 0.71 | | | | 0.00 | 97.30 | 99.30 | 40810 | |
| 106.60 | 108.30 | 1.80 | 105.88 | 108.30 | 0.50 | | | | 0.00 | | | | |
| 108.30 | 109.60 | 1.30 | 100.00 | 109.60 | 0.35 | | | | 0.00 | | | | |
| 109.60 | 112.60 | 3.00 | 100.00 | 112.60 | 0.22 | | | | 0.00 | 110.50 | 112.00 | 40811 | |
| 112.60 | 113.30 | 0.70 | 100.00 | 113.30 | 0.47 | | | | 0.00 | 112.00 | 113.10 | 40812 | |
| 113.30 | 115.60 | 2.30 | 100.00 | 115.60 | 0.22 | | | | 0.00 | | | | |
| 115.60 | 116.20 | 0.70 | 116.67 | 116.20 | 0.20 | | | | 0.00 | | | | |
| 116.20 | 116.70 | 0.50 | 100.00 | 116.70 | 0.19 | | | | 0.00 | | | | |
| 116.70 | 118.60 | 1.80 | 94.74 | 118.60 | 1.67 | | | | 0.00 | | | | |

A24104

**CORE PROCESSING RESULTS** | **DRILL HOLE NUMBER** sr2

| CORE RECOVERY | | | | mag sus S.I units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL. | S.G | FROM | TO | TICKET # | COMMENTS |
| 118.60 | 120.90 | 2.30 | 100.00 | 120.90 | 1.51 | | | | 0.00 | 120.50 | 121.50 | 40813 | petrology |
| 120.90 | 121.10 | 0.20 | 100.00 | 121.10 | 0.38 | | | | 0.00 | | | | |
| 121.10 | 122.60 | 0.80 | 53.33 | 122.60 | 0.94 | | | | 0.00 | | | | |
| 122.60 | 123.10 | 0.50 | 100.00 | 123.10 | 0.18 | | | | 0.00 | | | | |
| 123.10 | 124.60 | 1.40 | 93.33 | 124.60 | 0.19 | | | | 0.00 | | | | |
| 124.60 | 127.60 | 3.00 | 100.00 | 127.60 | 0.04 | | | | 0.00 | | | | |
| 127.60 | 128.50 | 1.00 | 111.11 | 128.50 | 0.17 | | | | 0.00 | | | | |
| 128.50 | 129.20 | 0.70 | 100.00 | 129.20 | 0.06 | | | | 0.00 | | | | |
| 129.20 | 131.70 | 2.50 | 100.00 | 131.70 | 0.11 | | | | 0.00 | | | | |
| 131.70 | 132.70 | 1.00 | 100.00 | 132.70 | 0.00 | | | | 0.00 | | | | |
| 132.70 | 135.80 | 3.10 | 100.00 | 135.80 | 0.08 | | | | 0.00 | | | | |
| 135.80 | 138.40 | 2.70 | 103.85 | 138.40 | 0.23 | | | | 0.00 | | | | |
| 138.40 | 141.50 | 3.10 | 100.00 | 141.50 | 0.06 | | | | 0.00 | | | | |
| 141.50 | 144.50 | 3.00 | 100.00 | 144.50 | 0.05 | | | | 0.00 | | | | |
| 144.50 | 146.20 | 1.70 | 100.00 | 146.20 | 0.02 | | | | 0.00 | | | | |
| 146.20 | 148.60 | 3.00 | 125.00 | 148.60 | 0.06 | | | | 0.00 | | | | |
| 148.60 | 151.60 | 3.00 | 100.00 | 151.60 | 0.04 | | | | 0.00 | | | | |
| 151.60 | 154.60 | 3.00 | 100.00 | 154.60 | 0.40 | | | | 0.00 | | | | |
| 154.60 | 157.60 | 3.00 | 100.00 | 157.60 | 0.07 | | | | 0.00 | | | | |
| 157.60 | 160.60 | 3.00 | 100.00 | 160.60 | 0.14 | | | | 0.00 | | | | |
| 160.60 | 163.60 | 3.00 | 100.00 | 163.60 | 0.09 | | | | 0.00 | 162.00 | 163.50 | 40814 | |
| 163.60 | 166.60 | 3.00 | 100.00 | 166.60 | 0.26 | | | | 0.00 | | | | |
| 166.60 | 169.60 | 3.00 | 100.00 | 169.60 | 0.30 | | | | 0.00 | | | | |
| 169.60 | 172.60 | 3.00 | 100.00 | 172.60 | 0.22 | | | | 0.00 | | | | |
| 172.60 | 175.60 | 3.00 | 100.00 | 175.60 | 0.05 | | | | 0.00 | | | | |
| 175.60 | 176.90 | 1.30 | 100.00 | 176.90 | 0.07 | | | | 0.00 | | | | |
| 176.90 | 177.90 | 1.00 | 100.00 | 177.90 | 0.10 | | | | 0.00 | | | | |
| 177.90 | 178.90 | 1.00 | 100.00 | 178.90 | 0.06 | | | | 0.00 | | | | |
| 178.90 | 181.60 | 2.70 | 100.00 | 181.60 | 0.14 | | | | 0.00 | | | | |
| 181.60 | 184.60 | 3.00 | 100.00 | 184.60 | 0.01 | | | | 0.00 | | | | |
| 184.60 | 187.60 | 3.00 | 100.00 | 187.60 | 0.06 | | | | 0.00 | | | | |
| 187.60 | 189.40 | 1.90 | 105.56 | 189.40 | 0.11 | | | | 0.00 | 188.70 | 190.70 | 40822 | |
| 189.40 | 192.50 | 3.17 | 102.26 | 192.50 | 0.13 | | | | 0.00 | 190.70 | 192.70 | 40823 | |
| 192.50 | 195.60 | 3.10 | 100.00 | 195.60 | 0.11 | | | | 0.00 | 192.70 | 194.00 | 40824 | |
| 195.60 | 197.40 | 1.80 | 100.00 | 197.40 | 0.08 | | | | 0.00 | 194.00 | 195.50 | 40825 | |
| 197.40 | 199.60 | 2.25 | 102.27 | 199.60 | 0.42 | | | | 0.00 | 195.50 | 196.60 | 40826 | |
| 199.60 | 202.60 | 3.00 | 100.00 | 202.60 | 3.12 | | | | 0.00 | 196.60 | 197.60 | 40827 | |
| 202.60 | 205.30 | 2.70 | 100.00 | 205.30 | 3.68 | | | | 0.00 | 197.60 | 199.00 | 40828 | |
| 205.30 | 208.40 | 3.10 | 100.00 | 208.40 | 0.09 | | | | 0.00 | 199.00 | 200.50 | 40829 | |
| 208.40 | 211.40 | 3.00 | 100.00 | 211.40 | 0.10 | | | | 0.00 | 200.50 | 202.00 | 40830 | |

254105

**CORE PROCESSING RESULTS** | **DRILL HOLE NUMBER** sr2

| CORE RECOVERY | | | | mag sus S.I units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| 211.40 | 214.50 | 3.10 | 100.00 | 214.50 | 0.35 | | | | 0.00 | 202.00 | 204.00 | 40831 | |
| 214.50 | 217.50 | 3.00 | 100.00 | 217.50 | 0.27 | | | | 0.00 | 204.00 | 206.00 | 40832 | |
| 217.50 | 220.50 | 3.00 | 100.00 | 220.50 | 0.16 | | | | 0.00 | 206.00 | 208.00 | 40833 | |
| 220.50 | 223.50 | 3.00 | 100.00 | 223.50 | 0.53 | | | | 0.00 | 208.00 | 209.00 | 40834 | |
| 223.50 | 226.60 | 3.10 | 100.00 | 226.60 | 0.53 | | | | 0.00 | 209.00 | 210.50 | 40835 | |
| 226.60 | 229.60 | 3.00 | 100.00 | 229.60 | 0.18 | | | | 0.00 | 210.50 | 212.00 | 40836 | |
| 229.60 | 232.60 | 3.00 | 100.00 | 232.60 | 0.45 | | | | 0.00 | | | | |
| 232.60 | 235.60 | 3.00 | 100.00 | 235.60 | 0.09 | | | | 0.00 | | | | |
| 235.60 | 238.60 | 3.00 | 100.00 | 238.60 | 0.20 | | | | 0.00 | | | | |
| 238.60 | 241.60 | 3.00 | 100.00 | 241.60 | 0.44 | | | | 0.00 | | | | |
| 241.60 | 244.60 | 3.00 | 100.00 | 244.60 | 0.15 | | | | 0.00 | | | | |
| 244.60 | 247.60 | 3.00 | 100.00 | 247.60 | 0.33 | | | | 0.00 | | | | |
| 247.60 | 250.60 | 3.00 | 100.00 | 250.60 | 0.25 | | | | 0.00 | 248.50 | 250.50 | 40837 | |
| 250.60 | 253.60 | 3.00 | 100.00 | 253.60 | 0.56 | | | | 0.00 | 250.50 | 252.50 | 40838 | |
| 253.60 | 256.60 | 3.00 | 100.00 | 256.60 | 0.60 | | | | 0.00 | 252.50 | 254.50 | 40839 | |
| 256.60 | 259.60 | 3.00 | 100.00 | 259.60 | 3.12 | | | | 0.00 | 254.50 | 256.50 | 40840 | |
| 259.60 | 262.60 | 3.00 | 100.00 | 262.60 | 0.14 | | | | 0 00 | 256.50 | 258.50 | 40841 | |
| 262.60 | 265.60 | 3.00 | 100.00 | 265.60 | 0.05 | | | | 0.00 | 258.50 | 260.50 | 40842 | |
| 265.60 | 268.60 | 3.00 | 100.00 | 268.60 | 0.07 | | | | 0.00 | | | | |
| 268.60 | 270.50 | 2.10 | 110.53 | 270.50 | 0.04 | | | | 0.00 | | | | |
| 270.50 | 271.60 | 1.20 | 109.09 | 271.60 | 0.10 | | | | 0.00 | | | | |
| 271.60 | 274.60 | 3.00 | 100.00 | 274.60 | 0.31 | | | | 0.00 | | | | |
| 274.60 | 277.60 | 3.00 | 100.00 | 277.60 | 0.14 | | | | 0.00 | | | | |
| 277.60 | 280.60 | 3.00 | 100.00 | 280.60 | 0.17 | | | | 0.00 | | | | |
| 280.60 | 283.60 | 3.00 | 100.00 | 283.60 | 0.15 | | | | 0.00 | | | | |
| 283.60 | 286.60 | 3.00 | 100.00 | 286.60 | 0.09 | | | | 0.00 | | | | |
| 286.60 | 289.60 | 3.00 | 100.00 | 289.60 | 0.33 | | | | 0.00 | | | | |
| 289.60 | 292.60 | 3.00 | 100.00 | 292.60 | 0.51 | | | | 0.00 | 289.90 | 291.90 | 40843 | |
| 292.60 | 295.60 | 3.00 | 100.00 | 295.60 | 0.08 | | | | 0.00 | 291.90 | 293.90 | 40844 | |
| 295.60 | 298.60 | 3.00 | 100.00 | 298.60 | 0.06 | | | | 0.00 | | | | |
| 298.60 | 301.60 | 3.00 | 100.00 | 301.60 | 0.06 | | | | 0.00 | | | | |
| 301.60 | 304.60 | 3.00 | 100.00 | 304.60 | 0.14 | | | | 0.00 | | | | |
| 304.60 | 307.60 | 3.00 | 100.00 | 307.60 | 0.08 | | | | 0.00 | | | | |
| 307.60 | 310.60 | 3.00 | 100.00 | 310.60 | 0.02 | | | | 0.00 | | | | |
| 310.60 | 313.60 | 3.00 | 100.00 | 313.60 | 0.00 | | | | 0.00 | | | | |
| 313.60 | 316.60 | 3.00 | 100.00 | 316.60 | 0.10 | | | | 0.00 | | | | |
| 316.60 | 319.60 | 3.00 | 100.00 | 319.60 | 0.04 | | | | 0.00 | | | | |
| 319.60 | 322.60 | 3.00 | 100.00 | 322.60 | 0.45 | | | | 0.00 | 321.00 | 323.00 | 40857 | |
| 322.60 | 325.60 | 3.00 | 100.00 | 325.60 | 0.62 | | | | 0.00 | 323.00 | 325.00 | 40858 | |
| 325.60 | 328.60 | 3.00 | 100.00 | 328.60 | 0.11 | | | | 0.00 | 325.00 | 327.00 | 40859 | |

90 1263

**CORE PROCESSING RESULTS** | **DRILL HOLE NUMBER** sr2

| CORE RECOVERY | | | | mag sus S.I units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| 328.60 | 331.60 | 3.00 | 100.00 | 331.60 | 0.05 | | | | 0.00 | 327.00 | 329.00 | 40860 | |
| 331.60 | 334.60 | 3.00 | 100.00 | 334.60 | 0.09 | | | | 0.00 | 329.00 | 331.00 | 40861 | |
| 334.60 | 336.50 | 1.90 | 100.00 | 336.50 | 0.07 | | | | 0.00 | 331.00 | 333.00 | 40862 | |
| 336.50 | 339.60 | 3.00 | 96.77 | 339.60 | 0.04 | | | | 0.00 | | | | |
| 339.60 | 340.60 | 1.00 | 100.00 | 340.60 | 0.06 | | | | 0.00 | | | | |
| 340.60 | 343.60 | 3.00 | 100.00 | 343.60 | 0.06 | | | | 0.00 | | | | |
| 343.60 | 346.60 | 3.00 | 100.00 | 346.60 | 0.19 | | | | 0.00 | | | | |
| 346.60 | 349.60 | 3.00 | 100.00 | 349.60 | 0.00 | | | | 0.00 | | | | |
| 349.60 | 352.60 | 3.00 | 100.00 | 352.60 | 0.10 | | | | 0.00 | | | | |
| 352.60 | 355.60 | 3.00 | 100.00 | 355.60 | 0.04 | | | | 0.00 | | | | |
| 355.60 | 358.60 | 3.00 | 100.00 | 358.60 | 0.15 | | | | 0.00 | | | | |
| 358.60 | 361.60 | 3.00 | 100.00 | 361.60 | 0.26 | | | | 0.00 | | | | |
| 361.60 | 364.60 | 3.00 | 100.00 | 364.60 | 0.13 | | | | 0.00 | 359.80 | 361.60 | 40863 | |
| 364.60 | 367.60 | 3.00 | 100.00 | 367.60 | 0.13 | | | | 0.00 | | | | |

HOLE No. SR 2

PROJECT: STERLING RIVER

# PASMINCO EXPLORATION
# DIAMOND DRILL HOLE SUPPLEMENTARY DATA
## PETROLOGY



SAMPLE NUMBER: Pasminco 40815 301·4m
SUMMARY DESCRIPTION:

This sample is a strongly foliated and altered felsic volcanic in which the pronounced foliation has obliterated most of the primary textural details in the groundmass, although phenocrysts of quartz and albite are still preserved. Quartz phenocrysts vary from almost euhedral to quite resorbed and/or broken crystals mainly less than 1mm long. Most are strained, with undulose extinction. Where they are cut by major microshears in the rock, quartz phenocrysts have been granulated, disaggregated and dragged out into the foliation; in other places, less extreme strain has produced subgrain recrystallization. Plagioclase phenocrysts have been albitized, and all have been broken and disaggregated during foliation development. They are partially sericitized, and overprinted by limited coarser-grained carbonate alteration. The few FeTi oxide phenocrysts have been altered to leucoxene before being stretched out along the foliation; these are hard to separate from stylolite-like concentrations of fine-grained insoluble material that developed during volume-loss accompanying foliation development. The groundmass is a foliated intergrowth of very fine-grained quartz and feldspar heavily meshed through with sericite that forms subparallel bands defining the foliation. In the most high-strain zones, groundmass is considerably coarser-grained due to recrystallization, and is heavily overprinted by coarse, deformed calcite bands. My best guess is that this rock was a quartz+plagioclase-phyric rhyolitic lava with a glassy groundmass, but it cannot be ruled out that it was a crystal vitric tuff; however, the latter usually carry more abundant and more broken phenocryst debris than this sample. The alteration is certainly more intense than regional degradation, and is presumably of local hydrothermal origin.

SAMPLE NUMBER: Pasminco 40816 289·5m
SUMMARY DESCRIPTION:

This sample is another quartz+plagioclase-phyric foliated rhyolitic lava. Unlike the previous sample, quartz phenocrysts far outnumber the plagioclase phenocrysts, making up around 5 modal% of this rock; most are subhedral to euhedral 0.3-2mm long crystals that show significant resorption, and common recrystallized melt inclusions. Only a few disaggregated albitized plagioclase phenocrysts are present, and these are partly replaced by a dark, pleochroic carbonate. The groundmass of this sample is a strongly recrystallized, foliated quartzo-feldspathic intergrowth with subparallel seams of sericite, and very fine-grained specks of sericite throughout. Blebs of anhedral coarser-grained quartz are crystallizing from the groundmass, and leucoxenitic aggregates along stylolitic planes are common. This sample is less hydrothermally-altered than 40815.

SAMPLE NUMBER: Pasminco 40817 251·7m

SUMMARY DESCRIPTION:

This sample is a moderately foliated matrix-supported fine sandstone derived from quartz-phyric felsic volcanics and tuffs. Most framework grains are broken quartz phenocrysts mainly <1mm long, and these make up less than 5-8 modal% of the rock. Rare small lithic clasts are of quartz-phyric formerly glassy rhyolitic lava in which the groundmass has devitrified to a fine-grained quartzo-feldspathic intergrowth. Less obvious and less abundant than quartz crystal detritus are broken and disaggregated phenocrysts of albitized plagioclase that are now stretched out into the foliation. Many of these are strongly sericitie-altered. The matrix of this rock is a strongly altered, foliated quartzo-feldspathic intergrowth probably derived in large part from altered and recrystallized vitric ash, although no shard shapes are preserved. Intense sericite alteration forms foliation-defining bands through the rock, and shows weak kink-banding. Anhedral patches of secondary opaques are not uncommon, although very fine-grained, and may be magnetite or deep red sphalerite rather than pyrite. This rock has formed by recrystallization in a high-strain zone of a sericitized fine silty sandstone derived from quartz+plagioclase-phyric glassy felsic volcanics (such as the Murchison Volcanics).

SAMPLE NUMBER: Pasminco 40818 202·4m

SUMMARY DESCRIPTION:

This sample is the quartz-veined contact between a carbonaceous shale and a quartz-rich fine sandstone to siltstone. The latter is dominated by angular, broken quartz grains in a strongly chloritized matrix composed of intergrown anhedral quartz and patchy pale green chlorite. The siltstone is foliated, with a prominent second fracture cleavage intersecting the main foliation at ~35°. The detrital quartz in the siltstone is strained and sometimes polycrystalline, and most appears to be derived from metamorphic rather than volcanic sources. Fine-grained pleochroic tourmaline occurs intergrown with the chlorite, and is clearly a secondary alteration mineral rather than a detrital phase in the siltstone. The quartz vein is composed mainly of strained and recrystallized quartz with intimately sutured grain boundaries; other phases in the vein include common yellowish chlorite, pyrite aggregates, and late-crystallizing (or late-recrystallized) calcite crystals. The shale is composed of bands of sericite with carbonaceous lamellae, containing abundant tiny blebs of tourmaline. Adjacent to the quartz vein, the sericite is replaced by chlorite and the tourmaline coarsens slightly. The shale shows beautiful kink banding

SAMPLE NUMBER: Pasminco 40863 358·2m

SUMMARY DESCRIPTION:

This sample is a texturally well-preserved rhyolitic lava in which about 2-4 modal% of quartz euhedra are the main phenocryst phase. These are rarely larger than 1mm across, and often contain melt inclusions that have devitrified to very fine-grained quartzo-feldspathic material, or been altered to chlorite. There were no plagioclase phenocrysts in this rock, but rare small phenocrysts of hornblende (?) have been replaced by green chlorite, sphene and magnetite. A few well-formed zircon microphenocrysts are also present in this sample. The groundmass was originally glassy, but has thoroughly devitrified, and commenced to recrystallize to a spotty quartzose intergrowth of anhedral blebby quartz and sericite. The latter defines a poorly-developed foliation. Common fairly fine-grained carbonate (calcite) overprints the sample, and probably results from weak hydrothermal alteration.

SAMPLE NUMBER: Pasminco 40864 360·9m

SUMMARY DESCRIPTION:

This sample is a foliated silty shale in which occasional bands of matrix-supported silt are dominated by anhedral broken quartz crystal detritus of undoubted volcanic origin and not uncommon zircon crystals, and the remainder of the rock is a dense sericite intergrowth spotted with very tiny opaques (magnetite?) and carrying common stylolitic partings along which insoluble ultrafine-grained material has accumulated. Veinlets and stringers of calcite are common, and several foliation-parallel zones of strong chlorite development are also present. Syn- and late deformational calcite-quartz veinlets either cut the foliation, or are slightly offset along major foliation-parallel microshears. Some of these veinlets contain fine-grained, rather poorly crystallized tourmaline, and minor magnetite.

CONFIDENTIAL

# Appendix 4

# Log of Hole SR3

HOLE No. SR3

# PASMINCO EXPLORATION
# DIAMOND DRILL CORE RECORD

Page 1 of

| | |
|---|---|
| LOCATION | STERLING RIVER |
| PROJECT | EL 24/91 |
| PROSPECT | STERLING VALLEY MINE |
| DESIGNED BY | J.G. PURVIS |
| LOGGED BY | J.G. PURVIS |
| RELOGGED | |
| COMMENCED | 5.5.95 |
| COMPLETED | 19.6.95 |
| DRILLED BY | K. HOU |
| DRILL RIG | LONGYEAR 38 |

## OBJECTIVE

TO TEST THE MASSIVE SULPHIDE POTENTIAL OF THE INTENSE ALTERATION IN THE MURCHISON VOLCANICS IN HOLE STP 96

## RESULT

INTENSELY-ALTERED MURCHISON VOLCANICS INTERSECTED. WIDESPREAD SUB-ECONOMIC Pb-Zn-As-Au MINERALIZATION IN LODES IN FARRELL SLATES.

## LOCATION/SURVEY DATA (AMG)

| | | | | |
|---|---|---|---|---|
| Grid | AMG | | RL Collar m | 261.5 |
| Northing m | S 371940.9 | | Bearing Collar | 090.15° |
| Easting m | 383688.0 | | Dip Collar | -70.25° |
| DH Survey Type | THEODOLITE - G. WATTS | | Length Hole m | 512.0 |

## SIGNIFICANT INTERSECTIONS

| From m | To m | Interval m | Pb | Zn | Ag | Au | As | Sn | Comments |
|---|---|---|---|---|---|---|---|---|---|
| 182.2 | 184.3 | 2.1 | 2.65% | 2.9% | 41 g/t | 0.23 g/t | 1.11% | | Lode in Farrell Slates |
| 278 | 279 | 1.0 | | | | 0.63 g/t | 5.0% | 0.07% | " " " " |
| 301 | 302 | 1.0 | 0.86% | 0.37% | 10 g/t | | | | " " " " |
| 307 | 307.75 | 0.75 | | 0.12% | | | | 0.28% | " " " " |
| 470 | 471 | 1.0 | 0.15% | 0.97% | 5 g/t | | | | Murchison Volcanics |

## SIGNIFICANT CORE LOSS

| From m | To m | % Lost |
|---|---|---|
| 20 | 37.9m | 20 |

## POOR GROUND CONDITION ZONES

| From m | To m | Condition |
|---|---|---|
| 19.5 | 65 | Clayey, faulted + broken |
| 65 | 74 | Badly sheared + broken (Henty Fault) |
| 128 | 134.5 | Broken + sheared black shale |

## HOLE SIZE

| Size | Depth m |
|---|---|
| HQ | 41.9 |
| NQ | 431.9 |
| BQ | 512.0 |

## HOLE CONDITIONS AFTER COMPLETION

| | |
|---|---|
| Collar | STEEL CAP ON HQ CASING |
| Steel Casing | 42m HQ, 0-42m. 115m NQ 317-432m, incl NQ BARREL |
| PVC Casing | NONE |
| Terminal Water | |
| Wedge | |
| Drill Pad | ON TRACK - SUMP FILLED IN |

EASTMAN CAMERA :

| Depth m | Bearing | Dip | Depth m | Bearing | Dip |
|---|---|---|---|---|---|
| 30 | 090.7° | -70.25° | | | |
| 61 | 091.25° | -70.7° | | | |
| 91 | 090.75° | -70.5° | | | |
| 121 | 091° | -70° | | | |
| 151 | 092° | -69.8° | | | |
| 181 | 091° | -69° | | | |
| 211 | 092.5° | -68.5° | | | |
| 241 | 093.5° | -66.4° | | | |
| 271 | 094.25° | -64° | | | |
| 304 | 095° | -62.6° | | | |
| 331 | 095° | -62° | | | |
| 361 | 095° | -61.5° | | | |
| 391 | 095.5° | -61° | | | |
| 421 | 095° | -60.25° | | | |
| 451 | 097° | -58.4° | | | |
| 481 | 097.25° | -55° | | | |
| 511 | 098° | -50.25° | | | |

2541110

Project : STERLING RIVER
Logged by: J.G. PURVIS
Date : 23·5·95

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. SR 3



| m | VEINING and ALTERATION (1 = weak, 4 = Intense) | STRUCTURE b = bedding c = cleavage f = fault Angles to LCA | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 0 | | | | | |
| 2 | | Approx 3m of core recovered | | GLACIAL BOULDERS Largely Owen Conglomerate. Also: chloritised qtz-feld porphyritic volcanics ± granite? | |
| 4 | | | | | |
| 6 | | | | | |
| 8 | | | | | |
| 10 | | | | | 10 |
| 12 | | | | | |
| 14 | | | | | |
| 16 | | | | | |
| 18 | | | | 19.5m (approx) | |
| 20 | chl (3) ox (2) Leached, with vugs after co. | Mod-strong foliation C:12° Soft clayey faulted + broken f by faults // fol, as shown | | MAFIC VOLCANICLASTIC Pyroclastic? Bleached frags 5-40mm (often stretched) in chloritic matrix with feldspars. MAFIC VOLCANICS Green or khaki | 20 |
| 22 | | | | | |
| 24 | | | | DOLERITE OR ANDESITE Common felds 1-2mm. Weak sub-ophitic texture in places. | Minor dissem + veinlet py |
| 26 | | f | | | |
| 28 | | f | | MAFIC VOLCANICLASTIC Epiclastic? Ble, stretched, sub-angular clasts av 5-20mm of unident volcs, in feld-rich matrix. ANDESITE? Feld-phyric volc. | |
| 30 | ser-chl (2) ble (1) | f: 20° | | ANDESITIC VOLCANICLASTIC Pyroclastic? Ble, angular, stretched, frags + patches av 5-40mm, to 250mm. Weak sub-ophitic texture in matrix in places. | Minor dissem py 30 |
| 32 | chl (3) ser (1) | f: 30° | | | |
| 34 | fuc-co (1) | Strong foliation C: 27° f | | FOLIATED ANDESITE Felds to 2mm Clastic texture in places | Trace dissem py |
| 36 | co (3) chl-ser (2-3) Abund irreg co veinlets + blebs // fol. Lesser qtz-co veins commonly dismembered by deformation. | f | No felds | | |
| 38 | | | Frags to 10mm | | |
| 40 | | V strong foliation with kinks + crenulations C: 35° | | MAFIC SCHIST After andesite. fi-med gr. Soft + greasy. | + |
| 42 | | Broken C: 35° along fol | | | |
| 44 | | Fault plane 45° (// fol) | | 44.7m | |
| 46 | ser > ble > sil-co (3) Common qtz-co ± chl veins to 250mm, irreg + brecciated, gen at high angle to foliation. | strongly foliated + broken C: 40° f (// fol) | | DEFORMED MAFIC VOLCANIC Bleached sericitic schist ← qtz veined black slate ← after feld-phyric volc (prob andesite). MIXED FAULTED ZONE | 1% py (dissem) + aspy-gn-sp or cp in veinlets + qtz-carb (most at // to ± to foliation). Sulphides best in zones of "cherty" silica. |
| 48 | | f 20° | qtz veins | | |
| 50 | | | qtz vein | | 50 |

104111

Project : STERLING RIVER
Logged by: J.G. PURVIS
Date : 24·5·95

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** SR 3



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 50 | Qtz veins | Fault cataclasite → | | Piggy black shale | 1% py-sp>gn disseminations. |
| 52 | chl-ser-co (2-3) Abund qtz-co veinlets | V Strongly foliated + broken f 35° (//fol) f 20° contorted + brx fol | | CHLORITE-SERICITE SCHIST AFTER MAFIC VOLC. MIXED FAULTED ZONE | sp veinlets cutting fol |
| 54 | ser-ble ± co-chl (3) | f 40° c:45° brx | | QTZOSE SST + BLACK SHALE FOLIATED + BRECCIATED CHLORITE-SERICITE SCHIST AFTER MAFIC VOLC | Minor dissem py, trace sp-gn in veinlets. |
| 56 | chl > ser > co (3) Brecciated qtz-co veins 40cm qtz-tourm? vein → | | | | |
| 58 | Contact 40° (fol) | Broken. V strong fol c:28° with common shears | | 57.1m Pale green, soft + greasy. Deformed + altered volc with common felds 1-2mm. FOLIATED ANDESITE | Minor dissem py, rare sp-gn |
| 60 | co > chl (+talc?) (3) Irreg co veinlets throughout. | | | | |
| 62 | | c:38° | | | |
| 64 | Fractured (2-3) | Fault plane 20° (// fol) | | 65.1m | Minor dissem sp-gn-aspy-py |
| 66 | sil > ser-chl (sst) (2-3) Brecciated qtz-co veins | f:35° Strongly sheared with zones of puggy cataclasite | Mafic volc cataclasite + shale / sst cataclasite | Strongly sheared + brecciated GRAPHITIC BLACK SHALE + FINE QUARTZOSE SANDSTONE MAJOR BRITTLE FAULT ZONE (HENTY FAULT) | 2% dissem py |
| 68 | | | | | 2% dissem py, minor dissem + veinlet sp. Py best in shale, sp in sst + qtz-co veins. |
| 70 | | Badly broken f:25° | | | |
| 72 | | f:30° | | | |
| 74 | Ser-sil-co (2) Minor chl. | Contact 38° (f) V strong foliation, folded in places, sst boudinaged + brecciated. | sericitic schist | 73.85m FARRELL SLATES Grey. Sst: Qtz grains <0.5mm, in matrix of silica-carbonate + carbonaceous material. Strong tectonic deformation. DEFORMED FINE QUARTZOSE SANDSTONE Lesser siltstone + black (graphitic) shale | Minor py + sp |
| 76 | | | | | Minor py, dissem |
| 78 | | | | | |
| 80 | sil-co (2) in sst sil patchy. Abund irreg qtz-co (± chl) veinlets + veins in sst (much less in shale + siltstone). | | Brx shale | | |
| 82 | | Strong foliation. c:10° sst f:45° boudinaged (sub// fol) + brecciated | pug | | 1% dissem py (+2% in shale) Trace sp. |
| 84 | | | | | ← 1mm sp veinlet // fol |
| 86 | | Broken along foliation. | | | |
| 88 | | Less ↓ deformed B/c:40° | | | Minor dissem py. Rare sp. |
| 90 | | Moderate foliation. c:15° (Dips 89° to 240° AMG) | | | |
| 92 | | Broken along foliation (to 98m) c:22° | f 43° (sub// fol) | | |
| 94 | | | | | |
| 96 | | | | | |
| 98 | | | | | |
| 100 | | | | | |

154112

Project : STERLING RIVER
Logged by: J.G. PURVIS
Date : MAY 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No. SR3**



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding c = cleavage f = fault Angles to LCA | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 100 | co > sil (2) in sst Abund qtz-co ± chl veinlets | Moderately foliated | | SANDSTONE AS BEFORE | 1% dissem py |
| | co-sil (2) in sst<br>ser-chl (1) assoc with veining | Faulted Zone Bk: 5° Badly broken along the strong foliation by numerous small faults 5-20° | | numerous black shale bands + laminae | 1% sp, veinlets + dissem |
| 110 | numerous qtz > co-chl veins // fol to 100mm | | | | Minor to 1% dissem py |
| | | Strong brittle fault 20° | | | |
| | | Strongly deformed Zone: V strong foliation with brecciation + boudinaging of sst C: 23° | | ← black shale frags + qtz grains to 1-2mm | Minor to 1% py. Minor sp (mainly veinlets) sp veinlets |
| 120 | Broken qtz > co-chl veins Tourm ? | f: 35° contorted foliation → f: 10° C: 3° | | ← black shale with qtz veins | 1-2% py, trace sp. 5-10% py > aspy-cp |
| | sil (2) chl-co (1) Numerous chl veinlets (assoc ± sulphs) | Broken by faults // fol | | | 1-2% py (dissem) Minor sp-gn in qtz-co-chl veins, Trace dissem cp + aspy. |
| | | Contact: broken | | 126.2m | |
| | sil-chl (2-3) Bx fill + veinlets | Strongly foliated & brecciated 15° | | FAULT ZONE Annealed, cataclasite + schist in sandstone + black shale 127.85m | 3-5% py > sp, trace gn + cp Dissem + veinlets. |
| 130 | Abund qtz-co ± chl veinlets | Contact: broken Faulted Zone: Broken sheared, V strongly foliated 25-30° Zones to 200mm of veined cataclasite f: 30° | | STRONGLY FOLIATED BLACK SHALE V minor sandstone + siltstone Very graphitic | Best sulphides assoc with chl veinlets. py = sp |
| | sil-chl (1) veining locally intense | Strongly foliated Warping + Kinking of fol. Bfc 15° | sp | Deformed by bands with qtz grains 5 to 5mm + lithics to 15mm. | 2-3% py > sp > gn Dissem + veinlets Much fine sp-gn in qtz-co calc veinlets |
| 140 | ser (1) Patchy co (3) | Deformation decreasing ↓ Broken in places C: 20° | | | Rare dissem aspy |
| | | Mod foliation | | | |
| 150 | | | | | |

RC 4113

Project : STERLING RIVER
Logged by: J.G. PURVIS
Date : JUNE 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No. SR3**



RS4114

| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION | m |
|---|---|---|---|---|---|---|
| 150 | qtz-co veinlets // fol | f: 10° broken by cracks // fol; c: 7° Moderately foliated B: 20° | | FOLIATED BLACK SHALE as before Very carbonaceous, with graphite on foliation planes. | 2-3% dissem & veinlet py. √ minor sp in qtz-co ± chl veinlets. sulphides decreasing ↓ | 150 |
| 160 | 200mm qtz+co → py vein. Abund qtz-co ± chl veinlets // fol | Broken along fol | | | | 160 |
| 170 | Common co-chl-tourm veinlets ↓ | c: 17° Strongly foliated ↓ Mod fract & broken | strong f: 20° (pug & cataclasite) | | 1-2% py as above. Trace sp & cp. ← 20mm qtz-co bx & py-cp. | 170 |
| 180 | | c: 22° | | | | 180 |
| | qtz-co-chl-tourm veinlets sil (3) Intense spidery qtz-sulph veinlets ↑ dstn | Contact: 30° (c) v strong fol → Contact: 28° (c) | | 181.2m MINERALIZED FAULT CATACLASITE Black shale bx annealed by qtz & sulphides 184.3m | Trace aspy. 10-15% py > aspy - sp > qtz-cp veinlets & bx fill | |
| 190 | Abund co > qtz ± chl veinlets ↓ co-tourm (1) | Mod-strongly foliated B: 26° f: 30° (// fol) chl Contact: 31° (B/k) | pug Badly broken | BLACK SHALE Carbonaceous & graphitic 190.3m | 1% py Rare sp & asply. 3% py > asply - sp. Conc in qtz-co-tourm bx bands to 100mm & veins | 190 |
| | co-ser-chl (1) Minor qtz-co-chl veins | Mod-strongly foliated f: 5° c: 35° f: 10° Contact: 25° (B) | shale beds f: 20° ← shale | FINE SANDSTONE / SILTSTONE Grey. Qtz-ser-chl. Wispy black shale frags. 197.2m | Minor to 1% py. Rare sp. Sulphs best in qtz-co-chl veinlets. | |
| 200 | Abund irreg co-qtz ± chl ± tourm veinlets, chl (1) | Mod-strongly foliated | sp | BLACK SHALE Carbonaceous. Some graphite on foliation. | 2% py, dissem & in qtz-co-qtz-chl veinlets. Minor sp. | 200 |

Project : STERLING RIVER
Logged by: J.G. PURVIS
Date : JUNE 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. SR3



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding c = cleavage f = fault Angles to LCA | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 200 | co > qtz ± chl-tourm veinlets. Overall: chl > tourm (1) | B/C: 20° | | BLACK SHALE As before. | 2% py, minor sp-aspy >gn. Best sp in zones with chl-tourm ↓ |
| 210 | | Contact: 23° (B/C) | | silty bands with fine sst boudins 215.0m | |
| 220 | ser > sil-chl ± tourm (1-2) ↓ qtz-co ± chl ± tourm veinlets throughout ↓ | Moderately - strongly foliated ↑ B/C: 40° C: 30° | Black shale vitric; ← carbonaceous matrix. numerous stretched black shale frags ↑ av <10mm (to 100×10mm) | VITRIC FINE TURBIDITIC SANDSTONES Possibly pumiceous. Qtzo-feldspathic. Lesser siltstone/shale. Series of upfining mass-flows. Grey. | 1% py disseminated veinlet; V minor dissem py > sp; ← 25mm qtz-py-po veinlet & co-tourm. |
| 230 | ser-chl bands // fol → | C: 28° | vitric; qtzose; vitric | ← pumice shards 1-3mm. | ← 20mm sp > gn-aspy -py vein 32° (// fol); ← 5mm sp-aspy-py vein 34° (// fol) |
| 240 | co-tourm → veinlets. ↓ pervasive chl (1-2) + common qtz-co-chl (± tourm) veinlets ↓ | C: 35° C: 33° | | | Trace dissem py; ← qtz-tourm-py veins 1% py > sp-aspy-gn in tourm-chl veinlets + dissem; Minor py |
| 250 | | | | | |

CSA 1113

Project : STERLING RIVER
Logged by: J.G. PURVIS
Date : JUNE 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. SR 3



RC 4116

| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding c = cleavage f = fault Angles to LCA | GRAPHIC LOG | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 250 | | | | | 250 |
| 252 | Ser-sil >chl (± tourm) (2) Qtz veins | f: 35° (// fol) Mod-strong foliation | Black shale flecks along fol. | SANDSTONE/ SILTSTONE As before. Siliceous + vitric. Hard. | Minor py, Trace sp, aspy |
| 254 | | C: 30° | | | ← Qtz-py-sp veinlet ← Cc-sp veinlets |
| 256 | 15cm qtz-cc ± tourm-py vein // fol | | Black shale frags | | |
| 258 | qtz veins | f: 30° (// fol) | silic + sericitic | | |
| 260 | | Broken by small faults | | | 260 |
| 262 | | | | Increasingly carbonaceous | ← 10mm py-gn > cp vein 30° (// fol) |
| 264 | | C: 30° | | | 1% py-sp > gn-aspy |
| 266 | | | | | ← py-sp-gn veins in small fault // fol ← sp veinlets |
| 268 | co (1) | | | | Rare py |
| 270 | | | | | 270 |
| 272 | | C: 30° | siltstone/shale | | |
| 274 | | Broken along fol | | | |
| 276 | sil (2-3) | Contact: 60° (f) | grey siltstone + black shale | 276.65m | |
| 278 | Qtz-sulph veining + bx fill | F: 65° Puggy Unbroken core | Qtz-sulphide lode | MINERALIZED FAULT CATACLASITE IN BLACK SHALE | 3% py > aspy > cp Mainly veinlets |
| | Tourm (3) | Contact: 65° (f) Irreg | | 279.8m Frags av <10mm. | 10-15% aspy > py |
| 280 | ser (1-2) chl (± tourm) (1) | | | | 7-10% py > aspy > sp-cp 150mm co-tourm-py > aspy > cp |
| 282 | | V strongly foliated/sheared with abund kinks (10-45°) and warps. f: 70° C: 20° | pug | QUARTZ—SERICITE (MUSCOVITE)—GRAPHITE SCHIST After strongly deformed carbonaceous fine siliceous and vitric sandstone, with black shale laminae. Grey. Common qtz xyl grains to 2mm, often rnd to augen-shaped. Abund dismembered lenses of black shale av 20-40mm x 5mm. | 2% py, disseme veinlet |
| 284 | Ser (2) | | | | |
| 286 | | | | | 1% py, dissem. Rare sp-gn. |
| 288 | chl ± tourm (1) | Deformation increasing with depth ↓ Broken along fol | | | |
| 290 | | | | | 290 |
| 292 | | C: 27° | | | |
| 294 | | Kinks 5-10/m | | | ← py, sp, aspy, gn in kink |
| 296 | | Contact: f: 55° (sub // fol) | | 296.9m | |
| 298 | chl (± tourm?) (2-3) Abund qtz-cc (retype) - chl veinlets | V strongly foliated with small folds. Broken | Graphitic, veined, foliated, partly brecciated. | DISTURBED + MINERALIZED BLACK SHALE | 30mm vein py > cp in cc-tourm, // fol 3-5% py, minor cp |
| 300 | | | | | 300 |

Project : STERLING RIVER
Logged by: J.G. PURVIS
Date : JUNE 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** SR3



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 mud … 0.5 … 2 … 8 … 32 … max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 300 | Intense fine + irreg chl ± qtz ± co (Fe type) ± sulph veining. Both // + X-cutting fol + as bx-fill. Trace tourm in some veinlets. | V strongly foliated. Some folding + warping of fol. Common post-fol bx zones annealed by qtz-sulphs. C: 33° | Bx 15° (// fol) f: C: 15° (Dips 80° to 135° AMG) Bx (f, 30° // fol) Bx (f, 35° // fol) f: 30° (// fol) strong f: 10° (// fol) Bx Bx Bx | DISTURBED BLACK SHALE. As above. Carbonaceous + graphitic. TS 39963: Highly deformed carbonaceous shale | 3–5% py > sp-gn-cp mostly veins. ← 5mm qtz-py vein // fol. 2–3% py > sp > gn. Sulphides best in zones of strongest chl + brecciation + veining. 5–7% py > sp > gn. Bx fill. 2% py > sp > gn. 3–5% py > sp > gn. Trace aspy + cp. ← py-aspy in bx ← sp veins ← py veins |
| 310 | | | | | |
| 320 | | C: 30° Contact: abrupt + bx. | | 322.65m | 1–2% py. Minor sp-gn. ↓ decreasing. |
| 330 | co (2) in sst/silt. ser (1) | Strongly foliated (some warping) ↑ Moderately foliated Bk: 33° Fissile. Badly broken along fol B/C: 20° (Dips 82° to 093° AMG) Strong disruption of shale laminae + boudinaging of calcareous siltstone. Contact: 33° (B/C) | qtz-xyl sst | FINE SANDSTONE, SILTSTONE ↑ SHALE Grey + black. Mostly calcareous silt/sst. Also: sericitic siltst (vitric) + Black shale laminae | V minor dissem py. 1–2% py. Veinlets + dissem. Minor dissem py ↓ |
| 340 | sil-ser → (3) chl-co > ser (2–3) Thin qtz < co lenses, bands + "spots" in fol (poss deformed amygdales?) | qtz-ser-pyrite schist (shear zone 29°) V strongly foliated C: 30° f: 35° (// fol) | 338.75m ← qtz xyl grains to 1mm pvg | MURCHISON VOLCANICS CHLORITISED + FOLIATED BASALT Pale green chl-co schist. Streaky + spotty appearance. TS 39964: Basalt | 2–3% po-py. Dissem. 1% py > po. Trace cp. Trace py ↓ |
| 350 | | | | | |

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# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. SR 3



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault; Angles to LCA) | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 350 | Sser (2) | Contact: ? 35° (// Fol) | | 350.3m | 350 |
| | Zones of sil-ser-ble (4) (gen felsics) interspersed with zones of chl-co>ser (2-3) (gen mafics) | V strongly foliated in silic altered zones C: 35° | Feldspar-phyric Volc. (Felsic volc not quite as altered as those below) | COMPLEX OF INTERCALATED FELSIC VOLCANICS + MAFIC VOLCANICS (Probable dykes) | 1% disseminated py + stringers py + cp + sp. |
| | | Abrupt contact along fol. | Mafic? small amygdales. | | 3% py disseminated + stringers along fol. |
| | | | Silic altered zone | TS 39965: felsic tuffaceous siltstone? | 5% py as above + minor sp clots |
| 360 | | gradational change | | Pale grey + grey-green. Comprises: Intensely-altered rhyolitic volcs, (lavas + tuffaceous siltstones ?), dacitic sills (?) + mafic dykes. Felsics : Mafics 50 : 50. | 3% py (varies 1-5%) 360 |
| | | f: 45° (sub // fol) C: 33° | Silic Altered | Qtz-phyric rhyolitic volcs | |
| | | Kinks 75° (opp sense to fol) | Silic Altered | | |
| | | | | | 5% py |
| 370 | | | | Silic alteration zone | 3% py (often assoc ? spots of chl) 370 |
| | | Contact: abrupt 30° (// Fol) | | Mafic Volc (Dyke?) Dk green, fold-phyric volc (felds to 2mm) co amygdales to 10mm. | 1% py |
| | | Contact: abrupt (fol) 1° banding: 35° | some ind qtz-xyl sst | Banded section: mafic (amygdaloidal) + qtz-xyl sst (?) | 3% py |
| | | Contact: abrupt 30° (fol) | | Altered zone in silic volc | 5-7% py |
| 380 | | Contact: abrupt ± → ragged (1°) 25° // fol | | Mafic Volc? (Dyke?) Dk green. Amygdales (co) | 2-3% py 380 |
| | | C: 28° | | TS 39966: Felsic or andesitic volcanic? | |
| | | Contact: abrupt 20° (// fol) | | Altered zone in probable rhyolitic volc (silic, fi qr, granular) | |
| | V minor co>qtz veining in chl zones | | | | |
| 390 | ↓ Alteration decreases sil-ser>chl (3) | | Broken qtz grains to 1mm. ← Small amygdales | | 390 |
| | qtz-co veinlets | C: 38° (Dips 84° to 297° AMG) | gradational change | ↓ Unidentified granular silic volc with qtz grains to 0.5mm. | |
| | large qtz>co-chl veins // LCA | Foliation Mod-strong | ← small amygdales | ← TS 39967: Dacitic intrusive? | 1-2% py minor po-cp. ← cp veinlets. |
| | ↓ Alteration increases (4) | Abrupt increase in Foliation | | ← Altered granular rock (main zone) | 5% py. |
| 400 | | | | | 400 |

CSA1118

Project : STERLING RIVER
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# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. SR3



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|---|---|---|---|---|---|
| 400 | sil-ser-ble (4) | V strong foliation C: 40° | 60mm band (bed?) of qtz xyl/ss? | AS ABOVE: QUARTZ-SERICITE SCHIST AFTER RHYOLITIC VOLCANICS (Main alteration zone) "White rhyolite" | 5% py. Disseminations & stringers Trace sp |
| | | B?: 35° (// fol) | | | |
| | | C: 35° | ← TS 39968: Rhyolitic tuffaceous siltstone? | Granular grey rock, pale grey rock with qtz grains to 1mm & small qtz augen. | 3-5% py. Trace sp. |
| 410 | | Gradational | 410.2m | | |
| | ser (3) sil-co-ble (1) Pale pink qtz veins 15cm | Mod-strong foliation C: 28° | 10mm silica band (B?: 25°) | UNIDENTIFIED VITRIC FELSIC VOLCANIC As above except less altered. Pale creamy-khaki V finely granular rock Uniform appearance & grainsize. Highly sericitic, less silic than before. | 1-2% py, mainly in veinlets along fol |
| 420 | | | | | Minor py |
| | | C: 32° | | | 1-2% py Disseminations & stringers |
| | Zone of large qtz-rich veins ± chl ± py | Mod foliation C: 23° | ↓ Darker khaki; qtz vein | | |
| 430 | ser (2-3) chl (1) chl most marked around qtz veins | Weak foliation | qtz veins; 150mm semi-massive py, trace cp; qtz veins (+py); 10mm py; qtz vein (0.7m, barren) 55° | | 5-7% py Disseminations & veinlets (after E chl); 2% py. Disseminations; 10% py. Trace cp in qtz veins; Nil |
| | | Fissile | Tr py → qtz veins | in qtz-chl veins | 2% py. 10% py. Minor aspy, po > cp. |
| | co (1-2) ser > chl (2) | C: 53° | | | 1-2% py Trace aspy |
| | | Contact: Small shear // fol 45° | augen zones | ← TS 39971: Glassy felsic lava? 438.25m | ← aspy veinlets |
| 440 | ser (2) co-qtz veinlets | Strong foliation & augen. Contact: Abrupt 85° | C(B?) 40° | LAYERED ZONE Same rock as above & textural & grainsize variations (VITRIC TUFF?) 440.3m | Minor py. ← sp-gn clots |
| | | | ← Pepperitic bx. | | |
| | ser-chl (2) Minor sil. co > qtz veins & patches | Badly broken f: 75° Mod foliated C: 65° | ← qtz xyls to 1mm | FINE GRAINED UNIDENTIFIED FELSIC VOLCANIC Vitric | Trace py |
| | | Contact: Abrupt 50° (// fol) | | 445.9m | |
| 450 | sil-ser > ble (2-3) Common qtz > co-chl veins (some pink qtz). | Mod Foliated C: 50° | Finely bx. Broken along fol. | RHYOLITIC VOLCANIC Pale khaki-grey sl corroded qtz phenos to 2mm. Poss feldspars to 2mm. | Trace py |

FS4119

Project : STERLING RIVER
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# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No. SR3**



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 450 | Ser-sil-chl (2-3) ↓ | Shear 40° Broken ↑ Shear 40° ↑ Mod-strong foliation ↓ C: 45° | qtz veins | ← Abrupt textural change | As above: FOLIATED RHYOLITE V weak wispy-texture Pale greenish-grey Common purple qtz to 3mm, euhedral + rounded. Deformed felds av 2mm. Weak ser-chl wisps in foliation in places. | Trace py | 45 |
| | | | | | | ] gn veinlets in fol | |
| | | | | | | Nil py | |
| | | | | | | ← gn-sp-py veinlets | |
| 460 | qtz-pink calcite-py vein // LCA. | | | | | Minor py ← cp blebs. | 46 |
| | | Contact: gradational C: 45° | | 464.75m | | Rare py-sp-cp ← py-sp veinlet | |
| | ser-chl (2) | Contact: Abrupt 45° (// fol) | | | | Minor py | |
| | chl > cb (2-3) | | | MAFIC DYKE ? | | | |
| | ser > chl-sil ± ble (2) ↓ Early ser-chl overprinted by later ser-sil-ble | Mod-strong foliation f: Broken C: 40° f: 35° (// fol) | | WISPY-TEXTURED RHYOLITE Pseudoclastic texture in same rock as above? Qtz + feld xyls av 1-2mm + lenticular biotite flakes 1-3mm. Conspicuous wisps of ser-chl after glass, gen < 30mm x < 5mm, av 5-10mm x 2mm. Wisps have same internal texture as rock itself. | Minor sp-gn > py veinlets & clots | |
| 470 | | | | | | 2% sp > gn > py veinlets | 47 |
| | | | | ← TS 39969: Glassy felsic volcaniclastic | | Trace sp-gn-py | |
| | ser > chl (2) | f (// fol) Broken f: 50° (// fol) | | Contact: 43° (// fol) MAFIC DYKE ? | | Rare py + cp. | |
| | | | | | | ] Minor disem cp | |
| | sil-ser > allo (2-3) | | | No wispy texture | | | |
| 480 | chl-ser > sil (2) cb veins | C: 45° Contact: abrupt 45° (// fol) | bx | 482.45m | | | 48 |
| | sil > ser > allo-ble (2-3) | | | | Creamy-grey SILICEOUS RHYOLITE V faint wispy-banded texture. V uniform volc compositionally same above: Porph qtz 1-3mm (euhedral + corroded + fractured) More-abund felds av 2mm | | |
| | chl > ser (2-3) | 40° (// fol) Weak-mod foliated | | felsic/bio-rich margins ACID DYKES (pk green) ← TS 39970: Dacitic Intrusive | | | |
| | sil > ser-ble (2-3) | 45° (// fol) Dyke: 40° (// fol) | | | | | |
| 490 | sil overgrowths on qtz xyls | C: 42° | | | | V rare as py also. | 49 |
| | | | | | | ← 1mm gn > py veinlet | |
| | | | | | | ] 1mm as py veinlets | |
| | | C: 42° | | | | ← cp stringer (< 1mm) | |
| 500 | | | | | | | 50 |

CB41120

Project : STERLING RIVER
Logged by: J.G. PURVIS
Date : JUNE 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. SR3



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32 mm sand) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 500 | ↓ As above<br>(1) patchy<br>↑ sil overgrths on qtz xyls | As above<br>C : 40° | | ↓ qtz xyls getting more abundant<br>RHYOLITE (as above) | Rare py |
| 510 | | | | 512.0m EOH | |

RC41121

## SR3 GEOCHECHEMISTRY

| Sample | From | To | Cu | Pb | Zn | Ag | Au | As | Ba | Sn | W | Rb | Sr | V | Y | Nb | Zr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 40469 | 44.70 | 46.00 | 170 | 33 | 107 | 2 | 0.02 | 21 | 361 | 5 | <10 | | | | | | |
| 40470 | 46.00 | 48.00 | 21 | 60 | 203 | 1 | 0.01 | 62 | 354 | <3 | <10 | | | | | | |
| 40471 | 48.00 | 50.00 | 11 | 252 | 396 | 1 | 0.01 | 35 | 434 | 29 | <10 | | | | | | |
| 40472 | 50.00 | 52.00 | 54 | 368 | 876 | 1 | 0.03 | 39 | 271 | 29 | <10 | | | | | | |
| 40473 | 52.00 | 53.30 | 52 | 173 | 1444 | 1 | 0.02 | 24 | 366 | 9 | <10 | | | | | | |
| 40474 | 53.30 | 54.50 | 48 | 494 | 794 | 1 | 0.02 | 65 | 320 | 16 | <10 | | | | | | |
| 40475 | 106.00 | 107.00 | 16 | 10 | 1676 | 1 | 0.02 | 47 | 260 | 7 | 10 | | | | | | |
| 40476 | 121.00 | 121.40 | 1053 | 119 | 88 | 5 | 0.05 | 8300 | 152 | 23 | 60 | | | | | | |
| 40477 | 126.20 | 127.85 | 86 | 168 | 251 | 2 | 0.03 | 72 | 164 | 40 | 25 | | | | | | |
| 40478 | 127.85 | 130.00 | 100 | 527 | 1619 | 2 | 0.02 | 85 | 327 | 10 | <10 | | | | | | |
| 40479 | 130.00 | 131.50 | 81 | 370 | 947 | 2 | 0.02 | 96 | 347 | 6 | <10 | | | | | | |
| 40480 | 131.50 | 133.00 | 82 | 498 | 2292 | 3 | 0.02 | 142 | 326 | 8 | | | | | | | |
| 40481 | 133.00 | 134.50 | 114 | 1282 | 4041 | 4 | 0.05 | 204 | 325 | 17 | | | | | | | |
| 40482 | 134.50 | 136.00 | 70 | 551 | 1809 | 2 | 0.02 | 118 | 345 | 13 | 10 | | | | | | |
| 40483 | 171.00 | 173.00 | 153 | 77 | 115 | 2 | 0.01 | 93 | 376 | 26 | 15 | | | | | | |
| 40484 | 173.00 | 175.00 | 64 | 91 | 91 | 2 | 0.01 | 100 | 340 | 40 | 45 | | | | | | |
| 40485 | 181.20 | 182.20 | 872 | 203 | 385 | 6 | 0.03 | 216 | 161 | 492 | 15 | | | | | | |
| 40486 | 182.20 | 184.30 | 466 | 26500 | 29000 | 41 | 0.23 | 11100 | 272 | 247 | | | | | | | |
| 40487 | 188.00 | 190.00 | 88 | 1142 | 3168 | 3 | 0.01 | 273 | 289 | 88 | | | | | | | |
| 40488 | 210.00 | 212.00 | 121 | 375 | 441 | 2 | 0.01 | 352 | 141 | 13 | 10 | | | | | | |
| 40489 | 212.00 | 214.00 | 78 | 72 | 821 | 1 | 0.01 | 108 | 558 | 7 | <10 | | | | | | |
| 40490 | 235.75 | 237.25 | 140 | 6900 | 4203 | 11 | 0.03 | 1254 | 799 | 50 | | | | | | | |
| 40491 | 276.60 | 278.00 | 123 | 640 | 1360 | 4 | 0.03 | 239 | 616 | 183 | 10 | | | | | | |
| 40492 | 278.00 | 279.00 | 38 | 99 | 103 | 4 | 0.63 | 50000 | 48 | 706 | 10 | | | | | | |
| 40493 | 279.00 | 280.00 | 164 | 5400 | 1176 | 9 | 0.07 | 2457 | 178 | 470 | 20 | | | | | | |
| 40494 | 296.90 | 299.00 | 118 | 38 | 147 | 2 | 0.03 | 121 | 433 | 37 | <10 | | | | | | |
| 40495 | 299.00 | 301.00 | 52 | 25 | 92 | 1 | 0.02 | 130 | 428 | 33 | <10 | | | | | | |
| 40496 | 301.00 | 302.00 | 135 | 8600 | 3731 | 10 | 0.04 | 318 | 414 | 38 | | | | | | | |
| 40497 | 302.00 | 304.00 | 64 | 216 | 304 | 2 | 0.01 | 132 | 490 | 50 | <10 | | | | | | |
| 40498 | 304.00 | 305.50 | 62 | 183 | 3402 | 1 | 0.01 | 87 | 510 | 29 | | | | | | | |
| 40499 | 305.50 | 307.00 | 35 | 71 | 616 | 2 | 0.01 | 73 | 513 | 35 | <10 | | | | | | |
| 40500 | 307.00 | 307.75 | 72 | 645 | 1165 | 3 | 0.06 | 468 | 261 | 2810 | 20 | | | | | | |
| 40577 | 307.75 | 309.00 | 81 | 522 | 1625 | 2 | 0.01 | 125 | 469 | 21 | 10 | | | | | | |
| 40578 | 309.00 | 311.00 | 86 | 110 | 697 | 1 | <0.008 | 127 | 502 | <3 | <10 | | | | | | |
| 40579 | 311.00 | 312.50 | 100 | 273 | 1354 | 2 | 0.04 | 363 | 424 | 66 | <10 | | | | | | |
| 40580 | 312.50 | 314.00 | 106 | 2745 | 4356 | 5 | 0.02 | 202 | 436 | 54 | | | | | | | |
| 40581 | 314.00 | 316.00 | 172 | 2173 | 3926 | 6 | 0.09 | 840 | 461 | 310 | | | | | | | |
| 40582 | 316.00 | 318.00 | 105 | 1563 | 4246 | 3 | 0.1 | 541 | 379 | 837 | | | | | | | |
| 40583 | 339.75 | 343.00 | 116 | 3 | 158 | 2 | 0.02 | 23 | 491 | 3 | | - | - | - | - | - | - |
| 40584 | 343.00 | 346.00 | 3 | 5 | 150 | 2 | <0.008 | 8 | 334 | 4 | | - | - | - | - | - | - |
| 40585 | 346.00 | 348.00 | <2 | 43 | 182 | 2 | <0.008 | 14 | 324 | <3 | | - | - | - | - | - | - |
| 40586 | 348.00 | 350.00 | 66 | 5 | 72 | 2 | <0.008 | 12 | 888 | 4 | | - | - | - | - | - | - |
| 40587 | 350.00 | 353.00 | 8 | 5 | 66 | 2 | 0.01 | 16 | 910 | <3 | | - | - | - | - | - | - |



22154

| Sample | From | To | Cu | Pb | Zn | Ag | Au | As | Ba | Sn | W | Rb | Sr | V | Y | Nb | Zr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 40588 | 353.00 | 356.00 | 22 | 29 | 108 | 2 | 0.03 | 41 | 820 | 5 | | - | - | - | - | - | - |
| 40589 | 356.00 | 359.00 | 29 | 28 | 113 | 1 | 0.05 | 33 | 707 | 11 | | - | - | - | - | - | - |
| 40590 | 359.00 | 362.00 | 23 | 20 | 83 | 2 | 0.03 | 32 | 537 | 7 | | - | - | - | - | - | - |
| 40591 | 362.00 | 365.00 | 11 | 18 | 97 | 2 | 0.02 | 29 | 608 | 4 | | - | - | - | - | - | - |
| 40592 | 365.00 | 368.00 | 38 | 14 | 76 | 2 | 0.02 | 24 | 505 | 3 | | - | - | - | - | - | - |
| 40593 | 368.00 | 371.00 | 22 | 25 | 76 | 2 | 0.01 | 24 | 529 | 4 | | - | - | - | - | - | - |
| 40594 | 371.00 | 374.00 | 32 | 23 | 90 | 2 | 0.02 | 34 | 468 | 6 | | - | - | - | - | - | - |
| 40595 | 374.00 | 377.00 | 76 | 21 | 106 | 3 | 0.05 | 39 | 468 | 6 | | - | - | - | - | - | - |
| 40596 | 377.00 | 380.00 | 27 | 21 | 82 | 2 | 0.12 | 126 | 485 | 9 | | - | - | - | - | - | - |
| 40597 | 380.00 | 383.00 | 82 | 32 | 117 | 3 | 0.03 | 173 | 590 | 3 | | - | - | - | - | - | - |
| 40598 | 383.00 | 386.00 | 120 | 35 | 87 | 2 | 0.04 | 124 | 769 | 4 | | - | - | - | - | - | - |
| 40599 | 386.00 | 389.00 | 68 | 21 | 53 | 2 | 0.01 | 141 | 918 | <3 | | - | - | - | - | - | - |
| 40600 | 389.00 | 392.00 | 22 | 29 | 88 | 2 | 0.03 | 128 | 1135 | 4 | | - | - | - | - | - | - |
| 40866 | 392.00 | 395.00 | 45 | 36 | 115 | 2 | 0.03 | 161 | 951 | 4 | | - | - | - | - | - | - |
| 40867 | 395.00 | 398.00 | 323 | 22 | 75 | 2 | 0.02 | 29 | 1003 | <3 | | - | - | - | - | - | - |
| 40868 | 398.00 | 401.00 | 37 | 59 | 63 | 3 | 0.04 | 50 | 985 | 6 | | - | - | - | - | - | - |
| 40869 | 401.00 | 404.00 | 25 | 55 | 177 | 2 | 0.06 | 43 | 699 | 9 | | - | - | - | - | - | - |
| 40870 | 404.00 | 407.00 | 49 | 29 | 99 | 2 | 0.06 | 40 | 417 | 5 | | - | - | - | - | - | - |
| 40871 | 407.00 | 410.00 | 141 | 45 | 76 | 2 | 0.09 | 43 | 392 | 11 | | - | - | - | - | - | - |
| 40872 | 410.00 | 413.00 | 88 | 92 | 70 | 2 | 0.03 | 23 | 474 | 11 | | - | - | - | - | - | - |
| 40873 | 413.00 | 416.00 | 14 | 26 | 40 | 2 | 0.03 | 13 | 572 | 6 | | - | - | - | - | - | - |
| 40874 | 416.00 | 419.00 | 23 | 43 | 94 | 3 | 0.03 | 14 | 639 | 5 | | - | - | - | - | - | - |
| 40875 | 419.00 | 422.00 | 14 | 8 | 41 | 2 | 0.03 | 13 | 635 | 5 | | - | - | - | - | - | - |
| 40876 | 422.00 | 425.00 | 7 | 25 | 59 | 3 | 0.02 | 17 | 802 | 3 | | - | - | - | - | - | - |
| 40877 | 425.00 | 428.00 | 7 | 19 | 63 | 2 | 0.04 | 23 | 1057 | 5 | | - | - | - | - | - | - |
| 40878 | 428.00 | 430.00 | 22 | 26 | 47 | 3 | 0.1 | 49 | 1341 | 17 | | - | - | - | - | - | - |
| 40879 | 430.00 | 432.00 | 213 | 25 | 93 | 2 | 0.03 | 304 | 867 | 11 | | - | - | - | - | - | - |
| 40880 | 432.00 | 434.00 | 97 | 16 | 36 | 2 | 0.03 | 730 | 1123 | 5 | | - | - | - | - | - | - |
| 40881 | 434.00 | 437.00 | 33 | 14 | 67 | 2 | 0.01 | 792 | 939 | 3 | | - | - | - | - | - | - |
| 40882 | 437.00 | 440.00 | 80 | 38 | 114 | 2 | 0.02 | 1100 | 674 | 4 | | - | - | - | - | - | - |
| 40883 | 440.00 | 443.00 | 14 | 20 | 41 | 3 | 0.04 | 11 | 616 | 7 | | - | - | - | - | - | - |
| 40884 | 443.00 | 446.00 | 41 | 7 | 81 | 2 | 0.01 | 4 | 433 | 8 | | - | - | - | - | - | - |
| 40885 | 446.00 | 449.00 | 6 | 9 | 29 | 2 | <0.008 | 3 | 417 | 8 | | - | - | - | - | - | - |
| 40886 | 449.00 | 452.00 | 12 | 21 | 24 | 2 | <0.008 | 2 | 599 | 5 | | - | - | - | - | - | - |
| 40887 | 452.00 | 455.00 | 9 | 149 | 148 | 1 | <0.008 | 2 | 658 | 7 | | - | - | - | - | - | - |
| 40888 | 455.00 | 458.00 | 27 | 22 | 48 | 2 | 0.01 | 2 | 668 | 4 | | - | - | - | - | - | - |
| 40889 | 458.00 | 461.00 | 83 | 73 | 88 | 2 | 0.01 | 3 | 719 | 5 | | - | - | - | - | - | - |
| 40890 | 761.00 | 464.00 | 248 | 40 | 73 | 2 | 0.06 | 2 | 644 | 7 | | - | - | - | - | - | - |
| 40891 | 464.00 | 467.00 | 64 | 41 | 200 | 2 | 0.01 | 7 | 874 | 10 | | - | - | - | - | - | - |
| 40892 | 467.00 | 470.00 | 52 | 883 | 3567 | 1 | 0.01 | 29 | 324 | 18 | | - | - | - | - | - | - |
| 40893 | 470.00 | 471.00 | 60 | 1504 | 9700 | 5 | 0.01 | 295 | 338 | 23 | | - | - | - | - | - | - |
| 40894 | 471.00 | 474.00 | 26 | 262 | 1067 | 2 | <0.008 | 4 | 352 | 12 | | - | - | - | - | - | - |
| 40895 | 338.75 | 339.75 | 105 | 18 | 98 | 3 | 0.02 | 17 | 815 | 3 | | - | - | - | - | - | - |
| 39972 | 339.75 | 348.00 | - | - | - | - | - | - | - | - | | 64 | 112 | 398 | 24 | <3 | 104 |
| 39973 | 348.00 | 356.00 | - | - | - | - | - | - | - | - | | 139 | 70 | 73 | 29 | 9 | 238 |
| 39974 | 356.00 | 365.00 | - | - | - | - | - | - | - | - | | 131 | 59 | 97 | 29 | 9 | 233 |



754129

| Sample | From | To | Cu | Pb | Zn | Ag | Au | As | Ba | Sn | W | Rb | Sr | V | Y | Nb | Zr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 39975 | 365.00 | 374.00 | - | - | - | - | - | - | - | - | | 151 | 62 | 161 | 26 | 10 | 191 |
| 39976 | 374.00 | 383.00 | - | - | - | - | - | - | - | - | | 134 | 31 | 110 | 31 | 7 | 189 |
| 39977 | 383.00 | 392.00 | - | - | - | - | - | - | - | - | | 172 | 48 | 46 | 33 | 10 | 244 |
| 39978 | 392.00 | 401.00 | - | - | - | - | - | - | - | - | | 164 | 78 | 24 | 40 | 8 | 235 |
| 39979 | 401.00 | 410.00 | - | - | - | - | - | - | - | - | | 144 | 16 | <5 | 34 | 11 | 254 |
| 39980 | 410.00 | 419.00 | - | - | - | - | - | - | - | - | | 156 | 39 | 7 | 51 | 11 | 262 |
| 39981 | 419.00 | 428.00 | - | - | - | - | - | - | - | - | | 165 | 35 | 52 | 51 | 11 | 270 |
| 39982 | 428.00 | 437.00 | - | - | - | - | - | - | - | - | | 169 | 15 | 8 | 37 | 12 | 259 |
| 39983 | 437.00 | 446.00 | - | - | - | - | - | - | - | - | | 178 | 53 | 25 | 58 | 12 | 216 |
| 39984 | 446.00 | 455.00 | - | - | - | - | - | - | - | - | | 195 | 37 | 6 | 36 | 13 | 130 |
| 39985 | 455.00 | 464.00 | - | - | - | - | - | - | - | - | | 197 | 37 | <5 | 42 | 14 | 129 |
| 39986 | 464.00 | 474.00 | - | - | - | - | - | - | - | - | | 204 | 18 | 11 | 34 | 13 | 125 |



ASP 1124

| Sample | From | To | Al2O3 | SiO2 | TiO2 | Fe2O3 | MnO | CaO | K2O | MgO | P2O5 | SO3 | Na2O | LOI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 40588 | 353.00 | 356.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40589 | 356.00 | 359.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40590 | 359.00 | 362.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40591 | 362.00 | 365.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40592 | 365.00 | 368.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40593 | 368.00 | 371.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40594 | 371.00 | 374.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40595 | 374.00 | 377.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40596 | 377.00 | 380.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40597 | 380.00 | 383.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40598 | 383.00 | 386.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40599 | 386.00 | 389.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40600 | 389.00 | 392.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40866 | 392.00 | 395.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40867 | 395.00 | 398.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40868 | 398.00 | 401.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40869 | 401.00 | 404.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40870 | 404.00 | 407.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40871 | 407.00 | 410.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40872 | 410.00 | 413.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40873 | 413.00 | 416.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40874 | 416.00 | 419.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40875 | 419.00 | 422.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40876 | 422.00 | 425.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40877 | 425.00 | 428.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40878 | 428.00 | 430.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40879 | 430.00 | 432.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40880 | 432.00 | 434.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40881 | 434.00 | 437.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40882 | 437.00 | 440.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40883 | 440.00 | 443.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40884 | 443.00 | 446.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40885 | 446.00 | 449.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40886 | 449.00 | 452.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40887 | 452.00 | 455.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40888 | 455.00 | 458.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40889 | 458.00 | 461.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40890 | 761.00 | 464.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40891 | 464.00 | 467.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40892 | 467.00 | 470.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40893 | 470.00 | 471.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40894 | 471.00 | 474.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| 40895 | 338.75 | 339.75 | - | - | - | - | - | - | - | - | - | - | - | - |
| 39972 | 339.75 | 348.00 | 14.8 | 46.3 | 0.94 | 13.79 | 0.31 | 5.17 | 1.47 | 6.37 | 0.15 | 0.31 | 1.3 | 9.11 |
| 39973 | 348.00 | 356.00 | 13.8 | 65.2 | 0.42 | 5.45 | 0.16 | 2.72 | 3.32 | 1.99 | 0.12 | 1.8 | 1.07 | 4.41 |
| 39974 | 356.00 | 365.00 | 13.3 | 64.4 | 0.38 | 6.71 | 0.15 | 2.78 | 3.28 | 2.2 | 0.18 | 2.16 | 0.71 | 4.03 |

| Sample | From | To | Al2O3 | SiO2 | TiO2 | Fe2O3 | MnO | CaO | K2O | MgO | P2O5 | SO3 | Na2O | LOI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 39975 | 365.00 | 374.00 | 14.4 | 59.5 | 0.51 | 7.48 | 0.23 | 3.83 | 3.63 | 2.29 | 0.09 | 2.52 | 0.76 | 4.11 |
| 39976 | 374.00 | 383.00 | 13.4 | 61.2 | 0.4 | 8.65 | 0.16 | 2.6 | 3.57 | 2.61 | 0.1 | 1.54 | <0.05 | 5.02 |
| 39977 | 383.00 | 392.00 | 13.6 | 63.3 | 0.37 | 4.91 | 0.19 | 3.69 | 4.4 | 1.64 | 0.09 | 2.2 | 0.24 | 3.97 |
| 39978 | 392.00 | 401.00 | 15.1 | 61.4 | 0.42 | 4.9 | 0.16 | 3.54 | 4.1 | 1.26 | 0.15 | 1.76 | 1.89 | 5.93 |
| 39979 | 401.00 | 410.00 | 11.9 | 68.6 | 0.24 | 6.84 | 0.05 | 1.28 | 4.17 | 0.68 | 0.03 | 1.95 | <0.05 | 7.12 |
| 39980 | 410.00 | 419.00 | 12.1 | 69.4 | 0.28 | 2.25 | 0.13 | 4.17 | 4.21 | 0.71 | 0.05 | 1.82 | 0.24 | 4.42 |
| 39981 | 419.00 | 428.00 | 12.4 | 67.7 | 0.26 | 2.49 | 0.15 | 4.07 | 4.62 | 0.78 | 0.04 | 1.71 | <0.05 | 6.62 |
| 39982 | 428.00 | 437.00 | 12.8 | 65.5 | 0.28 | 7.6 | 0.1 | 1.44 | 4.66 | 1.01 | 0.05 | 1.06 | <0.05 | 4.96 |
| 39983 | 437.00 | 446.00 | 13.4 | 63 | 0.36 | 3.41 | 0.17 | 5.08 | 4.18 | 1.21 | 0.09 | 0.47 | 0.74 | 7.7 |
| 39984 | 446.00 | 455.00 | 12.8 | 73.5 | 0.14 | 1.93 | 0.08 | 1.78 | 3.67 | 0.83 | 0.01 | 0.1 | 1.29 | 3.13 |
| 39985 | 455.00 | 464.00 | 12.6 | 73 | 0.14 | 2.07 | 0.08 | 2.67 | 3.78 | 0.95 | 0.01 | 0.46 | 1.06 | 3.63 |
| 39986 | 464.00 | 474.00 | 12.5 | 70.1 | 0.15 | 2.75 | 0.24 | 1.86 | 4.25 | 1.17 | 0.02 | 0.64 | 0.05 | 5.49 |



02 1 5 4 1 9

754127

**SAMPLE NUMBER: 39962 Hole SR 3 Sterling Valley 248.1m**

**SUMMARY DESCRIPTION:**

This is strongly foliated formerly highly glassy vitric tuff or vitric ash-rich volcaniclastic siltstone to fine sandstone. Despite the foliation development and replacement of glass by very fine-grained polycrystalline sugary quartz, abundant traces of shard shapes are still evident, in packages between closely-spaced, subparallel, sericite-defined foliation planes. Zones of intense sericite development also parallel to foliation have obliterated shard shapes. Occasional small broken grains of volcanic quartz are present, but no feldspar is preserved. Very minor amounts of disseminated fine-grained euhedral (<0.1mm across) pyrite occur throughout the rock, and one foliation-parallel zone of coarser quartz contains more abundant fine-grained sulphide, much of which is anhedral and may be base metal sulphide. A few narrow quartz veinlets are now strongly recrystallized, and folded and transposed by the foliation. Minor overprinting by calcite is present, but a careful search showed no tourmaline in this sample.

**SAMPLE NUMBER: 39963 Hole SR 3 Sterling Valley 311.35m**

**SUMMARY DESCRIPTION:**

This is a remarkable slide texturally. It is clearly strongly foliated and recrystallized, and is derived from formerly finely interbedded carbonaceous shale-siltstone layers. Bands of more carbonaceous, very fine-grained material are interleaved with layers of less carbonaceous, very fine-grained, sugary quartzose Kinking and brittle fracturing have broken the layers into small blocks, some of which have been driven into neighbouring blocks and caused strong pressure solution. Some of this appears to have resulted from fluid expulsion during deformation, as chloritic (and chlorite-quartz) veins, often containing randomly orientated small blocks of recrystallized shale, seem to have punched through the foliation-defined layers in places, then deflected parallel to foliation between other layers. Perfectly euhedral pyrite crystals to almost 0.5mm across are not uncommon, and occur scattered through the rock, and also in occasional foliation-parallel bands intergrown with quartz and chlorite. A few spots of anhedral dark red Fe-rich sphalerite are also present. There is no tourmaline in this sample. Structural geologists would freak out with this sample. (I didn't).

**SAMPLE NUMBER: 39970 Hole SR 3 Sterling Valley 486.1m**
**SUMMARY DESCRIPTION:**

This sample is very similar to 39967 in most respects, perhaps being slightly more altered with a more intense foliation. A few former mafic phenocrysts much less than 1mm long (probably originally augite) are replaced by chlorite and calcite, whereas less obvious plagioclase phenocrysts have been stretched and replaced by polycrystalline quartz and sericite. The groundmass of this rock is strongly foliated, and composed of a dense sericite-fine-grained quartz intergrowth, with common chloritic wisps and streaks, and a few small stretched vesicles filled by quartz. In places, small albitized plagioclase laths and microlites are still preserved, in textural details strongly reminiscent of 39967. Occasional narrow quartz-chlorite-calcite veinlets parallel to the foliation are present, and a single 5mm-wide vein composed of quartz-chlorite-calcite and some bladed hematite(?) crystals is obvious in the core specimen. A few small apatite crystals are also present. I think that this may have been a shallow dacitic intrusive, and would guess that compositionally, it matches 39967.

**SAMPLE NUMBER: 39971 Hole SR 3 Sterling Valley 436.8m**
**SUMMARY DESCRIPTION:**

Although less foliated than samples 39965 and 39968, this rock is moderately foliated, and presents a pseudo-clastic texture that appears to be dominated by small rounded clastic quartz grains in a sericitic matrix. However, the quartz grains are polycrystalline, and often almost spherulitic, with radiating extinction. I am certain that these are a devitrification texture. At least one former mafic phenocryst (now composed of chlorite, with common small zircon inclusions) was present, and several stretched former plagioclase phenocrysts now replaced by sericite are also present. Possible former FeTi oxide phenocrysts occur as dark streaks parallel to foliation, although these may also be pressure solution concentration of insoluble material during foliation development and volume loss. I am inclined to think that this sample may have been a particularly crystal-poor glassy felsic lava, based mainly on the texture of the groundmass. Although I can't rule out the possibility that 39665 and 39667 were also glassy notably phenocryst-poor (aphyric) lavas, the absence of the spherulitic groundmass textures in these rocks makes me think that they may have been fine-grained volcaniclastics. Clearly, 39970 has suffered strong silica-sericite alteration before incorporation into the fault zone that produced the foliation.

754129

SAMPLE NUMBER: 39968 Hole SR 3 Sterling Valley 406.8m

SUMMARY DESCRIPTION:

This is a strongly foliated and thoroughly recrystallized rock with no preserved primary textural evidence useful in determining its protolith. The rock consists of a fairly fine-grained quartzose intergrowth with a rather ragged texture, pervaded by a fine-grained mesh of sericite that coalesces in places to form dense foliation-parallel bands. Although disseminated fine-grained pyrite occurs throughout the rock (<1 modal%), it also occurs in discontinuous trails and bands of slightly coarser-grained crystals with pressure shadows of sericite and ribbon quartz. There is no convincing evidence that there were any phenocrysts or phenocryst fragments in this rock. I suggest that, as for sample 39965 (which is strikingly similar to this rock), this may have been a vitric ash-dominated tuff of volcaniclastic siltstone that was hydrothermally altered (silica-sericite±pyrite) then recrystallized in this fault zone.

**SAMPLE NUMBER: 39969 Hole SR 3 Sterling Valley 472.5m**

**SUMMARY DESCRIPTION:**

**This is a strongly foliated formerly largely glassy felsic volcanic or volcaniclastic rock. Sections through the core in hand specimen, and several areas of the thin section show clear clastic textures, with a few stretched lithic clasts to more than 1cm long. The very dark green streaks and wisps obvious in the hand specimen are composed of quartz-free very fine-grained sericite, lacking any former pumice textures. In a few places they may represent altered and stretched former plagioclase phenocrysts, but many appear to have crystallized during foliation development, rather than to have replaced pre-existing fiammae or other stretched felsic clasts. Broken and slightly resorbed quartz phenocrysts make up about 3-5 modal% of the rock, and with the sericite wisps and streaks are set in a thoroughly recrystallized fine-grained quartzose matrix penetrated by sericite that defines foliation planes, dark streaks of insoluble leucoxenitic material arranged on pressure solution planes (also defining foliation), and minor overprinting calcite. The matrix has almost certainly recrystallized from altered glass, and this rock was probably a vitric ash-rich volcaniclastic or vitric crystal lithic tuff that has suffered strong silica-sericite alteration.**

754130

SAMPLE NUMBER: 39966 Hole SR 3 Sterling Valley 381.3m

SUMMARY DESCRIPTION:

This is a strongly foliated rock composed of streaky chlorite and sericite bands in a fine-grained quartzose matrix heavily overprinted with carbonate. The chloritic streaks are probably too abundant and too long to have formerly been mafic phenocrysts. A few small carbonate-overprinted spots may represent former plagioclase phenocrysts, but this too is uncertain. There are no textural details whatsoever to infer a protolith from. However, notable are three or four small zircon crystals, typical of felsic and intermediate volcanics, but almost unknown in Henty Dyke Swarm or Hellyer Basalts. This, plus the abundance of quartz and sericite, suggest to me that this was a chlorite-altered felsic volcanic or fine-grained volcaniclastic, or alternatively an andesitic lava. I am confident it was not a Henty Dyke, and hope that wholerock chemistry would bear this out. Foliation-parallel concentrations and trains of tiny pyrite euhedra are common, especially in more chloritic bands.

**SAMPLE NUMBER: 39967 Hole SR 3 Sterling Valley 394.65m**

**SUMMARY DESCRIPTION:**

**This is a fairly difficult sample to diagnose. It is a weakly to moderately foliated felsic to intermediate rock, of unambiguous igneous derivation. Primary textural details are preserved in places. Small albitized plagioclase phenocrysts and microphenocrysts make up perhaps 2-4 modal% of the rock. However, there is no convincing evidence of the former presence of mafic phenocrysts in this rock. Occasional small vesicles have been filled by calcite and quartz. The groundmass of the rock retains small areas where abundant albite microlites and laths are present, with a texture approaching a holocrystalline intergrowth with minor quartz and chlorite. Small apatite crystals are not uncommon. Most of the groundmass, however, is replaced by an intergrowth of chlorite, abundant sericite and quartz, with common overprinting calcite. The foliation is defined by subparallel planes of sericite and more streaky chlorite. Disseminated pyrite is common, but volumetrically insignificant in this sample, with maximum grainsize being <<0.4mm. The texture of the rock suggests to me that this was originally a dacitic shallow intrusive.**

754131

**SAMPLE NUMBER: 39964 Hole SR 3 Sterling Valley 342.7m**

SUMMARY DESCRIPTION:

This is a strongly foliated quartz-chlorite-sericite-leucoxene rock with quite strong overprinting carbonate alteration. Former albitized plagioclase phenocrysts (<2 modal%) are mainly stretched into the foliation and totally overprinted by sericite and calcite. However the groundmass texture is well-enough preserved and abundant, randomly-orientated tiny albitized plagioclase microlites are present in a totally recrystallized matrix of chlorite, minor sericite, extremely fine-grained quartz, and abundant tiny leucoxene spots. Overprinting carbonate occurs as discontinuous veinlets and discrete crystals usually <0.2mm across. I suggest that this may have been a Henty Dyke Swarm-related basaltic dyke or sill. This should be immediately evident from a wholerock analysis, with TiO2>0.7%, and Ti/Zr probably >70. The sample is free of pyrite and tourmaline.

**SAMPLE NUMBER: 39965 Hole SR 3 Sterling Valley 357.0m**

**SUMMARY DESCRIPTION:**

This is a very strongly recrystallized hydrothermally altered felsic rock which preserves no primary textural features at all. It consists of a moderately foliated intergrowth of sericite, sugary to patchy quartz, very minor chlorite, and common trails and pockets of euhedral fine-grained pyrite. The largest pyrite grains are around 1mm across, and occur in bands of more coarsely recrystallized quartz. Only two small broken volcanic quartz grains are present; the remainder of the rock consists of a streaky sericite-silica intergrowth. The lack of phenocrysts is atypical of a felsic volcanics, and more typical of a vitric ash, or a volcaniclastic siltstone composed dominantly of vitric ash. Although its hard to prove, I suggest that this sample was probably a silica-sericite-pyrite-altered vitric ash-rich felsic rock that recrystallized in the high strain zone responsible for the foliation in this drillhole.

**CORE PROCESSING RESULTS**

**DRILL HOLE NUMBER** sr3

| CORE RECOVERY | | | | mag sus S.I units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| 0.00 | 3.50 | 0.50 | 14.29 | 3.50 | 0.03 | | | | 0.00 | | | | |
| 3.50 | 7.00 | 0.50 | 14.29 | 7.00 | 0.31 | | | | 0.00 | | | | |
| 7.00 | 9.90 | 0.40 | 13.79 | 9.90 | 0.05 | | | | 0.00 | | | | |
| 9.90 | 10.50 | 0.37 | 61.67 | 10.50 | 0.07 | | | | 0.00 | | | | |
| 10.50 | 11.50 | 0.30 | 30.00 | 11.50 | 0.00 | | | | 0.00 | | | | |
| 11.50 | 17.00 | 0.30 | 5.45 | 17.00 | 0.17 | | | | 0.00 | | | | |
| 17.00 | 20.00 | 0.20 | 6.67 | 20.00 | 0.00 | | | | 0.00 | | | | |
| 20.00 | 21.20 | 1.30 | 108.33 | 21.20 | 0.40 | | | | 0.00 | | | | |
| 21.20 | 22.30 | 0.50 | 45.45 | 22.30 | 0.00 | | | | 0.00 | | | | |
| 22.30 | 23.10 | 0.70 | 87.50 | 23.10 | 0.00 | | | | 0.00 | | | | |
| 23.10 | 24.00 | 0.70 | 77.78 | 24.00 | 0.47 | | | | 0.00 | | | | |
| 24.00 | 25.80 | 1.50 | 83.33 | 25.80 | 0.54 | | | | 0.00 | | | | |
| 25.80 | 27.20 | 0.90 | 64.29 | 27.20 | 0.42 | | | | 0.00 | | | | |
| 27.20 | 28.10 | 0.90 | 100.00 | 28.10 | 0.75 | | | | 0.00 | | | | |
| 28.10 | 29.00 | 0.80 | 88.89 | 29.00 | 0.41 | | | | 0.00 | | | | |
| 29.00 | 30.20 | 0.90 | 75.00 | 30.20 | 0.71 | | | | 0.00 | | | | |
| 30.20 | 31.30 | 0.90 | 81.82 | 31.30 | 0.00 | | | | 0.00 | | | | |
| 31.30 | 32.80 | 0.80 | 53.33 | 32.80 | 0.18 | | | | 0.00 | | | | |
| 32.80 | 34.20 | 1.00 | 71.43 | 34.20 | 0.00 | | | | 0.00 | | | | |
| 34.20 | 34.70 | 0.45 | 90.00 | 34.70 | 0.00 | | | | 0.00 | | | | |
| 34.70 | 36.40 | 1.50 | 88.24 | 36.40 | 0.34 | | | | 0.00 | | | | |
| 36.40 | 37.90 | 1.40 | 93.33 | 37.90 | 0.37 | | | | 0.00 | | | | |
| 37.90 | 39.10 | 1.30 | 108.33 | 39.10 | 0.38 | | | | 0.00 | | | | |
| 39.10 | 39.70 | 0.60 | 100.00 | 39.70 | 0.36 | | | | 0.00 | | | | |
| 39.70 | 41.60 | 1.90 | 94.74 | 41.60 | 0.26 | | | | 0.00 | | | | |
| 41.60 | 41.90 | 0.60 | 200.00 | 41.90 | 0.26 | | | | 0.00 | | | | |
| 41.90 | 42.70 | 0.40 | 50.00 | 42.70 | 0.00 | | | | 0.00 | | | | |
| 42.70 | 44.30 | 1.60 | 93.75 | 44.30 | 0.09 | | | | 0.00 | | | | |
| 44.30 | 45.40 | 1.10 | 100.00 | 45.40 | 0.07 | | | | 0.00 | 44.70 | 46.00 | 40469 | |
| 45.40 | 46.60 | 1.30 | 108.33 | 46.60 | 0.05 | | | | 0.00 | 46.00 | 48.00 | 40470 | |
| 46.60 | 47.10 | 0.20 | 40.00 | 47.10 | 0.20 | | | | 0.00 | | | | |
| 47.10 | 48.30 | 1.20 | 100.00 | 48.30 | 0.00 | | | | 0.00 | 48.00 | 50.00 | 40471 | |
| 48.30 | 49.20 | 0.90 | 100.00 | 49.20 | 0.07 | | | | 0.00 | | | | |
| 49.20 | 50.00 | 0.70 | 87.50 | 50.00 | 0.07 | | | | 0.00 | | | | |
| 50.00 | 51.30 | 0.90 | 69.23 | 51.30 | 0.32 | | | | 0.00 | 50.00 | 52.00 | 40472 | |
| 51.30 | 53.00 | 1.70 | 100.00 | 53.00 | 0.09 | | | | 0.00 | 52.00 | 53.30 | 40473 | |
| 53.00 | 54.50 | 1.30 | 86.67 | 54.50 | 0.30 | | | | 0.00 | 53.30 | 54.50 | 40474 | |
| 54.50 | 54.80 | 0.30 | 100.00 | 54.80 | 0.00 | | | | 0.00 | | | | |
| 54.80 | 56.30 | 1.30 | 86.67 | 56.30 | 0.01 | | | | 0.00 | | | | |
| 56.30 | 56.70 | 0.20 | 50.00 | 56.70 | 0.01 | | | | 0.00 | | | | |

RL4139

**CORE PROCESSING RESULTS**

**DRILL HOLE NUMBER** sr3

| CORE RECOVERY | | | | Magnetic Susceptibility Units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| 56.70 | 57.50 | 0.70 | 87.50 | 57.50 | 0.24 | | | | 0.00 | | | | |
| 57.50 | 57.80 | 0.20 | 66.67 | 57.80 | 0.25 | | | | 0.00 | | | | |
| 57.80 | 59.10 | 1.50 | 115.38 | 59.10 | 0.19 | | | | 0.00 | | | | |
| 59.10 | 60.10 | 1.00 | 100.00 | 60.10 | 0.18 | | | | 0.00 | | | | |
| 60.10 | 61.70 | 1.70 | 106.25 | 61.70 | 0.27 | | | | 0.00 | | | | |
| 61.70 | 62.90 | 1.50 | 125.00 | 62.90 | 0.25 | | | | 0.00 | | | | |
| 62.90 | 63.60 | 0.80 | 114.29 | 63.60 | 0.54 | | | | 0.00 | | | | |
| 63.60 | 65.00 | 1.40 | 100.00 | 65.00 | 0.00 | | | | 0.00 | | | | |
| 65.00 | 67.40 | 2.40 | 100.00 | 67.40 | 0.00 | | | | 0.00 | | | | |
| 67.40 | 68.40 | 1.00 | 100.00 | 68.40 | 0.00 | | | | 0.00 | | | | |
| 68.40 | 69.60 | 0.50 | 41.67 | 69.60 | 0.00 | | | | 0.00 | | | | |
| 69.60 | 70.80 | 1.15 | 95.83 | 70.80 | 0.00 | | | | 0.00 | | | | |
| 70.80 | 70.90 | 0.10 | 100.00 | 70.90 | 0.00 | | | | 0.00 | | | | |
| 70.90 | 71.60 | 1.10 | 157.14 | 71.60 | 0.05 | | | | 0.00 | | | | |
| 71.60 | 72.80 | 1.20 | 100.00 | 72.80 | 0.09 | | | | 0.00 | | | | |
| 72.80 | 73.70 | 0.90 | 100.00 | 73.70 | 0.07 | | | | 0.00 | | | | |
| 73.70 | 76.80 | 3.10 | 100.00 | 76.80 | 0.04 | | | | 0.00 | | | | |
| 76.80 | 79.90 | 3.10 | 100.00 | 79.90 | 0.19 | | | | 0.00 | | | | |
| 79.90 | 82.70 | 3.10 | 110.71 | 82.70 | 0.00 | | | | 0.00 | | | | |
| 82.70 | 84.60 | 2.10 | 110.53 | 84.60 | 0.11 | | | | 0.00 | | | | |
| 84.60 | 86.70 | 1.30 | 61.90 | 86.70 | 0.01 | | | | 0.00 | | | | |
| 86.70 | 88.20 | 1.50 | 100.00 | 88.20 | 0.05 | | | | 0.00 | | | | |
| 88.20 | 89.30 | 1.20 | 109.09 | 89.30 | 0.09 | | | | 0.00 | | | | |
| 89.30 | 90.90 | 1.70 | 106.25 | 90.90 | 0.17 | | | | 0.00 | | | | |
| 90.90 | 92.00 | 1.30 | 118.18 | 92.00 | 0.11 | | | | 0.00 | | | | |
| 92.00 | 93.80 | 1.80 | 100.00 | 93.80 | 0.08 | | | | 0.00 | | | | |
| 93.80 | 94.60 | 0.90 | 112.50 | 94.60 | 0.13 | | | | 0.00 | | | | |
| 94.60 | 95.40 | 0.95 | 118.75 | 95.40 | 0.15 | | | | 0.00 | | | | |
| 95.40 | 96.80 | 1.50 | 107.14 | 96.80 | 0.14 | | | | 0.00 | | | | |
| 96.80 | 99.90 | 3.30 | 106.45 | 99.90 | 0.14 | | | | 0.00 | | | | |
| 99.90 | 103.00 | 3.40 | 109.68 | 103.00 | 0.17 | | | | 0.00 | | | | |
| 103.00 | 105.10 | 2.10 | 100.00 | 105.10 | 0.14 | | | | 0.00 | | | | |
| 105.10 | 107.00 | 2.00 | 105.26 | 107.00 | 0.12 | | | | 0.00 | 106.00 | 107.00 | 40475 | |
| 107.00 | 108.10 | 1.10 | 100.00 | 108.10 | 0.07 | | | | 0.00 | | | | |
| 108.10 | 110.00 | 2.00 | 105.26 | 110.00 | 0.00 | | | | 0.00 | | | | |
| 110.00 | 110.70 | 0.70 | 100.00 | 110.70 | 0.12 | | | | 0.00 | | | | |
| 110.70 | 111.90 | 1.10 | 91.67 | 111.90 | 0.02 | | | | 0.00 | | | | |
| 111.90 | 115.00 | 3.20 | 103.23 | 115.00 | 0.02 | | | | 0.00 | | | | |
| 115.00 | 118.10 | 3.10 | 100.00 | 118.10 | 0.04 | | | | 0.00 | | | | |
| 118.10 | 120.60 | 2.90 | 116.00 | 120.60 | 0.05 | | | | 0.00 | | | | |

**CORE PROCESSING RESULTS** | **DRILL HOLE NUMBER** sr3

| CORE RECOVERY | | | | mag sus SI units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| 120.60 | 122.00 | 1.20 | 85.71 | 122.00 | 0.08 | | | | 0.00 | 121.00 | 121.40 | 40476 | |
| 122.00 | 122.90 | 1.10 | 122.22 | 122.90 | 0.11 | | | | 0.00 | | | | |
| 122.90 | 125.00 | 1.80 | 85.71 | 125.00 | 0.14 | | | | 0.00 | | | | |
| 125.00 | 126.50 | 1.50 | 100.00 | 126.50 | 0.38 | | | | 0.00 | 126.20 | 127.85 | 40477 | |
| 126.50 | 128.50 | 2.00 | 100.00 | 128.50 | 0.15 | | | | 0.00 | 127.85 | 130.00 | 40478 | |
| 128.50 | 130.00 | 1.50 | 100.00 | 130.00 | 0.11 | | | | 0.00 | | | | |
| 130.00 | 131.10 | 1.10 | 100.00 | 131.10 | 0.09 | | | | 0.00 | 130.00 | 131.50 | 40479 | |
| 131.10 | 132.00 | 0.90 | 100.00 | 132.00 | 0.11 | | | | 0.00 | 131.50 | 133.00 | 40480 | |
| 132.00 | 133.10 | 1.10 | 100.00 | 133.10 | 0.15 | | | | 0.00 | 133.00 | 134.50 | 40481 | petrology |
| 133.10 | 134.00 | 0.90 | 100.00 | 134.00 | 0.15 | | | | 0.00 | | | | |
| 134.00 | 134.60 | 0.60 | 100.00 | 134.60 | 0.27 | | | | 0.00 | 134.50 | 136.00 | 40482 | |
| 134.60 | 135.80 | 1.50 | 125.00 | 135.80 | 0.02 | | | | 0.00 | | | | |
| 135.80 | 137.50 | 1.80 | 105.88 | 137.50 | 0.03 | | | | 0.00 | | | | |
| 137.50 | 139.40 | 1.90 | 100.00 | 139.40 | 0.07 | | | | 0.00 | | | | |
| 139.40 | 141.10 | 0.90 | 52.94 | 141.10 | 0.03 | | | | 0.00 | | | | |
| 141.10 | 142.60 | 1.60 | 106.67 | 142.60 | 0.17 | | | | 0.00 | | | | |
| 142.60 | 143.80 | 1.30 | 108.33 | 143.80 | 0.14 | | | | 0.00 | | | | |
| 143.80 | 145.40 | 1.70 | 106.25 | 145.40 | 0.10 | | | | 0.00 | | | | |
| 145.40 | 147.10 | 0.80 | 47.06 | 147.10 | 0.14 | | | | 0.00 | | | | |
| 147.10 | 148.50 | 1.40 | 100.00 | 148.50 | 0.22 | | | | 0.00 | | | | |
| 148.50 | 149.90 | 1.50 | 107.14 | 149.90 | 0.29 | | | | 0.00 | | | | |
| 149.90 | 150.70 | 0.90 | 112.50 | 150.70 | 0.19 | | | | 0.00 | | | | |
| 150.70 | 152.00 | 1.30 | 100.00 | 152.00 | 0.12 | | | | 0.00 | | | | |
| 152.00 | 153.80 | 1.80 | 100.00 | 153.80 | 0.16 | | | | 0.00 | | | | |
| 153.80 | 156.00 | 2.80 | 127.27 | 156.00 | 0.12 | | | | 0.00 | | | | |
| 156.00 | 157.00 | 1.00 | 100.00 | 157.00 | 0.17 | | | | 0.00 | | | | |
| 157.00 | 158.60 | 1.60 | 100.00 | 158.60 | 0.08 | | | | 0.00 | | | | |
| 158.60 | 159.70 | 1.10 | 100.00 | 159.70 | 0.14 | | | | 0.00 | | | | |
| 159.70 | 161.00 | 1.60 | 123.08 | 161.00 | 0.26 | | | | 0.00 | | | | |
| 161.00 | 161.90 | 0.90 | 100.00 | 161.90 | 0.17 | | | | 0.00 | | | | |
| 161.90 | 163.80 | 2.00 | 105.26 | 163.80 | 0.18 | | | | 0.00 | | | | |
| 163.80 | 165.00 | 1.40 | 116.67 | 165.00 | 0.16 | | | | 0.00 | | | | |
| 165.00 | 167.00 | 2.00 | 100.00 | 167.00 | 0.22 | | | | 0.00 | | | | |
| 167.00 | 167.60 | 0.60 | 100.00 | 167.60 | 0.22 | | | | 0.00 | | | | |
| 167.60 | 169.30 | 1.80 | 105.88 | 169.30 | 0.25 | | | | 0.00 | | | | |
| 169.30 | 170.90 | 1.60 | 100.00 | 170.90 | 0.10 | | | | 0.00 | | | | |
| 170.90 | 172.80 | 2.10 | 110.53 | 172.80 | 0.14 | | | | 0.00 | 171.00 | 173.00 | 40483 | |
| 172.80 | 173.70 | 0.90 | 100.00 | 173.70 | 0.35 | | | | 0.00 | 173.00 | 175.00 | 40484 | |
| 173.70 | 174.00 | 0.30 | 100.00 | 174.00 | 0.17 | | | | 0.00 | | | | |
| 174.00 | 175.60 | 1.60 | 100.00 | 175.60 | 0.14 | | | | 0.00 | | | | |

154134

**CORE PROCESSING RESULTS** | **DRILL HOLE NUMBER** sr3

| CORE RECOVERY | | | | Magnetic Susceptibility S.I Units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| 175.60 | 177.30 | 1.90 | 111.76 | 177.30 | 0.24 | | | | 0.00 | | | | |
| 177.30 | 178.30 | 1.00 | 100.00 | 178.30 | 0.19 | | | | 0.00 | | | | |
| 178.30 | 179.90 | 1.70 | 106.25 | 179.90 | 0.30 | | | | 0.00 | | | | |
| 179.90 | 182.00 | 2.10 | 100.00 | 182.00 | 0.45 | | | | 0.00 | 181.20 | 182.20 | 40485 | |
| 182.00 | 183.20 | 2.20 | 183.33 | 183.20 | 0.24 | | | | 0.00 | 182.20 | 184.30 | 40486 | |
| 183.20 | 185.00 | 1.80 | 100.00 | 185.00 | 0.31 | | | | 0.00 | | | | |
| 185.00 | 187.90 | 2.90 | 100.00 | 187.90 | 0.14 | | | | 0.00 | | | | |
| 187.90 | 189.80 | 2.20 | 115.79 | 189.80 | 0.24 | | | | 0.00 | 188.00 | 190.00 | 40487 | |
| 189.80 | 192.00 | 2.20 | 100.00 | 192.00 | 0.09 | | | | 0.00 | | | | |
| 192.00 | 193.80 | 1.80 | 100.00 | 193.80 | 0.06 | | | | 0.00 | | | | |
| 193.80 | 195.80 | 2.00 | 100.00 | 195.80 | 0.02 | | | | 0.00 | | | | |
| 195.80 | 197.20 | 1.50 | 107.14 | 197.20 | 0.12 | | | | 0.00 | | | | |
| 197.20 | 198.20 | 1.00 | 100.00 | 198.20 | 0.17 | | | | 0.00 | | | | |
| 198.20 | 200.00 | 1.80 | 100.00 | 200.00 | 0.12 | | | | 0.00 | | | | |
| 200.00 | 202.20 | 2.20 | 100.00 | 202.20 | 0.15 | | | | 0.00 | | | | |
| 202.20 | 205.20 | 3.00 | 100.00 | 205.20 | 0.10 | | | | 0.00 | | | | |
| 205.20 | 207.00 | 2.00 | 111.11 | 207.00 | 0.19 | | | | 0.00 | | | | |
| 207.00 | 209.00 | 2.00 | 100.00 | 209.00 | 0.09 | | | | 0.00 | | | | |
| 209.00 | 210.90 | 1.90 | 100.00 | 210.90 | 0.09 | | | | 0.00 | 210.00 | 212.00 | 40488 | |
| 210.90 | 213.70 | 2.80 | 100.00 | 213.70 | 0.09 | | | | 0.00 | 212.00 | 214.00 | 40489 | |
| 213.70 | 215.30 | 1.80 | 112.50 | 215.30 | 0.04 | | | | 0.00 | | | | |
| 215.30 | 217.50 | 2.20 | 100.00 | 217.50 | 0.05 | | | | 0.00 | | | | |
| 217.50 | 220.60 | 3.10 | 100.00 | 220.60 | 0.05 | | | | 0.00 | | | | |
| 220.60 | 223.70 | 3.10 | 100.00 | 223.70 | 0.00 | | | | 0.00 | | | | |
| 223.70 | 226.80 | 3.10 | 100.00 | 226.80 | 0.07 | | | | 0.00 | | | | |
| 226.80 | 229.90 | 3.10 | 100.00 | 229.90 | 0.05 | | | | 0.00 | | | | |
| 229.90 | 233.00 | 3.10 | 100.00 | 233.00 | 0.40 | | | | 0.00 | | | | |
| 233.00 | 236.00 | 3.00 | 100.00 | 236.00 | 0.61 | | | | 0.00 | 235.75 | 237.25 | 40490 | |
| 236.00 | 239.00 | 3.00 | 100.00 | 239.00 | 0.00 | | | | 0.00 | | | | |
| 239.00 | 242.00 | 3.00 | 100.00 | 242.00 | 0.05 | | | | 0.00 | | | | |
| 242.00 | 245.00 | 3.00 | 100.00 | 245.00 | 0.05 | | | | 0.00 | | | | |
| 245.00 | 248.00 | 3.00 | 100.00 | 248.00 | 0.00 | | | | 0.00 | | | | |
| 248.00 | 250.50 | 2.50 | 100.00 | 250.50 | 0.00 | | | | 0.00 | | | | |
| 250.50 | 253.60 | 3.10 | 100.00 | 253.60 | 0.03 | | | | 0.00 | | | | |
| 253.60 | 256.60 | 3.00 | 100.00 | 256.60 | 0.02 | | | | 0.00 | | | | |
| 256.60 | 258.10 | 1.50 | 100.00 | 258.10 | 0.02 | | | | 0.00 | | | | |
| 258.10 | 260.00 | 2.00 | 105.26 | 260.00 | 0.02 | | | | 0.00 | | | | |
| 260.00 | 262.20 | 2.20 | 100.00 | 262.20 | 0.03 | | | | 0.00 | | | | |
| 262.20 | 264.20 | 2.00 | 100.00 | 264.20 | 0.04 | | | | 0.00 | | | | |
| 264.20 | 266.00 | 1.90 | 105.56 | 266.00 | 0.02 | | | | 0.00 | | | | |

23413

**CORE PROCESSING RESULTS**

**DRILL HOLE NUMBER** sr3

| CORE RECOVERY | | | | mag sus S.I units | | S.C | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| 266.00 | 269.00 | 3.00 | 100.00 | 269.00 | 0.04 | | | | 0.00 | | | | |
| 269.00 | 272.00 | 3.00 | 100.00 | 272.00 | 0.03 | | | | 0.00 | | | | |
| 272.00 | 274.80 | 2.80 | 100.00 | 274.80 | 0.05 | | | | 0.00 | | | | |
| 274.80 | 275.80 | 1.00 | 100.00 | 275.80 | 0.00 | | | | 0.00 | | | | |
| 275.80 | 278.00 | 2.20 | 100.00 | 278.00 | 0.04 | | | | 0.00 | 276.60 | 278.00 | 40491 | |
| 278.00 | 281.00 | 3.00 | 100.00 | 281.00 | 0.14 | | | | 0.00 | 278.00 | 279.40 | 40492 | |
| 281.00 | 283.80 | 2.80 | 100.00 | 283.80 | 0.03 | | | | 0.00 | 279.40 | 280.80 | 40493 | |
| 283.80 | 286.80 | 3.00 | 100.00 | 286.80 | 0.12 | | | | 0.00 | | | | |
| 286.80 | 289.70 | 2.90 | 100.00 | 289.70 | 0.02 | | | | 0.00 | | | | |
| 289.70 | 292.80 | 3.00 | 96.77 | 292.80 | 0.07 | | | | 0.00 | | | | |
| 292.80 | 295.90 | 3.20 | 103.23 | 295.90 | 0.03 | | | | 0.00 | | | | |
| 295.90 | 298.50 | 2.50 | 96.15 | 298.50 | 0.13 | | | | 0.00 | | | | |
| 298.50 | 300.70 | 2.20 | 100.00 | 300.70 | 0.32 | | | | 0.00 | 296.80 | 299.00 | 40494 | |
| 300.70 | 303.20 | 3.00 | 120.00 | 303.20 | 0.15 | | | | 0.00 | 299.00 | 301.00 | 40495 | |
| 303.20 | 305.00 | 2.00 | 111.11 | 305.00 | 0.21 | | | | 0.00 | 301.00 | 302.00 | 40496 | |
| 305.00 | 307.00 | 2.00 | 100.00 | 307.00 | 0.27 | | | | 0.00 | 302.00 | 304.00 | 40497 | |
| 307.00 | 310.10 | 3.10 | 100.00 | 310.10 | 0.24 | | | | 0.00 | 304.00 | 305.50 | 40498 | |
| 310.10 | 313.00 | 3.00 | 103.45 | 313.00 | 0.19 | | | | 0.00 | 305.50 | 307.00 | 40499 | |
| 313.00 | 316.00 | 3.00 | 100.00 | 316.00 | 0.09 | | | | 0.00 | 307.00 | 307.75 | 40500 | |
| 316.00 | 317.20 | 1.20 | 100.00 | 317.20 | 0.08 | | | | 0.00 | 307.75 | 309.00 | 40577 | |
| 317.20 | 320.00 | 3.00 | 107.14 | 320.00 | 0.12 | | | | 0.00 | 309.00 | 311.00 | 40578 | |
| 320.00 | 323.00 | 3.00 | 100.00 | 323.00 | 0.12 | | | | 0.00 | 311.00 | 312.50 | 40579 | |
| 323.00 | 324.60 | 1.60 | 100.00 | 324.60 | 0.14 | | | | 0.00 | 312.50 | 314.00 | 40580 | |
| 324.60 | 326.00 | 1.60 | 114.29 | 326.00 | 0.19 | | | | 0.00 | 314.00 | 316.00 | 40581 | |
| 326.00 | 328.60 | 2.60 | 100.00 | 328.60 | 0.10 | | | | 0.00 | 316.00 | 318.00 | 40582 | |
| 328.60 | 331.70 | 3.10 | 100.00 | 331.70 | 0.14 | | | | 0.00 | | | | |
| 331.70 | 334.60 | 3.00 | 103.45 | 334.60 | 0.09 | | | | 0.00 | | | | |
| 334.60 | 336.20 | 1.80 | 112.50 | 336.20 | 0.19 | | | | 0.00 | | | | |
| 336.20 | 338.00 | 1.90 | 105.56 | 338.00 | 0.17 | | | | 0.00 | | | | |
| 338.00 | 339.60 | 1.60 | 100.00 | 339.60 | 0.18 | | | | 0.00 | | | | |
| 339.60 | 342.70 | 3.00 | 96.77 | 342.70 | 0.34 | | | | 0.00 | 338.75 | 339.75 | 40895 | |
| 342.70 | 345.80 | 3.00 | 96.77 | 345.80 | 0.29 | | | | 0.00 | 339.75 | 343.00 | 40583 | |
| 345.80 | 348.90 | 3.00 | 96.77 | 348.90 | 0.13 | | | | 0.00 | 343.00 | 346.00 | 40584 | |
| 348.90 | 351.90 | 3.00 | 100.00 | 351.90 | 0.03 | | | | 0.00 | 346.00 | 348.00 | 40585 | |
| 351.90 | 355.00 | 3.00 | 96.77 | 355.00 | 0.17 | | | | 0.00 | 348.00 | 350.00 | 40586 | |
| 355.00 | 358.00 | 3.00 | 100.00 | 358.00 | 0.12 | | | | 0.00 | 350.00 | 353.00 | 40587 | |
| 358.00 | 361.10 | 3.00 | 96.77 | 361.10 | 0.26 | | | | 0.00 | 353.00 | 356.00 | 40588 | |
| 361.10 | 364.10 | 3.00 | 100.00 | 364.10 | 0.23 | | | | 0.00 | 356.00 | 359.00 | 40589 | |
| 364.10 | 367.20 | 3.00 | 96.77 | 367.20 | 0.07 | | | | 0.00 | 359.00 | 362.00 | 40590 | |
| 367.20 | 370.20 | 3.00 | 100.00 | 370.20 | 0.10 | | | | 0.00 | 362.00 | 365.00 | 40591 | |

CORE PROCESSING RESULTS

DRILL HOLE NUMBER sr3

| CORE RECOVERY | | | | mag sus S.I units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| 370.20 | 373.30 | 3.10 | 100.00 | 373.30 | 0.21 | | | | 0.00 | 365.00 | 368.00 | 40592 | |
| 373.30 | 376.30 | 3.10 | 103.33 | 376.30 | 0.17 | | | | 0.00 | 368.00 | 371.00 | 40593 | |
| 376.30 | 379.40 | 3.10 | 100.00 | 379.40 | 0.02 | | | | 0.00 | 371.00 | 374.00 | 40594 | |
| 379.40 | 382.40 | 3.00 | 100.00 | 382.40 | 0.14 | | | | 0.00 | 374.00 | 377.00 | 40595 | |
| 382.40 | 385.50 | 3.00 | 96.77 | 385.50 | 0.05 | | | | 0.00 | 377.00 | 380.00 | 40596 | |
| 385.50 | 388.50 | 3.00 | 100.00 | 388.50 | 0.07 | | | | 0.00 | 380.00 | 383.00 | 40597 | |
| 388.50 | 391.60 | 3.10 | 100.00 | 391.60 | 0.08 | | | | 0.00 | 383.00 | 386.00 | 40598 | |
| 391.60 | 394.60 | 3.00 | 100.00 | 394.60 | 0.13 | | | | 0.00 | 386.00 | 389.00 | 40599 | |
| 394.60 | 397.70 | 3.00 | 96.77 | 397.70 | 0.06 | | | | 0.00 | 389.00 | 392.00 | 40600 | |
| 397.70 | 400.70 | 3.00 | 100.00 | 400.70 | 0.02 | | | | 0.00 | 392.00 | 395.00 | 40866 | |
| 400.70 | 403.80 | 3.20 | 103.23 | 403.80 | 0.05 | | | | 0.00 | 395.00 | 398.00 | 40867 | |
| 403.80 | 406.80 | 3.00 | 100.00 | 406.80 | 0.09 | | | | 0.00 | 398.00 | 401.00 | 40868 | |
| 406.80 | 409.90 | 3.10 | 100.00 | 409.90 | 0.01 | | | | 0.00 | 401.00 | 404.00 | 40869 | |
| 409.90 | 412.80 | 2.90 | 100.00 | 412.80 | 0.06 | | | | 0.00 | 404.00 | 407.00 | 40870 | |
| 412.80 | 415.90 | 3.10 | 100.00 | 415.90 | 0.07 | | | | 0.00 | 407.00 | 410.00 | 40871 | |
| 415.90 | 419.00 | 3.10 | 100.00 | 419.00 | 0.04 | | | | 0.00 | 410.00 | 413.00 | 40872 | |
| 419.00 | 422.00 | 3.00 | 100.00 | 422.00 | 0.06 | | | | 0.00 | 413.00 | 416.00 | 40873 | |
| 422.00 | 425.00 | 3.00 | 100.00 | 425.00 | 0.05 | | | | 0.00 | 416.00 | 419.00 | 40874 | |
| 425.00 | 428.00 | 3.00 | 100.00 | 428.00 | 0.10 | | | | 0.00 | 419.00 | 422.00 | 40875 | |
| 428.00 | 431.00 | 3.00 | 100.00 | 431.00 | 0.76 | | | | 0.00 | 422.00 | 425.00 | 40876 | |
| 431.00 | 431.90 | 0.90 | 100.00 | 431.90 | 0.00 | | | | 0.00 | 425.00 | 428.00 | 40877 | |
| 431.90 | 432.90 | 1.00 | 100.00 | 432.90 | 0.04 | | | | 0.00 | 428.00 | 430.00 | 40878 | |
| 432.90 | 436.00 | 3.10 | 100.00 | 436.00 | 0.03 | | | | 0.00 | 430.00 | 432.00 | 40879 | |
| 436.00 | 438.90 | 2.80 | 96.55 | 438.90 | 0.02 | | | | 0.00 | 432.00 | 434.00 | 40880 | |
| 438.90 | 442.00 | 3.00 | 96.77 | 442.00 | 0.08 | | | | 0.00 | 434.00 | 437.00 | 40881 | |
| 442.00 | 445.00 | 3.00 | 100.00 | 445.00 | 0.14 | | | | 0.00 | 437.00 | 440.00 | 40882 | |
| 445.00 | 448.10 | 3.20 | 103.23 | 448.10 | 0.04 | | | | 0.00 | 440.00 | 443.00 | 40883 | |
| 448.10 | 449.90 | 1.40 | 77.78 | 449.90 | 0.01 | | | | 0.00 | 443.00 | 446.00 | 40884 | |
| 449.90 | 451.70 | 1.80 | 100.00 | 451.70 | 0.40 | | | | 0.00 | 446.00 | 449.00 | 40885 | |
| 451.70 | 453.40 | 1.60 | 94.12 | 453.40 | 0.06 | | | | 0.00 | 449.00 | 452.00 | 40886 | |
| 453.40 | 455.00 | 1.60 | 100.00 | 455.00 | 0.07 | | | | 0.00 | 452.00 | 455.00 | 40887 | |
| 455.00 | 458.00 | 3.00 | 100.00 | 458.00 | 0.04 | | | | 0.00 | | | | |
| 458.00 | 461.00 | 3.00 | 100.00 | 461.00 | 0.04 | | | | 0.00 | 455.00 | 458.00 | 40888 | |
| 461.00 | 464.00 | 3.00 | 100.00 | 464.00 | 0.05 | | | | 0.00 | 458.00 | 461.00 | 40889 | |
| 464.00 | 467.00 | 3.00 | 100.00 | 467.00 | 0.04 | | | | 0.00 | 461.00 | 464.00 | 40890 | |
| 467.00 | 468.80 | 1.70 | 94.44 | 468.80 | 0.07 | | | | 0.00 | 464.00 | 467.00 | 40891 | |
| 468.80 | 470.60 | 1.80 | 100.00 | 470.60 | 0.06 | | | | 0.00 | 467.00 | 470.00 | 40892 | |
| 470.60 | 473.00 | 2.40 | 100.00 | 473.00 | 0.09 | | | | 0.00 | 470.00 | 471.00 | 40893 | |
| 473.00 | 474.60 | 1.50 | 93.75 | 474.60 | 0.06 | | | | 0.00 | 471.00 | 474.00 | 40894 | |
| 474.60 | 475.50 | 0.80 | 88.89 | 475.50 | 0.07 | | | | 0.00 | | | | |

AGT 93

CORE PROCESSING RESULTS

DRILL HOLE NUMBER sr3

| CORE RECOVERY | | | | mag sus S.I units | | S.G | | | | SAMPLING INTERVALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | REC | %REC | DEPTH | M.SUS | DEPTH | WEIGHT | VOL | S.G | FROM | TO | TICKET # | COMMENTS |
| 475.50 | 477.90 | 2.50 | 104.17 | 477.90 | 0.08 | | | | 0.00 | | | | |
| 477.90 | 481.00 | 3.10 | 100.00 | 481.00 | 0.06 | | | | 0.00 | | | | |
| 481.00 | 484.10 | 3.20 | 103.23 | 484.10 | 0.06 | | | | 0.00 | | | | |
| 484.10 | 485.70 | 1.70 | 106.25 | 485.70 | 0.08 | | | | 0.00 | | | | |
| 485.70 | 488.00 | 2.20 | 95.65 | 488.00 | 0.10 | | | | 0.00 | | | | |
| 488.00 | 491.00 | 3.00 | 100.00 | 491.00 | 0.02 | | | | 0.00 | | | | |
| 491.00 | 494.00 | 3.00 | 100.00 | 494.00 | 0.02 | | | | 0.00 | | | | |
| 494.00 | 497.00 | 3.00 | 100.00 | 497.00 | 0.03 | | | | 0.00 | | | | |
| 497.00 | 500.00 | 3.00 | 100.00 | 500.00 | 0.03 | | | | 0.00 | | | | |
| 500.00 | 503.00 | 3.00 | 100.00 | 503.00 | 0.05 | | | | 0.00 | | | | |
| 503.00 | 506.00 | 3.00 | 100.00 | 506.00 | 0.03 | | | | 0.00 | | | | |
| 506.00 | 509.00 | 3.00 | 100.00 | 509.00 | 0.04 | | | | 0.00 | | | | |
| 509.00 | 512.00 | 3.00 | 100.00 | 512.00 | 0.03 | | | | 0.00 | | | | |

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# Appendix 5

## Logs and Geochemical Sample Results for Drill Holes STP96, 98, 100, 101, 105 & MM1a

Project : STERLING RIVER
Logged by: J.G. PURVIS
Date : 14TH MARCH 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. STP 96



| m / ft | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding c = cleavage f = fault Angles to LCA | GRAPHIC LOG | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 10' | ox (2) - patchy | strongly cleaved, c:26° mod broken | | ALTERED, DEFORMED, AND PYRITIC, UNIDENTIFIED FELSIC VOLCANIC. | Av 2% fine dissem py, locally 5%, often conc in bands // cleavage. (Bands 1-100mm) |
| 20' | scattered vuggy qtz veins to 100mm (± Fe/Mn ox) | | | | |
| 30' | | c: 23° | py | | Common limonite after py |
| 40' | | | py | | 3-5% py |
| 50' | ser-ble-sil-py (3) | | py | Brown to pale grey. | 5-10% py in sil band |
| 60' | | c: 12° | py | Fi-med gr, strongly foliated, banded granular sericite-qtz-feld rock. After feld-qtz phyric volcanic, possibly tuffaceous. | |
| 70' | | | | | |
| 80' | | c: 28° | py | Fractured qtz grains < 1mm, stretched + flattened feld xyls < 2mm (av < 1mm). | 3-4% py |
| 90' | | | | | |
| 100' | | | qtz veins | | |
| 110' | mainly vein qtz rubble (poor recovery) | | | | |
| 120' | ser (2) chl (1) | | | | 1-2% py |
| 130' | | | | 130' | |
| 140' | ox (3) ser (2-3) sil (1) chl (1) | c: 30° strongly cleaved, mod broken | | DACITE LAVA? Brown, or greenish-grey. Med gr, strongly foliated volcanic, with abundant evenly-distributed feldspars + minor qtz xyls, av 1-2mm, in sericitic (originally glassy) groundmass. | Limonite + MnOx stains + minor box-works on fracts. |
| 150' | | | | | |
| 160' | | c: 25° | | | |
| 170' | ox (2) - patchy ser > sil-chl (2-3) Trace alb. chl often in discrete zones | | | | 1-2% dissem py in unox zones. |
| 180' | | chl | Fine clastic? | | 2-3% py. Malachite stains |
| 190' | | c: 35° | | | Best py assoc with best chl alteration |
| 200' | | | | | |
| 210' | | | | No qtz xyls | |
| 220' | | | | | 30mm qtz-cp vein |
| 230' | 25mm qtz vein // LCA | | | | |
| 240' | ox (1) ser-chl (2) | Mod cleaved c:15° | | Greenish-grey. Appearance of minor leucoxene. | Minor dissem py |
| 250' | | | | | |

Deformed clastic? Ble poss lithics to 30mm

3-5% py

5-10% py in sil band

3-4% py

1-2% py

Limonite + MnOx stains + minor box-works on fracts.

1-2% dissem py in unox zones.

2-3% py. Malachite stains

Best py assoc with best chl alteration

30mm qtz-cp vein

Minor dissem py

No qtz xyls

Greenish-grey. Appearance of minor leucoxene.

25mm qtz vein // LCA

mainly vein qtz rubble (poor recovery)

ser (2) chl (1)

ox (3) ser (2-3) sil (1) chl (1)

OX (2) - patchy ser > sil-chl (2-3) Trace alb. chl often in discrete zones

ox (1) ser-chl (2)

ser-ble-sil-py (3)

ox (2) - patchy scattered vuggy qtz veins to 100mm (± Fe/Mn ox)

strongly cleaved, mod broken c:26°

c: 23°

c: 12°

c: 28°

c: 30°

strongly cleaved, mod broken

c: 25°

c: 35°

Mod cleaved c:15°

qtz veins

Fine clastic?

ALTERED, DEFORMED, AND PYRITIC, UNIDENTIFIED FELSIC VOLCANIC.

Brown to pale grey. Fi-med gr, strongly foliated, banded granular sericite-qtz-feld rock. After feld-qtz phyric volcanic, possibly tuffaceous.

Fractured qtz grains < 1mm, stretched + flattened feld xyls < 2mm (av < 1mm).

DACITE LAVA?

Brown, or greenish-grey. Med gr, strongly foliated volcanic, with abundant evenly-distributed feldspars + minor qtz xyls, av 1-2mm, in sericitic (originally glassy) groundmass.

Av 2% fine dissem py, locally 5%, often conc in bands // cleavage. (Bands 1-100mm)

Common limonite after py

3-5% py

5-10% py in sil band

3-4% py

1-2% py

Limonite + MnOx stains + minor box-works on fracts.

1-2% dissem py in unox zones.

2-3% py. Malachite stains

Best py assoc with best chl alteration

30mm qtz-cp vein

Minor dissem py

No qtz xyls

Greenish-grey. Appearance of minor leucoxene.

Project : STERLING RIVER
Logged by: J.G. ARVIS
Date : 14TH MARCH 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No. STP 96**



| ft | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding c = cleavage f = fault Angles to LCA | GRAPHIC LOG | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 250 | Limit of ox | Mod cleaved C: 5° | | | Minor dissem py, locally 1% |
| 260' | ser > chl (2-3) irreg carb veining | | | | |
| 270' | qtz-carb>chl veins to 400mm off sense to cleavage. | C: 35° | 400mm qtz-carb vein ± trace sp | | ← sp in 5mm qtz-carb vein |
| 280' | | | | | |
| 290' | alteration decreasing ↓ | | | Small qtz phenos 0.5-1mm. | |
| 300' | | C: 20° | | | |
| 310' | ser>chl>sil (2-3) | strongly cleaved | | | |
| 320' | | | | | 1% py (dissem) |
| 330' | chl>ser (2-3) | Less cleaved more massive C: 28° | | | 2% py |
| 340' | ser>chl>sil (2-3) | | | Minor qtz phenos 1-2mm | 2-3% py |
| 350' | small irreg carb-qtz ± alb patches + veins | | | | Minor py |
| 360' | | | | | |
| 370' | ← 1' barren qtz-carb vein, 6" ble selvages | C: 15° | Qtz vein | 376' 392': Petrology Sample 39938: Deformed mafic lava | |
| 380' | chl>ser (2-3) | Intensely cleaved C: 20° | | TUFFACEOUS INTERVAL OR SHEAR ZONE Fi gr, grey-green, intensely foliated 393'6" volcanic. Some felds to 0.5mm. | Trace py |
| 390' | Carb veinlets | | | | |
| 400' | Carb>qtz veinlets chl>ser (2-3) | V strongly cleaved with grainsize-reduced sheared zones 4' of core C: 23° | sheared | DEFORMED DACITE LAVA ? Greenish-grey, strongly foliated, feld-phyric volc. Felds, generally deformed to 2mm. Rare qtz to 0.5mm. V sericitic after glass. | Minor py |
| 410' | ser>chl (2) | | | | |
| 420' | | | py | | 2% dissem py |
| 430' | carb veinlets | | | | 1% py |
| 440' | ← 70mm qtz vein | C: 10° | | | |
| 450' | | | py | 449'6" | 2% dissem py |
| 460' | Ble-sil-ser-py (3-4) Minor qtz-carb veining | V strongly cleaved shears above 460' | sheared py | FOLIATED RHYOLITE LAVA Creamy, hard, highly foliated, v strongly altered Abundant qtz phenos to 2mm, less feldspars to 2mm - gen deformed. | ← dissem 2-3% py in py 3-5% py 2-3% py |
| 470' | | C: 27° | py | | ← Minor cp |
| 480' | | | cp | | ← large stringers of cp ← minor dissem cp |
| 490' | | 1' core | py | | |
| 500' | | V strong shearing on contact: 22° | | 498' | 10% dissem py Minor py |

CS41141

Project : STERLING RIVER
Logged by: J. G. PURVIS
Date : 14TH MARCH 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. STP 96



| ft | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 500' | ser (2) Minor ble | Mod cleaved B/c: 26° | | FARRELL SLATES Sandstone, siltstone, shale Mainly fine carb-rich volcaniclastic sst (qtz-felds-lithics), lesser dk grey sericitic shale laminae | Minor dissem py |
| 510' | | much core loss B/c: 20° | | | |
| 520' | co (2-3, in sst) ser (1, in shale) | | | | |
| 530' | | | | | 1% py (blebs // cleav) |
| 540' | sil (2) | | 537'3": 3" of semi-massive py>cp in fault | Mainly black shale | 5% py, minor sp, 3" 50% py>cp band |
| 550' | | c: 25° | | | 1-2% py, minor sp small stringers + dissem |
| 560' | | 3" core | | | |
| 570' | ser-co (1-2) | V strongly cleaved/ some kinks. c: 25° | Kinks Kinks | Sericitic sst/siltst with abund shale laminae + deformed qtz xyls to 1mm. | Minor to 1% dissem py |
| 574' | | | | Limit of logging (Hole extends to 785' in Farrell Slates) | |
| 580' | | | | | |
| 590' | | | | | |
| 600' | | | | | |

NOTE:

CORE BADLY JUMBLED IN PLACES, WITH CORE BLOCKS OUT OF ORDER.

AX CORE. MAJOR ZONES OF CORE LOSS (eg: 8' RECOVERED 80'-125')

# PASMINCO EXPLORATION
# DIAMOND DRILL CORE ASSAY DATA

754143

HOLE No. STP 96

PROJECT: STERLING RIVER

Page 4 of

| SAMPLE | | | | | | ASSAYS (ppm unless specified) | | | | | | | | | | | | | | | | | | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number | Type | From ft | To ft | Interval ft | Recovered ft | Cu | Pb | Zn | Ag | Au | As | Ba | Sn | W | Rb | Sr | Zr | V | Nb | Y | Ce | $Al_2O_3$ / $SiO_2$ | $TiO_2$ / $Fe_2O_3$ | MnO / CaO | $K_2O$ / MgO | $P_2O_5$ / $SO_3$ | $Na_2O$ / LOI | |
| 38996 | SPLIT AX | 0 | 30' | 30' | 14'6" | 159 | 35 | 187 | <1 | ·019 | 34 | 1238 | 6 | <5 | 178 | 10 | 263 | 74 | 10 | 40 | | 13.9 | 0.37 | 0.27 | 4.18 | ·158 | 0.18 | ALTERED & DEFORMED |
| | | | | | | | | | | | | | | | | | | | | | | 69.1 | 5.52 | 0.12 | 1.49 | 2.24 | 3.82 | |
| 97 | " " | 30' | 60' | 30' | 14' | 40 | 16 | 95 | <1 | ·020 | 14 | 841 | 8 | 10 | 186 | <5 | 280 | 74 | 13 | 38 | | 13.4 | 0.33 | 0.05 | 4.62 | ·073 | 0.09 | RHYOLITIC TO DACITIC |
| | | | | | | | | | | | | | | | | | | | | | | 72.0 | 3.94 | 0.03 | 0.97 | 1.96 | 3.03 | |
| 98 | " " | 60' | 90' | 30' | 9'3" | 43 | 32 | 106 | <1 | ·031 | 26 | 1268 | 5 | 22 | 163 | 7 | 171 | 35 | 11 | 20 | | 13.2 | 0.24 | 0.05 | 4.37 | ·065 | 0.08 | VOLCANICS |
| | | | | | | | | | | | | | | | | | | | | | | 72.4 | 4.31 | 0.07 | 0.74 | 1.99 | 3.03 | |
| 99 | " " | 90' | 120' | 30' | 4'3" | 37 | 33 | 127 | <1 | ·021 | 33 | 1507 | 10 | 13 | 129 | 15 | 132 | 8 | 8 | 15 | | 10.3 | 0.15 | 0.07 | 4.17 | ·052 | 0.07 | (MURCHISON VOLCANICS |
| | | | | | | | | | | | | | | | | | | | | | | 77.0 | 4.45 | 0.05 | 0.73 | 0.45 | 2.21 | |
| 39000 | " " | 120' | 150' | 30' | 10'3" | 60 | 22 | 220 | <1 | ·016 | 27 | 2500 | 8 | 9 | 168 | 32 | 203 | 57 | 11 | 25 | | 13.2 | 0.28 | 0.18 | 5.86 | ·087 | 0.18 | |
| | | | | | | | | | | | | | | | | | | | | | | 68.9 | 5.59 | 0.18 | 1.55 | 0.14 | 3.35 | |
| 39926 | " " | 150' | 180' | 30' | 12'9" | 91 | 38 | 291 | <1 | ·019 | 150 | 2047 | 5 | 16 | 175 | 26 | 205 | 121 | 9 | 32 | | 14.8 | 0.51 | 0.22 | 5.38 | ·136 | 0.40 | |
| | | | | | | | | | | | | | | | | | | | | | | 64.4 | 6.94 | 0.26 | 1.65 | 0.75 | 4.22 | |
| 27 | " " | 180' | 210' | 30' | 15'6" | 143 | 27 | 156 | <1 | ·022 | 38 | 2057 | 7 | 9 | 194 | 23 | 288 | 33 | 11 | 39 | | 14.5 | 0.47 | 0.16 | 5.66 | ·138 | 0.43 | |
| | | | | | | | | | | | | | | | | | | | | | | 69.2 | 4.35 | 0.18 | 1.14 | 0.75 | 2.72 | |
| 28 | " " | 210' | 240' | 30' | 11'3" | 37 | 120 | 200 | <1 | ·022 | 628 | 1758 | 12 | 18 | 196 | 35 | 324 | 28 | 12 | 42 | | 16.0 | 0.55 | 0.16 | 5.60 | ·232 | 1.36 | |
| | | | | | | | | | | | | | | | | | | | | | | 66.9 | 4.25 | 0.32 | 1.19 | 0.63 | 2.51 | |
| 29 | CORE CHIP * | 240' | 270' | 30' | 16'6" | 22 | 57 | 192 | <1 | ·010 | 9 | 1553 | 9 | 9 | 174 | 43 | 335 | 25 | 12 | 50 | | 16.4 | 0.53 | 0.19 | 4.81 | ·215 | 1.92 | |
| | | | | | | | | | | | | | | | | | | | | | | 65.1 | 5.38 | 0.56 | 1.64 | 0.35 | 2.45 | |
| 39930 | " | 270' | 300' | 30' | 19' | 18 | 20 | 130 | <1 | ·011 | 44 | 1319 | 11 | 18 | 181 | 66 | 356 | 36 | 11 | 50 | | 17.6 | 0.60 | 0.23 | 4.47 | ·253 | 2.38 | |
| | | | | | | | | | | | | | | | | | | | | | | 59.9 | 5.92 | 2.37 | 1.87 | 0.32 | 3.65 | |
| 31 | " | 300' | 330' | 30' | 16' | 12 | 47 | 134 | <1 | <·008 | 34 | 963 | 9 | 10 | 175 | 52 | 322 | 26 | 13 | 42 | | 14.8 | 0.45 | 0.21 | 3.96 | ·147 | 1.50 | |
| | | | | | | | | | | | | | | | | | | | | | | 66.7 | 4.51 | 2.27 | 1.46 | 0.25 | 3.61 | |
| 32 | " | 330' | 360' | 30' | 20'3" | 12 | 46 | 198 | <1 | ·015 | 23 | 825 | 9 | 9 | 162 | 28 | 253 | 38 | 13 | 32 | | 12.4 | 0.31 | 0.29 | 3.61 | ·097 | 0.10 | |
| | | | | | | | | | | | | | | | | | | | | | | 69.8 | 5.50 | 1.78 | 1.71 | 0.59 | 3.39 | |
| 33 | " | 360' | 390' | 30' | 16'3" | 17 | 17 | 145 | <1 | <·008 | 27 | 712 | 9 | 13 | 172 | 40 | 250 | 99 | 12 | 32 | | 13.6 | 0.45 | 0.19 | 3.76 | ·077 | 0.32 | |
| | | | | | | | | | | | | | | | | | | | | | | 66.1 | 5.51 | 3.03 | 2.08 | 0.08 | 4.62 | |
| 34 | " | 390' | 420' | 30' | 7' | 8 | 26 | 122 | <1 | ·008 | 16 | 348 | 5 | 11 | 100 | 122 | 144 | 191 | 7 | 30 | | 13.1 | 0.60 | 0.38 | 2.16 | ·148 | 0.84 | |
| | | | | | | | | | | | | | | | | | | | | | | 50.3 | 8.88 | 8.94 | 4.45 | 0.50 | 5.74 | |
| 35 | " | 420' | 450' | 30' | 11'9" | 251 | 45 | 170 | <1 | ·009 | 9 | 422 | 9 | 13 | 126 | 48 | 179 | 75 | 9 | 34 | | 13.6 | 0.47 | 0.34 | 2.85 | ·127 | 0.37 | |
| | | | | | | | | | | | | | | | | | | | | | | 59.0 | 8.20 | 3.22 | 4.44 | 1.48 | 5.84 | |
| 36 | SPLIT AX CORE | 450' | 480' | 30' | 15' | 274 | 92 | 84 | <1 | ·018 | 23 | 615 | 11 | <5 | 165 | 19 | 128 | 15 | 11 | 27 | | 11.5 | 0.19 | 0.09 | 3.72 | ·023 | 0.08 | |
| | | | | | | | | | | | | | | | | | | | | | | 71.4 | 2.92 | 0.79 | 0.94 | 2.72 | 3.57 | |
| 39937 | " | 480' | 498' | 18' | 4' | 1552 | 164 | 228 | 3 | ·056 | 220 | 644 | 11 | 10 | 147 | 14 | 126 | 17 | 11 | 24 | | 11.2 | 0.18 | 0.05 | 3.56 | ·030 | 0.09 | |
| | | | | | | | | | | | | | | | | | | | | | | 72.7 | 5.66 | 0.43 | 0.90 | 1.49 | 3.79 | |

* CORE CHIP: 20% OF CORE SPLIT AT REGULAR INTERVALS (ie: 10% OF TOTAL CORE TAKEN IN SAMPLE)

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Laboratory ANALABS | Analytical-Method | AAS | AAS | FA RATIO | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF |
| Job-No. 111310.60.10785 0279 Date 17·3·95 | Detection-Limit | 2 / 3 | 2 / 1 | ·008 / 0.5 | 10 / 3 | 5 / 5 | 5 / 5 | 5 / 3 | 3 / . | 0.05 / 0.05 | 0.01 / 0.01 | 0.01 / 0.01 | 0.01 / 0.01 | 0.01 / 0.01 | 005 / 0.01 | 0.05 / 0.01 | | | |

PROJECT: STERLING RIVER

# PASMINCO EXPLORATION
# DIAMOND DRILL HOLE SUPPLEMENTARY DATA

PETROLOGY

HOLE No. STP 96



SAMPLE NUMBER: Tullah STP 96 Sterling Valley Mine 39938 392'

SUMMARY DESCRIPTION:

This sample is an intensely foliated strongly hydrothermally altered rock in which little of the original textural detail is preserved. Former plagioclase and mafic phenocrysts were probably originally present, and are now stretched to many times their former length, and all are replaced by sericite and calcite (plagioclase) or chlorite and calcite (mafics). The rock consists of pervasive thin bands of chlorite, calcite, sericite, quartz and very minor albite through what was once a crystalline groundmass in which small albite laths are still discernible in wider packets of groundmass. Large augen of coarsely crystalline calcite are possibly stretched calcite-filled vesicles. Bands of strongly concentrated dark insoluble oxides and other mess attest to strong volume loss during foliation development of this rock. I suggest that this sample was a plagioclase+augite-phyric andesitic or more mafic lava that was strongly hydrothermally altered (chlorite-quartz, then perhaps sericite-calcite...guess) before being strongly recrystallized in a major fault zone.

23414

PROJECT :

# PASMINCO EXPLORATION
# DIAMOND DRILL CORE ASSAY DATA

754145

HOLE No. STP 98

Page | of

| SAMPLE | | | | | | ASSAYS (ppm unless specified) | | | | | | | | | | | | | | | | | | | | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number | Type | From m ft | To m ft | Interval m ft | Recovered m ft | Cu / Pb | Zn / Ag | Au / As | Ba / Sn | W / Rb | Sr / Zr | V / Nb | Y / Cr | $Al_2O_3$ / $SiO_2$ | $TiO_2$ / $Fe_2O_3$ | MnO / CaO | $K_2O$ / MgO | $P_2O_5$ / $SO_3$ | $Na_2O$ / LOI | |
| 38994 | SPLIT BX CORE | 841' | 878' | 37' | 10' | 180 / 45 | 164 / <1 | .019 / 335 | 915 / 11 | 15 / 149 | 54 / 192 | 73 / 9 | 29 | 11.9 / 66.7 | 0.33 / 5.36 | 0.23 / 3.01 | 3.72 / 1.84 | .113 / 2.02 | 0.64 / 3.58 | Altered Murchison Volcanics |

Note:

Core in poor state. Examined below 815':

815–821': No recovery. 821–841': Farrell Slates sandstone.

841–878': Murchison Volcanics – Highly cleaved and altered feldspar > qtz-phyric rhyolitic volcanics – probable lavas, but some zones look sandy. Patches & creamy ble-sil-ser-py alteration (rarely + alb), or dark green chl-co > sil-ser-py (mafic dykes?). Overall: 2% py dissem. Locally 5%. Foliation: 70°/LCA @ 858', 63°/LCA @ 870'.

SAMPLE NUMBER: Tullah STP 98 38995 860' (Murchison Volcanics)

SUMMARY DESCRIPTION:

This sample is a strongly foliated, fractured, veined and altered rock (known as a 'shocker' or nightmare' in the trade) of uncertain protolith. It contains a single quartz phenocryst 1.5mm across, and the remainder of the rock is a complex, messy intergrowth of microcrystalline quartz, sericite and chlorite (that define the foliation), with common calcite as undeformed patches, as well as veins of at least two generations, and minor very fine-grained disseminated pyrite. Despite a careful search, there is no trace of microphenocrystal or groundmass apatite or zircon. I suggest that this difficult sample may have been a strongly hydrothermally-altered (sericite-quartz-chlorite±silica±pyrite) volcaniclastic siltstone or fine sandstone derived from mainly felsic volcanics, but it can't be ruled out that this was a hydrothermally-altered aphyric felsic lava (which are very scarce) before foliation development.

| Laboratory | ANALABS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Job No. | 111310.60.10785 0279 | Date | 17.3.95 | Analytical Method | AAS | AAS | FA / HM40 | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF |
| | | | | Detection Limit | 2 / 3 | 2 / 1 | .008 / 0.5 | 10 / 3 | 5 / 5 | 5 / 5 | 5 / 3 | 3 / | 0.05 / 0.05 | 0.01 / 0.01 | 0.01 / 0.01 | 0.01 / 0.01 | .005 / 0.01 | 0.05 / 0.01 | | |

Project : STERLING RIVER
Logged by: J.G. PURVIS
Date : MARCH 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** STP 100

Page 1 of

754146

| PRT ft | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding c = cleavage f = fault Angles to LCA | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 400 | | | | Logging commences 435' | |
| | | | | FARRELL SLATES | |
| | ser (1-2) | c : 55° | black shale slivers | TUFFACEOUS SILTSTONE Grey. Finely granular rock, composed largely of qtz and sericite (after fine volc glass), with scattered sl abraded volc qtz xyl grains to 1mm. Rare felds to 3mm. Minor small stretched slivers of black shale. | Minor to 1% py, + in co veinlets |
| 450 | Minor co ± qtz veinlets throughout Patchy sil(2) | Strongly Foliated py | shaley | | 3% py in veinlets |
| | | c : 60° | | | 1% dissem + veinlet py |
| 500 | | c : 65° | | | |
| | | c : 85° (sl kinking) | black shale slivers | | |
| | | | | 528' | |
| | sil (2-3) Abund qtz veinlets | Strongly kinked. foliation | | MINERALIZED ZONE IN SILICIFIED BLACK SHALE, WITH CONTORTED FOLIATION 545' | 5-10% py, trace sp. Mainly in qtz veinlets |
| 550 | Abund co (fe type) veinlets. Qtz-co veinlets | Strong foliation kinked + folded. Brittle fault + crush zone | FAULT ZONE Broken badly | BROKEN + CONTORTED BLACK SHALE Finely laminated. 560' | 3-5% py, mainly in veinlets |
| | Co (3), chl (2) ser (1) | c : 80° strongly Foliated | Broken | MURCHISON VOLCANICS | V minor dissem py, trace cp. |
| | ↳ K-feld or alb (1) | Foliation moderate | | UNIDENTIFIED FELSIC VOLCANIC | Minor fine leucoxenised opaques, decreasing with depth ↓ |
| 600 | Abund chl microveinlets on fol | c : 80° | | ← Petrology sample 38982: Andesite/Dacite Lava Grey-green, fi-med gr Massive. Even-grained + uniform. Sparsely qtz-phyric. Occasional visible felds to 1mm. Minor calcite amygdales to 5mm. (above 600' + below 645') Glassy, with snowflake devitrification texture. | |
| | | c : 82° Broken | | | ← 10mm qtz-co-py vein |
| | | c : 70° Abrupt change | | 648' | |
| 650 | | | | | |

Project : STERLING RIVER
Logged by: J.G. PURVIS
Date : MARCH 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** STP 100

Page 2 of

| ft | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding c = cleavage f = fault Angles to LCA | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32 max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 650 | Patchy sil-alb(or kspar) -ble (2-3) or chl-ser (2) co (2) ↓ common co veinlets; dyke: co+chl (2) | Moderately foliated; calcite amygs; C: 73° | Dyke? Same rock as above 648'; Visible feld phenos; qtz veins 1/2 50mm | QUARTZ-PHYRIC VITRIC RHYOLITE Greenish-grey + creamy-pink. Hard. Common partially-corroded qtz phenos, av 1-2mm, in felsic vitric groundmass. Feld phenos visible in places to 2mm + sl stretched by fol ← Petrology sample 38983: Glassy Rhyolite Lava | V minor dissem + veinlet py, trace cp. minor cp stringers + dissem in fol. cp (stringers + dissem) in zones of stronger chl. |
| 700 | sil-ser-ble (3) Patches of co-chl (2-3) qtz veins ± co ± chl or alb ↓ | C: 77° | | 716' EOH | |

PROJECT: STERLING RIVER

# PASMINCO EXPLORATION
# DIAMOND DRILL CORE ASSAY DATA

754148

HOLE No. STP 100

Page 3 of

| SAMPLE Number | Type | From ft | To ft | Interval ft | Recovered m | Cu ppm | Pb ppm | Zn ppm | Ag ppm | Au ppm | As ppm | Ba ppm | Sn ppm | W ppm | Rb ppm | Sr ppm | Zr ppm | V ppm | Nb ppm | Y ppm | Cr ppm | $Al_2O_3$ % | $SiO_2$ % | $TiO_2$ % | $Fe_2O_3$ % | MnO % | CaO % | $K_2O$ % | MgO % | $P_2O_5$ % | $SO_3$ % | $Na_2O$ % | LOI % | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 38984 | CORE CHIP * | 560' | 590' | 30' | | 21 | 15 | 121 | <1 | <.008 | 5 | 889 | 9 | 18 | 173 | 71 | 218 | 69 | 10 | 36 | | 13.5 | 62.8 | 0.41 | 4.57 | 0.21 | 4.95 | 4.17 | 1.32 | .100 | 0.06 | 1.39 | 6.19 | Altered and deformed rhyolitic Murchison Volcanics. |
| 85 | " | 590' | 620' | 30' | | 4 | 12 | 84 | 1 | <.008 | 2 | 943 | 8 | 13 | 159 | 50 | 224 | 80 | 14 | 33 | | 14.1 | 64.5 | 0.43 | 6.10 | 0.13 | 2.93 | 4.07 | 1.69 | .108 | 0.07 | 1.43 | 4.41 | |
| 86 | " | 620' | 650' | 30' | | 52 | 8 | 66 | <1 | <.008 | 4 | 915 | 7 | <5 | 158 | 47 | 206 | 68 | 11 | 34 | | 13.6 | 65.4 | 0.38 | 4.74 | 0.11 | 3.53 | 4.34 | 1.30 | .095 | 0.08 | 1.27 | 4.76 | |
| 87 | " | 650' | 680' | 30' | | 37 | 42 | 163 | <1 | <.008 | 5 | 1130 | 8 | <5 | 186 | 49 | 138 | 14 | 11 | 37 | | 12.8 | 69.5 | 0.24 | 2.40 | 0.11 | 3.51 | 5.06 | 0.73 | .059 | 0.11 | 0.87 | 4.16 | |
| 38988 | " | 680' | 710' | 30' | | 122 | 38 | 90 | <1 | <.008 | 5 | 1784 | 5 | <5 | 180 | 31 | 106 | <5 | 14 | 28 | | 12.1 | 72.7 | 0.12 | 3.45 | 0.08 | 1.36 | 5.71 | 1.09 | .025 | 0.10 | 0.33 | 2.71 | |

* core chip = 20% of core split at regular intervals. ie: 10% of total core taken

SAMPLE NUMBER: Tullah STP 100 38982 585'

SUMMARY DESCRIPTION:

This sample is a strongly foliated silica-sericite-chlorite rock derived from a sparsely plagioclase+mafic-phyric intermediate (acid andesite?) lava. Former plagioclase phenocrysts (<5 modal%) were probably mainly <1mm long, and have been sericitized and stretched out into the foliation. Somewhat less abundant but not uncommon are stretched chlorite-FeTi oxide pseudomorphs after a former mafic phase; these often have small apatite and zircon grains adhering to their edges, and although evidence is hardly convincing, I feel that these were more likely to have been hornblende than augite. Several almost 1mm-sized apatite phenocrysts are present in this rock. The groundmass is a foliated quartz-feldspar intergrowth pervaded by strong sericite±chlorite alteration that defines the foliation. Augen-shaped spots of calcite are also not uncommon. This was probably a hornblende andesite to dacite lava that was hydrothermally altered (sericite-silica-chlorite-calcite) before it was affected by the foliation-producing deformation.

SAMPLE NUMBER: Tullah STP 100 38983 694'

SUMMARY DESCRIPTION:

This sample is a weakly foliated quartz-phyric formerly glassy rhyolitic lava. Rather resorbed and rounded quartz phenocrysts to about 2mm across make up about 3 modal% of the rock, and are sometimes fractured and healed by subgrain recrystallization. There appear to have been (surprisingly!) no plagioclase phenocrysts in this rock, but a few small stretched chlorite pseudomorphs after a mafic phenocryst phase are present. The groundmass has recrystallized to a patchy mainly fine-grained quartzose intergrowth that is pervaded by a weak to moderately developed sericite-chlorite mesh that defines the weak foliation. Chloritic alteration is sporadic and more patchy than the sericite alteration, but the rock is certainly not fragmental. This was probably a weakly hydrothermally altered glassy rhyolite before foliation development. The absence of plagioclase as either phenocrysts or a groundmass constituent may suggest that it was destroyed by the hydrothermal alteration BEFORE foliation development.

| | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Laboratory ANALABS | Analytical-Method | AAS | AAS | FA/AA40 | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF |
| Job-No. 111310.60.10755 0277 Date 3.3.95 | Detection Limit | 2 | 3 | 2 | 1 | .008 | 0.5 | 10 | 3 | 5 | 5 | 5 | 5 | 5 | 3 | 3 | 0.05 | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | .005 | 0.01 | 0.05 | 0.01 |

Project : STERLING RIVER
Logged by: J.G. PURVIS
Date : JANUARY 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** STP 101



| m / ft | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding c = cleavage f = fault Angles to LCA | GRAPHIC LOG (CLAS mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 0 | | | no core | | |
| | sil-ser ± alb-ble (2-3) | V strongly foliated | | MURCHISON VOLCANICS | |
| | ↑ Minor limonite stains on fracts | Local C: 27° augen texture. | | DEFORMED RHYOLITE LAVA. Uniform. | |
| | qtz-sid veinlets → | | | Porphyritic feldspars 1-2mm + quartz av 1-2mm, to 4mm (qtz gen fractured + felds sometimes totally deformed) | Minor lenses py-gn |
| 50' | qtz ± chl veins ± siderite | C: 23° | | | ← 2mm gn veinlets in fol. |
| | | | | ← small pumice | |
| | | | | ← Petrological sample 39901: Glassy rhyolite lava? | |
| | thin chl veinlets → comb-structured qtz ± sid ± chl ± alb veins to 100mm. (post-foliation) | | | Rock is xyl-rich. | Minor py-sp in qtz veins. |
| | | C: 20° | | | ← 150mm vein qtz-chl-sid > py |
| | | Foliation even stronger | | Rock now banded + granular, with many qtz breaking up completely. | sp-py in qtz > sid -chl veins 50-75mm. |
| 100' | | | | | |
| | | | | | ← 20mm qtz > chl ± sp-py vein |
| | | | | | ← 25mm qtz-chl-py vein (post-fol) |
| | | C: 35° | | | ← numerous chl-py veinlets |
| | Thin qtz veins (post-foliation) | | | | |
| | sil (3) | | | | Trace cp on fracts |
| 150' | sil-ser-ble (3) | augen texture | | ← Abundant 3-4mm qtz xyls some in augen shapes. | |
| | | | | ← Petrological sample 39902: Glassy rhyolite lava. | |
| | ↓ Occasional qtz-carb veins to 30mm. | C: 40° Less foliated than above. | | ← Finer grained and less deformed Banded, granular rock. | |
| | | | | ← snowflake devitrification texture. | |
| | | B: 50° | | ← 9" Tuffaceous band | |
| | | Very strong Foliation | | | Trace disseminated py |
| 200' | | | | ↓ Very xyl-rich (mostly qtz) to 4mm. | ← Thin chl-sid-py ± aspy veinlets. |
| | | C: 45° Augen texture in places | | ← mica flakes to 2mm. | |
| | | | | | cp in qtz vein |
| | | | | | ← chl-sil band minor py > sp. |
| | | | | | Trace py + cp in veinlets. |
| 250' | | | | ← xyl rich band | |

Project : STERLING RIVER
Logged by: J.G. PURVIS
Date : JANUARY 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** STP 101



| ft | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (CLAY, mud, SILT, sand, m, GRAVEL, mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 290 | sil-ser (3) | c: 35° Augen texture | | ← coarse grained, v xyl rich band<br>← Finer, + feldspars visible.<br>← Abundant coarse qtz xyls<br>some snowflake devitrification texture. | ← 1-2% py in thin bands // fol. chl-sp-gn veinlet |
| | ↓ sil increasing | ↓ foliation increasing | | | ↑ Minor py. ↓ |
| | | augen schist with kinking of foliation. c: 40° | | ← Petrological sample 39903: Pumiceous crystal Sandstone?<br>← coarse grained, abund qtz xyls. | |
| 300 | | ↓ Intense foliation | sp<br>sp | ↓ Grainsize reduction due to deformation - qtz broken up, felds smeared. | ← sp-gn in tiny qtz veinlets<br>3mm py veinlets<br>Minor dissem + veinlet py-sp<br>massive sp>py veins to 4mm. (± aspy) |
| | ble, ser | sheared F: 57°//Fol | | 317' FARRELL FAULT (1') | |
| | sil-ser-ble-py (4) | Intensely foliated | | 321' Granular Volcanic. | 10% py |
| | chl-co (2) qtz-carb veinlet | c: 58° | | 1' of core<br>FARRELL SLATES<br>DARK GREY SHALES + SANDSTONES<br>Sandstone has 1mm volc qtz grains in sericitic shale matrix. | Minor dissem py |
| | co > chl (1) | strongly Foliated | | | Several % py mainly as irreg veins + veinlets of qtz-carb-py ± cp, to 30mm. Also as persistent dissem. |
| 350 | | | | 70% core loss<br>Sandstone | |
| | | c: 67° | | 382' | |
| | | | | LIGHT GREY FINE QUARTZOSE TUFFACEOUS SANDSTONE/ SILTSTONE<br>Silica-sericite rock containing abund volc qtz xyl grains up to 1-2mm. Rare lithics of black shale to 3mm. | Minor to 1% py Dissem. ± in qtz-siderite veinlets ± sp or cp. |
| 400 | Veins + veinlets qtz-siderite -py ± sp or cp. sil-ser > chl (1) | c: 65° | Black shale fragments to 30mm. | | |
| | | | | 437' SILICIFIED 'CHERTY' SHALE 444' WITH SULPHIDES | Several % py-sp trace aspy-cp in qtz-sid-chl-py veins |
| | | | | SEMI-MASSIVE PYRITE IN QTZ-SIDERITE. trace aspy + cp. | |
| 450 | sil (2-3) ser (1) | c: 73° | | SILICIFIED SANDSTONE, SILTSTONE + SHALE. Siliceous + sericitic. | 3-5% py (±sp?) (in qtz-siderite veins, gen < 5mm) |
| | | c: 85° fault by → poss fold axis → | | | 1-2% py (±sp?) Dissem + in veinlets + siderite |
| | sil (1-2) ser (1) | | | | Minor to 1% dissem py |
| | Numerous veinlets of siderite-fourm | c: 68° Disrupted fol → | | | ← 5mm qtz-sid-chl-py vein. |
| 500 | | | | | |

Project : STERLING RIVER
Logged by: J.G. PURVIS
Date : JANUARY 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** STP 101



| ft / m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 590 | Numerous siderite veinlets at all angles (± sp?) | Strongly foliated ⇓ | ← py-siderite veins to 10mm. | SILICEOUS + SERICITIC SILTSTONE Hard. | Minor py Dissem + in siderite veinlets |
| | Massive vein qtz, minor siderite + chl | C: 65° | Qtz vein + some country rock | | 1% py (+ sp?) in qtz vein |
| 550' | sil (2) ser (1) | | | | Several py veinlets to 2mm |
| | | Abrupt contact, 70° | | 560' Almost shale | ← √ minor dissem as py |
| | 100mm qtz-tourm-py vein & bx shale margins | Moderately foliated B/C: 62° | ← Silicified grey siltstone ← Silicified grey qtzose sillst/sst | SILTY SHALE Grey to Black. Finely bedded | Several % py > po. Dissem + in stringers along foliation/bedding. |
| 600' | sil (1) | kinked fol → Strongly foliated | | | Common tiny siderite-py veinlets py-siderite veinlets ← 20mm qtz-sp vein. |
| | | | | 620' | |
| | Minor qtz-co veinlets | √ Strongly foliated with conspicuous kinking C: 70° | | FINE QUARTZO-FELDSPATHIC SANDSTONE Thin shale laminae. 630' Same unit as 590-598'. | Minor dissem py |
| | Tourm → | A mineralized major fault zone C: 70° | sulphides | MINERALIZED ZONE Qtz-py-po > aspy > cp lode in silicified + brecciated Black 644' shale | |
| 650' | Veinlets at all angles - a stockwork filling regular brittle fractures | C: 72° | | MINERALIZED BLACK SHALE Abundant sulphide (± qtz-co) veins + veinlets + bx-fill, in silicified, brecciated and foliated, black shale. | 5-10% py > po, minor cp. |
| 700' | | | | 705' | |
| | Rocks totally unaltered ↓ Qtz-co veins to 15mm av < 5mm, some with py | √ weakly foliated | Minor black intervals | GREYWACKE SANDSTONE Fine-medium grained Grey. Qtz-lithic. Massive. Minor mica | Sporadic py > po veining av 2% (margin of above zone) |
| 750' | | | | | √ minor dissem + veinlet py > po |

E 641 631

Project : STERLING RIVER
Logged by: J.G. PURVIS
Date : JANUARY 1995

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** STP 101



| m / ft | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 750' | Considerable carbonate content | Very weakly foliated<br>B: 80°<br>B/C: 85° | | Uniform, massive sandstone as before. Grainsize variations evident but core recovery too poor to determine facing. | ← 5mm siderite-qtz-py-po vein. Very minor dissem py |
| 800' | | | | | |
| 850' | | B/C: 84° | | | |
| | | | | 870' EOH | |

RS41102

# PASMINCO EXPLORATION
# DIAMOND DRILL CORE ASSAY DATA

754153

HOLE No. STP 101

PROJECT: STERLING RIVER

Page of

| SAMPLE | | | | | | ASSAYS (ppm unless specified) | | | | | | | | | | | | | | | | | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number | Type | From ft | To ft | Interval ft | Recovered in | Cu / Pb | Zn / Ag | Au / As | Ba / Sn | W / Rb | Sr / Zr | V / Nb | Y / Cr | $Al_2O_3$ / $SiO_2$ | $TiO_2$ / $Fe_2O_3$ | MnO / CaO | $K_2O$ / MgO | $P_2O_5$ / $SO_3$ | $Na_2O$ / LOI | | | | | | | | |
| 38971 | CORE GRIND | 0 | 30' | | | 46 / 85 | 183 / <1 | 12 | 780 / 10 | 97 / 284 | 14 / 163 | 9 / 17 | 42 | 13.6 / 75.2 | 0.17 / 1.91 | 0.04 / 0.03 | 5.05 / 0.65 | .017 / <0.01 | 0.75 / 2.30 | Altered + deformed rhyolitic lava (Murchison Volcanics) | | | | | | | |
| 72 | " | 30' | 60' | | | 24 / 65 | 235 / <1 | 50 | 755 / 15 | 60 / 301 | 29 / 168 | 11 / 16 | 47 | 13.6 / 75.2 | 0.17 / 1.92 | 0.04 / 0.03 | 5.06 / 0.64 | .018 / <0.01 | 0.74 / 2.30 | | | | | | | | |
| 73 | " | 60' | 90' | | | 26 / 70 | 165 / <1 | 5 | 890 / 12 | 52 / 262 | 36 / 173 | 13 / 18 | 48 | 14.3 / 73.3 | 0.18 / 2.03 | 0.10 / 0.46 | 4.95 / 0.56 | .020 / 0.01 | 1.64 / 2.17 | | | | | | | | |
| 74 | " | 90' | 120' | | | 34 / 99 | 214 / <1 | 6 | 925 / 6 | 43 / 266 | 25 / 160 | 8 / 16 | 43 | 14.2 / 73.2 | 0.18 / 2.04 | 0.10 / 0.46 | 4.94 / 0.56 | .019 / 0.01 | 1.65 / 2.17 | | | | | | | | |
| 75 | " | 120' | 150' | | | 176 / 292 | 321 / <1 | 42 | 940 / 12 | 33 / 254 | 46 / 153 | 9 / 17 | 44 | 13.4 / 73.9 | 0.17 / 1.84 | 0.14 / 0.74 | 5.21 / 0.43 | .018 / 0.03 | 1.33 / 2.33 | | | | | | | | |
| 76 | " | 150' | 180' | | | 42 / 76 | 168 / <1 | 18 | 835 / 12 | 47 / 185 | 72 / 164 | 11 / 18 | 41 | 13.4 / 73.3 | 0.17 / 1.52 | 0.09 / 1.52 | 3.91 / 0.44 | .021 / 0.04 | 2.63 / 2.69 | | | | | | | | |
| 77 | " | 180' | 210' | | | 56 / 106 | 201 / <1 | 63 | 760 / 11 | 30 / 248 | 39 / 173 | 16 / 17 | 40 | 13.4 / 73.4 | 0.17 / 1.52 | 0.09 / 1.53 | 3.91 / 0.44 | .022 / 0.04 | 2.64 / 2.69 | | | | | | | | |
| 78 | " | 210' | 240' | | | 144 / 109 | 447 / <1 | 115 | 1070 / 11 | 66 / 232 | 33 / 171 | 16 / 15 | 36 | 13.2 / 74.0 | 0.20 / 1.88 | 0.09 / 0.71 | 5.17 / 0.55 | .026 / 0.04 | 1.26 / 2.47 | | | | | | | | |
| 79 | " | 240' | 270' | | | 116 / 88 | 147 / <1 | 21 | 1040 / 12 | 36 / 216 | 55 / 165 | 12 / 17 | 35 | 13.5 / 73.4 | 0.19 / 1.47 | 0.05 / 1.35 | 4.86 / 0.45 | .024 / 0.06 | 1.92 / 2.55 | | | | | | | | |
| 38980 | " | 270' | 300' | | | 66 / 155 | 349 / <1 | 50 | 925 / 9 | 33 / 225 | 52 / 173 | 18 / 18 | 37 | 13.5 / 73.3 | 0.18 / 1.47 | 0.05 / 1.35 | 4.84 / 0.46 | .023 / 0.06 | 1.92 / 2.55 | | | | | | | | |
| 81 | " | 300' | 321' | | | 105 / 125 | 383 / <1 | 1202 | 595 / 15 | 51 / 214 | 39 / 160 | 16 / 13 | 42 | 12.5 / 69.0 | 0.22 / 4.55 | 0.23 / 2.76 | 4.23 / 1.00 | .067 / 0.85 | 0.10 / 4.38 | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |

HOLE No. STP 101

# PASMINCO EXPLORATION
## DIAMOND DRILL HOLE SUPPLEMENTARY DATA

PROJECT : STERLING RIVER

PETROLOGY



SAMPLE NUMBER: Tullah STP 101 39901 61'

SUMMARY DESCRIPTION:

This sample was either a crystal (vitric?) tuff or a quartz+ plagioclase-phyric rhyolitic lava. It is a weakly foliated rock with notably broken and rarely entire phenocrysts of albitized plagioclase (~5-8 modal%) and slightly less abundant quartz in an unusual groundmass composed of fine-grained patchy quartz pervaded by a strong sericite alteration that defines the foliation. The deformation-recrystallization has obliterated any primary textures in the groundmass, but the broken phenocrysts suggest at first to me that this was a tuffaceous rock rather than a coherent lava. However, looking at much less altered subsequent samples in this set, definite rhyolitic lavas contain reaaly surprisingly broken quartz and plagioclase phenocrysts, so this may well have been originally a glassy rhyolitic lava. Patches of very fine-grained secondary quartz in the groundmass have a light pinkish colour in places due to the presence of microcrystalline hematite dust.

SAMPLE NUMBER: Tullah STP 101 39902 157'

SUMMARY DESCRIPTION:

This sample is very similar petrographically to the preceding sample, being a weakly foliated and recrystallized rhyolitic lava with approximately equally abundant large broken quartz and albitized plagioclase phenocrysts. The latter are often rather rounded, whereas the quartz phenocrysts are also rounded and resorbed but many are broken crystals with strong internal strain, subgrain recrystallization and recrystallized margins that show intergrowth with the recrystallized quartzose groundmass. The formerly glassy groundmass has thoroughly recrystallized to a mainly fine-grained quartzose intergrowth now pervaded by a dense sericite mesh. Some foliation-parallel stylolite-like fractures show concentration of insoluble opaques and small zircon grains. Minor calcite overprints small spots and forms discontinuous veinlets in this sample.

SAMPLE NUMBER: Tullah STP 101 39903 282'

SUMMARY DESCRIPTION:

This sample contains a few more relics of the primary texture than the preceding samples. It may derived from a pumiceous felsic crystal tuff, with abundant broken quartz and albitized plagioclase phenocrysts. Unlike the two previous samples, this rock seems to preserve occasional pumiceous(?) fragments to at least 5mm long that have recrystallized to coarser-grained quartz-albite intergrowths than the more recrystallized and sericitized matrix. These more 'intact' recrystallized pumice fragments also contain euhedral rhombic calcite overprinting them in places, whereas in the more foliated matrix areas, the calcite is either stretched into the foliation or dissolved away. This is a difficult sample and my diagnosis is really only 'a best guess'.

Project : STERLING RIVER
Logged by: J.G. PURVIS
Date : DECEMBER 1994

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** STP 105



| m / ft | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 50' | ser-sil-ble (2-3) | strong foliation | | MURCHISON VOLCANICS<br>RHYOLITE<br>Creamy-khaki. Uniform. Even-grained. Feld & qtz phenos to 2mm in qtz-sericite groundmass. Conspicuous large "wisps" of dark sericite with denser xyl packing. | V minor dissem py |
| 100' | | | | | |
| 150' | | | | ← several "clasts" in this general area | |
| | ser-sil-ble (3) | c: 25° foliation stronger | | | some Mn staining |
| 200' | | c: 25° | | | |
| 250' | | | | | |

25415

Project : STERLING RIVER
Logged by: J.G. PURVIS
Date : DECEMBER 1994

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** STP 105



| m / ft | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 250 | | Strong foliation c: 35° | Mafic dykes 100mm & 50mm | 40° (// fol) | V minor dissem py |
| | ser-sil-ble (3-4) | | | ← Petrology sample 38942: Rhyolitic pumice breccia | some Mn staining |
| 300' | | Abrupt contact 33° | | 308'6" | |
| | ser-chl (2-3) | Strong foliation 11/69 Abrupt contact 40° | | CLASTIC? Sandy-textured. 323' | Trace py. |
| | ser-sil-py (3) | strong foliation c: 35° some kinking of fol | More vitric | FINE GRAINED UNIDENTIFIED FELSIC VOLCANIC Tuffaceous? Uniform qtz-sericite rock with v fine sandy texture. Lacks visible qtz or feld xyls. ← Petrology sample 38944: Glassy felsic lava. | 3-5% py. Minor cp. Dissem & in stringers & lenses in fol. common hematite. |
| 350' | | Abrupt contact // fol 37° | | 370'6" | |
| | sil-ser-py (4) | strong foliation some kinking Abrupt contact 35° | | LAYERED SEQUENCE? Fine gr qtz-sericite schist with sparse qtz > feld xyls. 388'9" | 5-10% py |
| | chl (2-3) | V strong fol (// fol) Abrupt, 40° (// fol) | | MAFIC DYKE? Green, massive foliated v fic 400' with small deformed feld phenos | 2-3% py Dissem. |
| 400' | ser-chl (2) | V strong fol Abrupt, 40° (// fol) | | UNIDENTIFIED DEFORMED VOLCANIC. Scattered small feld & qtz xyls. 409'6" | Minor dissem py Common hematite |
| | sil-ser-ble (3) | V strong fol Abrupt, 40° (// fol) | | DEFORMED FELSIC 417' VOLCANIC | No py or hem. |
| | ser (2-3) | V strong fol 35-50° with kinks | ← Petrology 38939: Sericite schist ← some blackshale | FOLIATED TUFFACEOUS SILTSTONE? Increasing black shale below 420' 427' | Minor dissem py + po. |
| | ↓ Increasing Veining (esp sulfides) chl (1) & sst assoc with veinlets of py-carb (incl siderite) Veinlets fill fracts at all angles. (Probably Devonian) | Mod-strong foliation | | FARRELL SLATES FINE VOLCANICLASTIC SANDSTONE AND INTERBEDDED GREY-BLACK SHALE. | py-siderite veinlets No sp. |
| 450' | | | | | ← 60mm qtz > py > aspy vein // fol Numerous 5-10mm qtz-siderite-hem/mag-py > aspy veinlets |
| | Veining decreases ↓ to v minor | Mod foliation ↓ | | | V minor siderite-py veinlets |
| 500' | | | | | |

RD41CC

Project : STERLING RIVER
Logged by: J.G. PURVIS
Date : DECEMBER 1994

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No. STP 105**



| m / ft | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 500' | | Fairly abrupt contact | | 518' | ← 50mm qtz-carb >>py-po-asph vein |
| | qtz-carb (fe/Mn type)-sulphide veinlets | Mod foliated | | BLACK SHALE | 5% py (± po, asph) Mostly in veinlets // fol, ± in net-vein type at all angles (av 1–10mm) No sp. |
| 550' | | C : 45° | | | 3% py as above |
| | | C : 38° | | 590' | common qtz-py veins to 50mm |
| | Qtz veins (irreg) | Buckling + brecciation | | 594' FAULT ZONE IN SHALE | 5% py, minor po, asph. & veinlets |
| 600' | Siderite veinlets | Very strongly foliated | Shale interbeds (buckled) | TURBIDITIC PUMICEOUS CRYSTAL-LITHIC EPICLASTIC GRADING DOWNHOLE TO SILICEOUS SANDSTONE AND SILTSTONE | Minor to 1% dissem py No sp. |
| | chl veins, increasing with depth | | Abundant lobe pumice frags. | | |
| | ser > chl (2) | | | | |
| 650' | | Mod-strongly foliated | | Pale creamy-grey. Rhyolitic provenance: much sand + silt-sized qtz + occasional larger qtz xyl grains. | |
| | sil (1-2) ser (1) | C : 63° | Occasional slugs of ripped-up grey shale | | sil/qtz veining commences (siderite > py) ± hem/mag |
| 700' | | | | | common siderite-py veins ± hem/mag |
| | | | Fine sandstone | | |
| | | C : 62° | | | |
| 750' | | | | | |

25413?

Project : STERLING RIVER
Logged by: J.G. PURVIS
Date : DECEMBER 1994

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** STP 105



| ft / m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding c = cleavage f = fault Angles to LCA | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, max mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 750' | sil (2) ser(1) Common siderite-sulphide veining (several/ft) | foliated | sp-py vein | | Common siderite-aspy>>py veins, ± diffused aspy around veins. 6" semi-massive aspy>>py in qtz-fluorite-siderite. 90° Minor stringers of sp. |
| 800' | | ⇓ | | ↓ Quartz Siltstone slightly sericitic. | Common veinlets + several thin bx zones of siderite-py-aspy ± gn-sp. (Several veinlets /ft) |
| | qtz-chl-sid-fluor-sulph veins (1/ft) 1mm to 20mm. | c: 60° | | | qtz-chlor-siderite ± fluorite, py-asp veins ± sp + po + mag |
| 850' | | | | 854' | Veining decreases ↓ 1% dissem py. |
| | sil (3) Vein-like zones of massive qtz to 0.5m. | | py; qtz-py vein; py | SILICIFIED MIXED SEDIMENTS 874' Fine sandy material / tuff, possibly pumiceous | veins of semi-massive py, almost po To 150mm. |
| 900' | | foliated | | GREY-BLACK SILTSTONE/SHALE | 3-5% py-po > sp > cp in shale 1% in silt. Dissem + veinlet. (Sulphides are in two styles: ① Dissem + tiny veinlets in fol ② Sl larger veinlets + veins of siderite-qtz-sulphides. ① is most common |
| | qtz-dolomite(?) veins to 0.5m (generally without sulphides) | | | Mostly Siltstone ↓ Mostly shale | |
| 950' | | c: 78° | | | |
| | | c: 67° | | 977' | |
| | ser > sil (2) | ⇑ c: 63° ⇑ | py-mag veins; ← 3% py-po | SILICEOUS + SERICITIC SILTSTONE Minor black shale. Similar to rock above 854'. | ← 150mm semi-massive py-asp-tourm-fluorite vein // fol 1-2% py-po > asp Mainly in siderite-fluorite-tourm veinlets // fol |
| 1000' | | | | | No co |

PASMINCO EXPLORATION

# DIAMOND DRILL CORE ASSAY DATA

754155

HOLE No. STP 105

PROJECT: STERLING RIVER

Page of

| SAMPLE | | | | | | ASSAYS (ppm unless specified) | | | | | | | | | | | | | | | | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number | Type | From m ft | To m ft | Interval m ft | Recovered m | Cu / Pb | Zn / Ag | Au / As | Ba / Sn | W / Rb | Sr / Zr | Y / Nb | Y / Cr | $Al_2O_3$ / $SiO_2$ % | $TiO_2$ / $Fe_2O_3$ % | MnO / CaO % | $K_2O$ / MgO % | $P_2O_5$ / $SO_3$ % | $Na_2O$ / LOI % | | | | | | | |
| 38957 | CORE GRIND | 0 | 30′ | 30′ | | 27 / 69 | 456 / <2 | 2 | 970 / 7 | 21 / 207 | 38 / 155 | 6 / 11 | 29 | 13·3 / 74·6 | 0·17 / 1·73 | 0·03 / 0·68 | 4·73 / 0·41 | 0·019 / 0·05 | 1·89 / 2·31 | | | | | | | Altered rhyolitic Murchison Volcanics |
| 58 | " | 30′ | 60′ | 30′ | | 24 / 71 | 385 / <2 | 5 | 1070 / 7 | 18 / 214 | 41 / 160 | <5 / 14 | 31 | 12·8 / 74·5 | 0·18 / 1·66 | 0·05 / 1·54 | 5·14 / 0·34 | 0·022 / 0·06 | 1·47 / 2·31 | | | | | | | |
| 59 | " | 60′ | 90′ | 30′ | | 35 / 81 | 749 / <2 | 3 | 1085 / 9 | 17 / 216 | 45 / 165 | <5 / 13 | 28 | 13·5 / 72·6 | 0·18 / 1·79 | 0·05 / 1·29 | 4·92 / 0·46 | 0·019 / 0·13 | 2·26 / 2·44 | | | | | | | |
| 38960 | " | 90′ | 120′ | 30′ | | 80 / 266 | 684 / <2 | 77 | 1095 / 9 | 16 / 218 | 35 / 152 | 5 / 11 | 27 | 13·0 / 73·2 | 0·19 / 1·87 | 0·06 / 1·15 | 5·05 / 0·42 | 0·029 / 0·15 | 1·77 / 2·60 | | | | | | | |
| 61 | " | 120′ | 150′ | 30′ | | 33 / 566 | 927 / <2 | 40 | 1105 / 12 | 22 / 225 | 37 / 151 | 5 / 12 | 25 | 13·2 / 72·8 | 0·16 / 2·08 | 0·07 / 1·31 | 5·03 / 0·53 | 0·019 / 0·33 | 1·77 / 2·43 | | | | | | | |
| 62 | " | 150′ | 180′ | 30′ | | 36 / 109 | 547 / <2 | 10 | 1120 / 7 | 13 / 251 | 29 / 154 | <5 / 15 | 30 | 13·1 / 74·3 | 0·17 / 2·18 | 0·13 / 0·75 | 5·06 / 0·51 | 0·021 / 0·07 | 1·57 / 2·19 | | | | | | | |
| 63 | " | 180′ | 210′ | 30′ | | 125 / 147 | 544 / <2 | 11 | 1190 / 7 | 11 / 252 | 38 / 159 | <5 / 11 | 28 | 13·2 / 71·5 | 0·19 / 2·15 | 0·14 / 2·08 | 5·27 / 0·44 | 0·021 / 0·24 | 1·44 / 3·19 | | | | | | | |
| 64 | " | 210′ | 240′ | 30′ | | 45 / 555 | 1431 / <2 | 12 | 935 / 15 | 33 / 255 | 34 / 165 | 9 / 12 | 28 | 13·5 / 71·4 | 0·20 / 2·49 | 0·32 / 1·36 | 4·65 / 0·46 | 0·023 / 0·28 | 1·71 / 3·21 | | | | | | | |
| 65 | " | 240′ | 270′ | 30′ | | 60 / 151 | 594 / <2 | 7 | 960 / 10 | 19 / 203 | 62 / 144 | 14 / 11 | 30 | 13·1 / 70·1 | 0·19 / 2·40 | 0·09 / 2·33 | 4·58 / 0·73 | 0·031 / 0·21 | 2·31 / 3·70 | | | | | | | |
| 66 | " | 270′ | 300′ | 30′ | | 123 / 161 | 602 / <2 | 10 | 1005 / 6 | 14 / 218 | 58 / 149 | <5 / 12 | 32 | 12·7 / 72·1 | 0·17 / 1·81 | 0·10 / 2·57 | 5·07 / 039 | 0·020 / 0·15 | 1·16 / 3·28 | | | | | | | |
| 67 | " | 300′ | 330′ | 30′ | | 311 / 184 | 551 / <2 | 13 | 990 / 13 | 37 / 206 | 25 / 228 | 38 / 11 | 44 | 13·3 / 67·1 | 0·34 / 5·75 | 0·20 / 1·74 | 4·36 / 1·32 | 0·067 / 1·11 | 0·61 / 364 | | | | | | | |
| 68 | " | 330′ | 360′ | 30′ | | 107 / 283 | 600 / <2 | 47 | 660 / 17 | 54 / 168 | 13 / 260 | 8 / 10 | 46 | 12·1 / 68·5 | 0·27 / 6·05 | 0·08 / 1·99 | 4·31 / 0·77 | 0·051 / 0·95 | 0·11 / 4·56 | | | | | | | |
| 69 | " | 360′ | 390′ | 30′ | | 906 / 234 | 669 / 2 | 29 | 990 / 13 | 73 / 176 | 53 / 256 | 28 / 9 | 71 | 12·4 / 62·2 | 0·31 / 4·35 | 0·21 / 5·96 | 4·34 / 0·84 | 0·063 / 3·18 | 0·17 / 5·2 | | | | | | | |
| 38970 | " | 390′ | 417′ | 27′ | | 331 / 128 | 666 / <2 | 15 | 960 / 10 | 36 / 182 | 56 / 235 | 54 / 8 | 47 | 14·7 / 60·5 | 0·66 / 7·81 | 0·24 / 3·62 | 3·81 / 1·82 | 0·157 / 1·26 | 0·43 / 5·57 | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 38940 | BQ CORE | 86′ | 86′9″ | 9″ | | 7 / 53 | 54 / <1 | 5 | 1215 / 8 | <10 / 196 | 40 / 147 | <5 / 13 | 23 / <5 | 12·85 / 75·8 | 0·17 / 1·75 | 0·03 / 0·47 | 4·59 / 0·42 | 0·019 / 0·08 | 2·41 / 1·23 | | | | | | | Altered & cleaved rhyolitic Vdc. |
| 41 | " | 186′3″ | 187′ | 9″ | | 3 / 11 | 49 / <1 | 1 | 1390 / 9 | 12 / 229 | 42 / 158 | 7 / 15 | 30 / 5 | 13·68 / 73·5 | 0·19 / 1·80 | 0·05 / 1·02 | 5·22 / 0·42 | 0·029 / 0·02 | 2·09 / 1·76 | | | | | | | " " " " |
| 42 | " | 289′6″ | 290′6″ | 1′ | | 122 / 8 | 23 / <1 | 4 | 640 / 9 | <10 / 171 | 72 / 128 | 8 / 10 | 46 / <5 | 11·30 / 70·60 | 0·15 / 1·56 | 0·18 / 5·45 | 3·56 / 0·34 | 0·019 / 0·05 | 1·42 / 4·87 | | | | | | | Altered, cleaved pumiceous clast |
| 43 | " | 380′ | 380′9″ | 9″ | | 62 / 546 | 509 / 2 | 28 | 965 / 14 | <10 / 183 | 22 / 260 | 7 / 11 | 32 / <5 | 11·83 / 74·2 | 0·23 / 2·57 | 0·07 / 1·58 | 4·23 / 0·66 | 0·031 / 1·45 | 0·10 / 2·85 | | | | | | | Highly altered rhyolitic Vdc, 5% p |
| 38945 | SPLIT BQ | 381′ | 388′9″ | 7′9″ | | | | | | | | | | | | | | | | | | | | | | " " " " 5-10% |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Laboratory ANALABS | | | | Analytical-Method | | AAS | AAS | FA HAMG | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | | | | | | | |
| Job-No. 111310.60.10679 1480 | | Date 27.1.95 | | Detection-Limit | | 2 / 3 | 2 / 2 | 0·08 / 0·5 | 10 / 3 | 5 / 5 | 5 / 5 | 5 / 3 | 3 / 5 | 0·05 / 0·05 | 0·01 / 0·01 | 0·01 / 0·01 | 0·01 / 0·01 | ·005 / 0·01 | 0·05 / 0·01 | | | | | | | |

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754160

**PASMINCO EXPLORATION**

**PROJECT:** STERLING RIVER **DIAMOND DRILL HOLE SUPPLEMENTARY DATA**

PETROLOGY

**HOLE No.** STP 105

Page of

SAMPLE NUMBER: Tullah STP 105 38944

SUMMARY DESCRIPTION:

This sample is a quite strongly foliated formerly sparsely plagioclase-phyric dacitic to rhyolitic lava. Former plagioclase phenocrysts are stretched out to 4-5 times their original length, thoroughly sericitized, and hardly retain their original identity. There were no quartz phenocrysts in this rock. The groundmass of this rock was probably composed of devitrified glass that has crystallized to a quartzo-feldspathic intergrowth that is now strongly sericite-pyrite-silica-altered. The foliation is defined by both the sericitized phenocrysts, the sericitic mesh through the groundmass, and by trails to almost 1cm long of tiny pyrite crystals set in quartz and sericite. A pronounced but widely-spaced (>3-4 cm between kinks) kink band-style deformation affects the foliation, and contains discontinuous calcite veinlets along the kink axis. A very small amount of dark red sphalerite is present as anhedral small, disseminated grains in this rock. The sample is a glassy felsic lava that was probably hydrothermally altered (silica-sericite-pyrite) before recrystallization in a high-strain zone.

SAMPLE NUMBER: R ALLEN: Tullah-Sterling Valley 38939
STP 105 at 420 ft.

SUMMARY:

This is an almost phyllitic sericite schist with typical Farrell Slate style carbonate- (siderite?) and less abundant quartz veining. The foliation, common cleavage-parallel faults, and fault-bounded rows of kinks are typical of deformation in a high strain zone at the brittle ductile transition. Occasional angular quartz clasts (<1mm across) show no-, or extremely limited rotation and subgrain recrystallization, so that I wouldn't call this a mylonite sensu stricto.

SAMPLE NUMBER: R ALLEN: Tullah-Sterling Valley 38942
STP105 289.5ft

SUMMARY:

This is a strongly foliated rock derived from a felsic volcanic or pyroclastic rock. About 3 modal% of the rock consists of entire euhedral, to (mainly) broken quartz phenocrysts, some containing rounded, recrystallized melt inclusions. A few clasts stretched into the foliation still retain enough textural evidnce to suggest that they were small (mainly 1-2mm long) tube pumice fragments. The remainder of this rock consists of lozenge-shaped domains of fine-grained quartzo-feldspathic material almost certainly after felsic glass, separated by subparallel bands and seams of sericite. A few patches of calcite overprint the sericite-silica. I think that this was either a rhyolitic poorly-sorted pumice breccia, or perhaps more likely a proximal epiclastic derived from felsic pyroclastic material, including a major vitric ash fraction. The alteration is essentially silica-sericite±minor disseminated pyrite, and may have accompanied the development of foliation in a high strain fault zone.

754161

HOLE No. STP 105

# PASMINCO EXPLORATION
## DIAMOND DRILL HOLE SUPPLEMENTARY DATA

PROJECT: STERLING RIVER

PETROLOGY



SAMPLE NUMBER: Tullah STP 105 38944

SUMMARY DESCRIPTION:

This sample is a quite strongly foliated formerly sparsely plagioclase-phyric dacitic to rhyolitic lava. Former plagioclase phenocrysts are stretched out to 4-5 times their original length, thoroughly sericitized, and hardly retain their original identity. There were no quartz phenocrysts in this rock. The groundmass of this rock was probably composed of devitrified glass that has crystallized to a quartzo-feldspathic intergrowth that is now strongly sericite-pyrite-silica-altered. The foliation is defined by both the sericitized phenocrysts, the sericitic mesh through the groundmass, and by trails to almost 1cm long of tiny pyrite crystals set in quartz and sericite. A pronounced but widely-spaced (>3-4 cm between kinks) kink band-style deformation affects the foliation, and contains discontinuous calcite veinlets along the kink axis. A very small amount of dark red sphalerite is present as anhedral small, disseminated grains in this rock. The sample is a glassy felsic lava that was probably hydrothermally altered (silica-sericite-pyrite) before recrystallization in a high-strain zone.

SAMPLE NUMBER: R ALLEN: Tullah-Sterling Valley 38939
STP 105 at 420 ft.

SUMMARY:

This is an almost phyllitic sericite schist with typical Farrell Slate style carbonate- (siderite?) and less abundant quartz veining. The foliation, common cleavage-parallel faults, and fault-bounded rows of kinks are typical of deformation in a high strain zone at the brittle ductile transition. Occasional angular quartz clasts (<1mm across) show no-, or extremely limited rotation and subgrain recrystallization, so that I wouldn't call this a mylonite sensu stricto.

SAMPLE NUMBER: R ALLEN: Tullah-Sterling Valley 38942
STP105 289.5ft

SUMMARY:

This is a strongly foliated rock derived from a felsic volcanic or pyroclastic rock. About 3 modal% of the rock consists of entire euhedral, to (mainly) broken quartz phenocrysts, some containing rounded, recrystallized melt inclusions. A few clasts stretched into the foliation still retain enough textural evidnce to suggest that they were small (mainly 1-2mm long) tube pumice fragments. The remainder of this rock consists of lozenge-shaped domains of fine-grained quartzo-feldspathic material almost certainly after felsic glass, separated by subparallel bands and seams of sericite. A few patches of calcite overprint the sericite-silica. I think that this was either a rhyolitic poorly-sorted pumice breccia, or perhaps more likely a proximal epiclastic derived from felsic pyroclastic material, including a major vitric ash fraction. The alteration is essentially silica-sericite±minor disseminated pyrite, and may have accompanied the development of foliation in a high strain fault zone.

**PASMINCO EXPLORATION**
**DIAMOND DRILL CORE ASSAY DATA** 73402

HOLE No. MM1a

PROJECT: TULLAH

Page 1 of

| SAMPLE | | | | | | ASSAYS (ppm unless specified) | | | | | | | | | | | | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number | Type | From m | To m | Interval m | Recovered m | Cu / Pb | Zn / Ag | Au / As | Ba / Sn | U / Rb | Sr / Zr | Y / Nb | Y / Cr | $Al_2O_3$ / $SiO_2$ % | $TiO_2$ / $Fe_2O_3$ | MnO / CaO | $K_2O$ / MgO | $P_2O_5$ / $SO_3$ | $Na_2O$ / LOI | |
| 38947 | CORE GRIND | 270 | 280 | 10 | | 12 / 33 | 206 / <2 | / 8 | 1085 / 3 | 8 / 130 | 165 / 268 | 58 / 12 | 37 / | 13·3 / 66·0 | 0·56 / 4·35 | 0·10 / 4·48 | 3·13 / 0·78 | 0·078 / 0·38 | 1·73 / 4·92 | Altered Murchison Volcanics |
| 48 | " | 280 | 290 | 10 | | 11 / 84 | 339 / <2 | / 18 | 1445 / 7 | 11 / 150 | 136 / 303 | 20 / 16 | 43 / | 12·8 / 71·5 | 0·30 / 3·36 | 0·11 / 1·94 | 3·81 / 0·53 | 0·049 / 0·38 | 2·36 / 2·74 | (rhyodacitic lavas + clastics). |
| 49 | " | 290 | 300 | 10 | | 17 / 210 | 624 / <2 | / 9 | 1210 / 4 | 7 / 146 | 106 / 310 | 25 / 19 | 34 / | 11·5 / 73·7 | 0·48 / 3·30 | 0·10 / 1·73 | 3·61 / 0·54 | 0·011 / 0·19 | 1·71 / 2·54 | |
| 38950 | " | 300 | 310 | 10 | | 13 / 73 | 880 / <2 | / 3 | 1000 / 10 | <5 / 134 | 77 / 254 | <5 / 16 | 40 / | 11·6 / 74·2 | 0·20 / 2·56 | 0·15 / 2·27 | 3·17 / 0·35 | 0·018 / 0·03 | 1·86 / 3·17 | |
| 51 | " | 310 | 320 | 10 | | 19 / 354 | 790 / <2 | / 26 | 575 / 19 | 8 / 194 | 74 / 282 | 31 / 11 | 42 / | 13·4 / 65·3 | 0·43 / 4·39 | 0·27 / 3·73 | 4·07 / 1·06 | 0·085 / 0·34 | 1·08 / 5·29 | |
| 52 | " | 320 | 330 | 10 | | 14 / 121 | 358 / <2 | / 3 | 930 / 4 | 7 / 181 | 126 / 245 | 43 / 9 | 36 / | 14·8 / 62·6 | 0·69 / 6·28 | 0·18 / 2·99 | 3·44 / 1·60 | 0·167 / 0·27 | 2·32 / 4·47 | |
| 53 | " | 330 | 340 | 10 | | 28 / 131 | 300 / <2 | / 4 | 670 / 7 | <5 / 178 | 108 / 245 | 62 / 10 | 34 / | 14·3 / 63·0 | 0·51 / 4·92 | 0·19 / 4·54 | 4·12 / 1·44 | 0·131 / 0·06 | 1·24 / 5·86 | |
| 54 | " | 340 | 350 | 10 | | 37 / 119 | 473 / <2 | / 9 | 685 / 8 | 5 / 200 | 109 / 248 | 71 / 9 | 29 / | 14·1 / 62·5 | 0·45 / 4·84 | 0·38 / 4·62 | 4·32 / 1·02 | 0·106 / 0·10 | 1·28 / 5·98 | |
| 55 | " | 350 | 360 | 10 | | 33 / 213 | 631 / <2 | / 15 | 885 / 5 | 15 / 177 | 96 / 238 | 65 / 8 | 32 / | 14·5 / 61·7 | 0·56 / 5·33 | 0·21 / 3·95 | 4·02 / 1·66 | 0·122 / 0·33 | 2·21 / 5·01 | |
| 38956 | " | 360 | 370 | 10 | | 30 / 682 | 1263 / <2 | / 18 | 1105 / 9 | 17 / 227 | 61 / 138 | 9 / 13 | 36 / | 13·1 / 71·6 | 0·18 / 2·21 | 0·15 / 2·20 | 4·94 / 0·77 | 0·024 / 0·49 | 1·07 / 3·00 | |
| Previously-taken samples (1993): | | | | | | | | | | | | | | | | | | S | | |
| 34236 | CORE SPLIT | 269 | 270 | 1 | | 6 / 86 | 63 / <1 | <0·008 / 4 | 600 / 4 | <5 / 105 | 167 / 182 | 10 / 11 | 30 / | 10·4 / 74·3 | 0·23 / 2·52 | 0·08 / 3·95 | 2·45 / 0·63 | 0·035 / 0·47 | 0·93 / 4·24 | |
| 34239 | " | 305 | 306 | 1 | | / | / | / | / | / 131 | 90 / 229 | <5 / 14 | 36 / | 11·45 / 74·5 | 0·21 / 2·77 | 0·21 / 2·35 | 3·49 / 0·39 | 0·020 / 0·015 | 1·67 / 3·03 | |
| 34241 | " | 336 | 337 | 1 | | / | / | / | / | / 173 | 132 / 237 | 61 / 11 | 27 / | 14·24 / 62·0 | 0·45 / 4·68 | 0·22 / 4·89 | 4·00 / 1·22 | 0·102 / 0·024 | 1·63 / 6·38 | |
| 34242 | " | 361·3 | 363·3 | 2 | | / | / | / | / | / 240 | 51 / 129 | <5 / 13 | 33 / | 13·65 / 71·7 | 0·15 / 1·92 | 0·18 / 1·95 | 4·87 / 0·92 | 0·021 / 0·314 | 0·89 / 3·41 | |
| 34243 | " | 397 | 398 | 1 | | / | / | / | / | / 190 | 59 / 109 | <5 / 12 | 32 / | 10·30 / 73·7 | 0·13 / 1·71 | 0·32 / 3·94 | 4·01 / 0·48 | 0·016 / 0·043 | 0·46 / 4·82 | |
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| Laboratory | ANALABS | | | Analytical Method | | AAS | AAS | FA HA140 | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | XRF | |
| Job No. | 111310.60.10679 1480 | Date | 27·1·95 | Detection Limit | | 2 / 3 | 2 / 2 | 0·008 / 0·5 | 10 / 3 | 5 / 5 | 5 / 5 | 5 / 3 | 3 | 0·05 / 0·05 | 0·01 / 0·01 | 0·01 / 0·01 | 0·01 / 0·01 | 0·005 / 0·01 | 0·05 / 0·01 | |

# Appendix 6

## Rock Samples - Geochemical Results

## TULLAH STERLING ROCK SAMPLE LEDGER 1994-95

| SAMPLE | NORTH | EAST | Cu | Pb | Zn | Ag | Au | Ba | As | Sn | W | Type | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 38190 | 5373023 | 383843 | 16 | 412 | 432 | <2 | <0.008 | 122 | 80 | 8 | <5 | sub outcrop | Fe/Mn - stained vein qtz |
| 38191 | 5373020 | 383850 | 7 | 31 | 193 | <2 | <0.008 | 550 | 4 | 132 | 19 | outcrop | sil-chl hornfels, minor py |
| 38192 | 5373017 | 383862 | 9 | 7 | 47 | <2 | <0.008 | 83 | 14 | 9 | 11 | outcrop | sil hornfels + qtz veins |
| 38193 | 5373015 | 383870 | 15 | 22 | 369 | <2 | 0.01 | 97 | 2830 | 71 | 13 | float | sil-ser-epi-chl hornfels + aspy |
| 38194 | 5373040 | 383625 | 37 | 393 | 2291 | <2 | <0.008 | 118 | 128 | 39 | 19 | outcrop | basalt with Fe/Mn stained qtz veins |
| 38195 | 5373005 | 383740 | 56 | 55 | 76 | <2 | <0.008 | 345 | 11 | 5 | 11 | float | dolerite with 1-2% py |
| 38196 | 5372985 | 383798 | 17 | 10 | 114 | <2 | <0.008 | 135 | 5 | <3 | <5 | sub outcrop | qtz-veined dolerite |
| 38197 | 5372982 | 383808 | 15 | 592 | 460 | <2 | <0.008 | 390 | 28 | 119 | 21 | outcrop | sil-chl schist + qtz-lim veinlets |
| 38198 | 5372975 | 383832 | 16 | 118 | 163 | <2 | <0.008 | 300 | 24 | 224 | 5 | float | sil-ser-chl altered mafic + qtz-lim-mn veinlets |
| 38199 | 5373430 | 384675 | 14 | 24 | 64 | <2 | <0.008 | 1140 | 3 | 15 | <5 | outcrop | rhyodacite lava + qtz-lim veins |
| 38200 | 5373245 | 384645 | 8 | 11 | 52 | <2 | <0.008 | 1140 | 2 | 8 | 7 | outcrop | rhyodacitic volc |
| 38989 | 5373707 | 384515 | 29 | 7 | 50 | <1 | <0.008 | 21 | 16 | 3 | <5 | sub outcrop | vein qtz with lim boxworks |
| 38990 | 5373707 | 384576 | 43 | 126 | 37 | 7 | 0.24 | 370 | 9962 | 19 | 6 | float | greisenous qtz with 3-5% py>aspy |
| 38991 | 5373660 | 384570 | 562 | 53 | 142 | 2 | 1.38 | 43 | 132000 | 1456 | - | dump float | semi-massive aspy-py in qtz |
| 38992 | 5373660 | 384570 | 3015 | 135 | 155 | 12 | 1.1 | 25 | 117000 | 3278 | - | dump float | semi-massive py>aspy>cp in qtz |
| 38993 | 5373660 | 384570 | 212 | 165 | 108 | 5 | 0.06 | 16 | 5330 | 895 | 16 | dump float | vein qtz with lim + minor py-aspy |
| 39913 | 5373707 | 384890 | 9 | 59 | 89 | <1 | <0.008 | 1667 | 4 | 13 | 24 | outcrop | rhyodacite |
| 39914 | 5373690 | 384985 | 3 | 10 | 62 | <1 | <0.008 | 2685 | 3 | 10 | 12 | outcrop | rhyodacite |
| 39915 | 5373700 | 385040 | 22 | 145 | 79 | <1 | <0.008 | 1578 | 4 | 11 | <5 | outcrop | pumiceous? rhyodacite |
| 39916 | 5373710 | 385080 | 188 | 469 | 137 | 2 | <0.008 | 2243 | 1256 | 108 | 97 | outcrop | leached, bleached felsic volc with minor pits after py |
| 39917 | 5373710 | 385080 | 274 | 396 | 141 | 5 | 0.01 | 2415 | 576 | 60 | 62 | outcrop | leached, bleached felsic volc with minor pits after py |
| 39918 | 5373695 | 385085 | 14 | 117 | 25 | 1 | <0.008 | 2922 | 26 | 12 | 14 | outcrop | silicified unidentified volc |
| 39919 | 5373700 | 385105 | 61 | 107 | 65 | <1 | <0.008 | 2460 | 50 | 19 | 11 | sub outcrop | leached, bleached silicified volc with 1-2% py |
| 39920 | 5373700 | 385155 | 7 | 17 | 57 | <1 | <0.008 | 2425 | 6 | 7 | 13 | outcrop | sil-kspar-chl altered rhyodacite |
| 39921 | 5373700 | 385240 | 46 | 7 | 82 | <1 | <0.008 | 2496 | 3 | 7 | 14 | outcrop | sil-kspar-chl altered rhyodacite |
| 39922 | 5373350 | 385070 | 3 | 8 | 107 | <1 | <0.008 | 2455 | 4 | 11 | 10 | outcrop | sil-kspar-chl altered rhyodacite |
| 39923 | 5373400 | 385070 | 2 | 28 | 202 | <1 | <0.008 | 2118 | 8 | 10 | 9 | outcrop | sil-kspar-chl altered rhyodacite |
| 39925 | 5373400 | 385700 | 116 | 23 | 336 | <1 | <0.008 | 893 | 6 | 43 | 21 | outcrop | chl - altered rhyodacitic volc with minor py-cp |
| 39939 | 5374655 | 385250 | 49 | 13 | 52 | <1 | 0.01 | 1247 | 560 | 7 | 6 | outcrop | felsic lava with minor lim box works |
| 39940 | 5374975 | 385355 | 11100 | 8200 | 354000 | 80 | 0.78 | 18 | 1594 | 26 | - | outcrop | 150mm sp>gn-py-cp-qtz vein |
| 39941 | 5374650 | 385200 | - | - | - | - | - | - | - | - | - | outcrop | dacite |
| 39942 | 5374650 | 385230 | 14 | 12 | 57 | <1 | <0.008 | 1581 | 3 | 6 | 8 | outcrop | dacite |
| 39943 | 5374646 | 385300 | 9 | 24 | 44 | <1 | <0.008 | 1684 | 30 | 9 | 7 | outcrop | glassy rhyodacite |
| 39944 | 5374650 | 385390 | 9 | 31 | 50 | <1 | <0.008 | 625 | 6 | 7 | 5 | outcrop | glassy rhyolite |
| 39945 | 5374975 | 385360 | 1815 | 5200 | 50000 | 112 | 0.33 | 121 | 9720 | 35 | - | outcrop | qtz vein with 20% sp-py>gn-cp |
| 39946 | 5374940 | 385250 | 12 | 84 | 176 | <1 | 0.01 | 524 | 20 | 13 | 36 | outcrop | qtz-ser altered rhyolite with 1%py |
| 39947 | 5371940 | 383987 | 19 | 15 | 46 | <1 | 0.03 | 1216 | 50 | 11 | <5 | outcrop | qtz-ser altered dacitic volc with 3-5% py |
| 39948 | 5379200 | 385840 | 522 | 53000 | 2285 | 226 | 0.07 | 268 | 1117 | 32 | - | dump float | 3kg of jig tailings, South Mackintosh Mine |
| 39949 | 5379175 | 385830 | 310 | 70200 | 2039 | 210 | 0.09 | <10 | 1286 | 48 | - | dump float | 3kg of jig tailings, South Mackintosh Mine |
| 39950 | 5378950 | 385875 | 505 | 40000 | 50400 | 168 | 0.11 | 73 | 4087 | 254 | - | outcrop | 5-10% gn>sp-py in silicified shale |
| 39951 | 5379000 | 385880 | 979 | 22400 | 54100 | 630 | 0.05 | 17 | 211 | 124 | - | dump float | vein qtz + 5-10% gn>sp, Nth.Mt. Farrell Mine opencut |
| 39952 | 5378295 | 386050 | 8 | 247 | 93 | <1 | <0.008 | 229 | 7 | 5 | <5 | outcrop | qtz-ser altered tuffaceous siltstone |
| 39953 | 5378275 | 386065 | 7 | 186 | 65 | <1 | <0.008 | 574 | 7 | 6 | 6 | outcrop | qtz-ser altered volc conglomerate |
| 39954 | 5378365 | 386120 | 7 | 33 | 56 | <2 | <0.008 | 810 | 10 | 7 | <10 | outcrop | rhyodacite |
| 39955 | 5378320 | 386040 | 15 | 17 | 168 | <2 | <0.008 | 584 | 9 | 6 | <10 | float | sericitised & foliated volc conglomerate |
| 39956 | 5378500 | 385705 | 4 | <3 | 9 | <2 | <0.008 | 35 | 1 | 6 | <10 | sub outcrop | vein qtz |
| 39957 | 5378500 | 385935 | 15 | <3 | 27 | <2 | <0.008 | 205 | 4 | 8 | <10 | dump float | vein qtz + minor limonite stains |
| 39958 | 5378500 | 386180 | 10 | 3 | 43 | <2 | <0.008 | 741 | 2 | 4 | <10 | outcrop | qtz-ser altered pumiceous bx |
| 39959 | 5378500 | 386110 | 22 | 9 | 36 | <2 | <0.008 | 586 | 1 | 7 | <10 | float | siliceous & sericitic tuffaceous siltstone + 2-3% py |
| 39960 | 5378500 | 386105 | 15 | 15 | 192 | <2 | <0.008 | 664 | 3 | 7 | <10 | float | sericitised pumice-lithic bx with minor py |

19416

| Bl | Rb | Sr | Y | Nb | Zr | V | SiO2 | TiO2 | Al2O3 | Fe2O3 | MnO | MgO | CaO | K2O | Na2O | P2O5 | SO3 | LOI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <10 | - | - | - | - | - | - | 92.1 | 0.12 | 2.58 | 2.48 | 0.35 | 0.04 | 0.02 | 0.72 | - | - | - | - |
| <10 | - | - | - | - | - | - | 59.9 | 0.65 | 15.7 | 10.78 | 0.63 | 2.73 | 0.09 | 3.32 | - | - | - | - |
| <10 | - | - | - | - | - | - | 89.7 | 0.19 | 3.45 | 3.49 | 0.05 | 0.67 | <0.01 | 0.81 | - | - | - | - |
| <10 | - | - | - | - | - | - | 77 | 0.27 | 5.73 | 10.52 | 1.3 | 1.07 | 0.03 | 0.12 | - | - | - | - |
| <10 | - | - | - | - | - | - | 59.2 | 0.48 | 12.4 | 16.93 | 0.77 | 3.9 | 0.03 | 1.03 | - | - | - | - |
| <10 | - | - | - | - | - | - | 49.2 | 0.65 | 17.2 | 10.4 | 0.24 | 5.45 | 7.38 | 0.67 | - | - | - | - |
| <10 | - | - | - | - | - | - | 72.9 | 0.85 | 10.2 | 7.01 | 0.15 | 2.02 | 0.19 | 0.51 | - | - | - | - |
| <10 | - | - | - | - | - | - | 62.2 | 0.61 | 13.7 | 11.75 | 1.46 | 1.2 | 0.04 | 3.52 | - | - | - | - |
| <10 | - | - | - | - | - | - | 77.7 | 0.4 | 9.45 | 5.72 | 0.79 | 0.59 | 0.03 | 2.46 | - | - | - | - |
| <10 | 233 | 27 | 29 | 15 | 191 | 14 | 73.9 | 0.22 | 14 | 2.06 | 0.03 | 0.47 | 0.01 | 5.66 | - | - | - | - |
| <10 | 167 | 50 | 25 | 13 | 164 | 10 | 76.2 | 0.18 | 12.6 | 2.07 | 0.04 | 0.41 | 0.03 | 4.01 | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | 221 | 74 | 33 | 13 | 327 | 62 | 70.2 | 0.55 | 13.1 | 5.55 | 0.14 | 1.44 | 0.17 | 5.82 | 1.14 | 0.09 | <0.01 | 2.06 |
| - | 202 | 76 | 37 | 14 | 252 | 49 | 71.4 | 0.43 | 12.9 | 3.56 | 0.03 | 0.94 | 0.01 | 9.03 | 0.2 | 0.04 | <0.01 | 1.22 |
| - | 203 | 24 | 31 | 13 | 334 | 82 | 70.7 | 0.56 | 13.8 | 4.65 | 0.06 | 1.5 | 0.02 | 5.54 | 0.08 | 0.03 | 0.01 | 3.16 |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | 277 | 61 | 18 | 11 | 152 | 6 | 74.7 | 0.24 | 12.6 | 0.95 | 0.02 | 0.2 | <0.01 | 10.36 | 0.13 | 0.03 | <0.01 | 0.61 |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | 206 | 68 | 35 | 16 | 252 | 39 | 72.5 | 0.43 | 12.5 | 3.26 | 0.02 | 0.74 | 0.02 | 9.32 | 0.2 | 0.06 | <0.01 | 1.2 |
| - | 196 | 67 | 26 | 14 | 238 | 53 | 71.3 | 0.4 | 12.4 | 4.47 | 0.03 | 1.15 | 0.01 | 8.64 | 0.12 | 0.05 | <0.01 | 1.55 |
| - | 189 | 79 | 57 | 15 | 302 | 77 | 69.5 | 0.51 | 12.6 | 5.42 | 0.06 | 1.56 | 0.08 | 8.13 | 0.14 | 0.1 | 0.07 | 1.53 |
| - | 182 | 84 | 52 | 13 | 261 | 60 | 69.7 | 0.45 | 13 | 5.63 | 0.2 | 1.04 | 0.15 | 7.23 | 1.41 | 0.08 | <0.01 | 1.25 |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | 155 | 69 | 26 | 12 | 254 | 76 | 68.6 | 0.46 | 14.8 | 4.74 | 0.05 | 1.18 | 0.1 | 4.83 | 3.08 | 0.08 | <0.01 | 1.93 |
| - | 374 | 28 | 26 | 17 | 174 | 11 | 69.1 | 0.19 | 16.8 | 2.27 | 0.02 | 1 | 0.01 | 7.04 | 0.23 | 0.01 | <0.01 | 2.5 |
| - | 216 | 49 | 40 | 16 | 144 | 12 | 73 | 0.15 | 14 | 2.09 | 0.11 | 0.65 | 1.19 | 3.92 | 2.59 | 0.02 | <0.01 | 2.42 |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | 263 | 6 | 31 | 12 | 199 | 8 | 80 | 0.18 | 11 | 1.83 | 0.04 | 0.41 | <0.01 | 3.88 | <0.05 | 0.01 | 0.05 | 1.85 |
| - | 117 | <5 | 28 | 10 | 235 | 12 | 79.1 | 0.25 | 10.9 | 3.6 | <0.01 | 0.49 | <0.01 | 3.72 | <0.05 | 0.03 | 0.06 | 2.15 |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | 56 | 94 | 29 | 12 | 211 | 28 | 75.7 | 0.26 | 9.29 | 5.48 | 0.08 | 1.22 | 2.41 | 1.21 | 1.11 | 0.07 | 0.05 | 3.69 |
| - | 74 | 297 | 38 | 12 | 164 | 27 | 78.5 | 0.2 | 11.5 | 3.8 | 0.03 | 1.02 | 0.05 | 1.4 | 2.65 | 0.01 | <0.01 | 1.78 |
| - | 106 | 303 | 29 | 16 | 390 | 54 | 65.7 | 0.63 | 15.7 | 5.24 | 0.1 | 0.84 | 2.09 | 2.08 | 3.28 | 0.07 | 0.04 | 3.65 |
| - | 119 | 121 | 32 | 11 | 175 | 89 | 70.7 | 0.47 | 14.2 | 4.98 | 0.08 | 1.17 | 0.68 | 2.42 | 1.57 | 0.06 | 0.09 | 3 |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | 104 | 301 | 37 | 13 | 293 | 28 | 70.4 | 0.36 | 13.3 | 2.87 | 0.06 | 0.81 | 2.82 | 2.13 | 2.35 | 0.04 | 0.06 | 4.02 |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

2341163

# Appendix 7

## Rock Samples - Petrological Descriptions

**SAMPLE NUMBER: Tullah** 5373700N 39913 S 373707N / 384890E (OUTCROP)
**SUMMARY DESCRIPTION:**

This sample is a massive formerly glassy quartz+plagioclase+augite +FeTi oxide±apatite-phyric rhyodacitic to rhyolitic lava. Quartz phenocrysts make up about 3-5 modal% of the rock and are often broken and/or resorbed; most contain common devitrified or chloritized round melt inclusions. Plagioclase phenocrysts are largely sericitized, and many are also broken or disaggregated crystals. Former mafic phenocrysts are subordinate to plagioclase and quartz, but are not uncommon. All are replaced by chlorite and FeTi oxides, but shapes vary from those suggestive of augite precursors through to those that were almost certainly derived from hornblende phenocrysts. FeTi oxide phenocrysts are replaced by leucoxene. Small apatite microphenocrysts and remarkably common and large zircon crystals are present; the measured Zr content (327ppm) is higher than normal in MRV felsic lavas, but it is not at the level of the distinctive alkali rhyolites occasionally reported, which have 400-800 ppm Zr. The groundmass was almost certainly glassy, and has recrystallized to a very fine-grained quartzo-feldspathic intergrowth in which all feldspar is sericitized and lightly Fe-stained and oxidized.

**SAMPLE NUMBER: Tullah** 537300N 39914 S 373690N / 384985E (OUTCROP)
**SUMMARY DESCRIPTION:**

This sample is a formerly glassy plagioclase+quartz-phyric rhyolitic lava. Albitized plagioclase phenocrysts are slightly less abundant than the quartz phenocrysts in this sample, and are rather angular and broken. Similarly the common quartz phenocrysts are mostly angular and strained, and some have almost entirely recrystallized to polygonal secondary quartz within the former crystal outlines. Former FeTi oxide phenocrysts and microphenocrysts are notably less abundant in this sample than in the previous rock, and are totally chloritized; they were probably augite. Sparse FeTi oxide phenocrysts show narrow altered (leucoxene) rims. The groundmass of this sample is clearly derived by recrystallization of devitrified glass. It is particularly fractured, with blocks between intersecting fractures showing slightly variable grainsize of the recrystallized quartz, producing a weak false brecciation texture in thin section. The sample shows minor secondary chlorite alteration as a weak mesh along fractures.through the rock, and mainly fine-grained Kspar aggregates are present as narrow veinlets and occasional patches. The high K2O content of the sample (>9%) suggests that Kspar is also abundant in the very fine-grained groundmass.

SAMPLE NUMBER: Tullah 5373700N 39915 5373700N / 385040E (OUTCROP)

SUMMARY DESCRIPTION:

This sample is a heavily altered felsic volcanic or volcaniclastic rock in which a moderately developed sericite-defined foliation has obliterated the original texture. Abundant broken, strained and recrystallized quartz phenocryst fragments make up perhaps 20 modal% of the rock. Many show rounded, resorbed edges on some crystal faces. Former plagioclase phenocrysts are also often rather angular and broken crystals that are almost entirely replaced by very fine-grained sericite. In microshears paralleling the foliation, sericitized plagioclase phenocrysts are stretched and smeared out. The foliated groundmass or matrix now consists of intensely sericite-altered (Fe-stained, oxidized) fine-grained quartzo-feldspathic material probably derived originally from recrystallized glass. Occasional patches and fractures are healed with quite coarse-grained intergrown Kspar. Chlorite is much less abundant through the matrix than sericite, but it is not uncommon. This rock is very similar to the first three described in this set (38944, 38982 and 38983), especially in the angular broken nature of the phenocryst population. It is more altered and foliated than the preceding rhyolitic lavas (39913, 39914) from the Murchison Volcanics. I doubt that this rock was pumiceous, but evidence is inconclusive due to alteration.

SAMPLE NUMBER: Tullah 537300N 39918 5373695N / 385085E (OUTCROP)

SUMMARY DESCRIPTION:

This sample is an almost crystal-free, thoroughly recrystallized vitric tuff. In only a few small patches in the rock is there any trace of the former textural detail, and in these spots, vague but convincing outlines of former vitric shards are poorly preserved. The remainder of the rock, apart from a few small resorbed quartz crystal pieces, is composed of a very fine-grained quartz-Kspar intergrowth with light sericitization. Abundant short veins and patches of more coarsely-crystalline Kspar occur throughout the rock, and a weak mesh of sericite pervades the groundmass. The abundant Kspar alteration in this sample is reflected in the extremely high K2O content of this rock (10.4%). This style of alteration is almost always related to granite-derived fluids further south in the MRV.

**SAMPLE NUMBER: Tullah** 5373700 The Cliffs 39920 S 373700N / 385155E (outcrop)

**SUMMARY DESCRIPTION:**

This sample is a texturally well-preserved quartz+plagioclase+ biotite-phyric rhyolitic lava that was originally glassy. It consists of <4 modal% of broken and strained quartz phenocrysts to about 3mm long, and less abundant albitized plagioclase phenocrysts that have been replaced by Kspar. Occasional chloritized mafic phenocrysts all have typical biotite shapes, and not uncommon equant FeTi oxide phenocrysts have altered rims, and often carry one or two small zircon crystals adhering to their edges. The groundmass has devitrified, and recrystallized to a fine-grained quartz-Kspar±sericite intergrowth, and narrow veinlets of Kspar and chlorite transect the rock. Alteration is essentially Kspar±silica, and is reflected in the extraordinarily high K2O content (>9%); such Kspar alteration is usually related in W Tasmania to hydrothermal systems in the roof of Cambrian granites along the backbone of the MRV.

**SAMPLE NUMBER: Murchison Plateau (The Cliffs)** 39922 S 373350N / 385070E (outcrop)
**SUMMARY DESCRIPTION:**

This sample is another unusual rhyolitic lava in that the phenocryst population (quartz+sparse Kspar-altered plagioclase) is particularly broken and disaggregated, normally indicative of a crystal tuff, yet the groundmass texture is very much that of a recrystallized, formerly glassy lava. Quartz phenocrysts are dominant, all are strained and broken, and many have clearly been incorporated in the rock as broken crystals;in addition, many others have been broken and disaggregated 'in situ'. Much less abundant Kspar-altered plagioclase phenocrysts are also broken and disaggregated. This thin section contains only a few small chloritized former mafic phenocrysts, but chlorite is quite common as an irregularly distributed meshwork throughout the rock. The groundmass is a heavily fractured ultrafine- to fine-grained quartzo-feldspathic intergrowth with zones of crushing and recrystallization having less chlorite than adjacent slightly coarser zones. Many fractures appear to have been sites of pressure solution and concentration of small Fe oxides and other insolubles. As in some of the earlier samples, large and quite abundant zircons are a feature of this rock. This sample was a quartz+plagioclase -phyric glassy rhyolitic lava that was fractured and recrystallized, yet did not acquire a foliation; this suggests that the 'deformation' may be due to volume changes rather than strain.

754170

SAMPLE NUMBER: Tullah Murchison Plateau 39924 S 373460N / 385120E (OUTCROP)

SUMMARY DESCRIPTION:

This sample is a fine-grained, fractured and veined volcaniclastic siltstone. There is no evidence of grading in the sample, which consists of very small, angular fragments of volcanic-derived quartz and feldspar set in an ultra-fine-grained quartzo-feldspathic groundmass. Bedding-parallel fractures and veins composed largely of Kspar and minor quartz, with some goethite-altered pyrite, are common, and patchy development of dirty brown very fine-grained chlorite-sericite intergrowths occur throughout much of the sample. This is a fine-grained volcaniclastic siltstone derived from quartz+plagioclase-phyric felsic lavas; it has suffered strong silica-Kspar-chlorite alteration.

SAMPLE NUMBER: Tullah STP 96 Sterling Valley Mine 39938 392'

SUMMARY DESCRIPTION:

This sample is an intensely foliated strongly hydrothermally altered rock in which little of the original textural detail is preserved. Former plagioclase and mafic phenocrysts were probably originally present, and are now stretched to many times their former length, and all are replaced by sericite and calcite (plagioclase) or chlorite and calcite (mafics). The rock consists of pervasive thin bands of chlorite, calcite, sericite, quartz and very minor albite through what was once a crystalline groundmass in which small albite laths are still discernible in wider packets of groundmass. Large augen of coarsely crystalline calcite are possibly stretched calcite-filled vesicles. Bands of strongly concentrated dark insoluble oxides and other mess attest to strong volume loss during foliation development of this rock. I suggest that this sample was a plagioclase+augite-phyric andesitic or more mafic lava that was strongly hydrothermally altered (chlorite-quartz, then perhaps sericite-calcite...guess) before being strongly recrystallized in a major fault zone.

754171

**SAMPLE NUMBER: Tullah** E of Farrell Mines 39952 5 378295N / 386050E (OUTCROP)

**SUMMARY DESCRIPTION:**

This sample is an even-textured, quite fine-grained recrystallized volcaniclastic siltstone. Occasional small angular grains of detrital volcanic quartz are evident, and one or two slightly larger albitized plagioclase phenocryst fragments, but the vast bulk of the rock consists of recrystallized fine-grained quartz and chlorite, spotted with calcite-sericite. The calcite shows bands of more intense development, and other bands (mainly < 1mm wide) are almost calcite-free. The weakly developed sericite mesh shows a parallel development to the calcite. An altogether unremarkable rock!

**SAMPLE NUMBER: Tullah** E of Farrell Mines 39953 5 378275N / 386065E (OUTCROP)

**SUMMARY DESCRIPTION:**

This sample is a foliated, strongly altered and recrystallized rock that probably derives from a coarse volcaniclastic sandstone protolith, although evidence is sparse. The main primary features are the presence of rare small quartz phenocrysts and albitized plagioclase phenocryst fragments. The latter are heavily sericitized. The remainder of the rock consists of a heavily fractured intergrowth of secondary quartz and fine-grained chlorite and minor albite, which is transected by diffuse bands of intense sericite alteration, much of it stained by Fe deriving from alteration of disseminated pyrite. Patchy concentrations of former calcite alteration, present as disseminated small rhombs, are replaced by opaque clay-goethite? aggregates, or calcite has been leached, leaving euhedral holes in the rock. The only reason for appealing for a crystal tuff or volcaniclastic sandstone protolith is the strong and abrupt textural changes in the recrystallized matrix of this sample. A few very small lithic clasts now composed of polycrystalline quartz may have been glassy felsic lava; alternatively, they may have been primary quartz phenocrysts replaced by polygonal secondary quartz. Evidence is inconclusive, but the appearance of the hand specimen, and the textural inhomogeneity of the thin section, suggest that this may have been a coarse felsic volcaniclastic sedimentary rock. It has clearly suffered strong silica-chlorite alteration, and subsequent sericite-carbonate alteration. It is unclear whether the sparse disseminated pyrite relates to the former or the latter alteration.

SAMPLE NUMBER: Pasminco 39955 5 378320N / 386040E (FLOAT)

SUMMARY DESCRIPTION:

This sample is a poorly-sorted, framework-supported medium-grained sandstone with a weak to moderate foliation. Framework grains consist of broken and anhedral volcanic quartz phenocryst fragments, many with melt inclusions. These vary from 0.2-4mm long, and make up about 25-30 modal% of the rock. More abundant are blocky, altered albitized plagioclase phenocrysts with strong overprinting calcite-chlorite±sericite alteration. Lithic fragments/clasts of fine-grained formerly glassy felsic volcanics are also present, but are difficult to discern from altered plagioclase crystals due to the ubiquitous alteration. Whatever fine-grained matrix there was originally in this sample has been winnowed out, so that framework grains abut each other, and the weak fracture cleavage foliation is defined by sericite, minor chlorite and stylolite-like pressure solution concentrations of insoluble fine opaques wrapping around framework grains. A few small concentrations of euhedral pyrite crystals in clear polycrystalline quartz are present. This sample has definitely suffered significant hydrothermal-related chlorite-alteration. There is no evidence to suggest that the framework-forming quartz-plagioclase detritus in this rock is derived from any other source than the Murchison Volcanics.

SAMPLE NUMBER: Pasminco 39958 5 378500N / 386180E (outcrop)

SUMMARY DESCRIPTION:

This sample is another medium- to coarse-grained volcaniclastic sandstone derived probably entirely from glassy quartz+plagioclase-phyric felsic lavas and pyroclastics. Unlike the previous sample, this rock is matrix-supported, and consists of around 40 modal% of framework grains in an altered and recrystallized matrix. The framework grains consist of approximately equal proportions of phenocrystal quartz and albitized plagioclase, with most crystals around 1-2mm across. Quartz crystals are mainly broken and slightly strained, although clearly of volcanic derivation, and albitized plagioclase crystals are blocky weakly sercite-calcite-altered. Lithic clasts are not uncommon, although none are pumiceous; most are devitrified and recrystallized formerly glassy felsic lavas, occasionally with small plagioclase phenocrysts. The matrix of this sample is a quartzo-feldspathic aggregate probably recrystallized after vitric ash; it is patchily sericite-carbonate altered. This samples lacks the moderate to weak foliation that characterizes the preceding samples, and the alteration assemblage is likely to be more due to regional burial degradation than to localized hydrothermal alteration.

# Appendix 8

## DHEM Survey of Hole SR2
## (PW Basford)

754174

PASMINCO
EXPLORATION

A Division of Pasminco Australia Limited,
A.C.N. 004 074 962

Old Burnie Railway Station
Burnie, Tasmania 7320
G.P.O. Box 886
Burnie, Tasmania 7320

# MEMORANDUM

**TO:** JG Purvis
NK McGunnigle

**FROM:** PW Basford

**DATE:** 27 July, 1995

**SUBJECT:** **DHEM SR2, STERLING RIVER EL 24/91**

**FILE:** EP/02/3012/8.4

pwb:95025

---

From May 17 to 19, 1995, Outer Rim Exploration surveyed hole SR2 with the CRONE PEM system. Two loops were used for the survey, both of size 300m by 300m, one positioned over the collar of the hole (west loop), the other located east of the collar (PAS1201). The survey was recorded using a 20 msec time base and 0.5 msec ramp. Twenty channels of data were recorded from 0.07 to 14.5 msecs. A peak current of 8 Amps was circulated through the west loop, with 7 Amps through the east loop. All three components were recorded for both loops.

West (Collar) Loop

The collar loop axial data is dominated by two 'in-hole' responses, one located at approximately 88m down the hole, the other at 200m (PAS1203), both of which correlate with intersected mineralisation. The upper anomaly appears to migrate into an off-hole response at later time. This is not as apparent for the lower anomaly, which is later swamped by a large off-hole shale? response.

Cross-component data infers the upper anomaly also to be both in and off hole. X component data infers the feature to be below the hole, with the Y component data indicating the source to be north of the hole. The lower anomaly does not have a persistent X component response.

East loop

The east loop data (PAS1202) also indicates the presence of the two anomalous in-hole zones observed in the west loop data. This implies that neither loop null coupled the conductors, inferring the bodies to dip at a different angle than initially expected, or that the bodies have a 'second face' to couple with (ie are block shaped instead of ribbon shaped).

Physical Property Analysis

Twelve samples of core were sent to Don Emerson for physical property analysis. Six samples were taken around the lower anomalous zone and six from the upper zone. Samples varied from black shales to siltstone/shales with vein/disseminated pyrite to deformed and mineralised black shales, to mineralised siltstone shales. One mineralised quartz vein was also sampled. Dry bulk density, magnetic susceptibility and EM, both inductive and galvanic response, were tested. Sample results are in table 1.

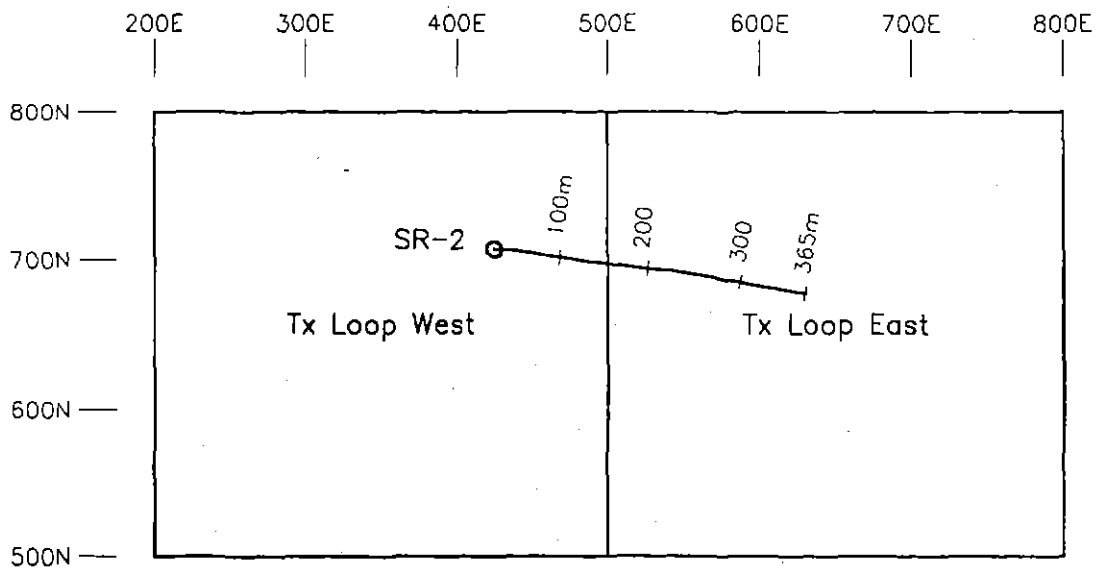
Although only one sample came back conductive, it was clearly apparent that the galvanic resistance of non-mineralised and undeformed black shale is high. The resistance of the mineralised assemblages (deformed black shale; some graphitic, some not) was low. The conductive unit was also strongly magnetic compared to the rest of the samples probably indicating the presence of pyrrhotite.

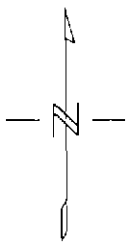
Summary

There is a high degree of confidence that the in-hole responses are a consequence of the deformed and mineralised black shale units. The extent of the off-hole anomaly is limited and geochemical results should aid in determining whether further investigation is warranted.

It can also be concluded that the mineralisation, although often not very conductive, is vastly less resistive than the black shales (Farrell slates). The physical property study, although only just beginning and not authoritative, does indicate that any significant conductors would be associated with deformed and mineralised (sulphides, not necessarily economic) black shales. Physical property testing should be continued, beginning with holes SR3, TF1, MM1 and MM2.

Paul Basford




5 cm

Scale 1:5000

50 0 50 100

(meters)

PAS1201a

*Pasminco Exploration*

Sterling Valley

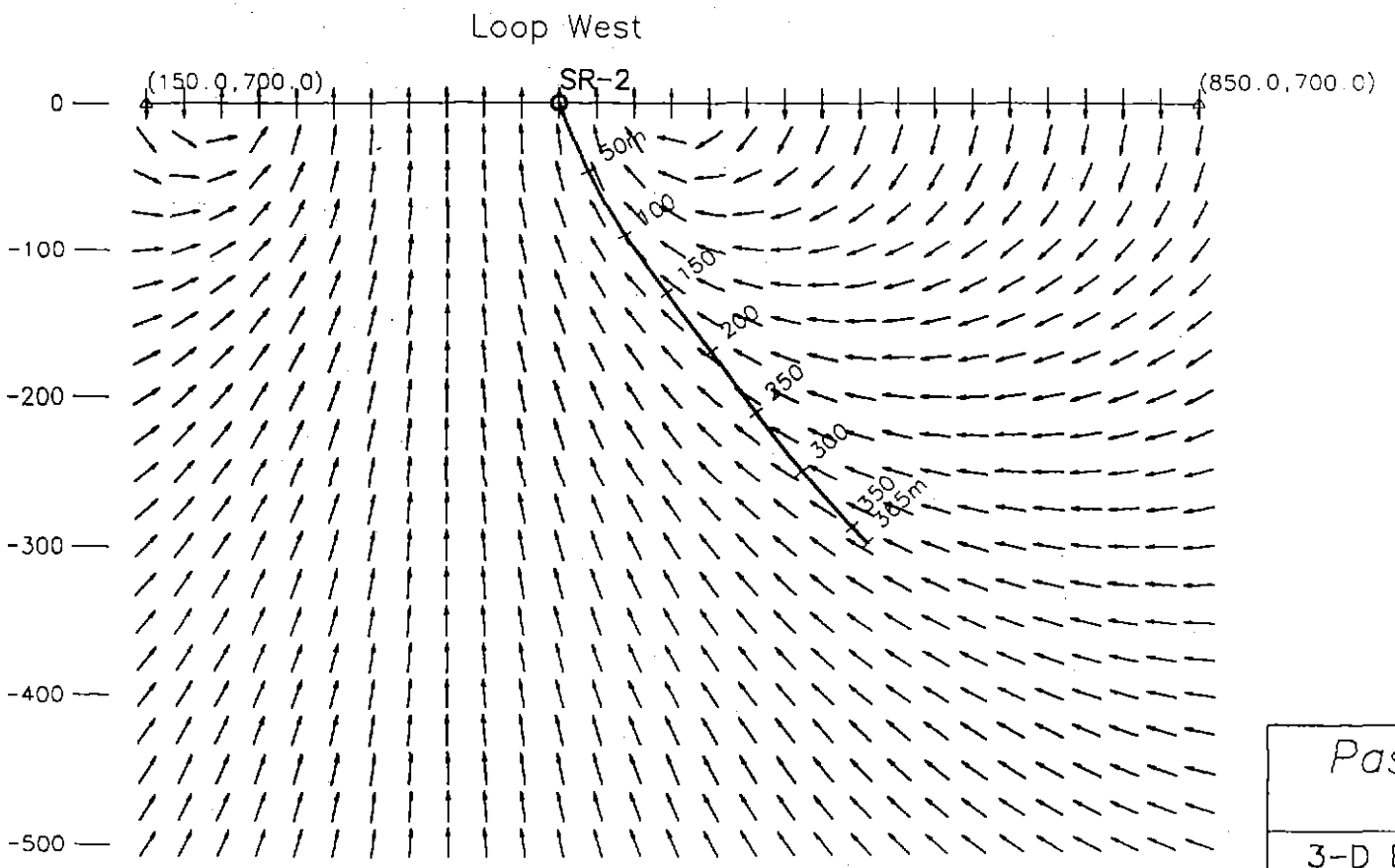
3-D Borehole Pulse EM Survey

Borehole & Loop Location Map

Hole: SR-2

Survey Date: May 17/19, 1995

*Outer-Rim Exploration Services*




Scale 1:5000

5 cm

50 0 50 100
(meters)

PAS1201b

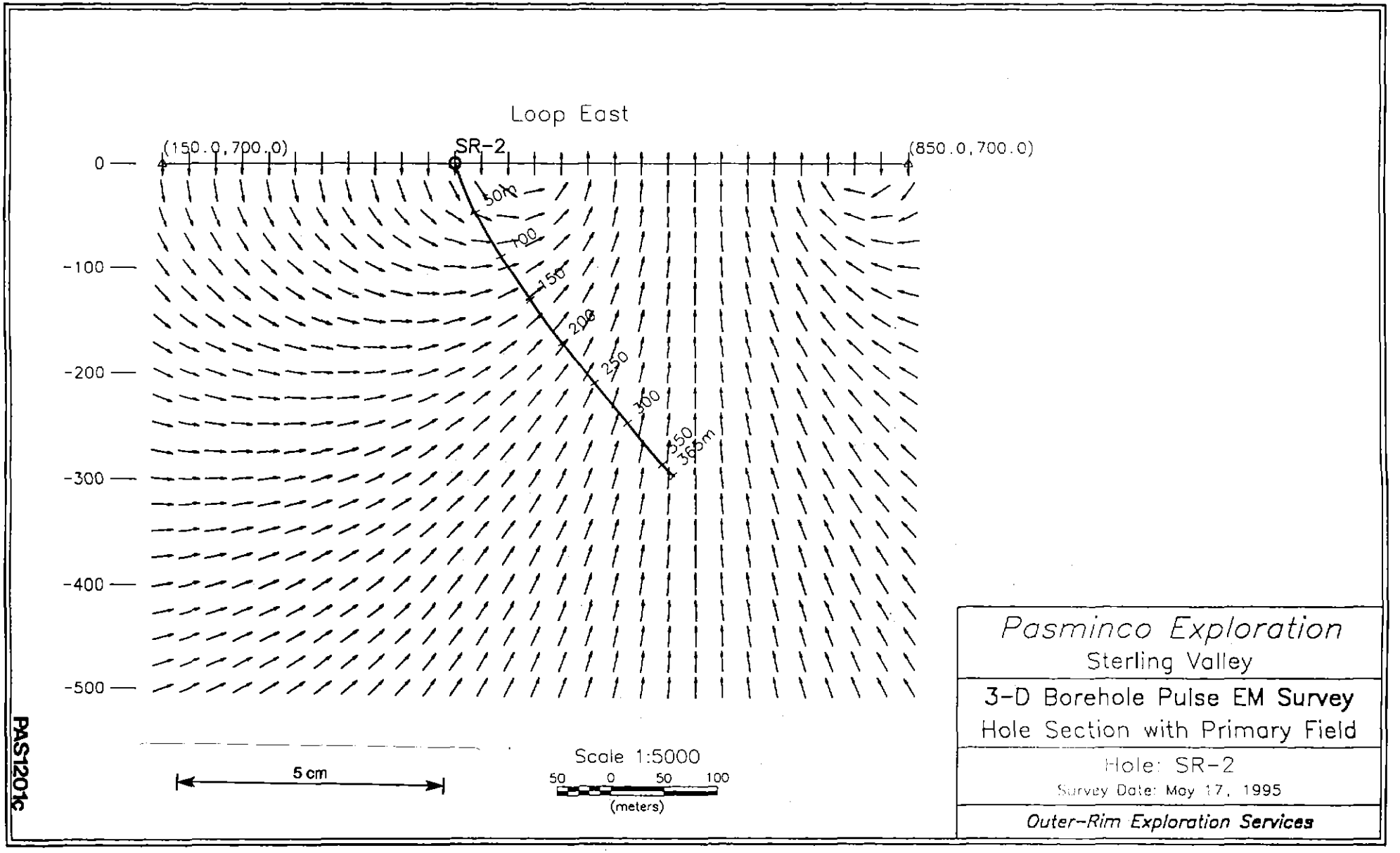
*Pasminco Exploration*
Sterling Valley

3-D Borehole Pulse EM Survey
Hole Section with Primary Field

Hole: SR-2
Survey Date: May 17, 1995

*Outer-Rim Exploration Services*

93-1178


Loop East
(150.0,700.0)
SR-2
(850.0,700.0)
0
-100
-200
-300
-400
-500
50m
100
150
200
250
300
350
365m
5 cm
Scale 1:5000
50 0 50 100
(meters)
PAS1201c
Pasminco Exploration
Sterling Valley
3-D Borehole Pulse EM Survey
Hole Section with Primary Field
Hole: SR-2
Survey Date: May 17, 1995
Outer-Rim Exploration Services

23419

# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754180

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : West |
| Date | : May 17, 1995 | File name | : SR2WZ.PEM |
| Time Base | : 20.00 ms | # Readings | : 57 |
| Ramp Time | : 0.50 ms | Stn Units | : Metric |
| # Channels | : 20 | Coil Area | : 6500 sq m |
| Sync Type | : Cable | Polarity | : + |
| Loop Size | : 300m X 300m | Receiver | : Digital #108 |
| Current | : 8 Amps | Operator | : Kent Honner |

Loop Coordinates (X,Y,Z)

1. 200m, 500m, 0m
2. 500m, 500m, 0m
3. 500m, 800m, 0m
4. 200m, 800m, 0m

Hole Coordinates (X,Y,Z) or (Azimuth,Dip,Length)

1. 425m, 707m, 0m
2. 90.5deg, 70deg, 15m
3. 96deg, 67.5deg, 32m
4. 99.5deg, 61.8deg, 29m
5. 99deg, 59.4deg, 29m
6. 97.5deg, 54.8deg, 30m
7. 98deg, 54.3deg, 30m
8. 97deg, 53deg, 30m
9. 95deg, 53deg, 30m
10. 98.5deg, 52.3deg, 30m
11. 100deg, 51.4deg, 30m
12. 101.8deg, 50deg, 30m
13. 99.3deg, 47.8deg, 30m
14. 100deg, 45.3deg, 20m

Channel Times (usec)

| Ch | Start | End | Center | Ch | Start | End | Center | Ch | Start | End | Center |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PP | -198 | -99 | -149 | 1 | 76 | 104 | 90 | 2 | 104 | 131 | 117 |
| 3 | 131 | 171 | 151 | 4 | 171 | 225 | 198 | 5 | 225 | 292 | 259 |
| 6 | 292 | 378 | 335 | 7 | 378 | 490 | 434 | 8 | 490 | 639 | 565 |
| 9 | 639 | 828 | 733 | 10 | 828 | 1075 | 952 | 11 | 1075 | 1395 | 1235 |
| 12 | 1395 | 1809 | 1602 | 13 | 1809 | 2348 | 2078 | 14 | 2348 | 3046 | 2697 |
| 15 | 3046 | 3951 | 3498 | 16 | 3951 | 5121 | 4536 | 17 | 5121 | 6646 | 5884 |
| 18 | 6646 | 8617 | 7632 | 19 | 8617 | 11170 | 9894 | 20 | 11170 | 14490 | 12830 |

General Comments

Client's wire, 14 Ohms.
Powerlines through west loop, directly over hole.

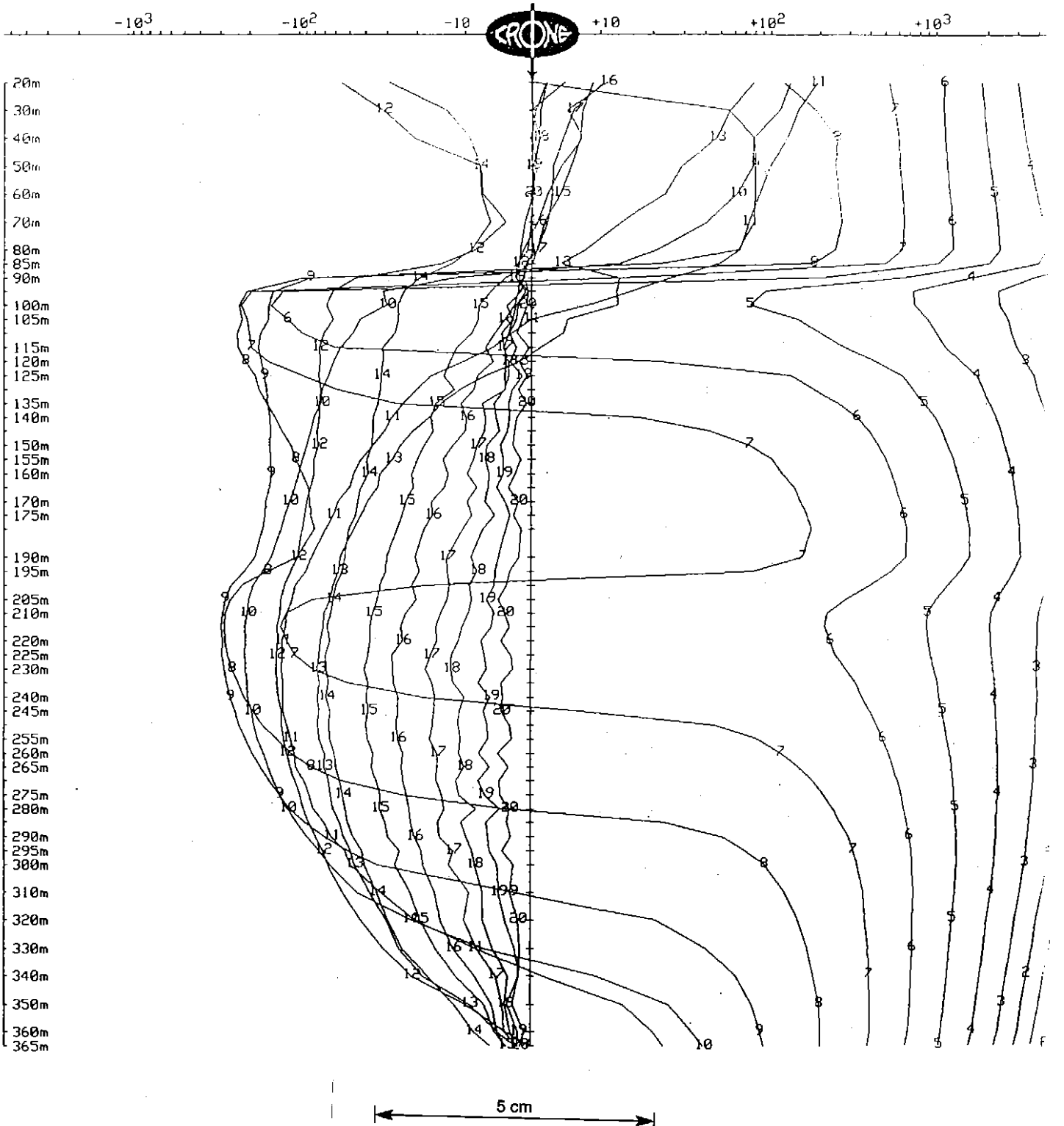
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754181

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : West |
| Date | : May 17, 1995 | File name | : SR2WZ.PEM |

Z COMPONENT dBz/dt nanoTesla/sec - 20 channels and PP

Scale: 1:2000




5 cm

PAS1203a

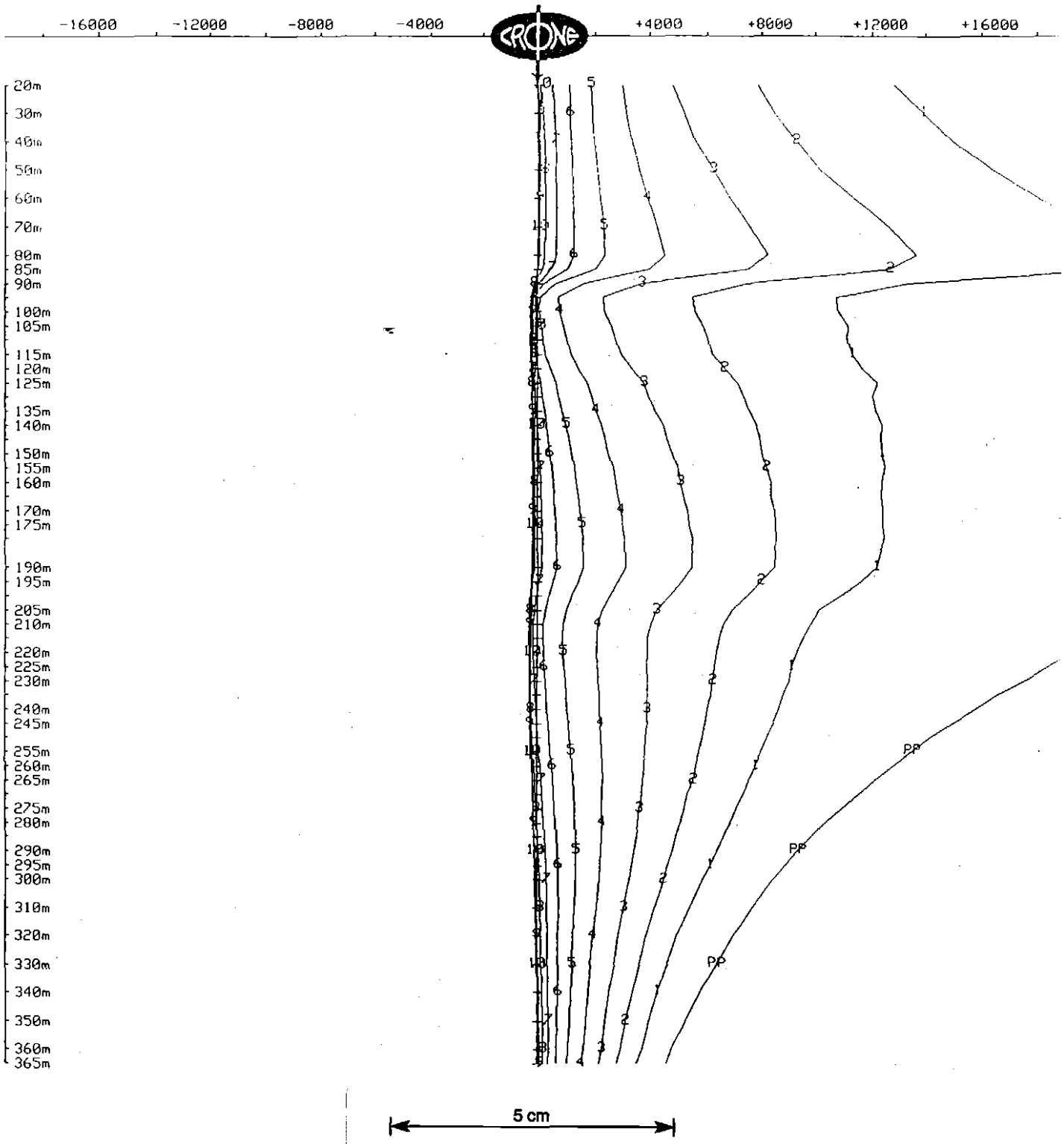
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754182

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : West |
| Date | : May 17, 1995 | File name | : SR2WZ.PEM |

Z COMPONENT dBz/dt nanoTesla/sec - 20 channels and PP

Scale: 1:2000 Unit Scale: 1cm = 2000 nT/



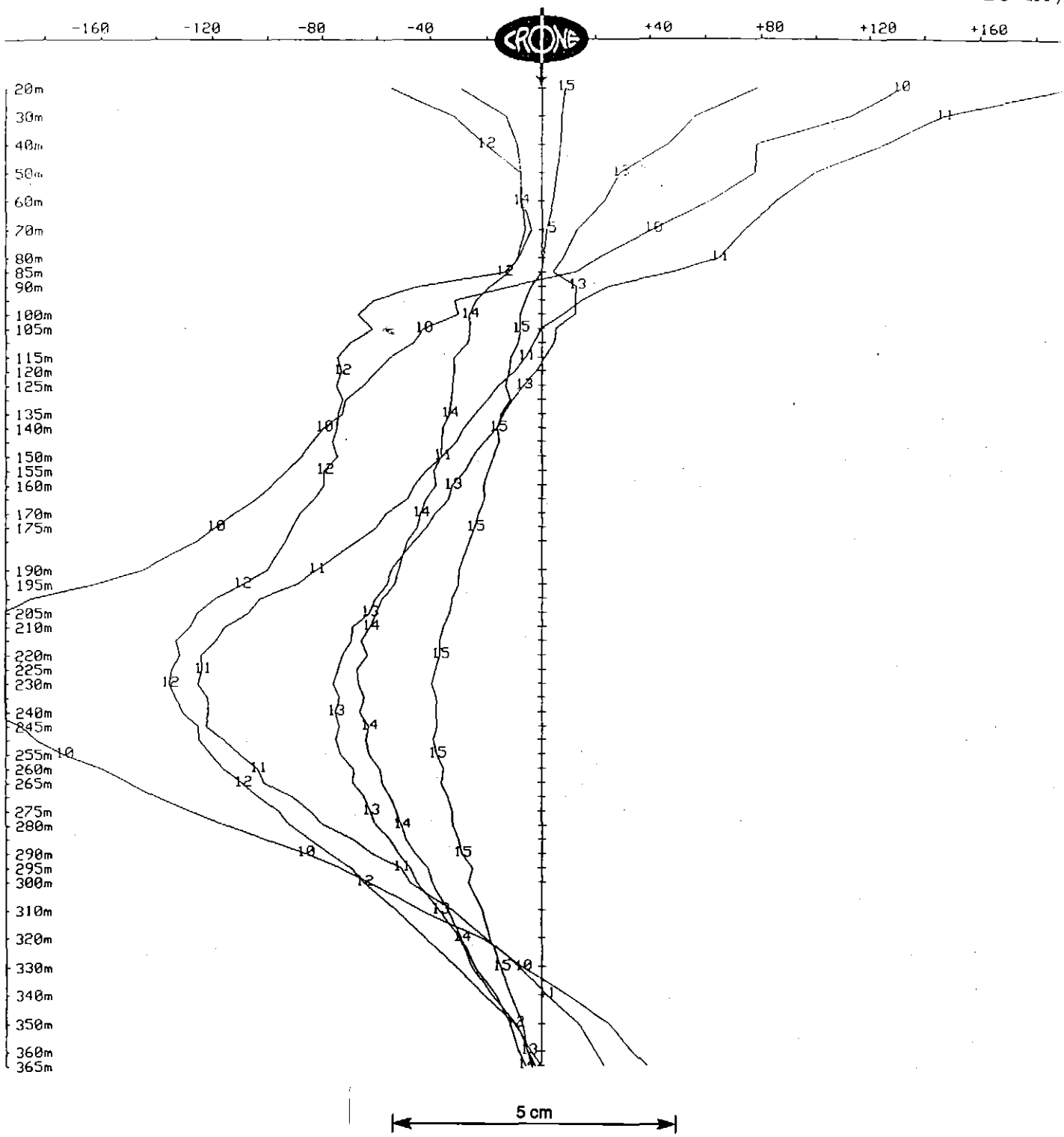
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754183

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : West |
| Date | : May 17, 1995 | File name | : SR2WZ.PEM |

Z COMPONENT dBz/dt nanoTesla/sec - 20 channels

Scale: 1:2000 Unit Scale: 1cm = 20 nT/



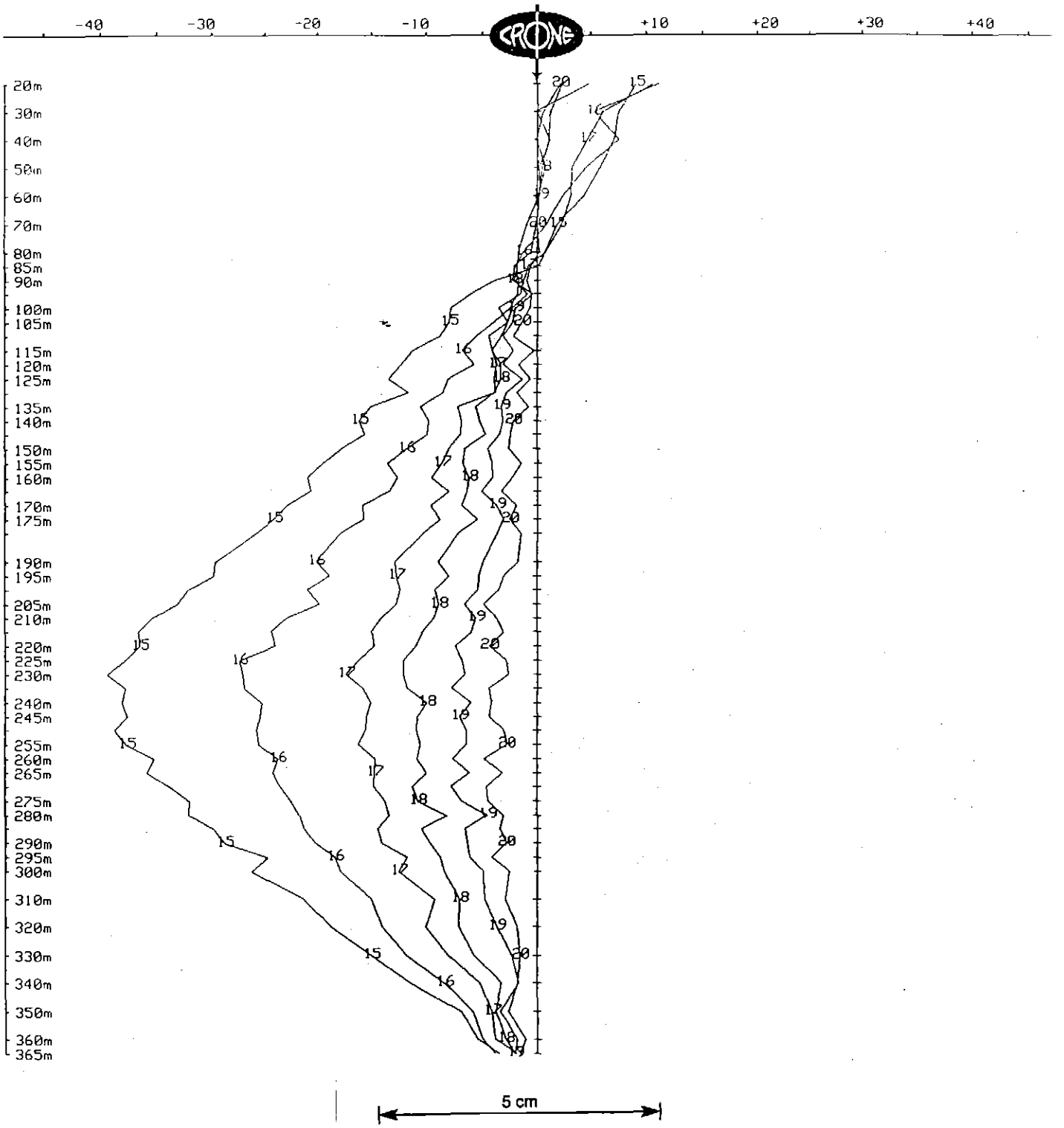
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754184

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : West |
| Date | : May 17, 1995 | File name | : SR2WZ.PEM |

Z COMPONENT dBz/dt nanoTesla/sec - 20 channels

Scale: 1:2000 Unit Scale: 1cm = 5 nT/



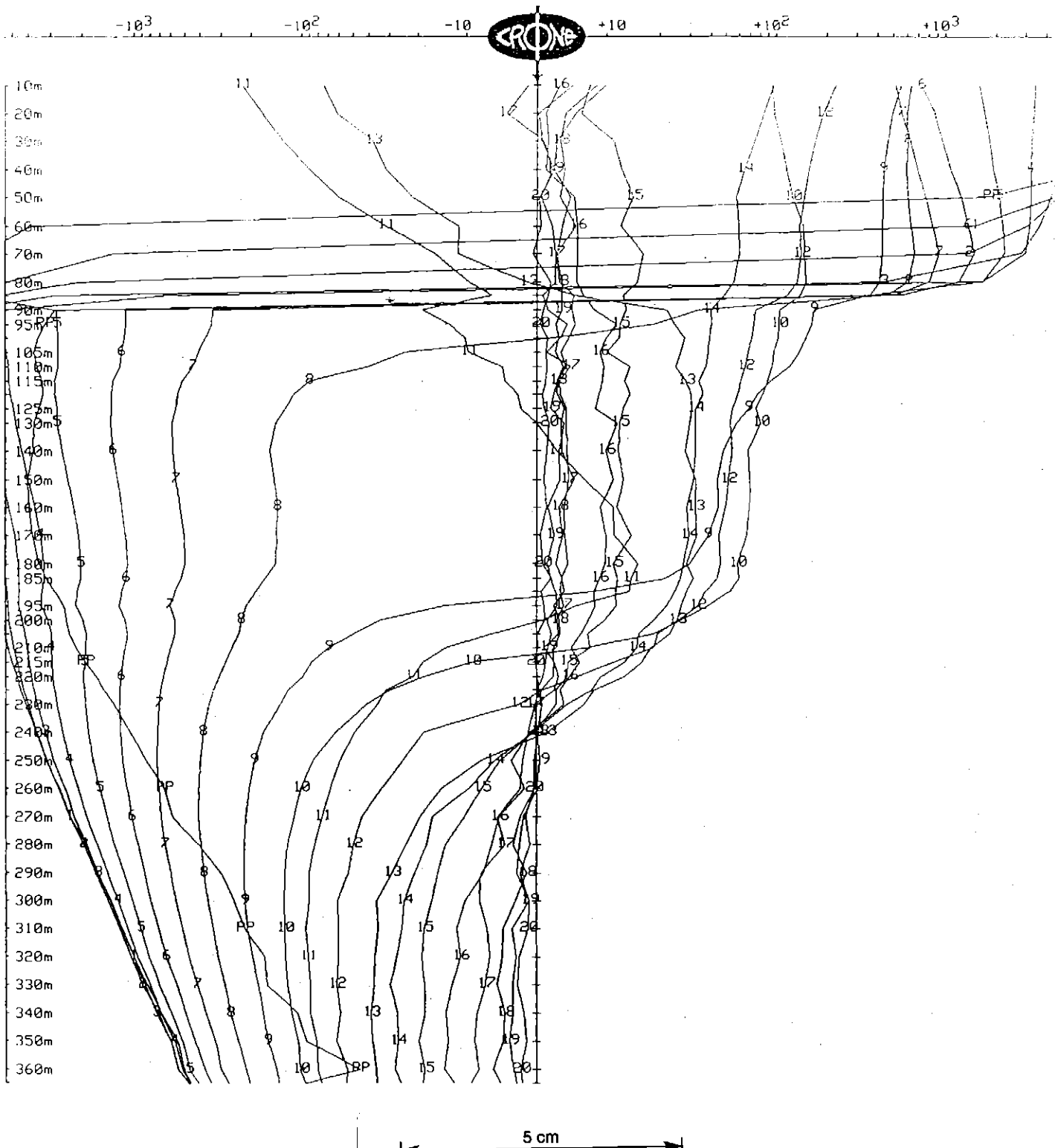
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754185

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : West |
| Date | : May 18, 1995 | File name | : SR2WXY.PEM |

Data Corrected for Probe Rotation using Orientation Tool #2
X COMPONENT dBx/dt nanoTesla/sec - 20 channels and PP

Scale: 1:2000




PAS1203b

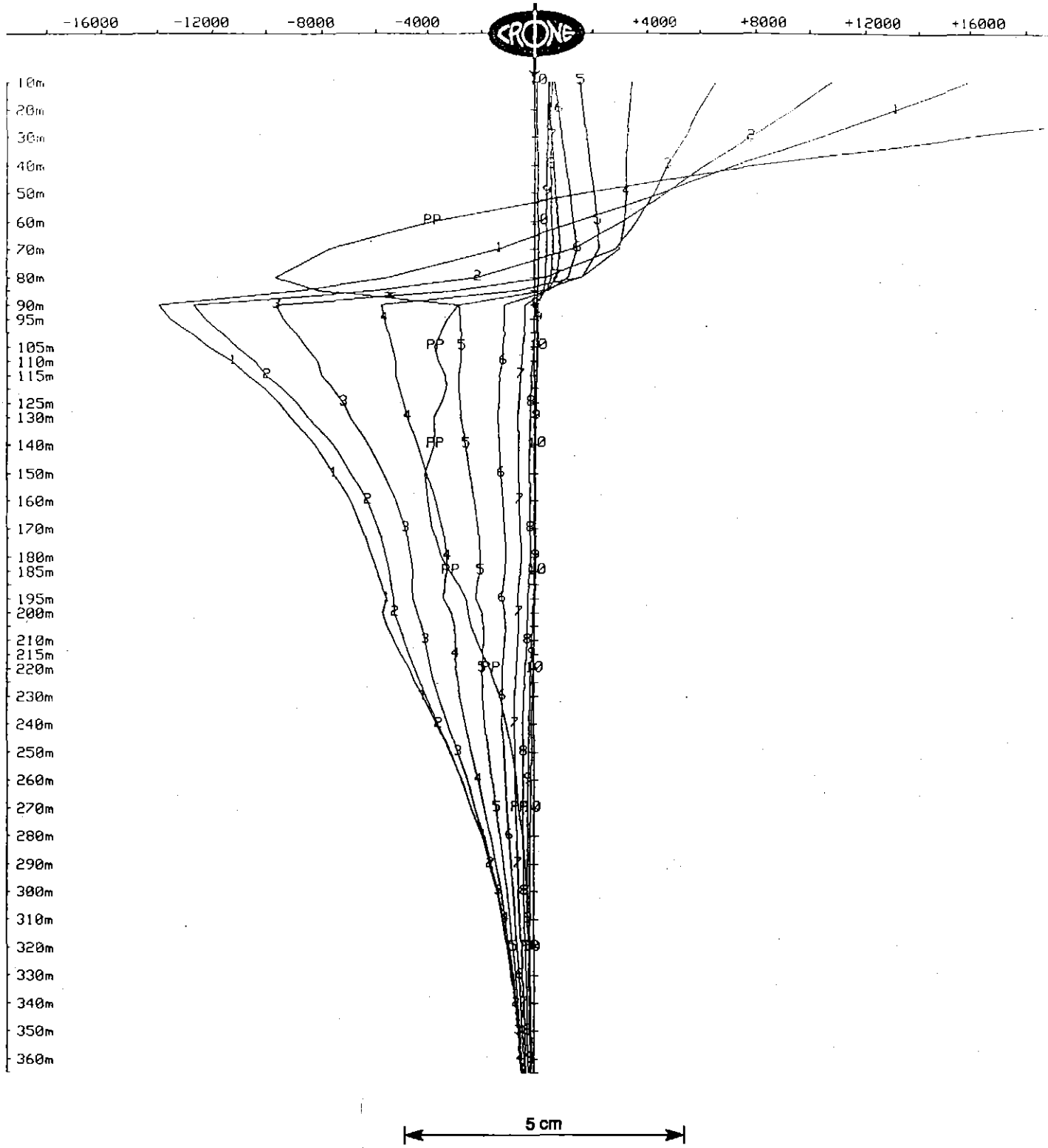
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754186

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : West |
| Date | : May 18, 1995 | File name | : SR2WXY.PEM |

Data Corrected for Probe Rotation using Orientation Tool #2
X COMPONENT dBx/dt nanoTesla/sec - 20 channels and PP

Scale: 1:2000 Unit Scale: 1cm = 2000 nT/



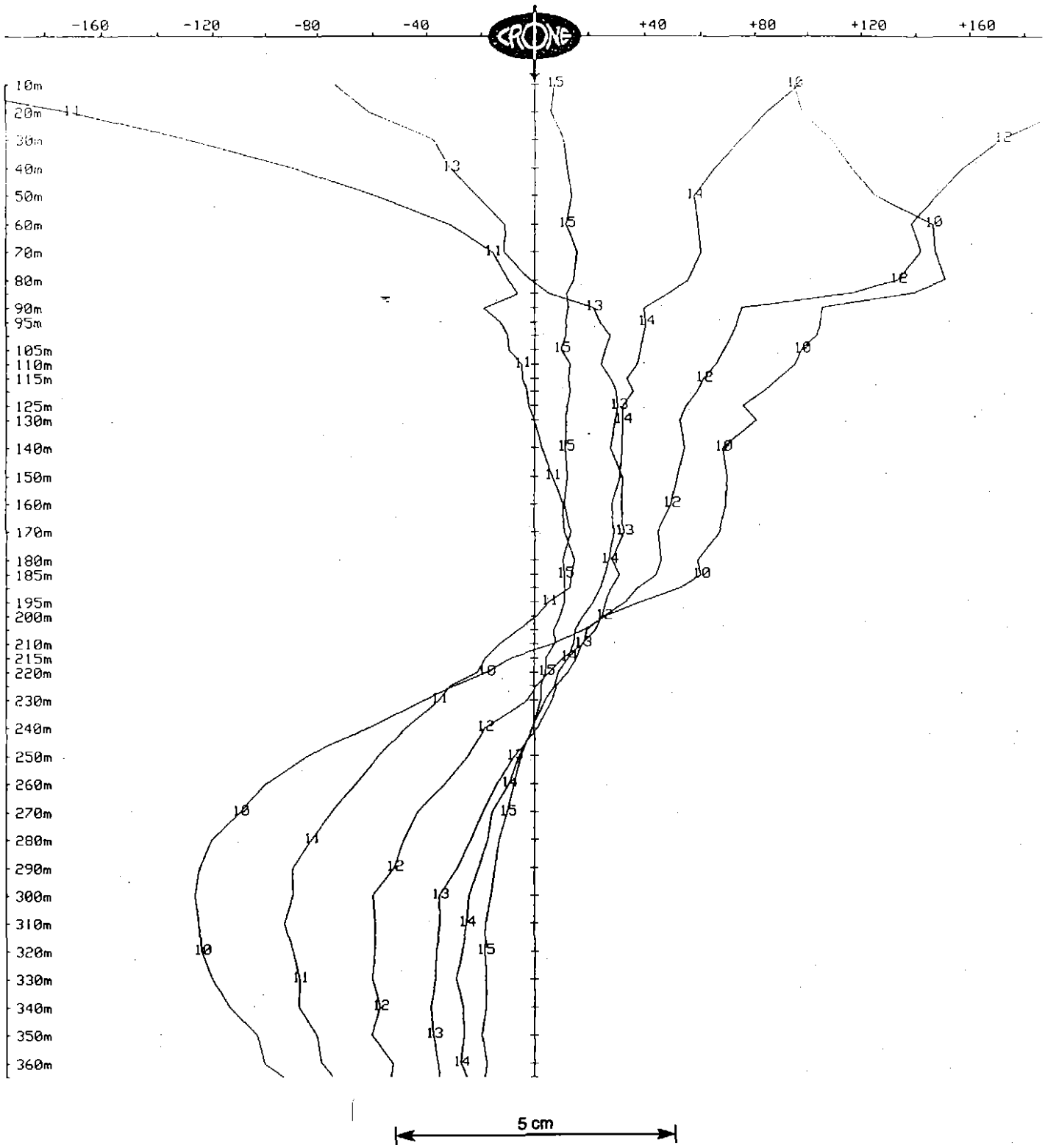
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754187

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : West |
| Date | : May 18, 1995 | File name | : SR2WXY.PEM |

Data Corrected for Probe Rotation using Orientation Tool #2
X COMPONENT dBx/dt nanoTesla/sec - 20 channels

Scale: 1:2000 Unit Scale: 1cm = 20 nT/



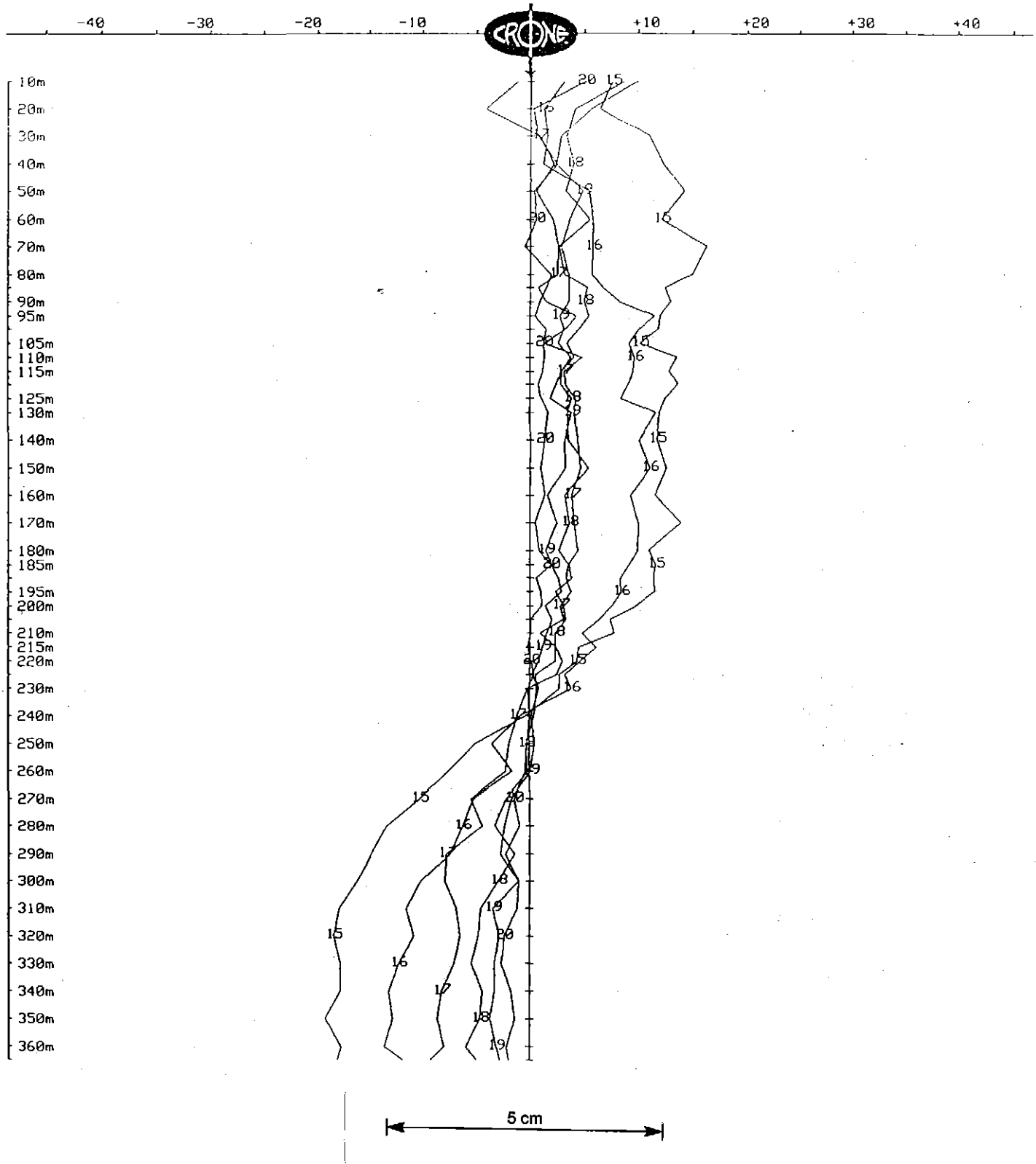
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754188

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : West |
| Date | : May 18, 1995 | File name | : SR2WXY.PEM |

Data Corrected for Probe Rotation using Orientation Tool #2
X COMPONENT dBx/dt nanoTesla/sec - 20 channels

Scale: 1:2000 Unit Scale: 1cm = 5 nT/



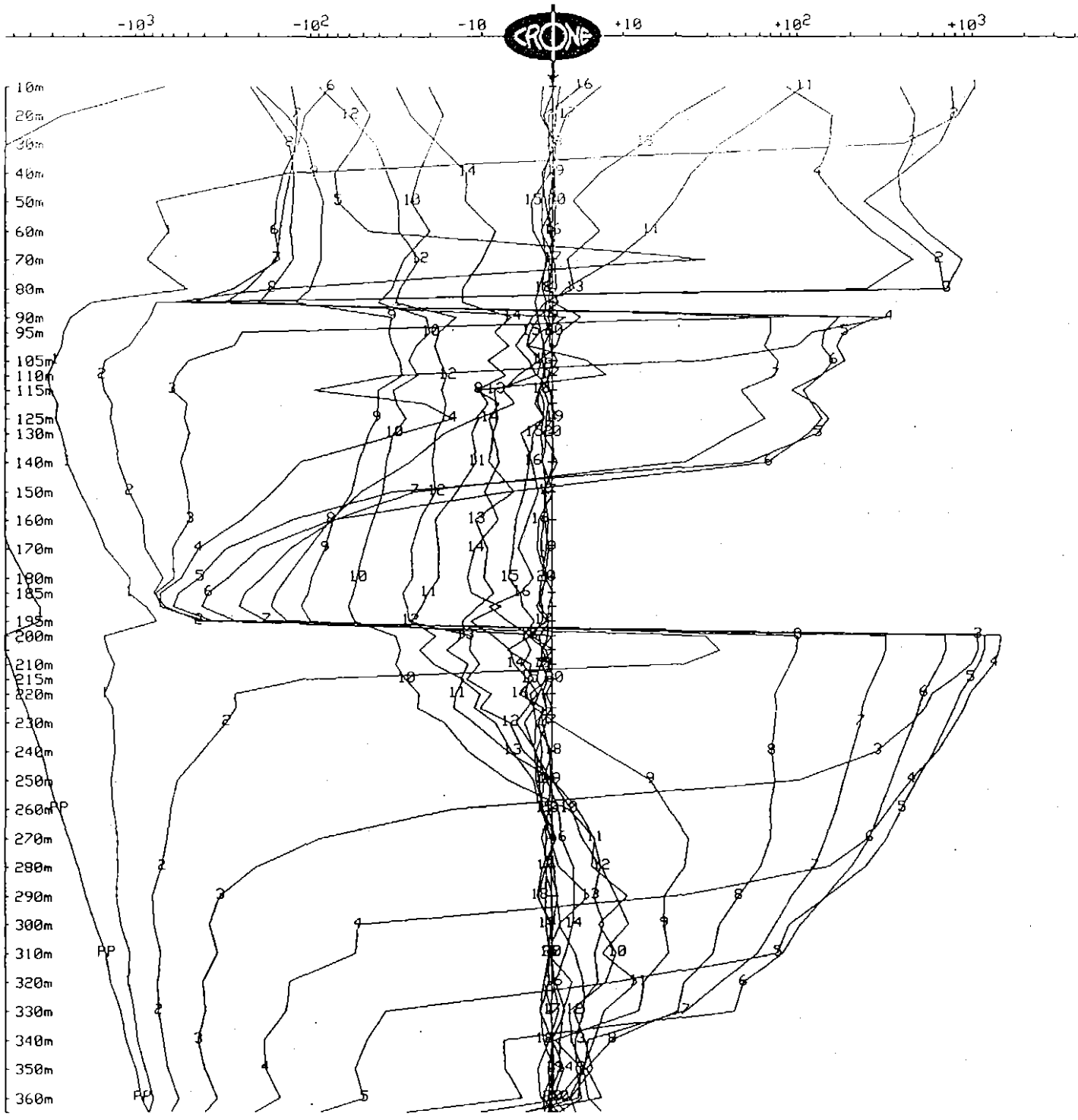
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754189

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : West |
| Date | : May 18, 1995 | File name | : SR2WXY.PEM |

Data Corrected for Probe Rotation using Orientation Tool #2
Y COMPONENT dBy/dt nanoTesla/sec - 20 channels and PP

Scale: 1:2000




5 cm

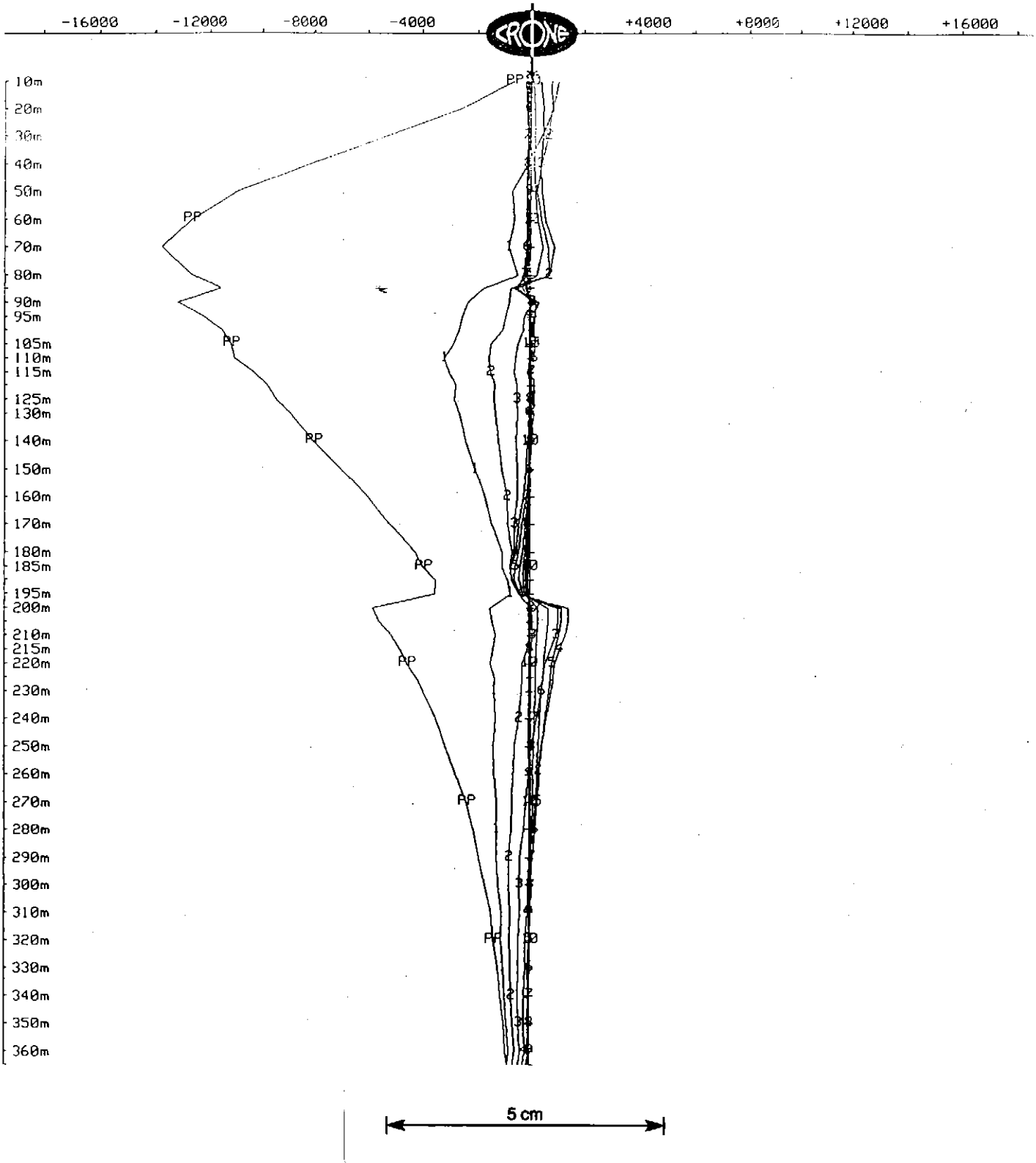
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754190

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : West |
| Date | : May 18, 1995 | File name | : SR2WXY.PEM |

Data Corrected for Probe Rotation using Orientation Tool #2
Y COMPONENT dBy/dt nanoTesla/sec - 20 channels and PP

Scale: 1:2000 Unit Scale: 1cm = 2000 nT/



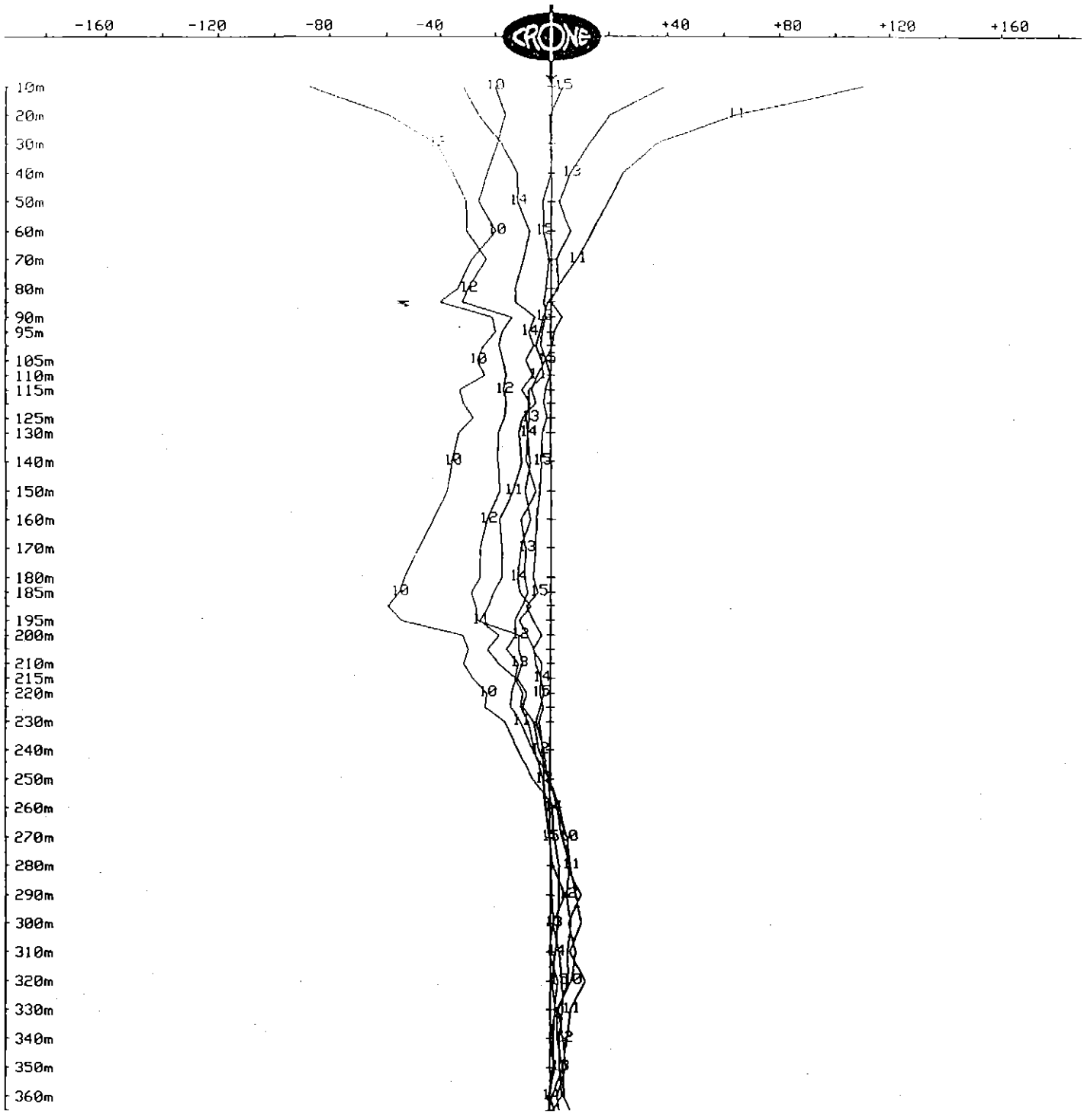
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754191

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : West |
| Date | : May 18, 1995 | File name | : SR2WXY.PEM |

Data Corrected for Probe Rotation using Orientation Tool #2
Y COMPONENT dBy/dt nanoTesla/sec - 20 channels

Scale: 1:2000 Unit Scale: 1cm = 20 nT/




5 cm

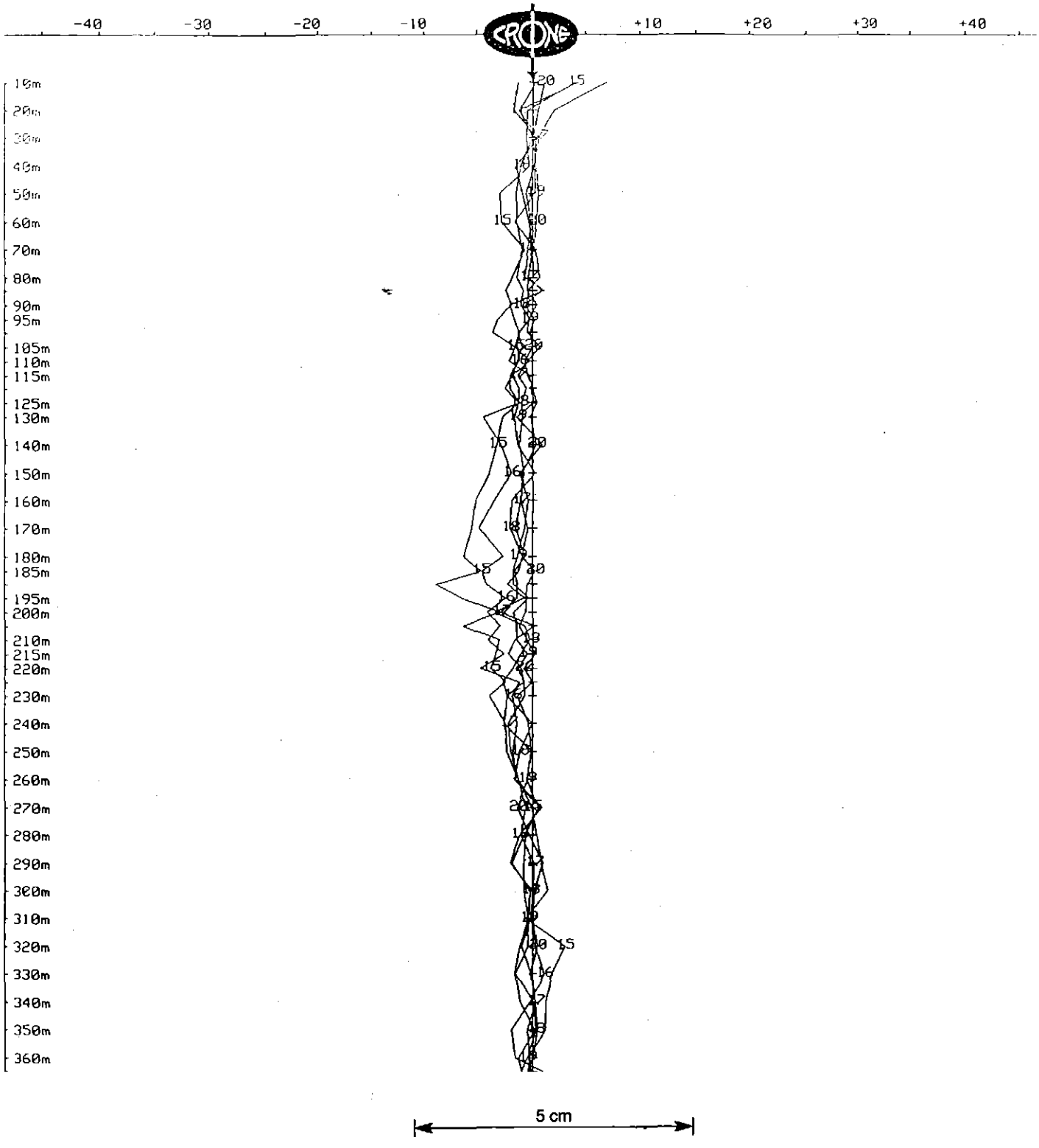
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754192

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : West |
| Date | : May 18, 1995 | File name | : SR2WXY.PEM |

Data Corrected for Probe Rotation using Orientation Tool #2
Y COMPONENT dBy/dt nanoTesla/sec - 20 channels

Scale: 1:2000 Unit Scale: 1cm = 5 nT/



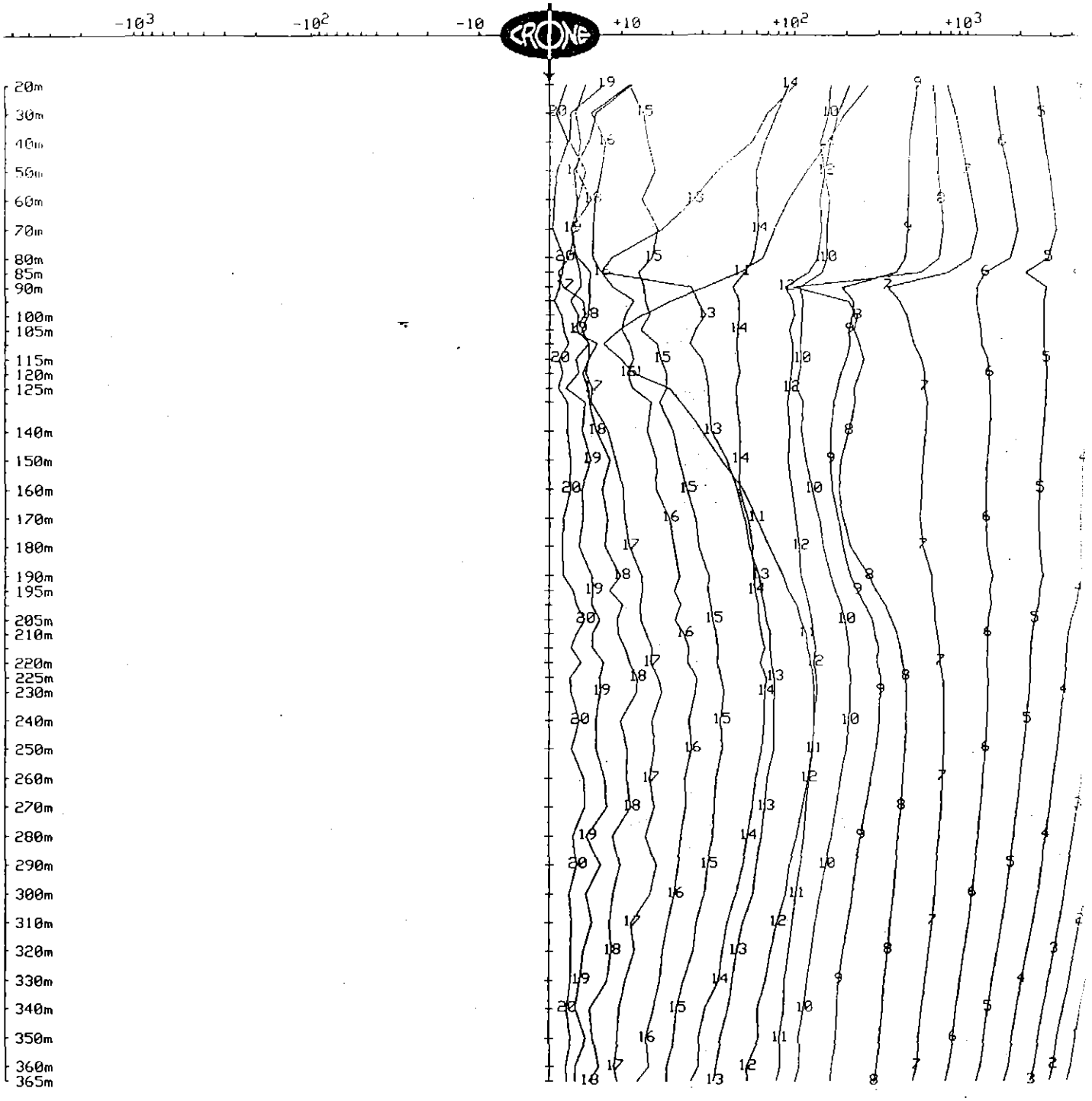
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754193

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : West |
| Date | : May 18, 1995 | File name | : SR2WXYZ.PEM |

TOTAL FIELD dBxyz/dt nanoTesla/sec - 20 channels

Scale: 1:2000




5 cm

# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754194

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : East |
| Date | : May 17, 1995 | File name | : SR2EZ.PEM |
| Time Base | : 20.00 ms | # Readings | : 46 |
| Ramp Time | : 0.50 ms | Stn Units | : Metric |
| # Channels | : 20 | Coil Area | : 6500 sq m |
| Sync Type | : Cable | Polarity | : + |
| Loop Size | : 300m X 300m | Receiver | : Digital #108 |
| Current | : 7 Amps | Operator | : Kent Honner |

Loop Coordinates (X,Y,Z)

1. 500m, 500m, 0m
2. 800m, 500m, 0m
3. 800m, 800m, 0m
4. 500m, 800m, 0m

Hole Coordinates (X,Y,Z) or (Azimuth,Dip,Length)

1. 425m, 707m, 0m
2. 90.5deg, 70deg, 15m
3. 96deg, 67.5deg, 32m
4. 99.5deg, 61.8deg, 29m
5. 99deg, 59.4deg, 29m
6. 97.5deg, 54.8deg, 30m
7. 98deg, 54.3deg, 30m
8. 97deg, 53deg, 30m
9. 95deg, 53deg, 30m
10. 98.5deg, 52.3deg, 30m
11. 100deg, 51.4deg, 30m
12. 101.8deg, 50deg, 30m
13. 99.3deg, 47.8deg, 30m
14. 100deg, 45.3deg, 20m

Channel Times (usec)

| Ch | Start | End | Center | Ch | Start | End | Center | Ch | Start | End | Center |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PP | -198 | -99 | -149 | 1 | 76 | 104 | 90 | 2 | 104 | 131 | 117 |
| 3 | 131 | 171 | 151 | 4 | 171 | 225 | 198 | 5 | 225 | 292 | 259 |
| 6 | 292 | 378 | 335 | 7 | 378 | 490 | 434 | 8 | 490 | 639 | 565 |
| 9 | 639 | 828 | 733 | 10 | 828 | 1075 | 952 | 11 | 1075 | 1395 | 1235 |
| 12 | 1395 | 1809 | 1602 | 13 | 1809 | 2348 | 2078 | 14 | 2348 | 3046 | 2697 |
| 15 | 3046 | 3951 | 3498 | 16 | 3951 | 5121 | 4536 | 17 | 5121 | 6646 | 5884 |
| 18 | 6646 | 8617 | 7632 | 19 | 8617 | 11170 | 9894 | 20 | 11170 | 14490 | 12830 |

General Comments

Client's wire, 14 Ohms.
Powerlines through west loop, directly over hole.

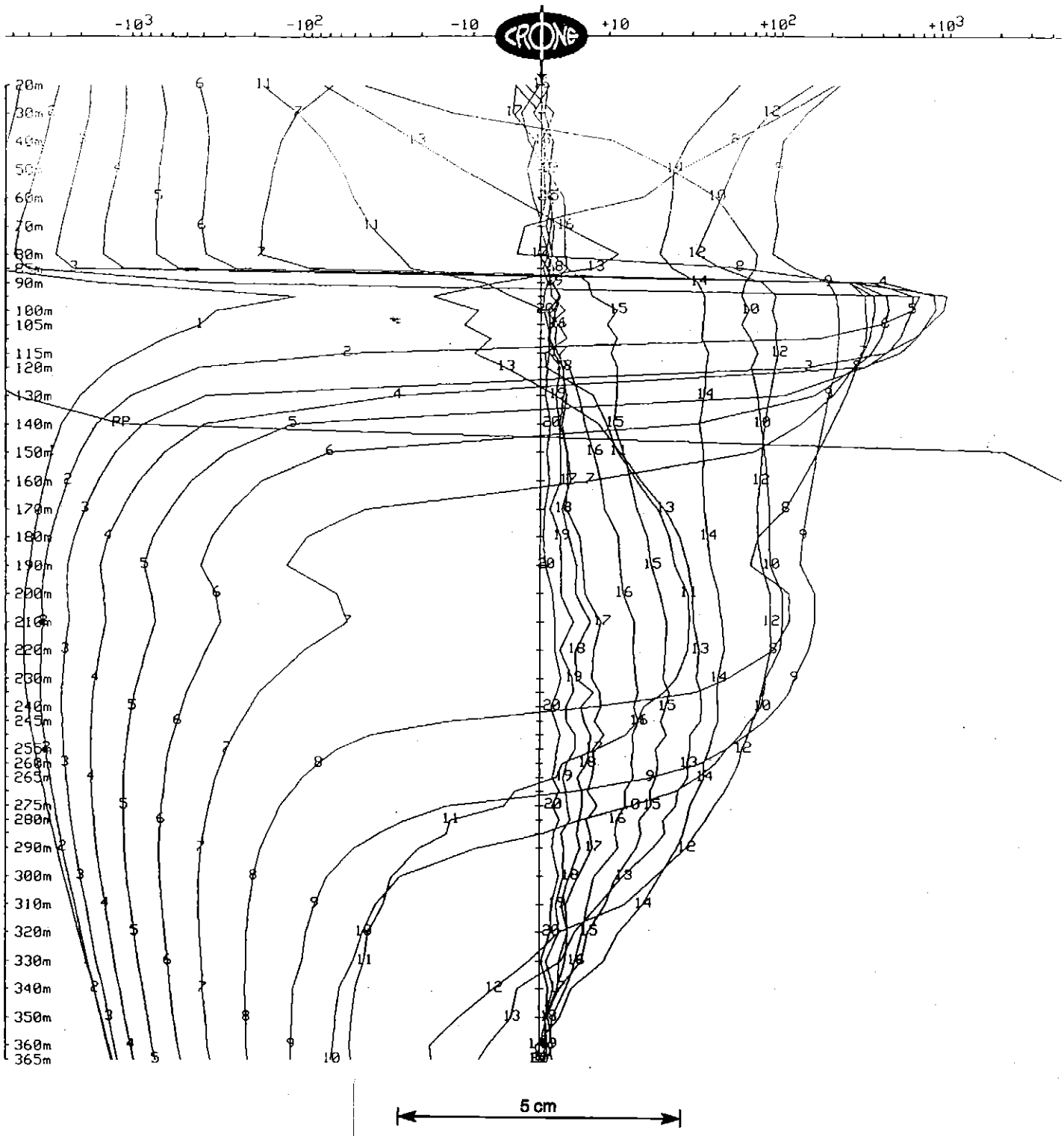
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754195

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : East |
| Date | : May 17, 1995 | File name | : SR2EZ.PEM |

Z COMPONENT dBz/dt nanoTesla/sec - 20 channels and PP

Scale: 1:2000




PAS1202a

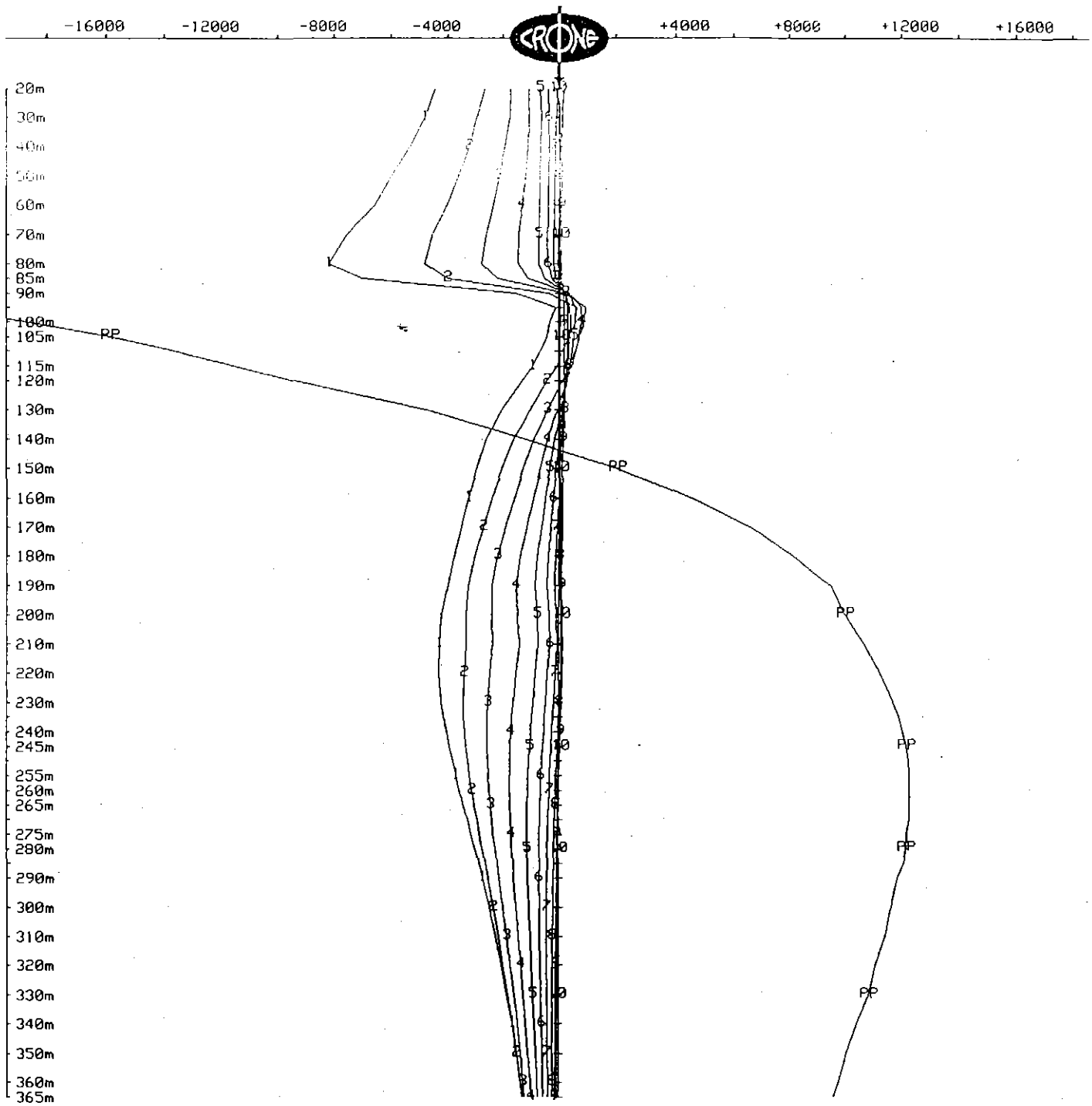
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754196

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : East |
| Date | : May 17, 1995 | File name | : SR2EZ.PEM |

Z COMPONENT dBz/dt nanoTesla/sec - 20 channels and PP

Scale: 1:2000 Unit Scale: 1cm = 2000 nT/



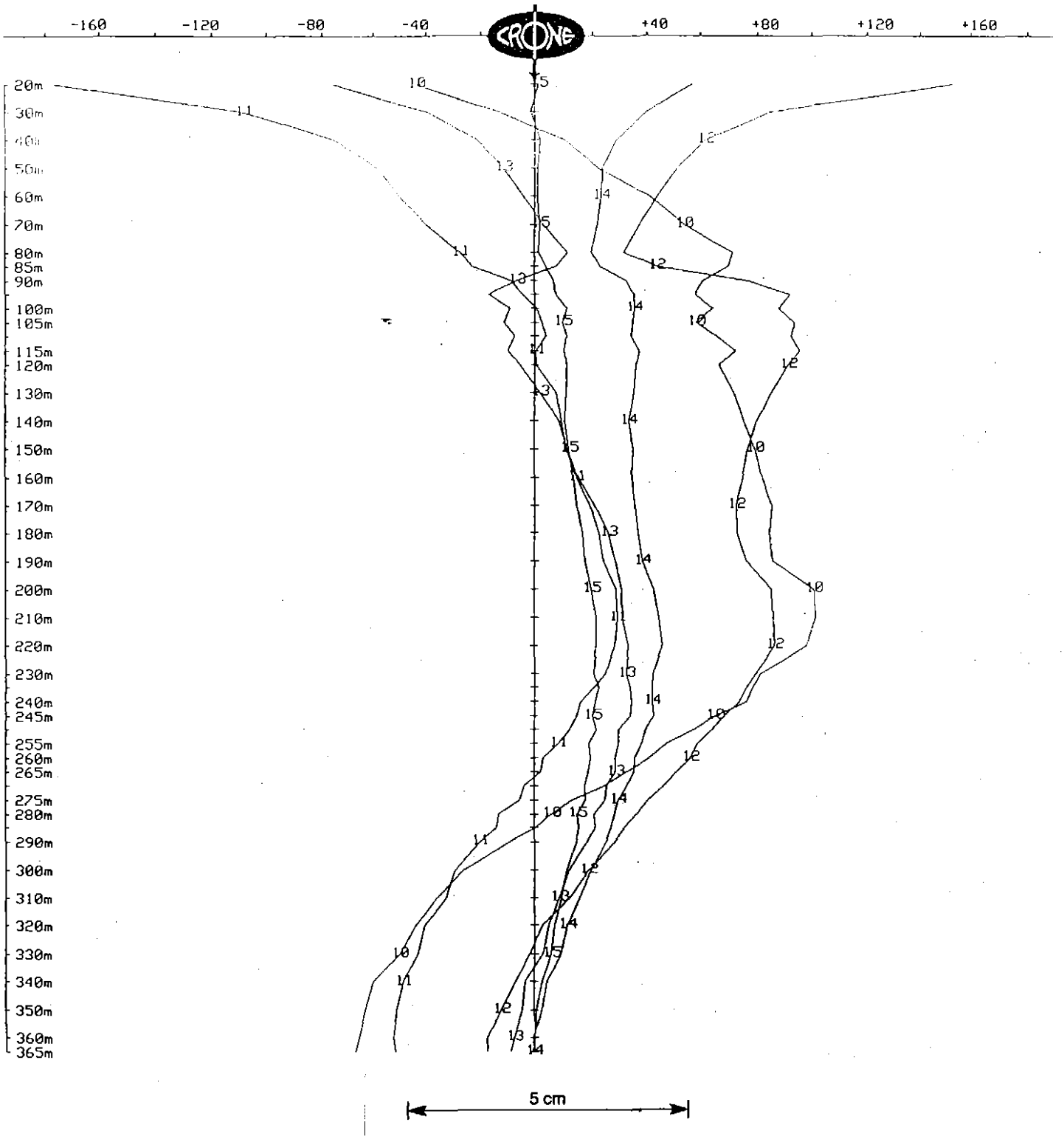
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754197

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : East |
| Date | : May 17, 1995 | File name | : SR2EZ.PEM |

Z COMPONENT dBz/dt nanoTesla/sec - 20 channels

Scale: 1:2000 Unit Scale: 1cm = 20 nT/



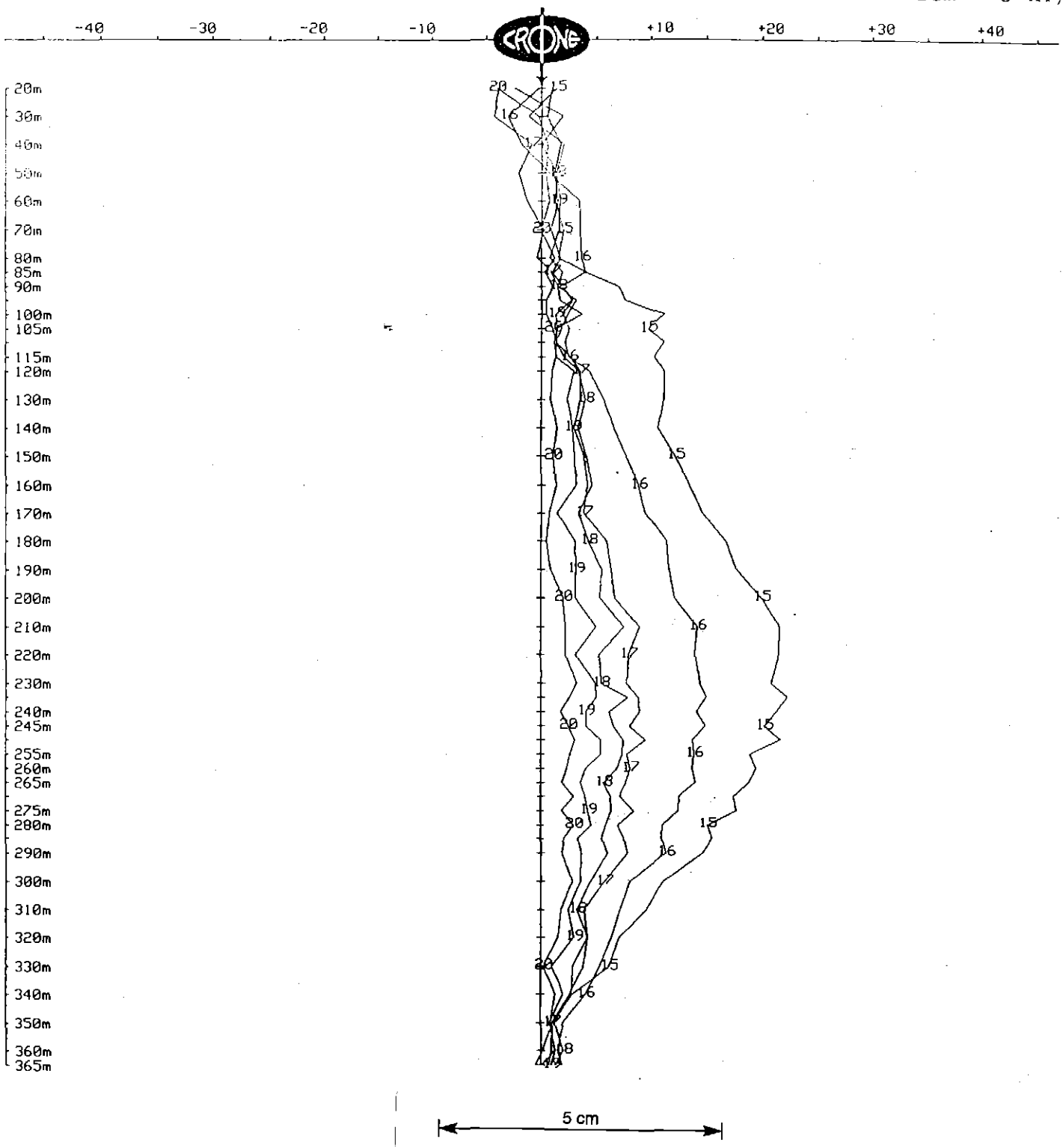
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754198

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : East |
| Date | : May 17, 1995 | File name | : SR2EZ.PEM |

Z COMPONENT dBz/dt nanoTesla/sec - 20 channels

Scale: 1:2000 Unit Scale: 1cm = 5 nT/



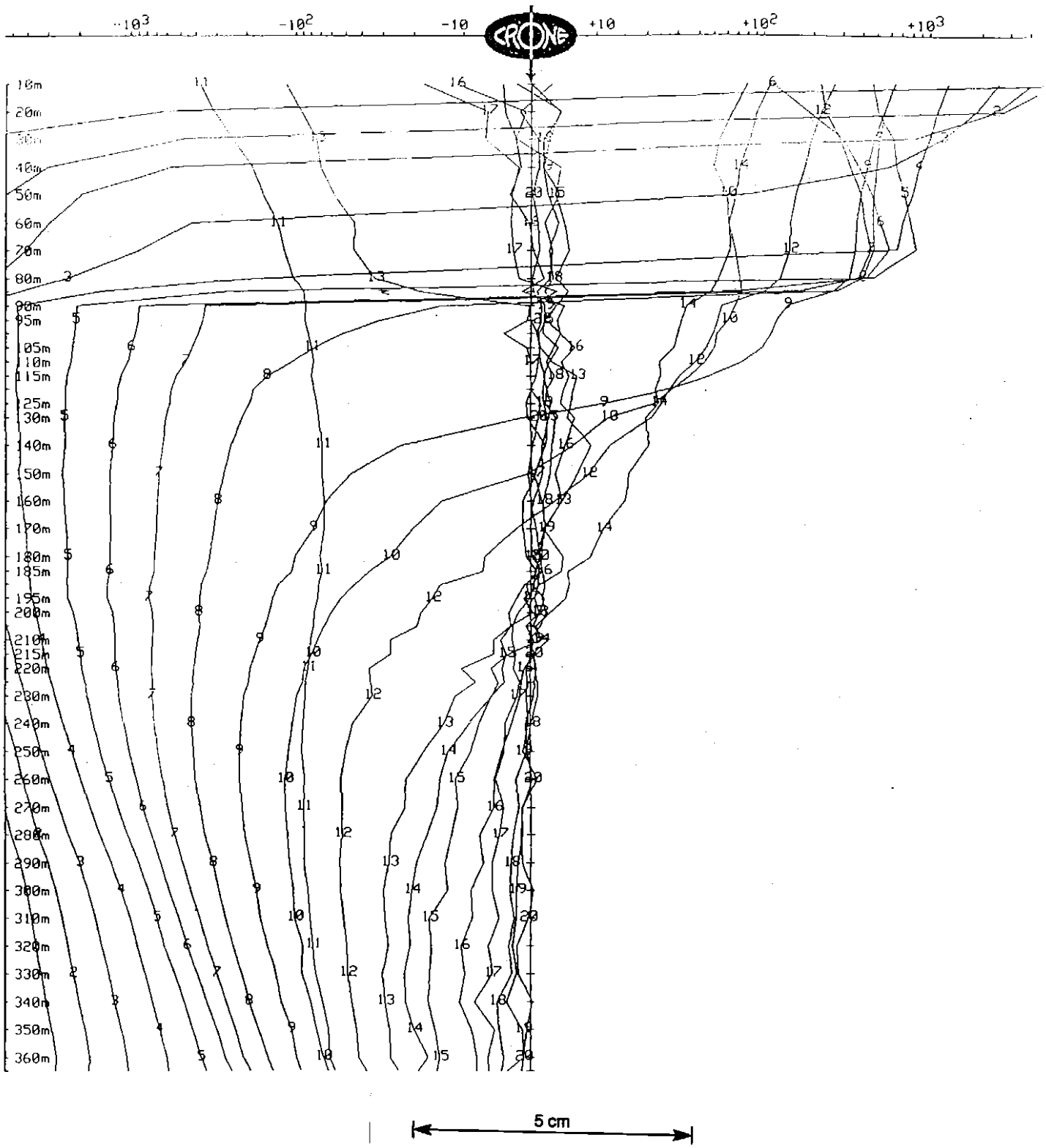
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754199

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : East |
| Date | : May 19, 1995 | File name | : SR2EXY.PEM |

Data Corrected for Probe Rotation using Orientation Tool #2
X COMPONENT dBx/dt nanoTesla/sec - 20 channels and PP

Scale: 1:2000




PAS1202b

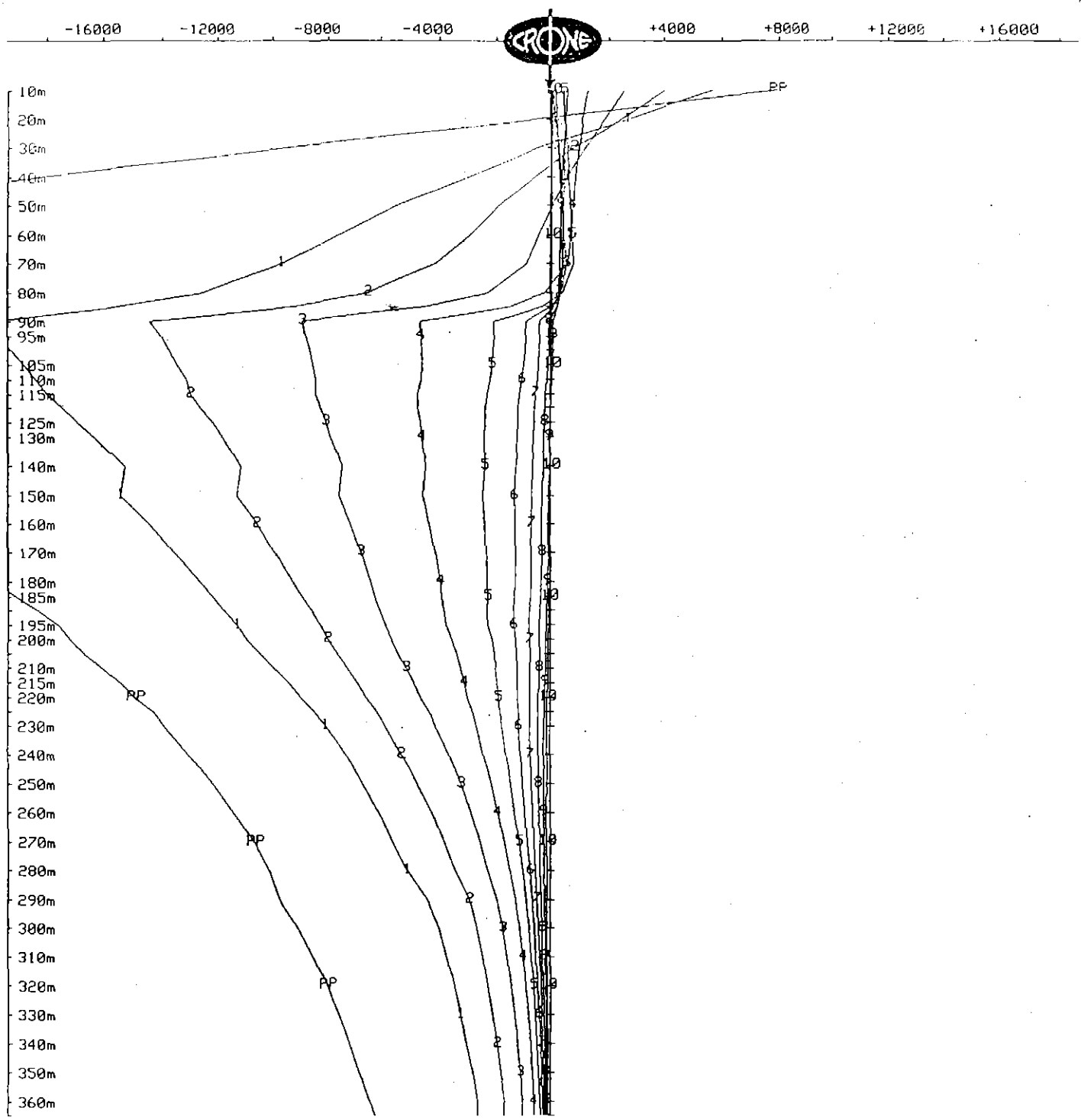
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754200

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : East |
| Date | : May 19, 1995 | File name | : SR2EXY.PEM |

Data Corrected for Probe Rotation using Orientation Tool #2
X COMPONENT dBx/dt nanoTesla/sec - 20 channels and PP

Scale: 1:2000 Unit Scale: 1cm = 2000 nT/




5 cm

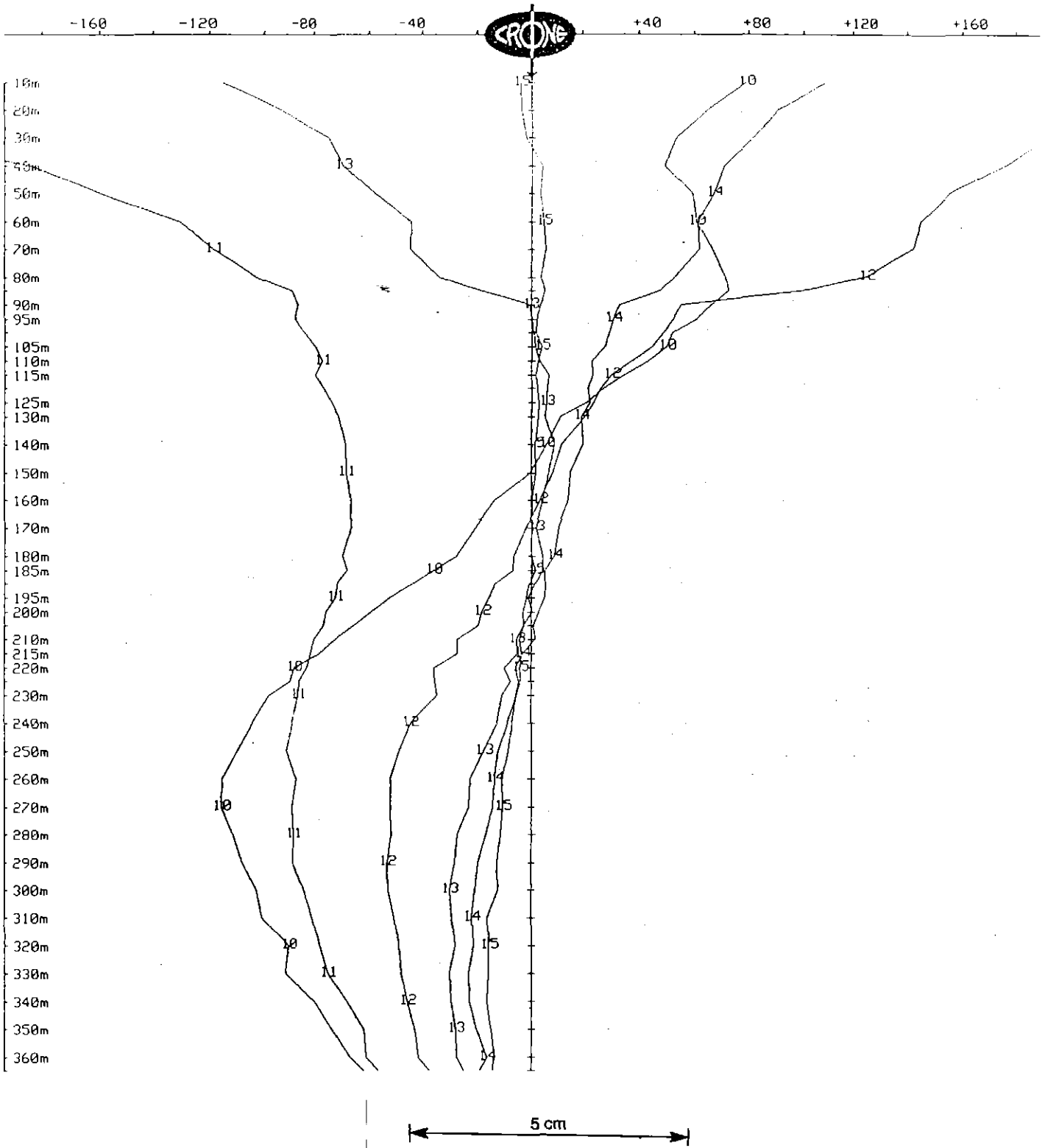
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754201

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : East |
| Date | : May 19, 1995 | File name | : SR2EXY.PEM |

Data Corrected for Probe Rotation using Orientation Tool #2
X COMPONENT dBx/dt nanoTesla/sec - 20 channels

Scale: 1:2000 Unit Scale: 1cm = 20 nT/



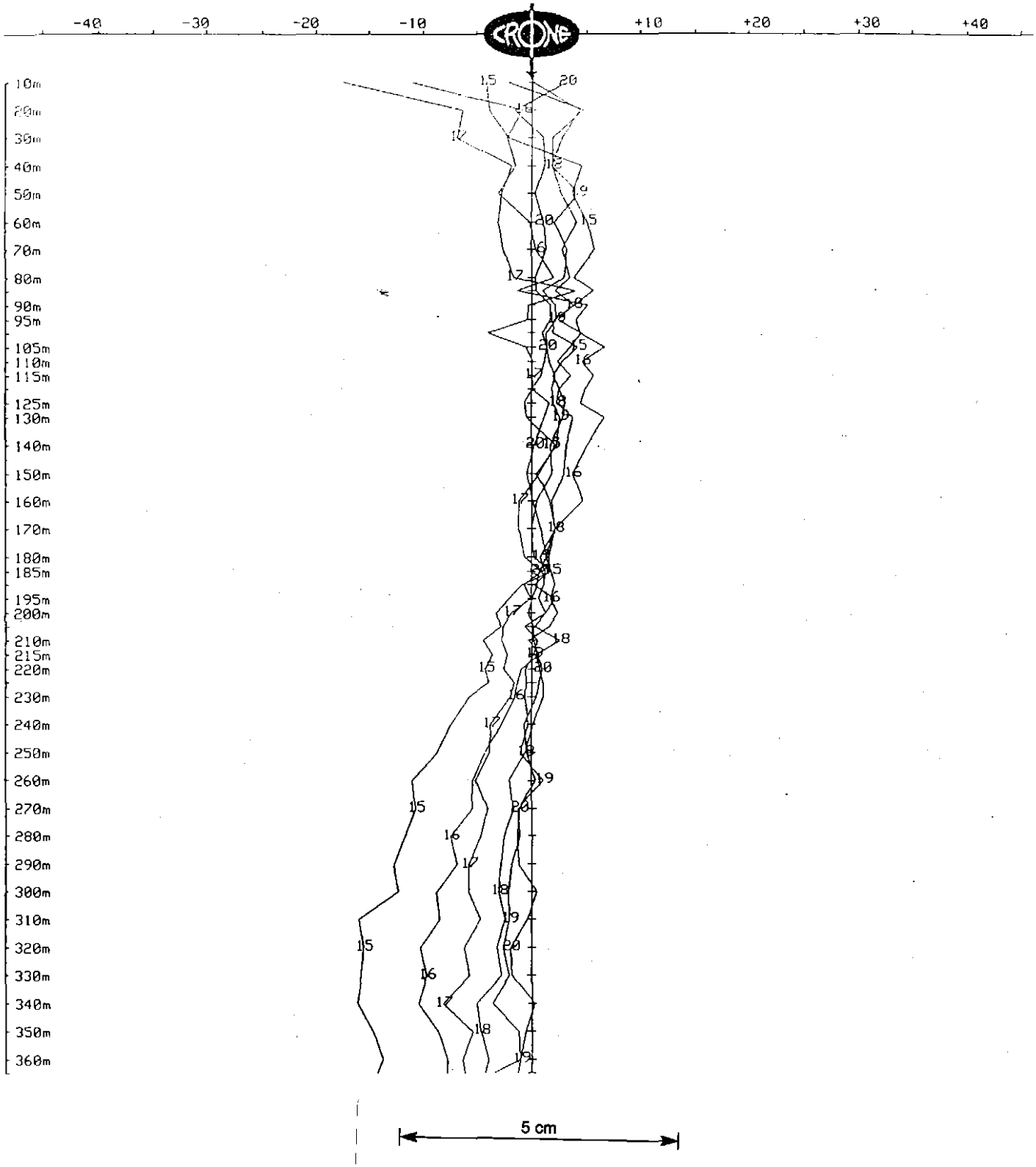
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754202

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : East |
| Date | : May 19, 1995 | File name | : SR2EXY.PEM |

Data Corrected for Probe Rotation using Orientation Tool #2
X COMPONENT dBx/dt nanoTesla/sec - 20 channels

Scale: 1:2000 Unit Scale: 1cm = 5 nT/



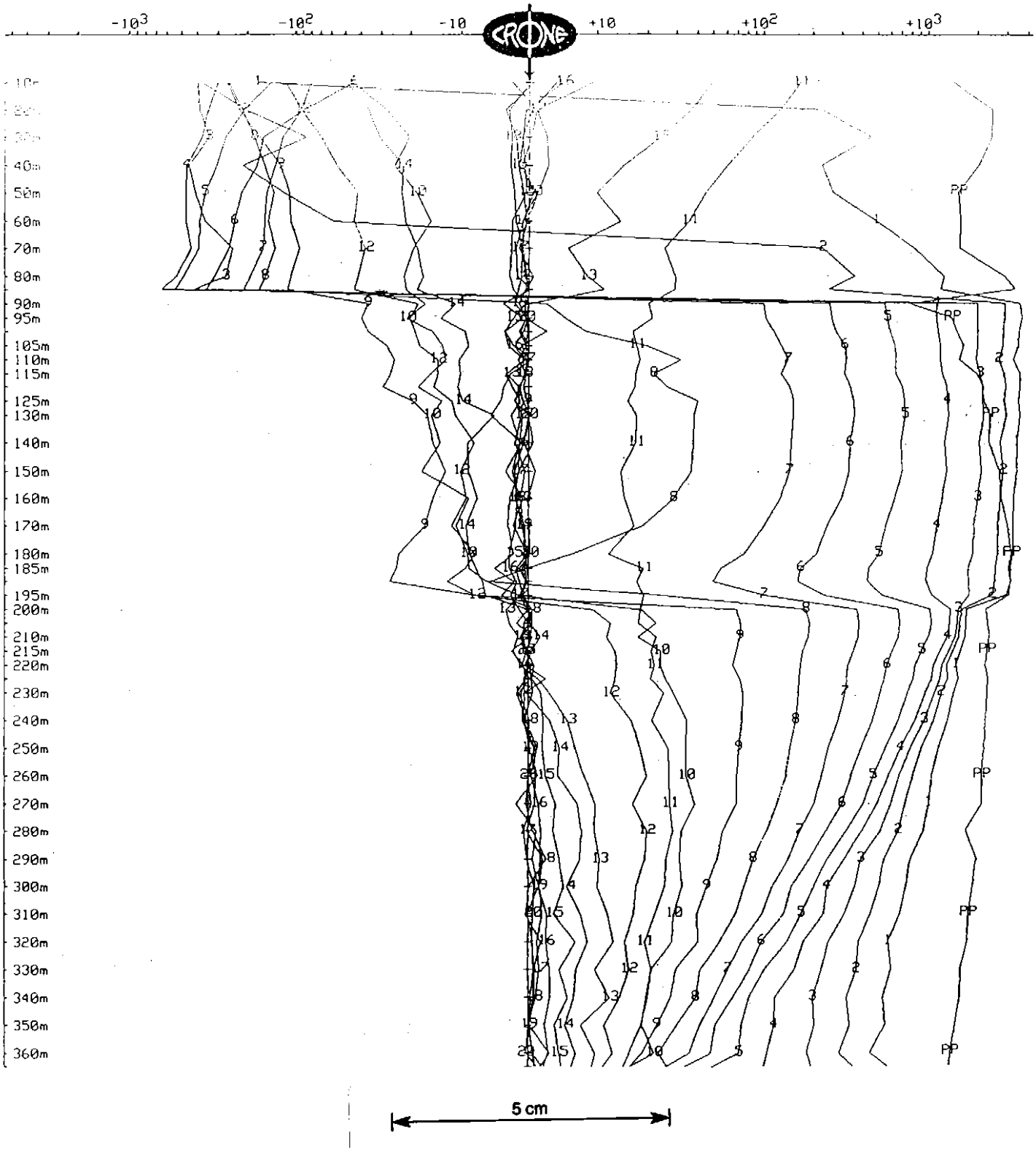
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754203

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : East |
| Date | : May 19, 1995 | File name | : SR2EXY.PEM |

Data Corrected for Probe Rotation using Orientation Tool #2
Y COMPONENT dBy/dt nanoTesla/sec - 20 channels and PP

Scale: 1:2000




PAS1202c

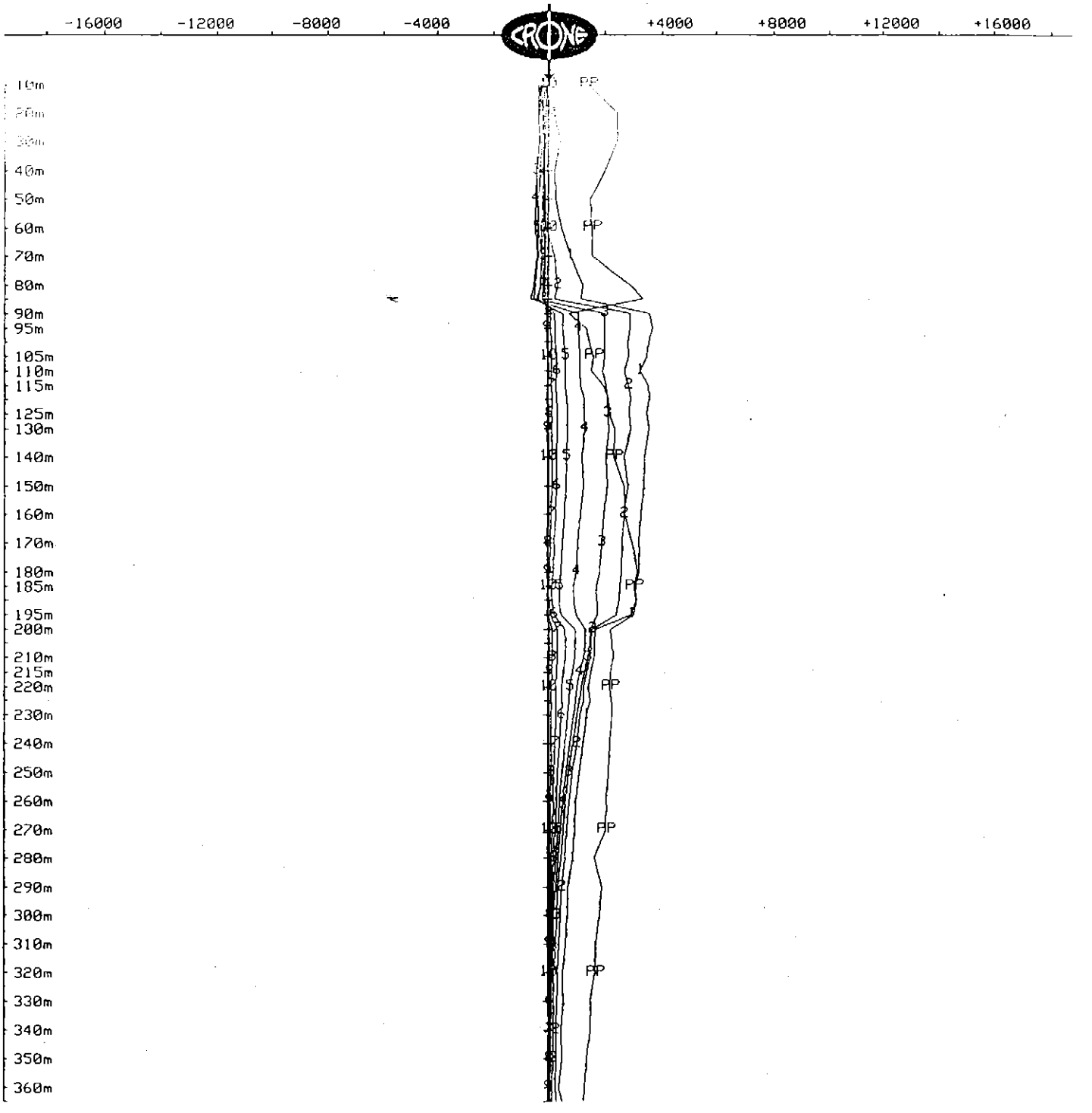
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754204

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : East |
| Date | : May 19, 1995 | File name | : SR2EXY.PEM |

Data Corrected for Probe Rotation using Orientation Tool #2
Y COMPONENT dBy/dt nanoTesla/sec - 20 channels and PP

Scale: 1:2000 Unit Scale: 1cm = 2000 nT/



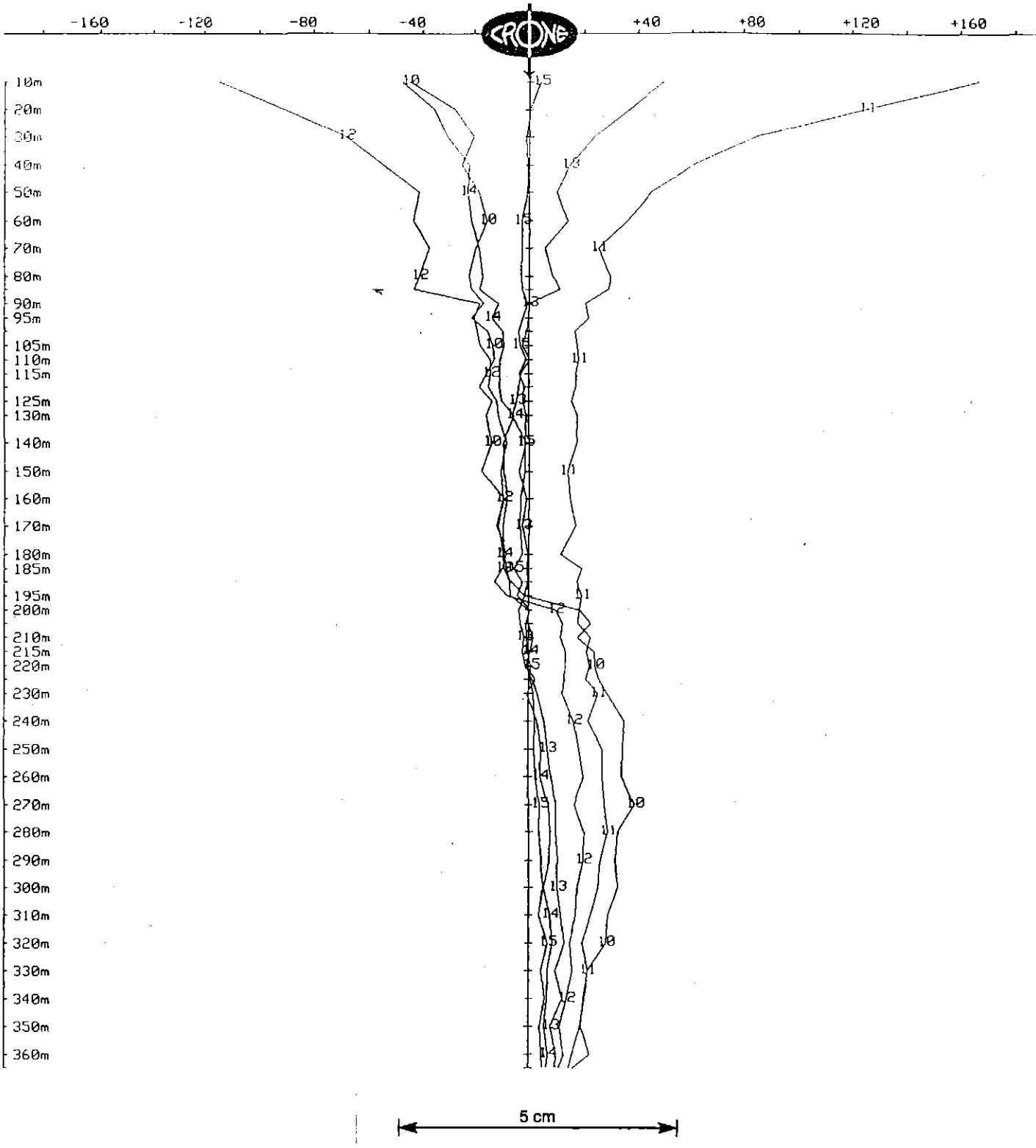
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754205

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : East |
| Date | : May 19, 1995 | File name | : SR2EXY.PEM |

Data Corrected for Probe Rotation using Orientation Tool #2
Y COMPONENT dBy/dt nanoTesla/sec - 20 channels

Scale: 1:2000 Unit Scale: 1cm = 20 nT/



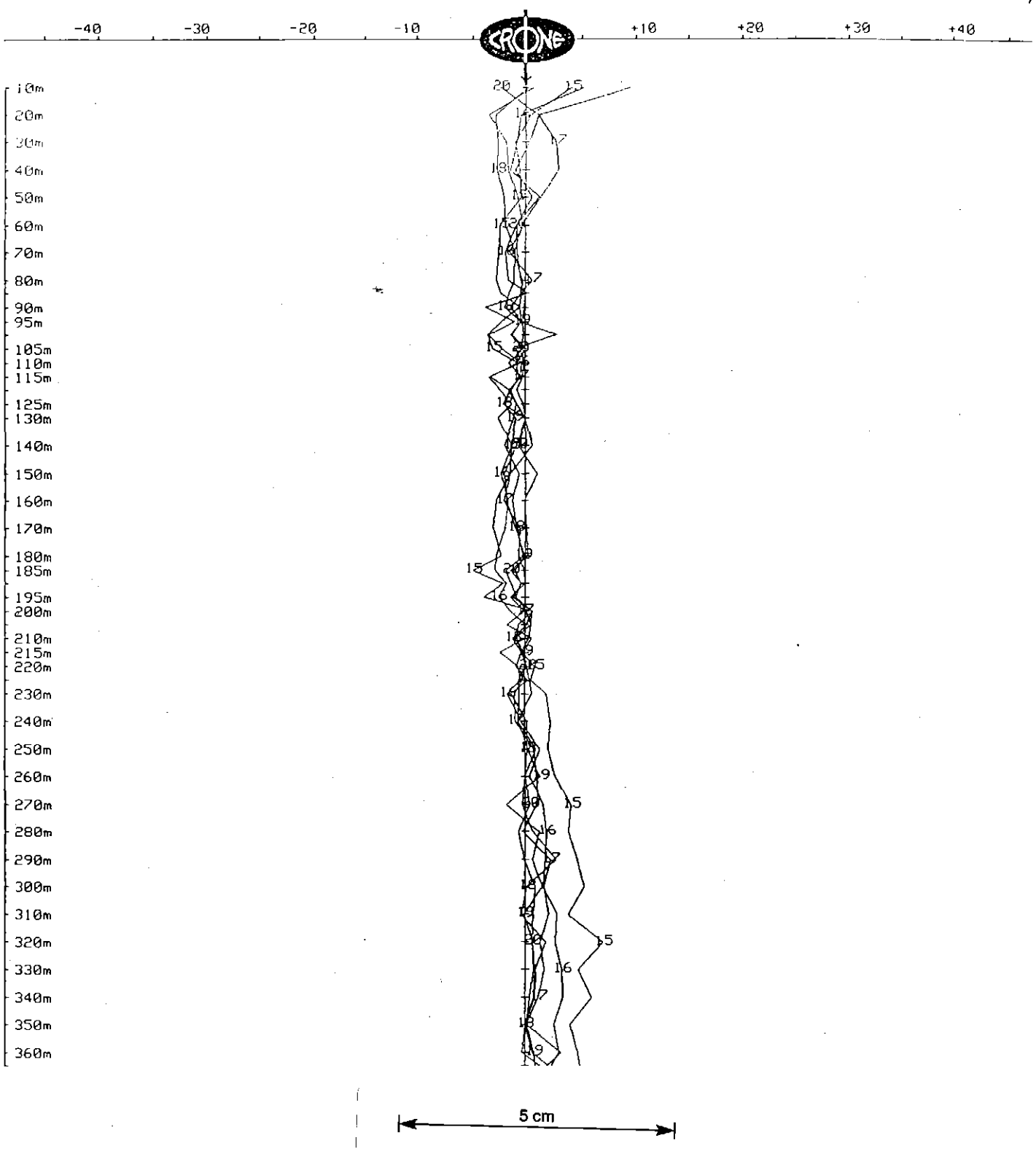
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754206

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : East |
| Date | : May 19, 1995 | File name | : SR2EXY.PEM |

Data Corrected for Probe Rotation using Orientation Tool #2
Y COMPONENT dBy/dt nanoTesla/sec - 20 channels

Scale: 1:2000 Unit Scale: 1cm = 5 nT/



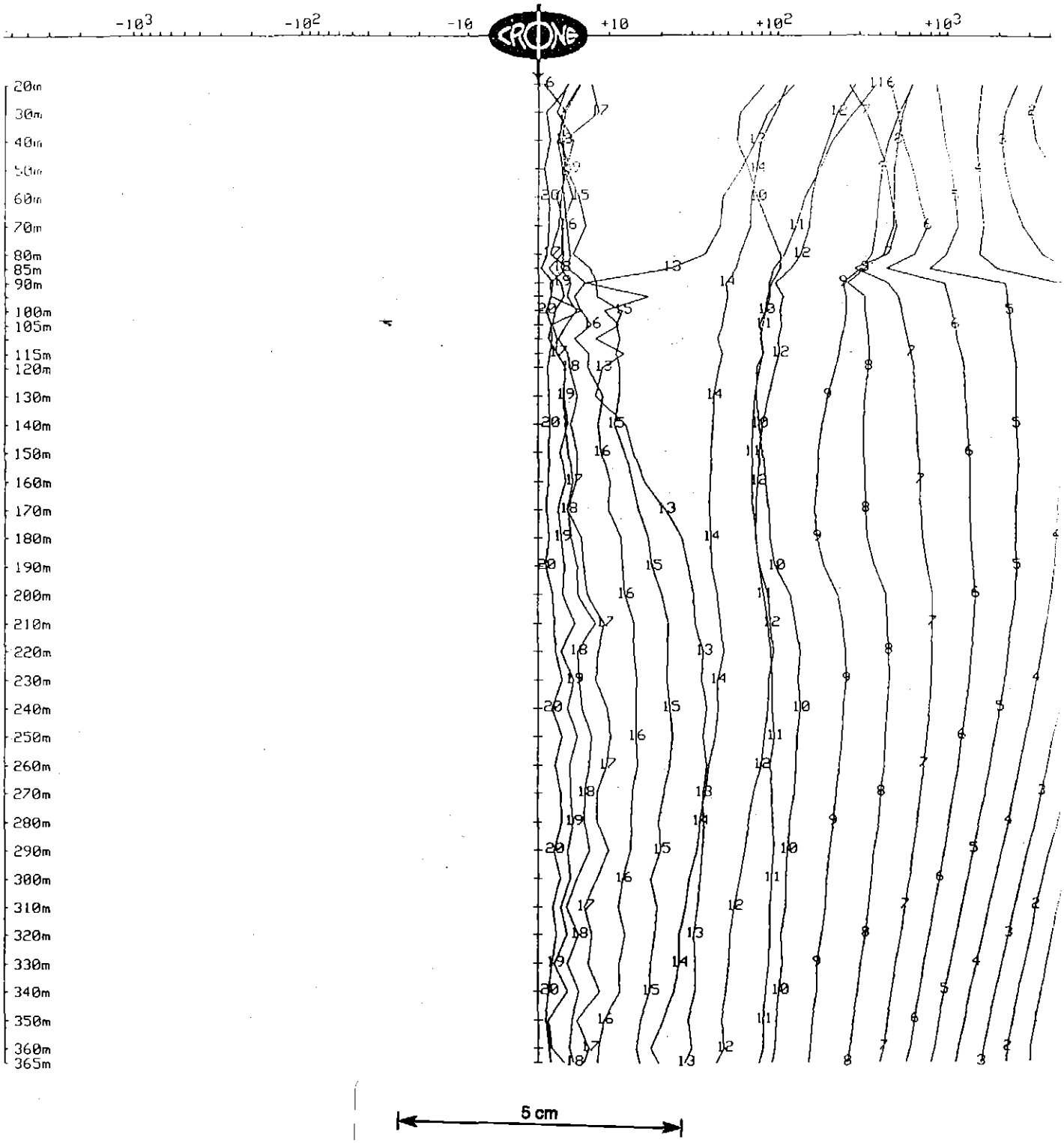
# OUTER-RIM EXPLORATION SERVICES
## Operating Crone PEM System
## BOREHOLE PEM

754207

| | | | |
|---|---|---|---|
| Client | : Pasminco Exploration | Hole | : SR-2 |
| Grid | : Sterling Valley | Tx Loop | : East |
| Date | : May 19, 1995 | File name | : SR2EXYZ.PEM |

TOTAL FIELD dBxyz/dt nanoTesla/sec - 20 channels

Scale: 1:2000




5 cm

PAS1202d

754208


**SYSTEMS EXPLORATION (NSW) PTY LIMITED**

Office: "Coach Hill" River Road Lower Portland

Postal Address: Box 6001 Dural Delivery Centre NSW 2158

Telephone: (045) 791 183

Facsimile: (045) 791 290


Data Sheet 1 of 1

Date 14 July 1995

STUDY Pasminco Lot 95/1 (Job #9550)

TECHNIQUES Elec, EM

REFERENCE P Basford 5.6.95 (P.O. No.1450)

| SAMPLES | | PHYSICAL PROPERTIES | | | | | |
|---|---|---|---|---|---|---|---|
| Sterling River | | | approx density $g/cm^3$ | mag k $cgsx10^{-6}$ (for SI, x by $4\pi$) | EM cond 100kHz 2.5MHz $\sigma$, S/m | | galvanic resist (fresh water sat) $\rho$, $\Omega m$ (1kHz) |
| # | (408-) | | | | | | |
| 1 | (45) | | 2.74 | 20 | -> 0 | | 16615 |
| 2 | (46) | | 2.81 | 115 | -> 0 | | 257 |
| 3 | (47) | sulphidic | 3.33 | 125 | -> 0 | | 147 |
| 4 | (48) | | 2.77 | 80 | -> 0 | | 89 |
| 5 | (49) | | 2.78 | 65 | -> 0 | | 4926 |
| 6 | (50) | sulphidic | 3.08 | 20 | slight | | 114 |
| 7 | (51) | sulphidic | 3.19 | 150 | slight | | 2 |
| 8 | (52) | | 2.89 | 85 | -> 0 | | 40 |
| 9 | (53) | | 2.75 | 1450 | ~ 1 | (hetero) | 258 |
| 10 | (54) | | 2.74 | 240 | ~ 0.1 | (bands) | 6828 |
| 11 | (55) | | 2.72 | 25 | -> 0 | | 7690 |
| 12 | (56) | | 2.75 | 30 | slight | | 6994 |
| | | | | | "slight" | | although some |
| | | | | | probably | | samples are |
| | | | | | due to | | sulphidic, their |
| | | | | | finely | | mineralogy & |
| | | | | | dissem | | texture operate |
| | | | | | sulphide | | against significantly |
| | | | | | with low | | enhancing |
| | | | | | effective | | conductivity |
| | | | | | (field) | | especially EM |
| | | | | | conductivity | | |

| Sample No. (408-) | Depth (m) | Geological Description |
|---|---|---|
| 45 | 79 | Graphitic black shale with disseminated py |
| 46 | 83.3 | Deformed and mineralised black shale - veined py |
| 47 | 87.1 | Deformed and mineralised black shale - semi-massive sulphide |
| 48 | 89.6 | Deformed and mineralised black shale - vein mineralisation |
| 49 | 96.4 | Siltstone/shale - vein mineralisation & disseminated py |
| 50 | 208.4 | Mineralised qtz vein |
| 51 | 198.5 | Siltstone/shale - mineralised (represents 197 to 200m) |
| 52 | 202 | Siltstone/shale - mineralised |
| 53 | 199.4 | Siltstone/shale - disseminated mineralisation |
| 54 | 214 | Siltstone/shale - graphitic foliation |
| 55 | 193 | Graphitic black shale - disseminated mineralisation |
| 56 | 72.8 | Black shale - graphitic - disseminated py |

# Appendix 9

## Geophysics over Aeromagnetic Anomaly "C"
## (PW Basford)

754211

PASMINCO
EXPLORATION

A Division of Pasminco Australia Limited,
A.C.N. 004 074 962

Old Burnie Railway Station
Burnie, Tasmania 7320
G.P.O. Box 886
Burnie, Tasmania 7320

# MEMORANDUM

**TO:** JG Purvis

**FROM:** PW Basford

**DATE:** 27 January, 1995

**SUBJECT:** **GEOPHYSICS OVER AEROMAGNETIC ANOMALY C**

FILE: EP/02/3012/8.4

---

An aeromagnetic survey carried out by Geoex over Sterling Valley 4/73 in 1978 detected several significant anomalies were detected along and parallel to the HFZ in the Stirling Valley and Murchison River grid regions. Five anomalies are highlighted in many reports and have been summarised by Hall, Hungerford and Purvis (1988). One of these anomalies is associated with the Arsenic Resource discovered by EZ. Of the other four, three have been drill tested, results for which vary from the proposed source being intersected (often pyrrhotite) to the target not apparently being tested fully. The fourth anomaly was down graded and thought to be from magnetic volcanic rocks (dykes).

Several generations of induced polarisation have been carried out along the Sterling Valley and Murchison River grids. Ground magnetics have also been recorded along these lines.

The anomaly that remains untested has been the subject of investigation by Pasminco since the recently compiled aeromagnetic data (Geoterrex and Geoff Dickson) was finalised. Purvis (1994) has labelled it anomaly C (label to be used for this memo),

however, it has been previously labelled and it is referenced as anomaly E (Dighem aeromagnetics) in a 1988 Billiton report (Hall, Hungerford & Purvis). Four generations of induced polarisation data have passed close to or over part of anomaly C. A fifth induced polarisation survey carried out in 1976 by Cominco covered grid lines north of it.

From 1976 to 1989 ground magnetic surveys have been carried out over the Sterling Valley grid. Cominco's survey in 1976 failed to detect the aeromagnetic anomaly as it did not traverse far enough west and south. However, a follow up survey by Scintrex for EZ in 1982 did highlight the aeromagnetic anomaly (this survey was conducted due to the success of the 1980 ground magnetic survey over the northern section of the Sterling Valley grid and Murchison River/Tullah grids). The ground magnetic data revealed a strike extensive anomaly that has been bisected at around 2540N by a fault. The northern section of the anomaly (greatest coverage by induced polarisation) also thins at its southern end and has two discrete highs on its eastern edge, along lines 2900N and 3080N.

In 1961 McPhar carried out a 300ft frequency domain dipole-dipole survey on the Sterling Valley grid. Only lines 28S, 32S and 36S are of interest. From the 1979 Mt Black progress report one is able to equate the old lines to the later lines (ie line 28S = 3080N and 36S = 2840N). Data on the west edge for the three lines was extremely resistive and the frequency effect was background, however the three lines only went as far west as 900ft (300m) and thus did not sample any part of the aeromagnetic anomaly. Lines 24S (3200N) was recorded north of the anomaly and line 44S (2600N) was recorded east of the anomaly.

In 1979 Scintrex were contracted to carry out induced polarisation surveys over the entire Sterling Valley grid (later complimented by ground magnetic surveys). From this four more lines crossed or passed close to anomaly C; 2360N, 2600N, 2840N and 3080N.

Line 2360N extends over the eastern edge of the 'southern' anomaly. Induced polarisation data is very resistive on the western limit of surveying, with weak to

moderate chargeability. Line 2600N is located at the southern edge of anomaly C north. It too only extends to the eastern edge of the magnetic anomaly ending with high resistivity and weak to moderate chargeability. A high 'near surface' chargeability was recorded over the eastern edge of the magnetic anomaly (magnetic low), however, this single point is not worth following up. Line 2840 stops too far east of the magnetic feature to warrant any association. It should be noted that at the western limit of the line the response was of high resistivity and low chargeability. None of the three lines have indicated a sulphide response, neither have they confirmed the absence of sulphides, as the induced polarisation data did not extend far enough on to or over the magnetic anomaly.

The fourth line (3080N) traversed over the northern section of anomaly C north, stopping at the western edge of the magnetic anomaly and totally crossing one of the isolated magnetic features. No induced polarisation response was recorded over either of the magnetic features, thus down grading the prospectivity of the magnetic feature at its northern extent. It would have been useful to see the traverse continue over the western edge of the anomaly to determine if there truly is no response.

Scintrex in 1982 surveyed four more lines over the grid with one specifically targeted over the magnetic anomaly (line 3020N). This line covered most of the feature, returning a resistive response. There is however a length of lower resistivity (down a dipole) but it is not significant enough to indicate an anomaly. Again the survey should have been extended further west to fully cover the anomaly. Never the less, it does downgrade the potential for disseminated sulphides.

Billiton conducted a gradient array induced polarisation survey over the southern half of the Sterling Valley grid in 1987, with the northern most line of the survey located approximately between the two portions of anomaly C. The only data available from this survey are contours of chargeability and resistivity. Chargeability data infers an increase in response in the northwest corner of the grid, where the magnetic feature is located. This is coincident with a drop in the resistivity, however, the values are not comparable to the low over the arsenic resource and the drop in resistivity may be a sympathetic response from the high over the HFZ.

The only other data found to exist over the aeromagnetic anomaly is the Dighem flown in 1984. It traversed the entire Sterling Valley 4/73 tenement (part of a larger survey also covering Mt Black 1/62). There is a significant EM response (low resistivity) over the Arsenic resource, however, there is no equivalent response over anomaly C. It should be noted however that an apparent low exists over the southern section of anomaly C. The low is high compared to the Arsenic resource. The cause of the low resistivity was not explained by EZ.

Although anomaly C appears to have no induced polarisation response at its northern limits (two lines), the remainder of the induced polarisation data does not conclusively indicate the absence of a sulphidic source. This is made more significant considering the geology dips west and the surveys stopped well east of or on the eastern margin of the magnetic feature.

References

Bishop J.R., 1982. Memorandum to R. Sainty - Sterling Valley Geophysics. Pasminco Burnie Library TSV40.

Hall D.B., Hungerford N. & Purvis J.G., 1988. E.L. 4/73 - Sterling Valley Final Report and Report on Exploration to 6th March, 1988. Billiton report no. 08.3912. Pasminco Burnie Library TSV55.

Hallof P.G., 1961. Memorandum on the induced polarisation results from the Stirling Valley Grid near Rosebery, Tasmania. EZ report 5T/23d. Pasminco Burnie Library TSV17.

Howland-Rose A.W., 1980. A report on dipole-dipole electrical induced polarisation surveys over the Sterling Valley grid near Rosebery, Tasmania on behalf of Electrolytic Zinc Company of Australasia Limited. Scintrex report TAS-065; EZ report 315.04/9T. Pasminco Burnie Library TSV31

McDonald I.R., 1981. Sterling Valley Exploration Licence E.L. 4/73 Progress Report on Activity July, 1980 - June, 1981. EZ Report No. 143 (Geological Department).

Pasminco Burnie Library TSV 35.

McDonald I.R., 1985. Exploration Licence No. 4/73 - Sterling Valley. Annual Report on Exploration Activity 2nd May, 1984 to 6th March, 1985. EZ Report No. T202. Pasminco Burnie Library TSV48

Mill J.H.A., 1980. Mt. Black exploration licence 1/62. Report on work undertaken to 30th June, 1979. EZ Report No. 131 (Geological Department). Pasminco Burnie Library MTB20.

Mollison A.J., 1980. Sterling Valley Exploration Licence E.L. 4/73 Progress Report on Activity July, 1979 - June, 1980. EZ Report No. 133 (Geological Department). Pasminco Burnie Library TSV 33.

Purvis J.G., 1994. Annual Report for the Period September 1993 - September 1994. Pasminco Exploration Report T94-8. Pasminco Burnie Library TSV72.

Sainty R.A., 1982. Exploration Licence No. 4/73 - Sterling Valley. Progress Report on Exploration Activity 16th December, 1981 to 4th May, 1982. Appendix 5 - J.R. Bishop: Memorandum concerning results of Sterling Valley Ground Magnetic Survey. EZ Report No. 150 (Geology Department). Pasminco Burnie Library TSV39

Simpson D.C., 1976. Progress report on Exploration Licence 4/73 Sterling Valley, Tasmania for six months ending March 6, 1976 (and summarising work carried out in the previous six months period). Pasminco Burnie Library TSV25.

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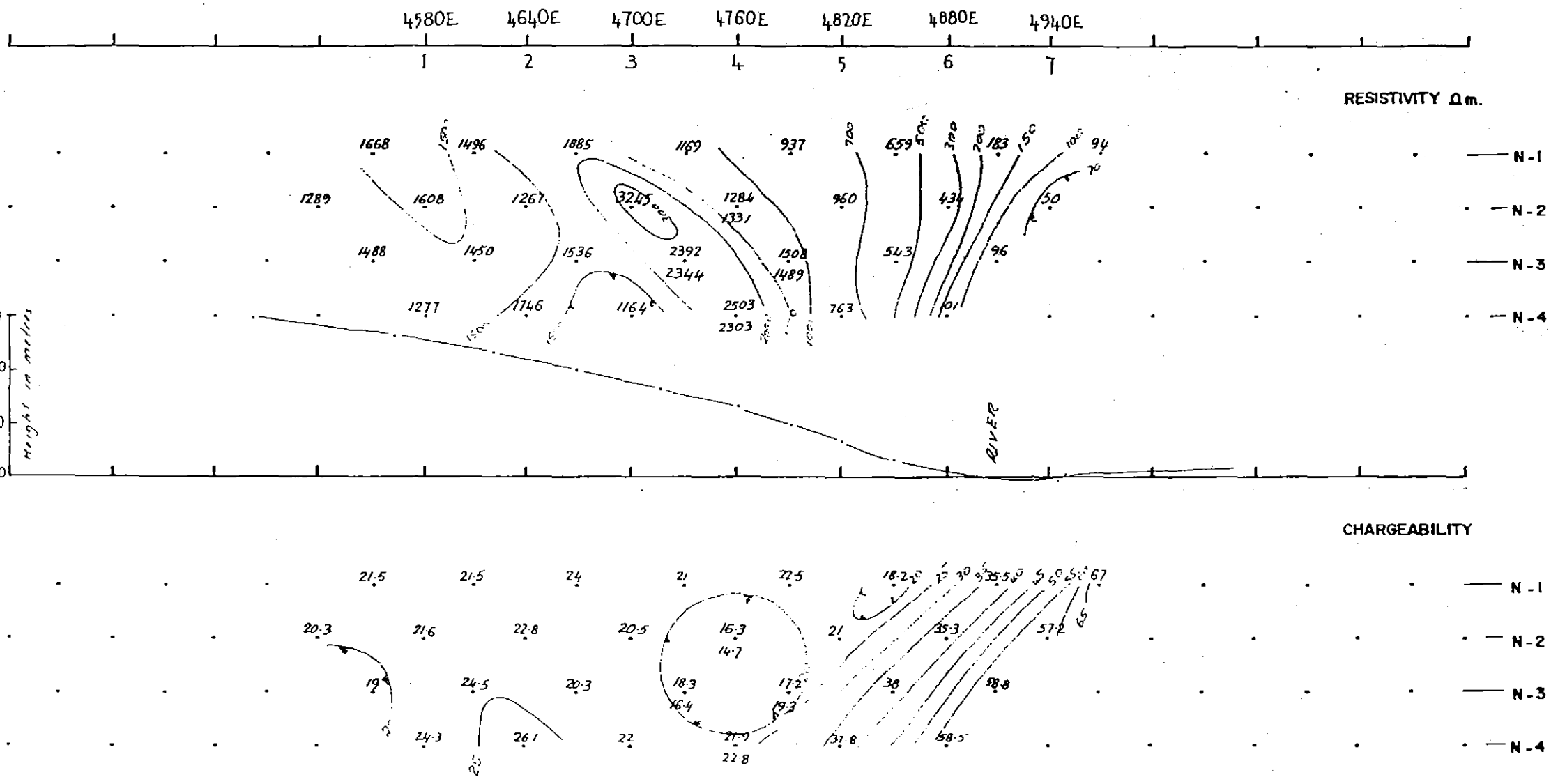
754216

# SCINTREX PTY. LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY

DIPOLE - DIPOLE ARRAY

| | |
|---|---|
| DATE 12-10-79 | LINE No. 3080 N |
| PLOTTED BY T.V.S. | PROSPECT STERLING VALLEY |
| PULSE 2 sec / Rx. | JOB No. TAS-065 |
| DIPOLE SPACING 60 m | |



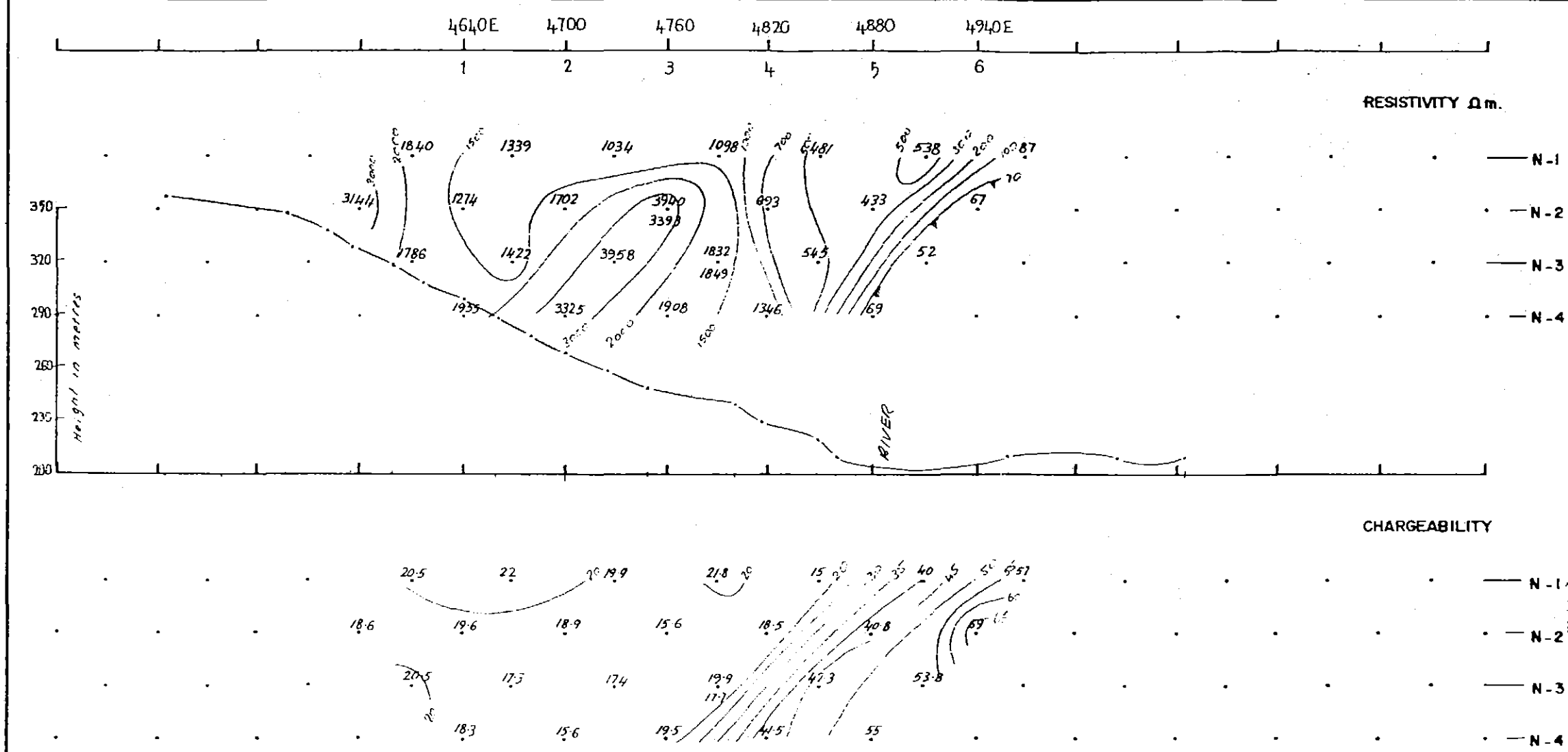
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# SCINTREX PTY. LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY

## DIPOLE - DIPOLE ARRAY

| | |
|---|---|
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| PLOTTED BY T.V.S. | PROSPECT STERLING VALLEY |
| PULSE 2 sec / Rx. | JOB No. TAS-065 |
| DIPOLE SPACING 60 m | |



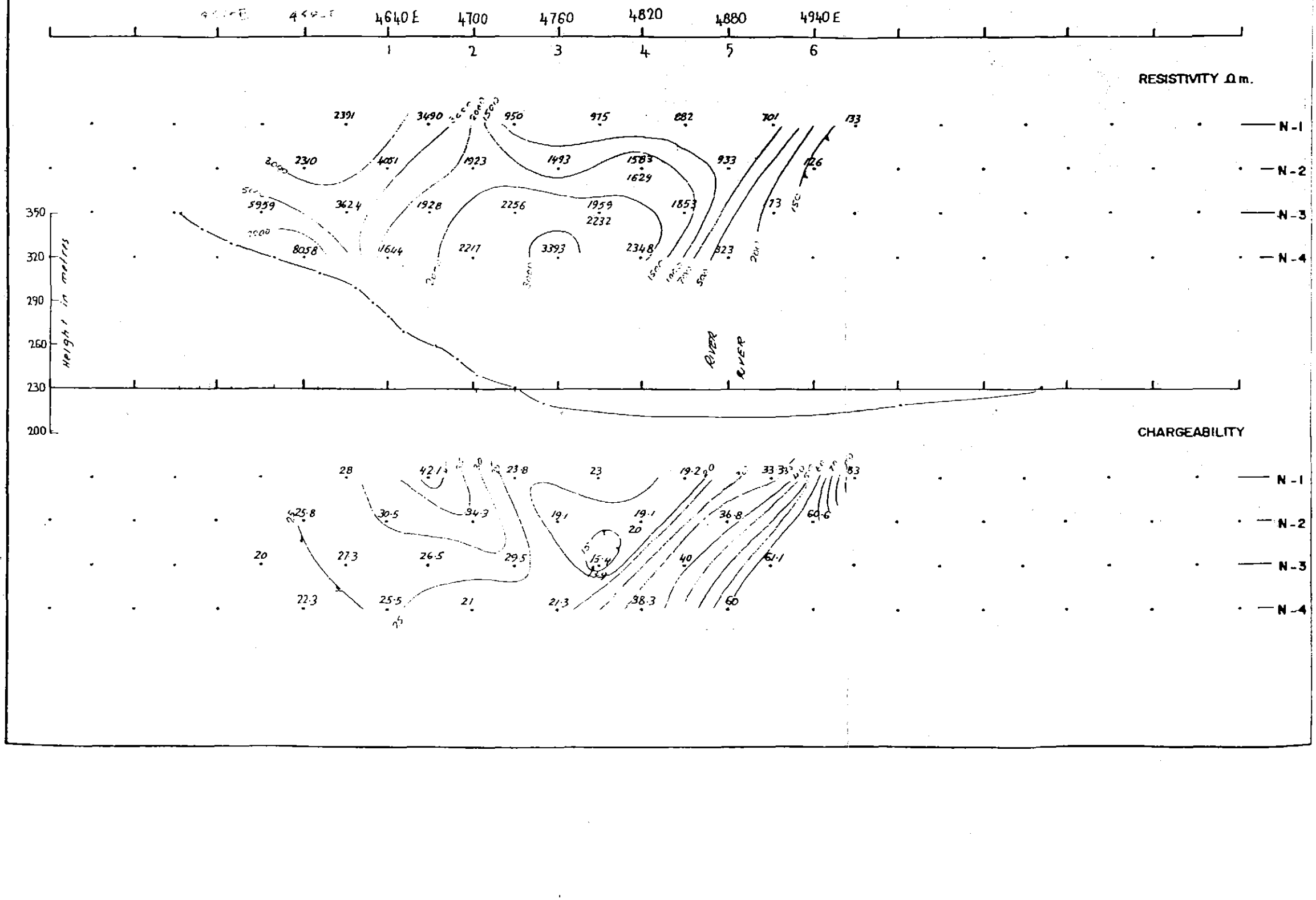
754218

# SCINTREX PTY. LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY

## DIPOLE - DIPOLE ARRAY

| | |
|---|---|
| DATE 14 - 10 - 79 | LINE No. 2600N |
| PLOTTED BY T.V.S. | PROSPECT STERLING VALLEY |
| PULSE 2 Sec / Rx. | JOB No. TAS - 065 |
| DIPOLE SPACING 60m | |



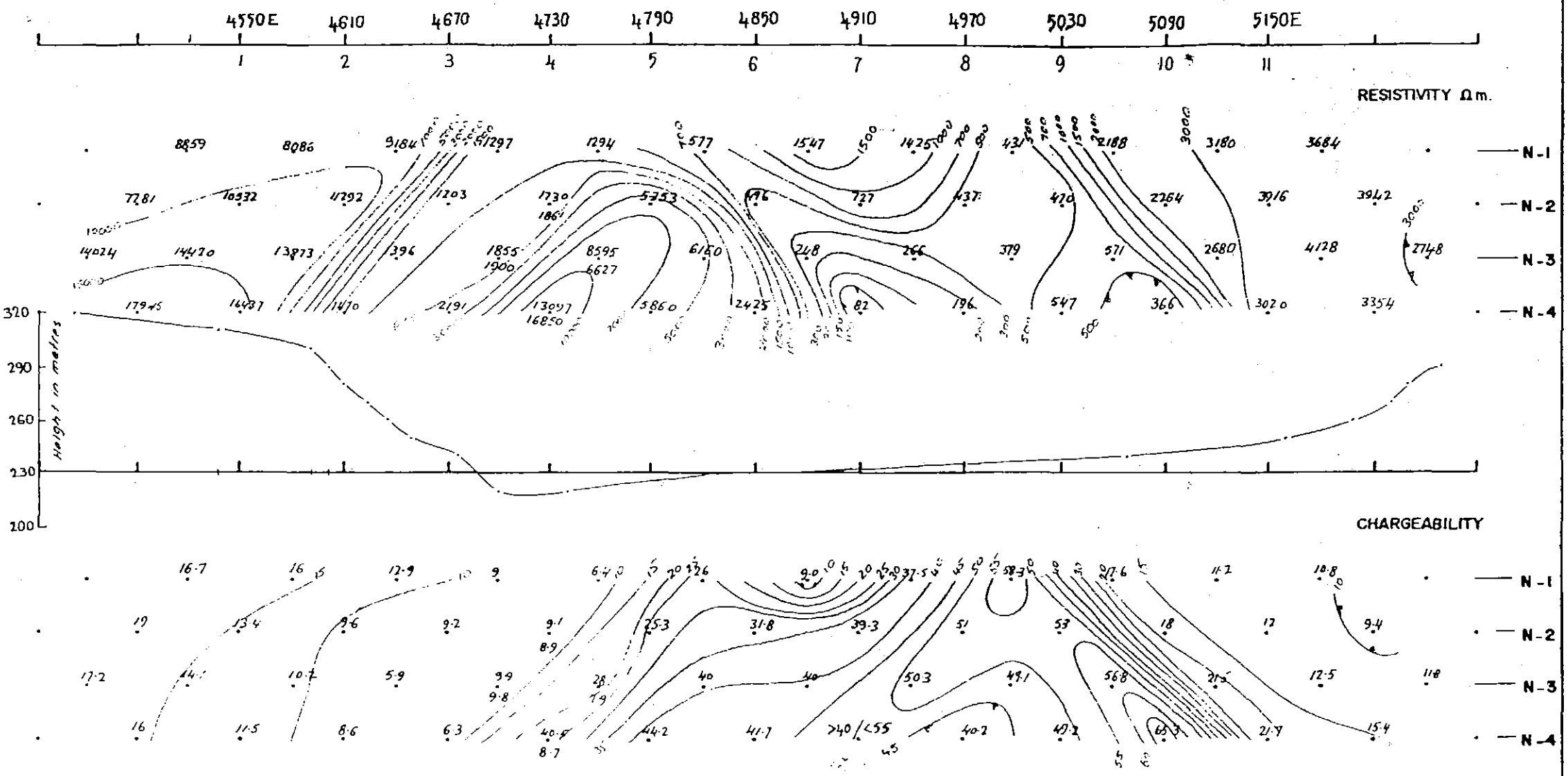
754219

# SCINTREX PTY. LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY

DIPOLE - DIPOLE ARRAY

| | |
|---|---|
| DATE 29-9-79 | LINE No. 2360 N |
| PLOTTED BY T.V.S. | PROSPECT STERLING VALLEY |
| PULSE 2 sec / Rx. | JOB No. TAS-065 |
| DIPOLE SPACING 60 m | |



754220

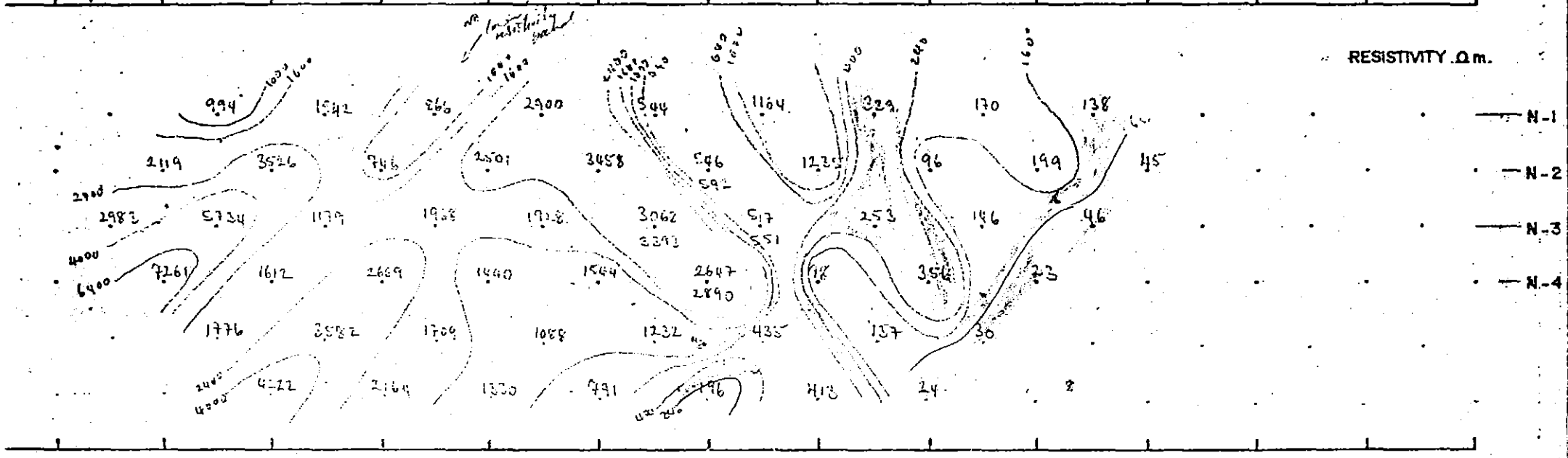
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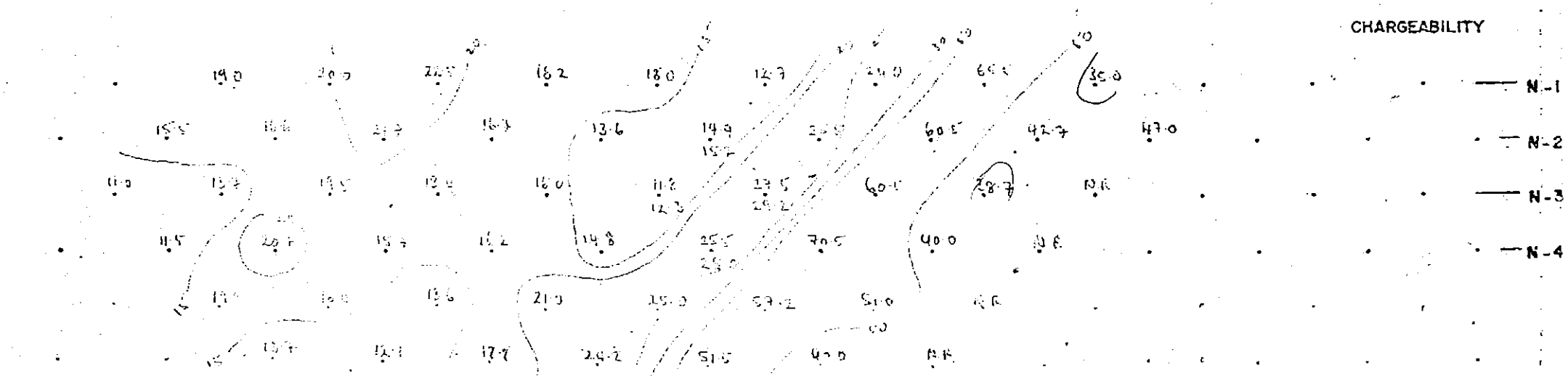
INDUCED POLARIZATION AND RESISTIVITY SURVEY

## DIPOLE - DIPOLE ARRAY

| | |
|---|---|
| DATE | LINE No. 3020N |
| PLOTTED BY R P | PROSPECT STERLING VALLEY |
| PULSE 2 SEC / Rx. 1.6SEC | |
| DIPOLE SPACING 60m | JOB No. TAS 094 X. |

Scale 1:3000



754221

PASMINCO
EXPLORATION

# MEMORANDUM

**TO:** JG Purvis
**FROM:** PW Basford
**DATE:** 2 February, 1995
**SUBJECT:** **AEROMAGNETIC ANOMALY C: AMENDMENT**
**FILE:** EP/02/3012/8.4

---

1) The previous memorandum did not contain any data from the induced polarization data over line 3260N. Two different dipole spacings were employed over this line in 1982 (Bishop), one using the normal 60m dipole width, the other a 30m dipole. A significant resistivity low was observed coincident with a confusing yet anomalous chargeability zone. A shallow but depth extensive source is assumed to be the source, as the anomaly is observed to the largest dipole spacing (n=6) for both the small and larger spaced surveys.

This resistivity low was also observed on the line 60m north; 3320N (initially not included on plan). It too displays a strange chargeability response. The centre of the anomaly on all three lines is around 4590E, however, it is further east at depth.

These induced polarization anomalies are coincident with a thin spine of high magnetics, stretching north from anomaly C. Drill hole STP283 was designed to test the coincident geophysical anomaly and intersected disseminated pyrite and pyrrhotite. The geological logs (McDonald, 1986) did not indicate if the magnetic source was intersected, however, the presence of pyrrhotite does infer both targets were realised.

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The significance of this data is that sulphides are present and appear to be associated with the northern most extent of anomaly C. The fact that the two lines further south (3080N and 3020N) did not have an induced polarization response may not preclude the presence of sulphides, as any sulphides present may not be electrically connected.

The mineralisation intersected in hole STP283 was noted as being very similar in style to the Arsenic Resource (page 6 in McDonald, 1986). This dramatically improves the prospectivity of the entire zone of magnetics around and including anomaly C.

2) The statement about the shallow chargeability response on line 2600N was incorrect. In fact, due to its proximity to and being along strike from a magnetic high, it is indeed worth further investigation. It is not a single point but a zone of anomalous induced polarization (pers. comm with Purvis).

References

Basford P.W., 1994. Memorandum to J.G. Purvis - Geophysics over aeromagnetic anomaly C.

Bishop J.R., 1982. Memorandum to R. Sainty - Sterling Valley Geophysics. Pasminco Burnie Library TSV40.

McDonald I.R., 1986. Exploration Licence No. 4/73 - Sterling Valley. Annual Report on Exploration Activity 7th March, 1985 to 6th March, 1986. E.Z. Report No. T214. Pasminco Burnie Library TSV51.

PWB:95006

5 cm

# SCINTREX PTY. LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY

## DIPOLE - DIPOLE ARRAY

mag high

| | |
|---|---|
| DATE 754223 | LINE No. 326 |
| PLOTTED BY | PROSPECT |
| PULSE 2 sec | Rx. 2 sec |
| DIPOLE SPACING 60 m | JOB No. |

IP Rs

Scale 1:3000

STP 283

RESISTIVITY Ωm.

N-1
N-2
N-3
N-4
N-5
N-6

CHARGEABILITY

N-1
N-2
N-3
N-4
N-5
N-6

5 cm

# SCINTREX PTY. LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY

## DIPOLE - DIPOLE ARRAY

DATE 754224

PLOTTED BY G.F.

PULSE [illegible] Rx. [illegible]

DIPOLE SPACING 30m

LINE No. 3260N

PROSPECT [illegible]

JOB No. [illegible]

Scale 1:3000

RESISTIVITY Ωm.

N-1 N-2 N-3 N-4

CHARGEABILITY

N-1 N-2 N-3 N-4

5 cm

# SCINTREX PTY. LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY

## DIPOLE - DIPOLE ARRAY

D [illegible] 754225

PLOTTED BY [illegible]

PULSE [illegible] Rx. [illegible]

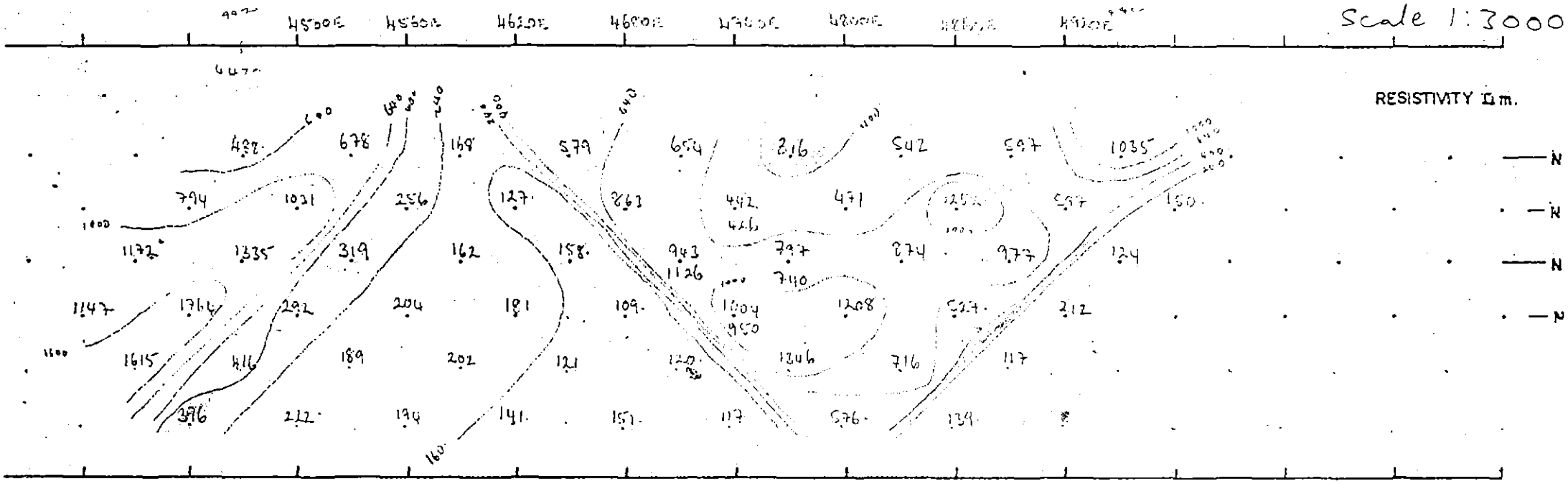
DIPOLE SPACING 60m.

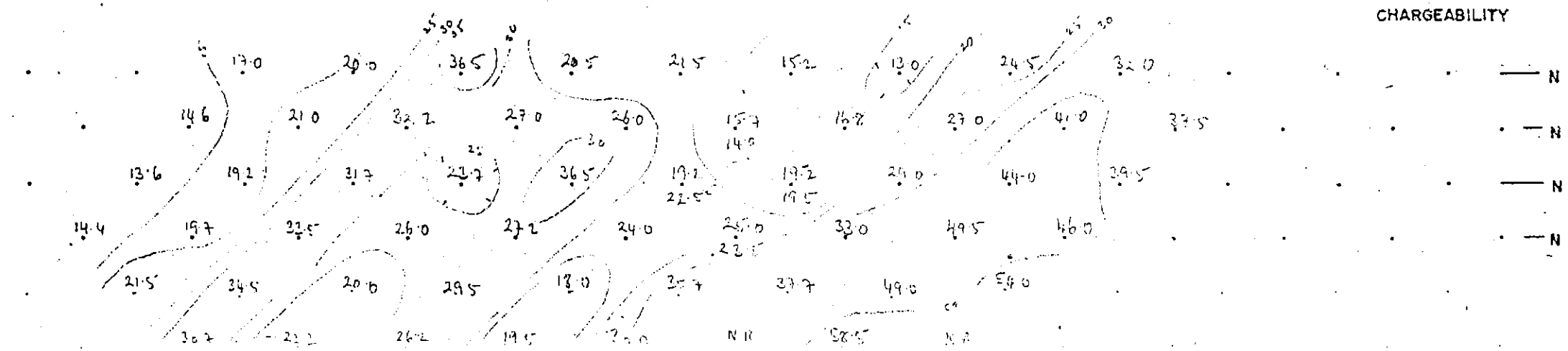
LINE No. 3320N

PROSPECT [illegible] VALLEY

JOB No. TAL 094 X

Scale 1:3000



754226

# Appendix 10

## Sterling River Magnetic Lows and Radiometric Response
## (GO Dixon)

754227

# PASMINCO EXPLORATION

## STERLING RIVER

## MAGNETIC LOWS and RADIOMETRIC RESPONSE

PREPARED BY:-
G O DICKSON & ASSOCIATES

FEB 1995

# 1.0 INTRODUCTION

A particularly low magnetic response, in an area of generally low magnetic relief, was considered to be of possible exploration importance. The small size of the anomaly and its position between flight lines, as shown on the recently re-processed Tasmanian helicopter data, raised some concerns to its validity. Mr. B. Murphy sort our opinion before proceeding on ground follow up.

The general area of interest is shown in figure 1 and the anomaly of interest is labelled A.

# 2.0 DISCUSSION

## 2.1 MAGNETIC LOW

We extracted a small data set, around the area of interest, from the original located data files. This was re-gridded and contoured. The results, along with the flight lines, are shown in figure 1.

The data shown in figure 1 have been subjected to minimal processing. No filtering and no corrections for altitude were applied. It is clear that the low response occurs mainly on line 3581. The raw data, along with a pseudo topographic profile, are shown in figures 2, 3 and 4. There is an obvious 'spike' on two lines and we assume, therefore, that the source of the magnetic low is a cultural feature.

Never-the-less, in this immediate area the potassium channel is clearly elevated.

## 2.2 RADIOMETRIC CHANNELS

Figure 5 shows contours of the potassium channel. The response is clearly elevated over a broad area which includes part of the area of the low magnetic response.

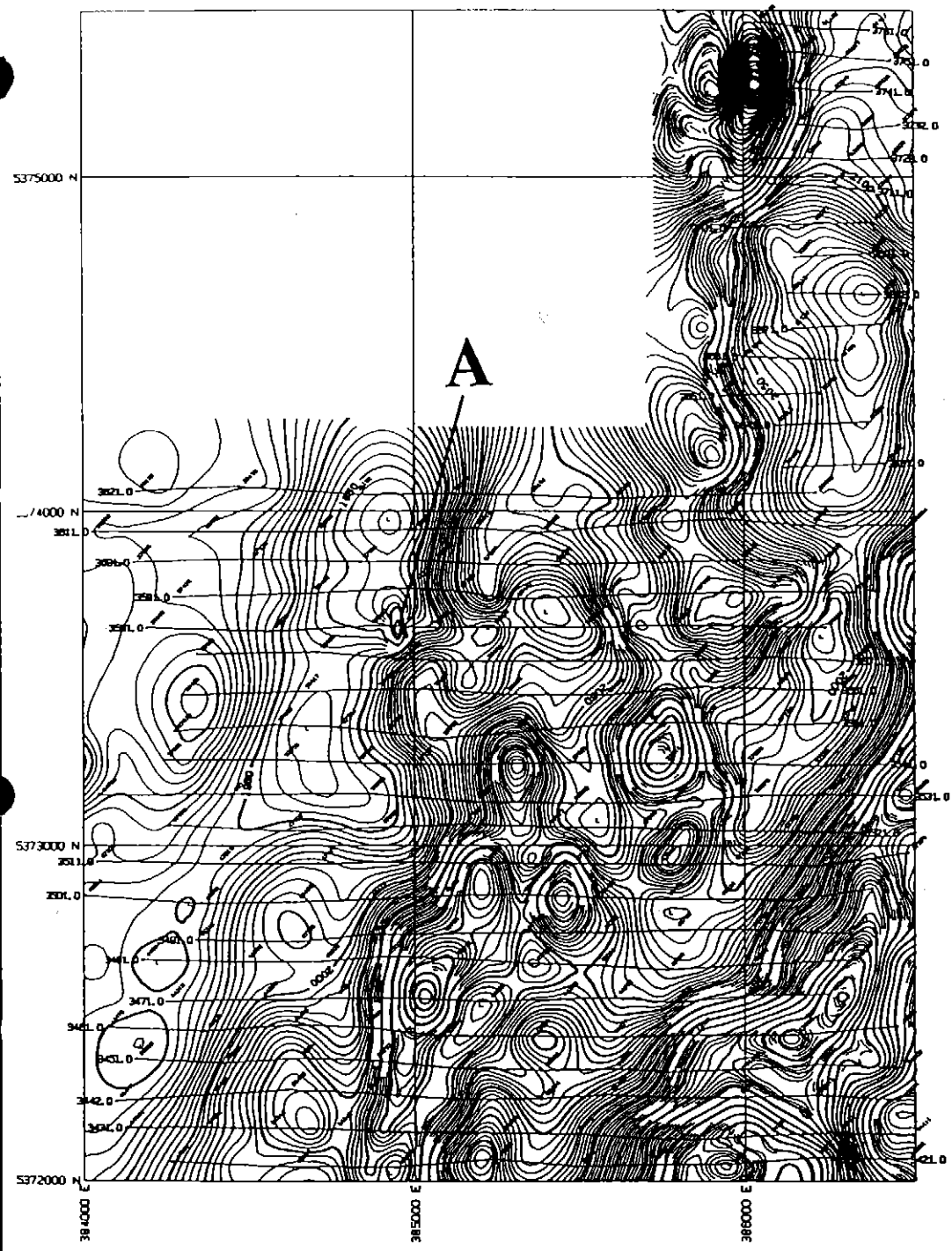
Figure 6 shows contours for the ratio of the responses, potassium to thorium (K/Th). The ratio of the radiometric channels tends to compensate for variations in ground clearance and ground cover attenuation. It is also our understanding that the Thorium channel tends to be less response than the Potassium channel in areas of alteration.

The radiometric ratio still peaks in this area.

Figure 7 shows that the 'spot highs' in the radiometric ratio occur in an area of excessive ground clearance. Figure 8 shows contours of topography calculated from the barometric and radiometric data. Clearly, rugged terrain is the reason for the higher than normal terrain clearance.

We can only guess why the radiometric data should be elevated in this area but Pasminco may wish to give some thought to the use of these data in their exploration effort.

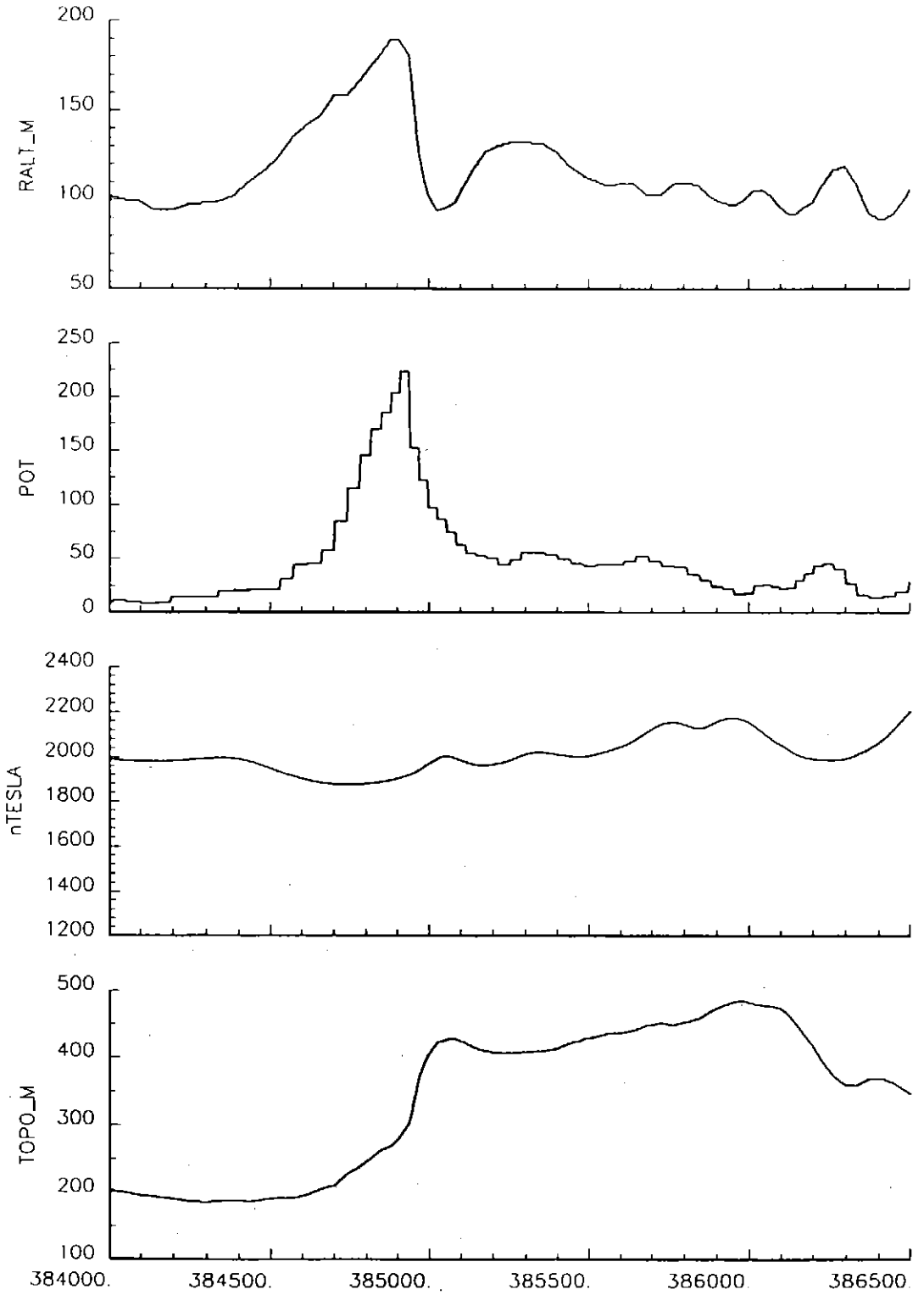
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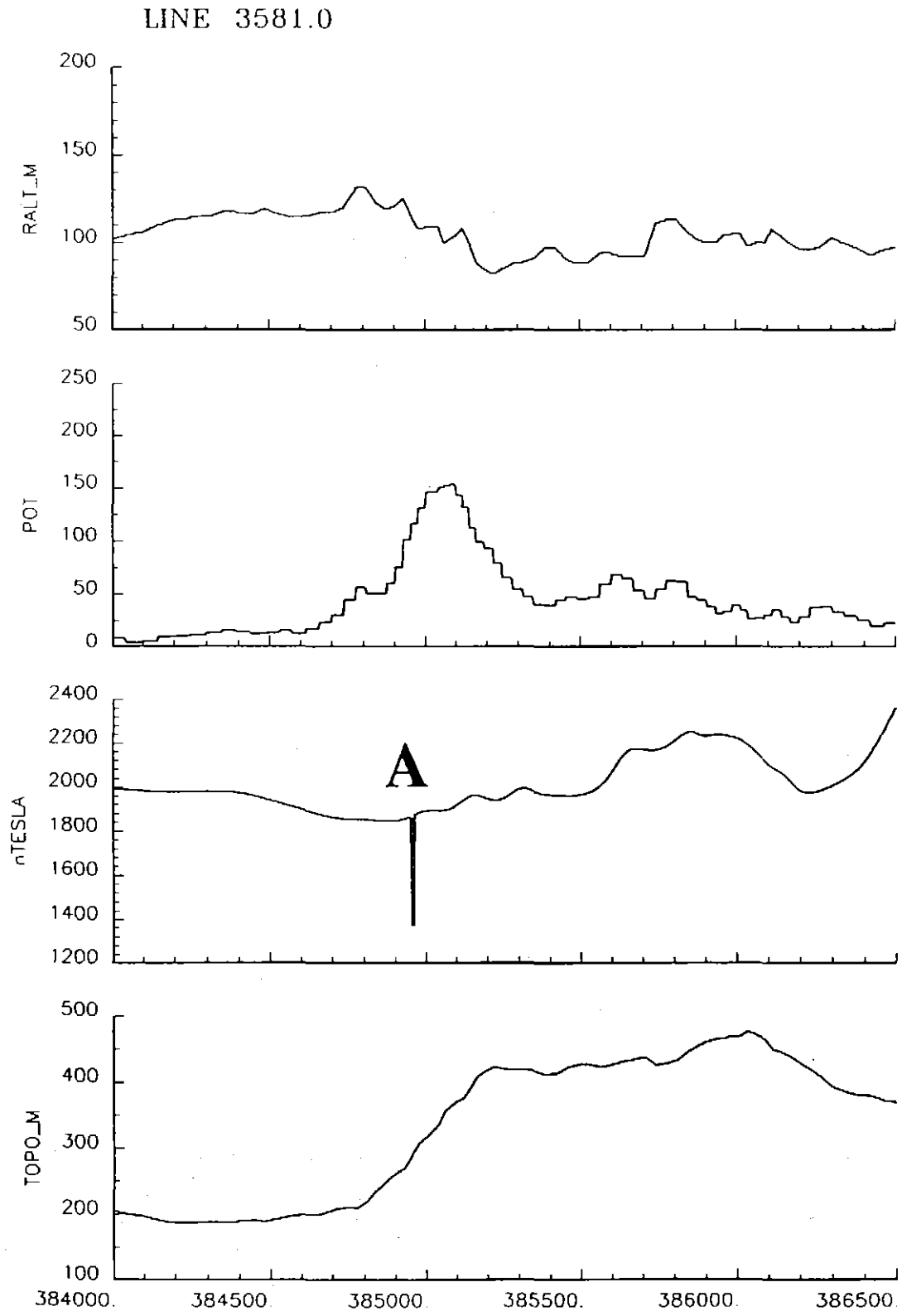



| PASMINCO EXPLORATION |
| --- |
| STERLING RIVER |
| HELICOPTER SURVEY |
| EXTRACTED AREA MAGNETICS |

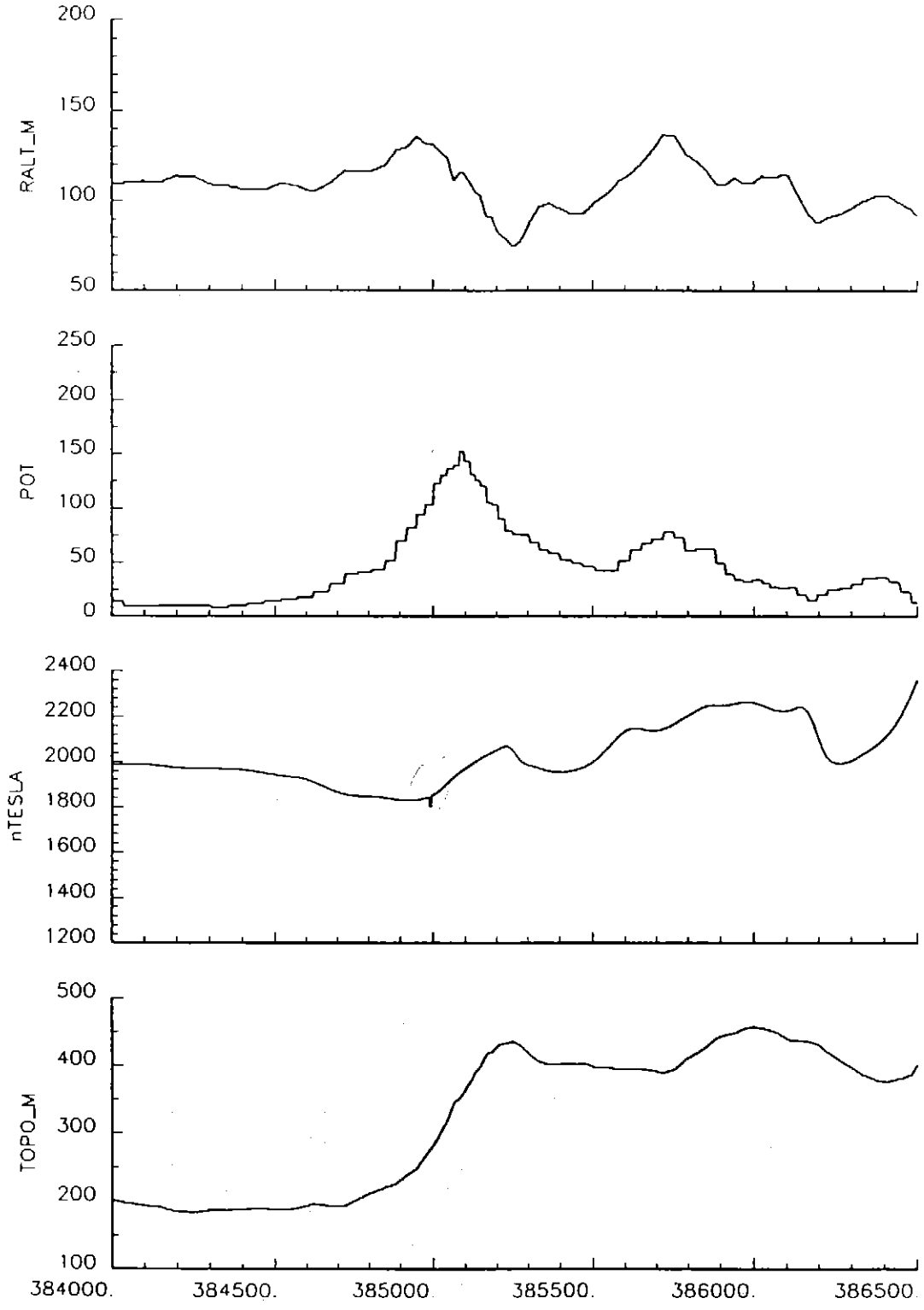
5 cm

LINE 3571.0

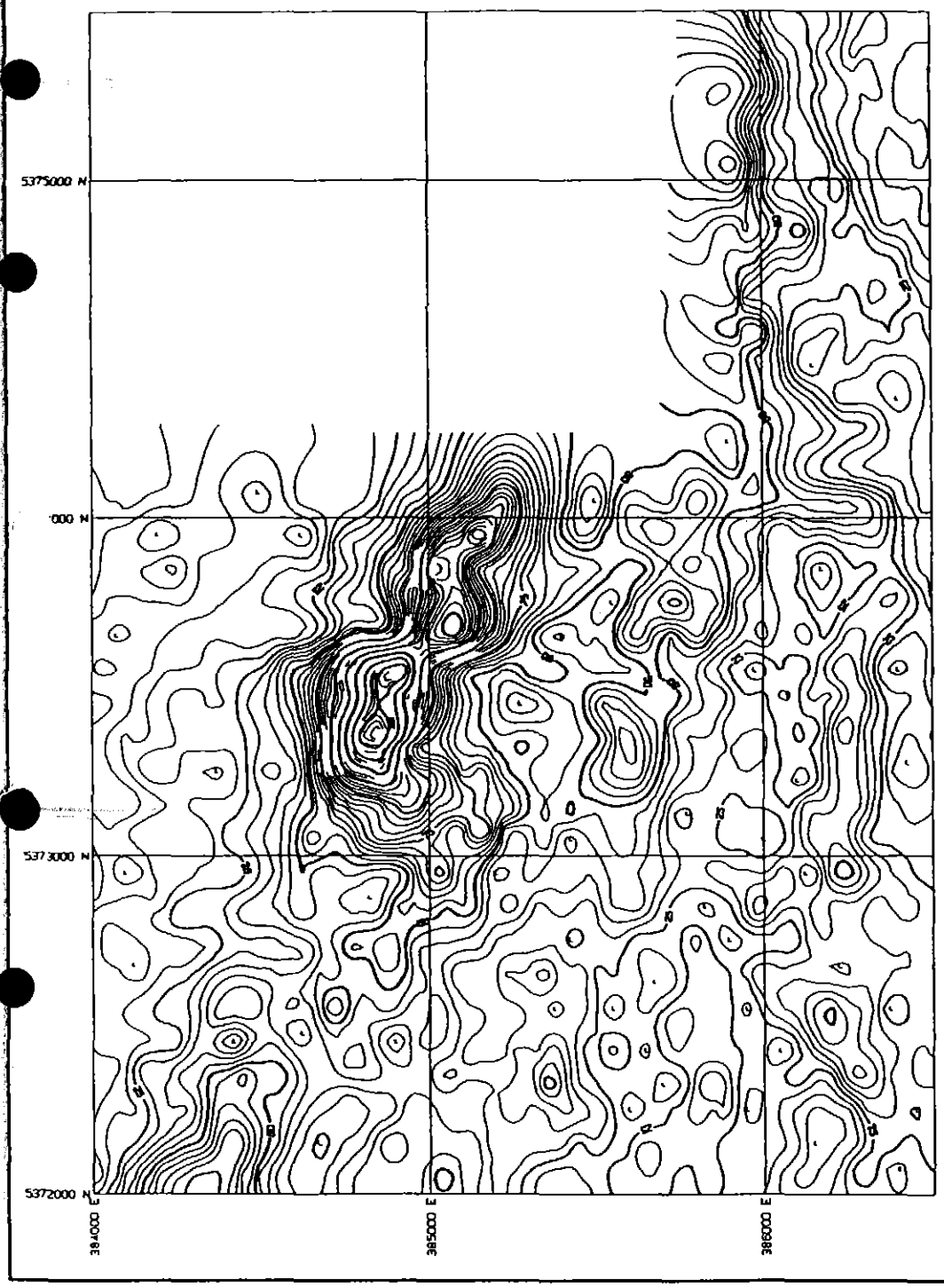

RALT_M
200
150
100
50
POT
250
200
150
100
50
0
nTESLA
2400
2200
2000
1800
1600
1400
1200
TOPO_M
500
400
300
200
100
384000.
384500.
385000.
385500.
386000.
386500.

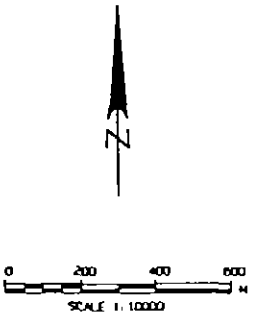

LINE 3581.0
RALT_M
200
150
100
50
POT
250
200
150
100
50
0
nTESLA
2400
2200
2000
1800
1600
1400
1200
A
TOPO_M
500
400
300
200
100
384000.
384500.
385000.
385500.
386000.
386500.

LINE 3591.0


RALT_M
200
150
100
50
POT
250
200
150
100
50
0
nTESLA
2400
2200
2000
1800
1600
1400
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386000.
386500.

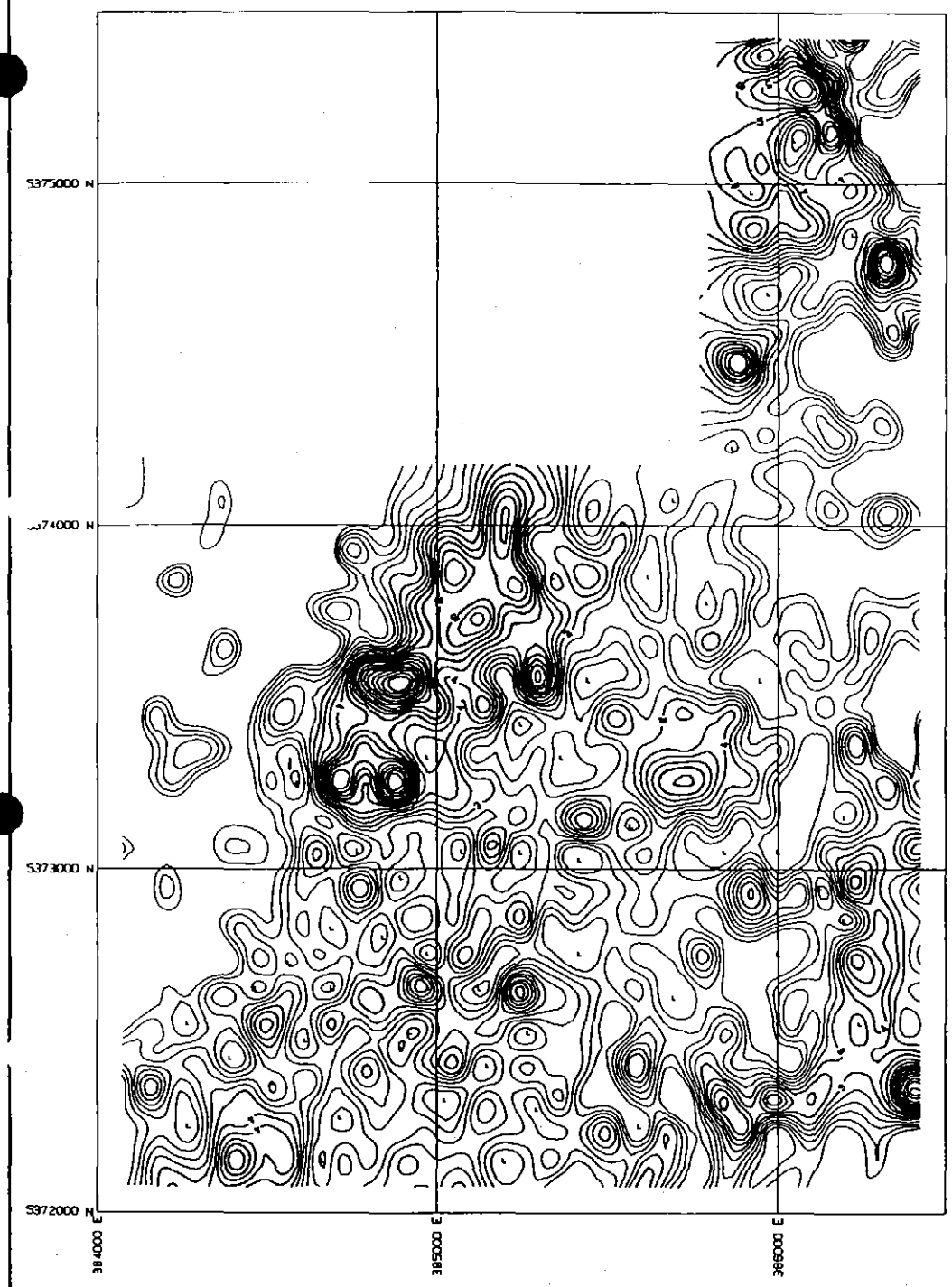
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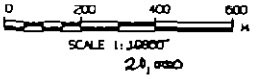

| PASMINCO EXPLORATION |
| --- |
| STERLING RIVER |
| HELICOPTER SURVEY |
| EXTRACTED AREA |
| POTASSIUM CHANNEL |
| JAN 1995 |

5 cm





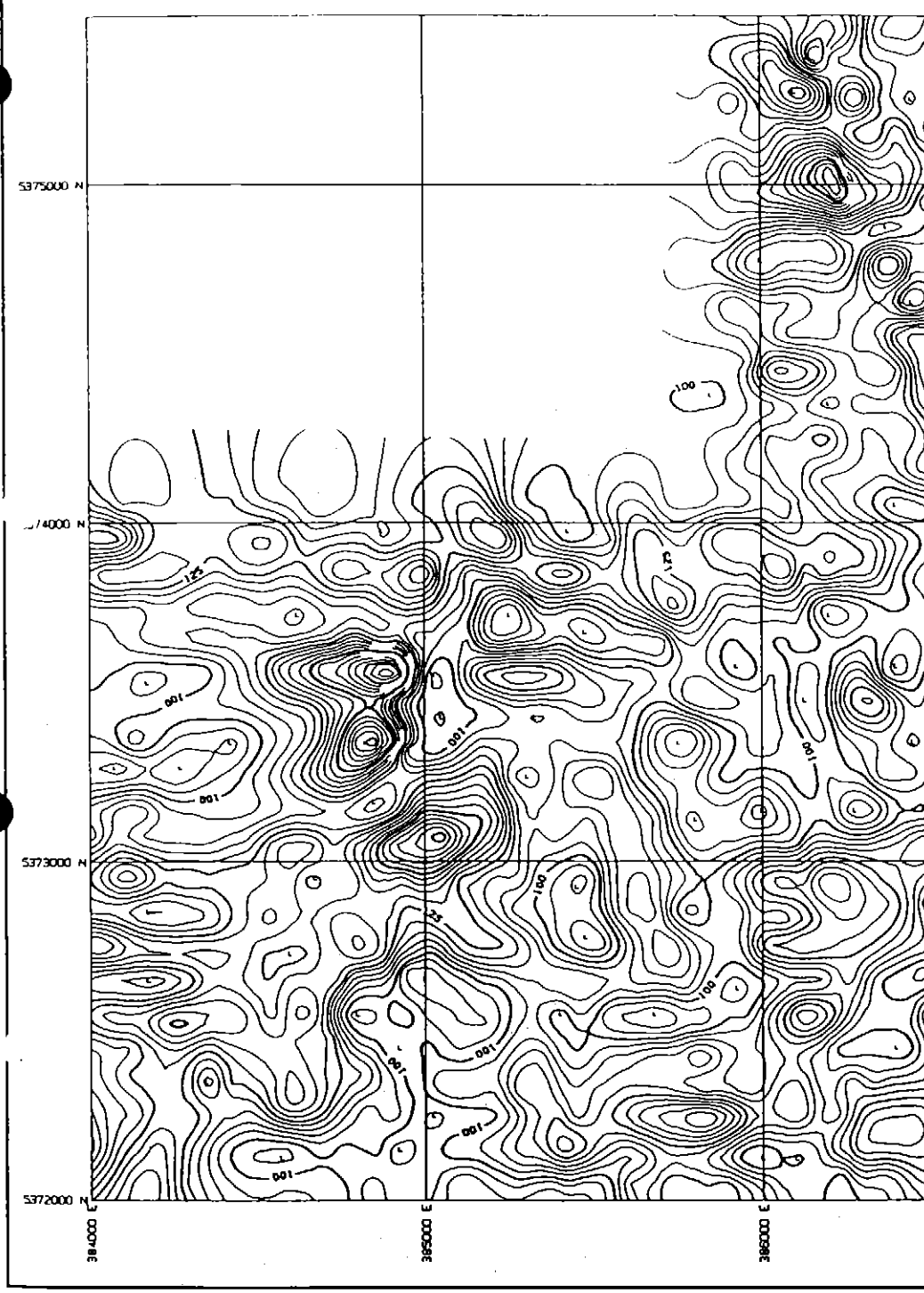


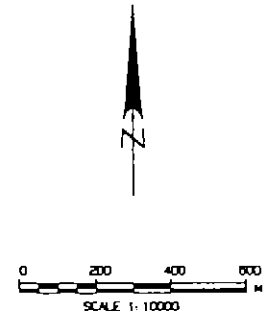



| PASMINCO EXPLORATION |
|---|
| STERLING RIVER |
| HELICOPTER SURVEY |
| EXTRACTED AREA<br>RATIO POTASSIUM/THORIUM<br>CONTOUR INTERVAL= 0.25 |
| JAN 1995 |

5 cm

754236




PASMINCO EXPLORATION

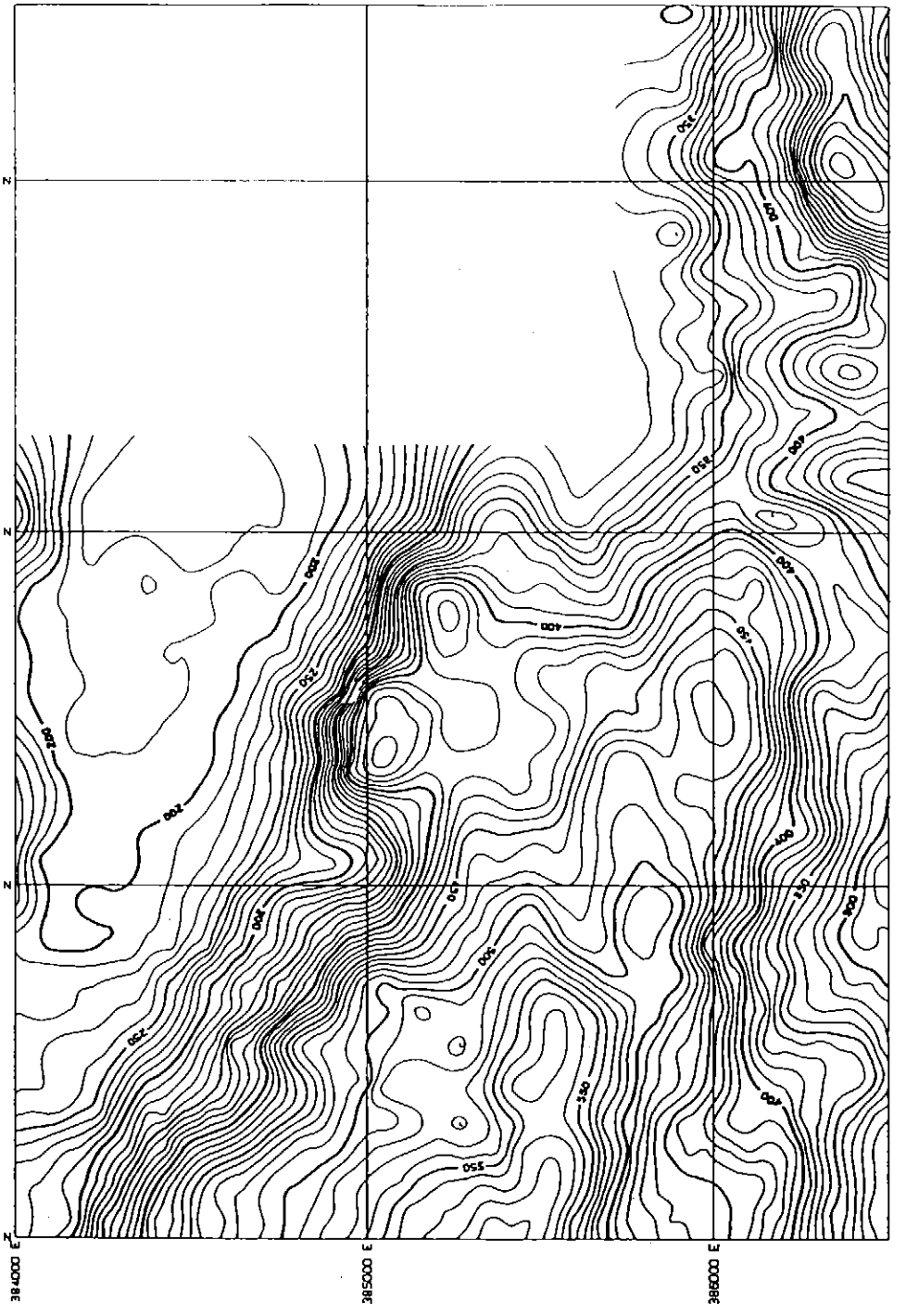
STERLING RIVER

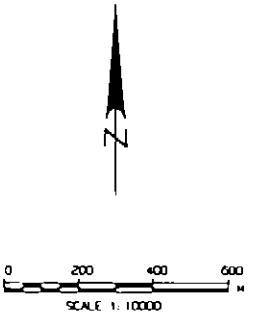
HELICOPTER SURVEY

EXTRACTED AREA
RADAR ALTIMETER
CONTOUR INTERVAL = 5 METRES

JAN 1995

5 cm




| PASMINCO EXPLORATION |
|---|
| STERLING RIVER |
| HELICOPTER SURVEY |
| EXTRACTED AREA<br>PSEUDO TOPOGRAPHY<br>CONTOUR INTERVAL= 10 METRES |
| JAN 1995 |

5 cm

754238

PASMINCO EXPLORATION

To:

6/2/95

Gerald,

Geoff Dixon proposed this based on my earlier querie on the mAg low. The Radiometrics are interesting in that the very high responses seem to be on the slopes Rather than in the cliffs - And worth thinking about further. (The mAg low 'spike' occurs on 2 lines - a funny response for "culture" in W. Tassie!!?).

Barry

From:

754239

# Appendix 11

## Tullah Area - Magnetics, Interpretive Report
## (GO Dixon)

754240

# PASMINCO EXPLORATION

## TULLAH AREA- MAGNETICS

## INTERPRETIVE REPORT

**PREPARED BY:-**
**G O DICKSON & ASSOCIATES**



**MAY 1995**

754241

# 1.0 INTRODUCTION

We were requested to examine the helicopter magnetic data acquired in the Tullah area of Tasmania. The area of major interest essentially centres around the North Mt. Farrell Mine. We have had discussions with both Mr. G. Purvis and Mr. P. Basford concerning geological concepts and the data.

In particular, geological traverses carried out by Mr. Purvis suggests that the position of the Farrell Fault may be incorrectly mapped on the published plans.

Our report follows.

# 2.0 ENCLOSURES

All plans and images are produced at 1:20,000 scale.

1 IMAGES- Total field magnetics reduced to the pole. First and second vertical derivatives of the above. An image of the residual total field data after removal of a regional surface. An interpretive image.

2 PLANS- Contour plans of the total field data reduced to the poles. A contour plan of the first vertical derivative. An interpretive plan.

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## 3.0 DATA & DATA PRESENTATION

The data used in this study is that recently compiled by Geoterrex. It includes all the Tasmanian helicopter surveys and the data were 'draped' to a ground clearance of 120 metres.

The area of immediate interest lies within the area of the Tullah 1991 flying campaign. It is not a good set of data and has never been re-processed (G O Dickson & Associates earlier report). As structures are important in this study, we have produced derivative plans. The derivative operator is inherently noisy and has accentuation the poor flight control on these data.

***Caution must be exercised when interpreting any EW structures which tend to parallel the flight lines.***

## 4.0 INTERPRETATION

### 4.1 STRUCTURE

Mr. Purvis has noted a difference between the published position of the Farrell Fault and his position of the fault, following his geological traverses. The difference could be of exploration importance. However, we need to point out that structures which parallel the strike are as difficult to interpret geophysically as they are geologically.

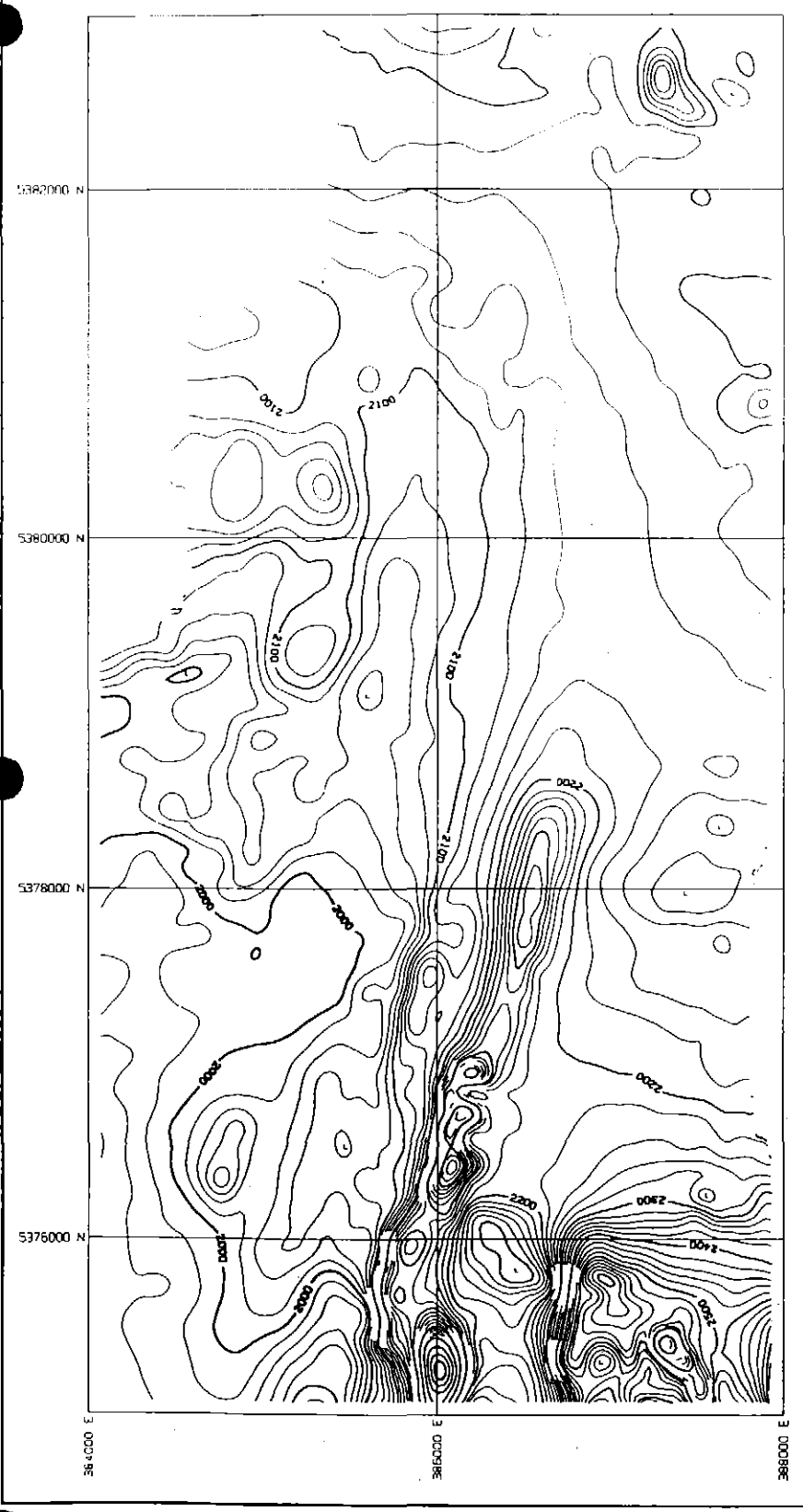
Plans 1 through 3 show the magnetic intensity, first vertical derivative and the interpretation; the same numbers are assigned to the figures in this report. Images IMA1 through IMA3 correspond to the above; the second vertical derivative image is assigned to IMA4.

From the derivative plans we note structural breaks F1, F2 and F3 which strike roughly NW. Of these, there is good magnetic evidence for F1 and F2. The evidence for break F3 is less certain. It occurs in an area of low magnetic response which is emphasised on the derivative and residual plans. Never-the-less, the area is magnetically anomalous. The reason for the low magnetic response is unclear. It could be due to magnetite destruction or to structural complications; cross folding or faulting. F2 strikes close to the North Mt. Farrell Mine and appears to terminate the Murchison Volcanics to the east. We see fault F2 as a major structural break. We imagine that the Murchison Volcanics (labelled A on the plans) to be terminated at depth by the Farrell Fault, and to the north, by the F2. As far as we can tell, there are no folded repeats of this unit to west. We expect that Farrell Slates will be found to the north of F2. There is some evidence, albeit weak, for folding between F1 and F2, see first vertical derivative plans.

The Henty Fault is shown in its published position and there is good supporting evidence for this location in the magnetic data at least up to the New North Mt. Farrell Mine. To the north of the Mine the position of the Henty Fault is not clearly reflected in the magnetic data. It could, conceivably, take on a more northerly strike.

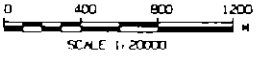
We understand that the position of the Farrell Fault is well established at the location of the Murchison Mine (Mr. G Purvis). Mr. Purvis's mapping suggests that the Farrell Fault lies to the ~~east~~ west of the published position north of the Murchison Mine. We tend to agree with that interpretation but suggest that there may be a splay in the fault immediately north of the Murchison Mine; see interpretive plans. The only problem that we see with this interpretation is the structural complexity with the termination of the fault against F2.

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PASMINCO EXPLORATION

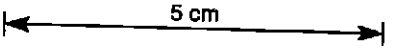
TULLAH

HELICOPTER MAGNETICS

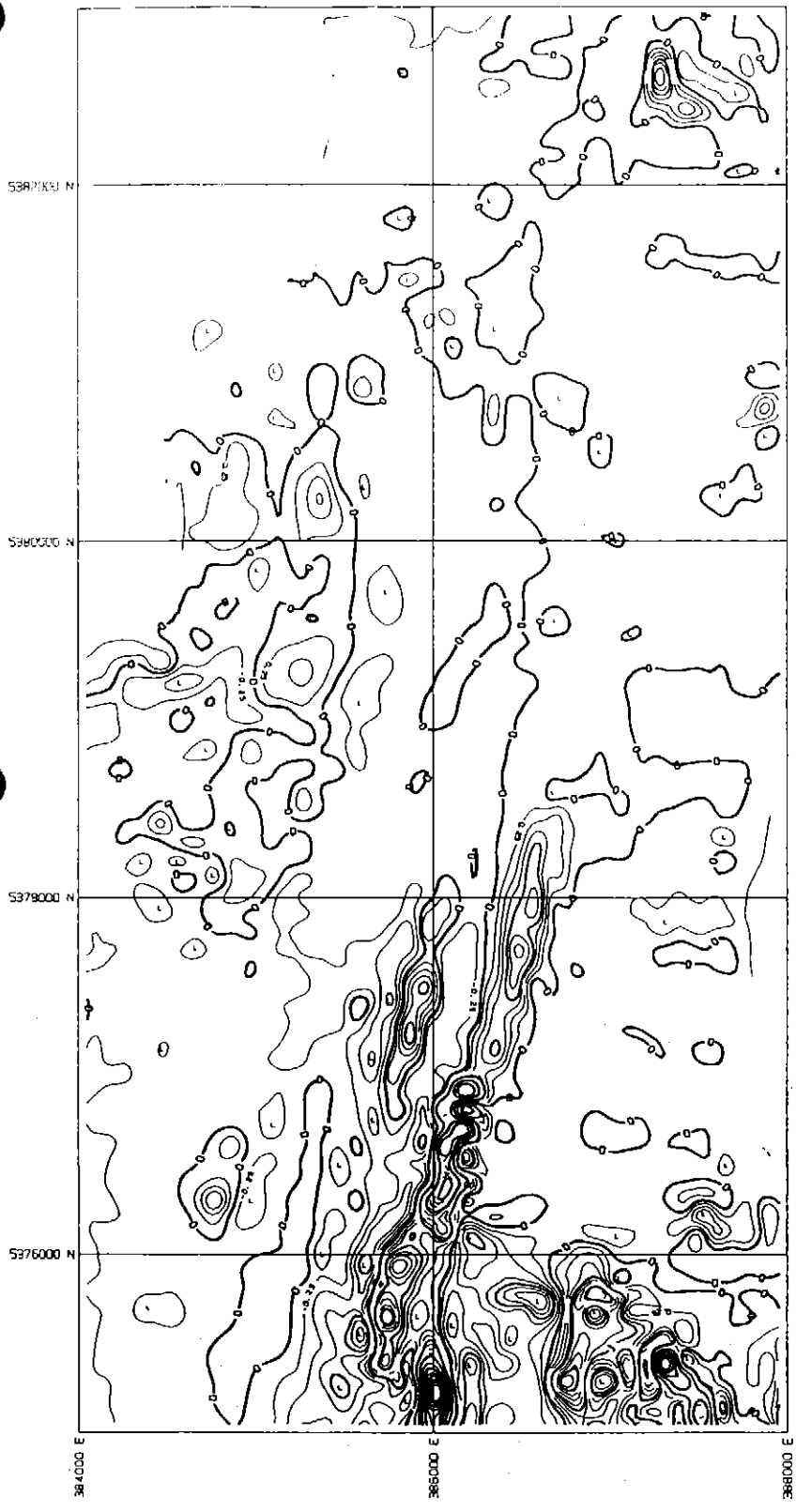
CONTOUR INTERVAL- 20 NTESLA

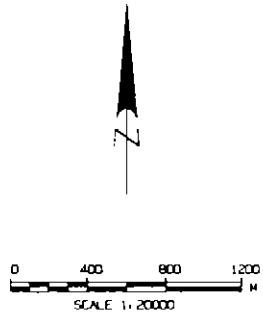
1

APRIL 1995



254245




PASMINCO EXPLORATION

TULLAH

HELICOPTER MAGNETICS

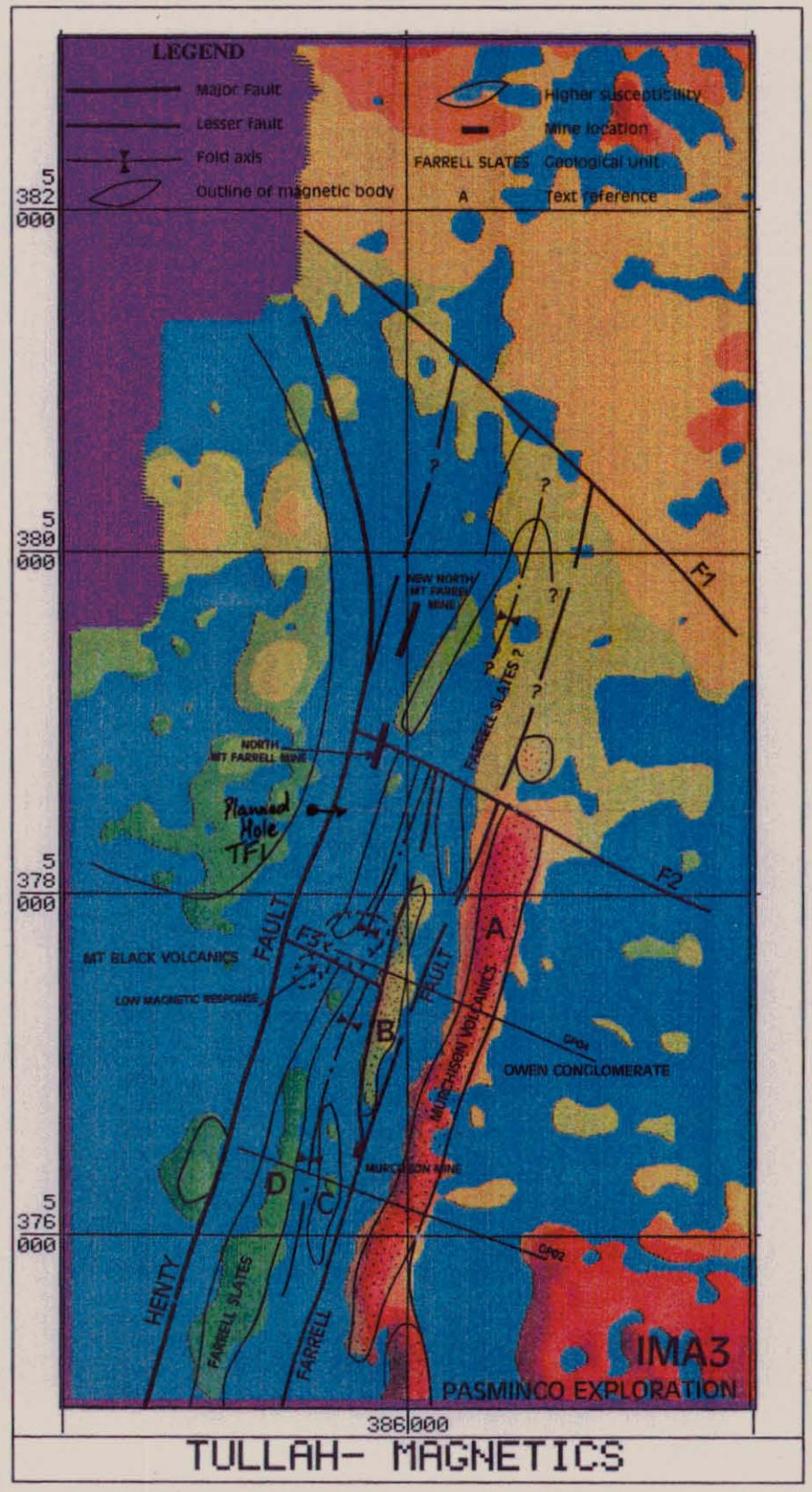
FIRST VERTICAL DERIVATIVE
CONTOUR INTERVAL = 0.25 NT/M

APRIL 1995

2

5 cm

754246




TULLAH- MAGNETICS

754247

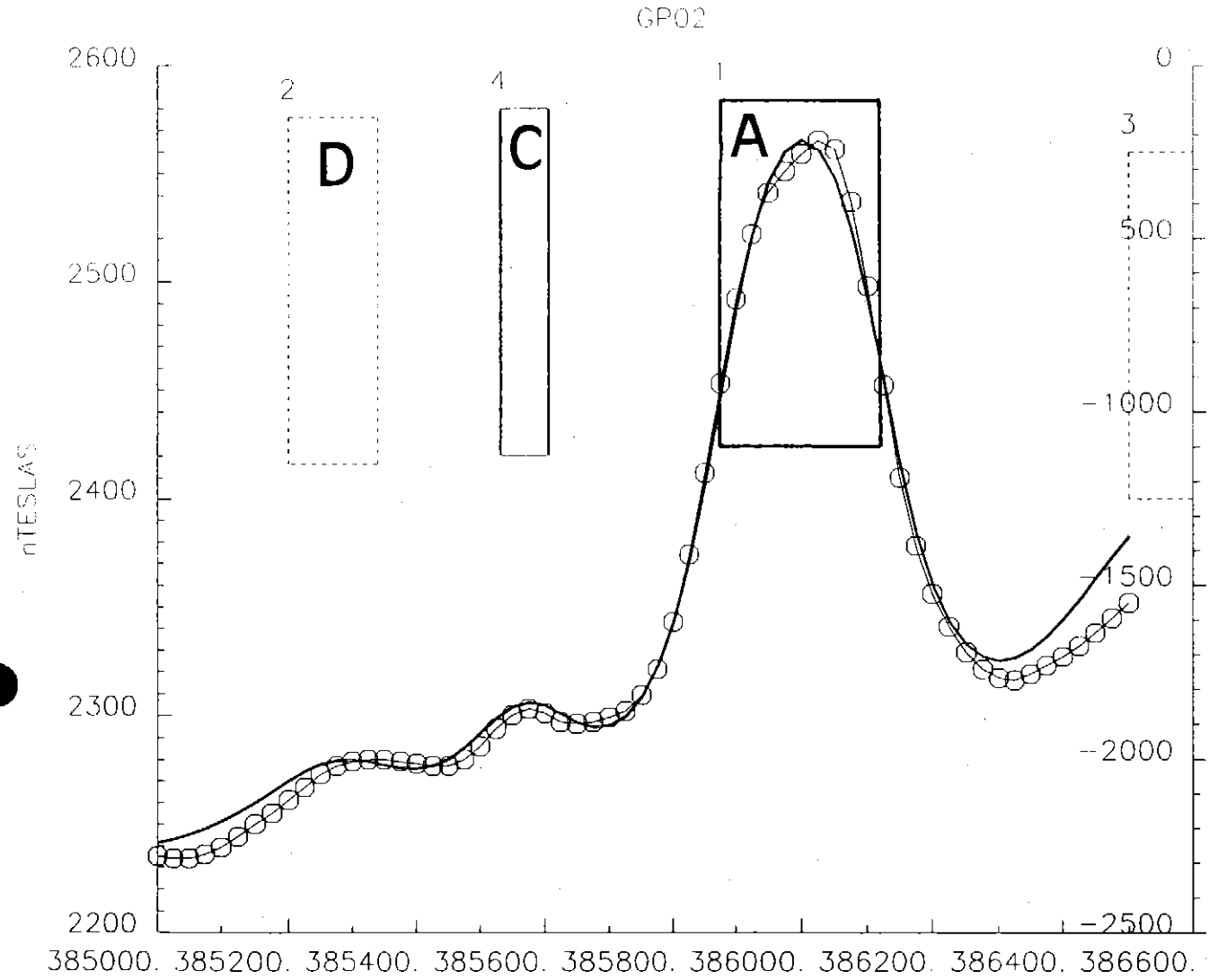
## 4.2 MODELS

We were concerned about the amplitude of the magnetic rock unit labelled B on the plans. It appears to be too high, and therefore out of character with the response of magnetic units within the Farrell Slates. Its linearity suggests a formational source and we are therefore not inclined to assign the source to pyrrhotite in the slates. Several models were made and two of these are included with this report. They are labelled GP02 and GP04 and the position of the profile cuts are shown on the interpretative plan. The purpose of the models was to get some understanding of the relative level of the susceptibility across the various magnetic units.

Model GP02 was cut to the south of the Murchison Mine across weak anomalies assigned to the Farrell Slates and a relatively thick and complex section of the Murchison Volcanics. The model results suggest that the Murchison Volcanics, **A**, are at surface (given 120m ground clearance) and have a susceptibility in excess of .0016 cgs units. We see this as a minimum possible susceptibility for this unit on this section. Magnetic units **C** and **D**, to the west, have a lower susceptibility. Although we cannot be certain of the susceptibility of magnetic unit **C**, because of its narrow width which places it at the limit of the airborne resolution, susceptibilities of the order of .0004-.0007 cgs units are indicated. The results along profile GP04 to the north are very different.

The amplitude of the anomalies over magnetic units **A** and **B** are satisfied with a susceptibility of .002 cgs units with the source at a shallow depth of burial. On physical properties we would assign both magnetic units to the Murchison Volcanics. This again suggests a placement of the Farrell Fault, or a splay of the Farrell Fault, to the west of **B** and to the west of the published position of the fault. This still leaves us with a structural complication at the termination of the Farrell Fault with F2.

754248



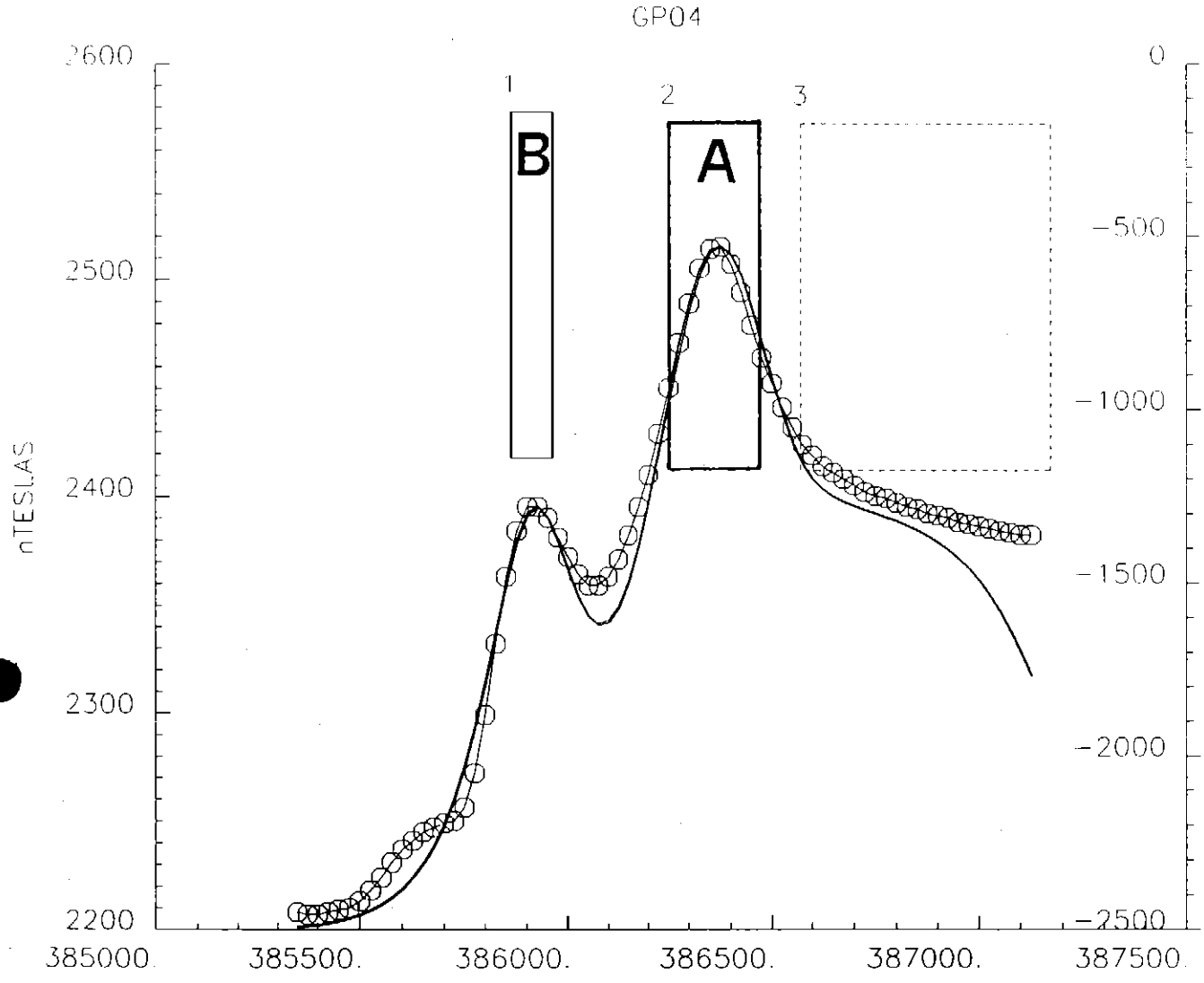

**PASMINCO EXPLORATION**

**TULLAH AREA**

MODEL GP02

MAY 1995

754249

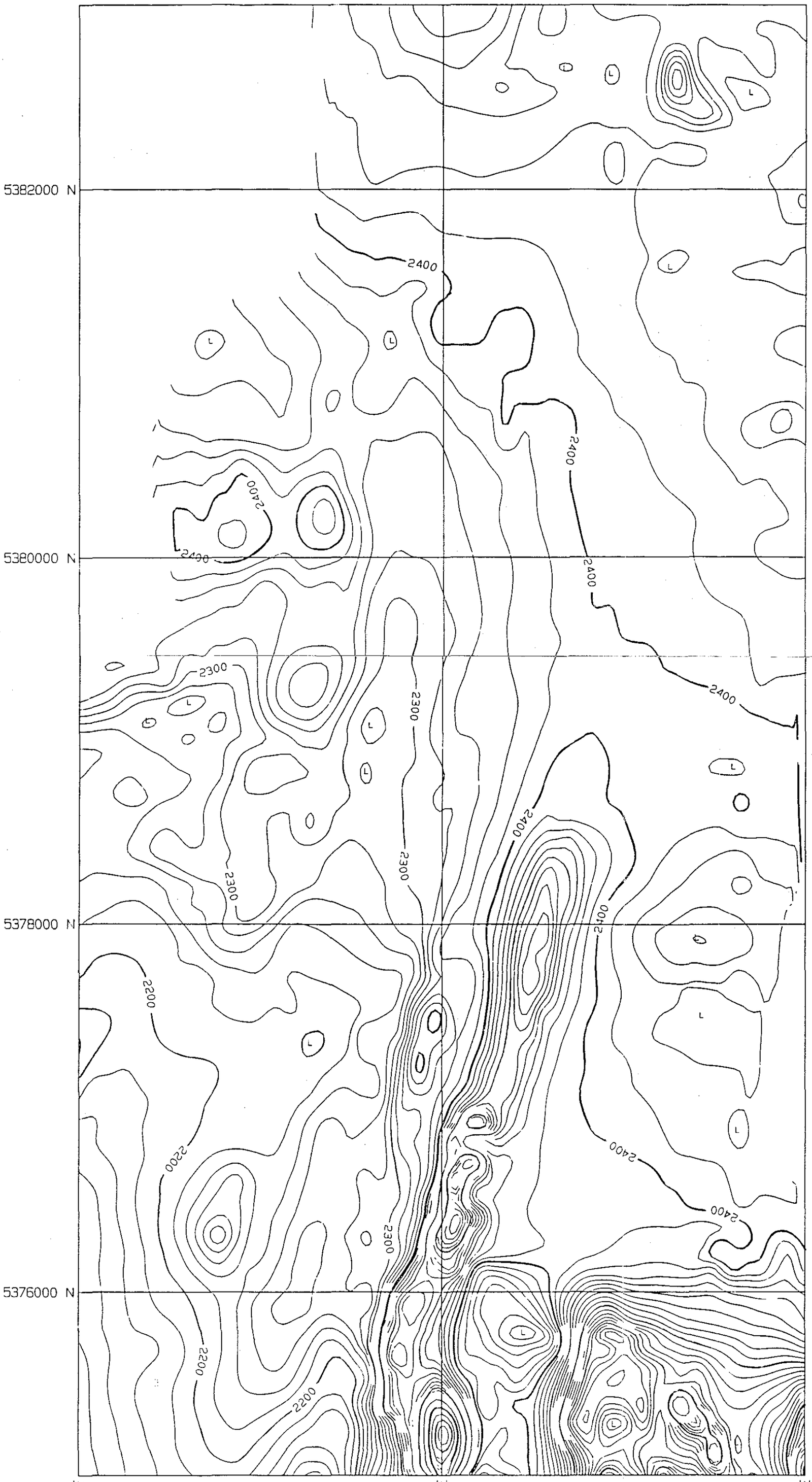



**PASMINCO EXPLORATION**

**TULLAH AREA**

MODEL GP04

MAY 1995




N

0 400 800 1200 M

SCALE 1: 20000

5 cm

754250

PASMINCO EXPLORATION

TULLAH

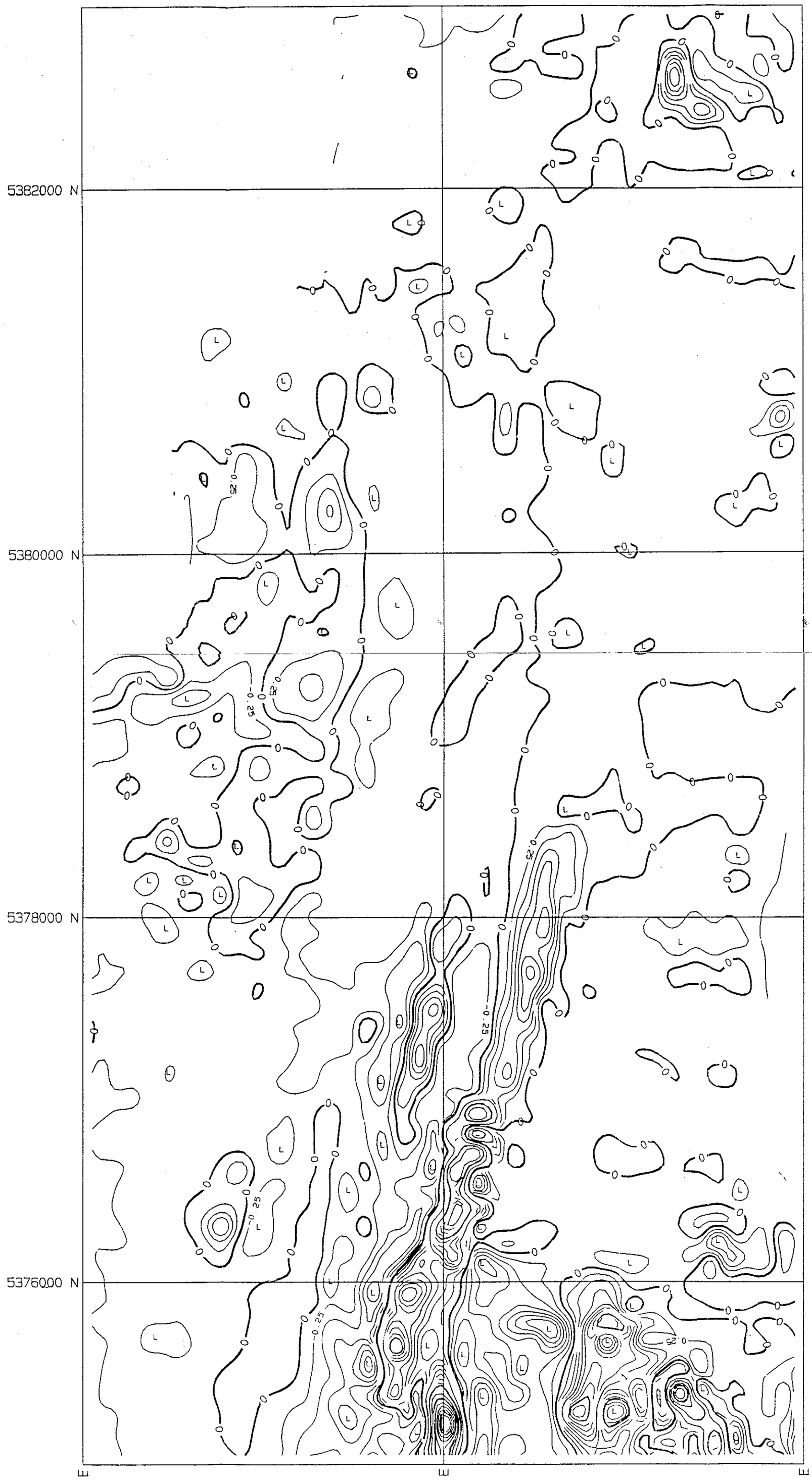
HELICOPTER MAGNETICS

TOTAL FIELD POLE REDUCED
CONTOUR INTERVAL= 20 NTESLA

APRIL 1995

1

95-3783 VOL 1







0 400 800 1200 M

SCALE 1: 20000

5 cm

754251

PASMINCO EXPLORATION

TULLAH

HELICOPTER MAGNETICS

FIRST VERTICAL DERIVATIVE
CONTOUR INTERVAL= 0.25 NT/M

APRIL 1995

2

95-3783 Vol 1

5382000 N

5380000 N

5378000 N

5376000 N

384000 E

386000 E

388000 E

F1

F2

F3

CP04

CP02

NEW NORTH MT FARRELL MINE

NORTH MT FARRELL MINE

FARRELL SLATES ?

FAULT

FAULT

MT BLACK VOLCANICS

LOW MAGNETIC RESPONSE

A

B

C

D

MURCHISON VOLCANICS

OWEN CONGLOMERATE

MURCHISON MINE

HENTY

FARRELL SLATES

FARRELL

N

0 400 800 1200 M

SCALE 1: 20000

5 cm

## LEGEND

- Major Fault
- Lesser fault
- Fold axis
- Outline of magnetic body
- Higher susceptibility
- Mine location
- FARRELL SLATES — Geological Unit
- A — Text reference

754252

PASMINCO EXPLORATION

TULLAH

HELICOPTER MAGNETICS

INTERPRETIVE PLAN

APRIL 1995

3

95 - 3783 Vol1

754253

# Appendix 12

## Tullah Sterling Structural Review

754254

# MEMORANDUM

**TO:** Gerald Purvis
**cc** Bob Haydon

**FROM:** Barry Murphy

**DATE:** 17 February 1995

**RE:** **Tullah Sterling Structural Review**

---

1. Introduction

- The focus of this review has been to establish the structural history of the Farrell Fault and how this history impacts on the prospectivity of the rocks either side of it, the Farrell Slates to the west and Murchison Volcanics to the east. Interpretation of aeromagnetic, gravity, digital elevation and geological maps was carried out at 1:25,000 scale. Core through the contact zone was examined in holes STP101, STP105 and MM1A (Fig.1). Field work was also conducted through relevant sections on the Murchison Highway, the Murchison Dam Road, the Anthony Road and various tracks through the Sterling Valley (Fig.1). This memorandum outlines the key observations arising from the review. Log sheets and field notes are attached for reference.

- Map 1 shows a compilation of magnetic, gravity and geological data for the region of interest.

## 2. Aeromagnetic Interpretation

- The Tullah-Sterling region has a large dynamic range and is characterised by a series of pronounced magnetic lows. Broad diffuse lows occur in the Mt Black Volcanics west of the Henty Fault. However, the major low magnetic response occurs immediately east of the mapped position of the Farrell Fault and is largely contained within the Murchison Volcanics, here termed the Sterling Valley Low (SVL Map.1). Given an association of magnetic "thumbprint" lows with pyritic alteration zones elsewhere in the Mt Read Belt, it is reasonable to suggest that the elongate SVL is related to alteration effects in the volcanics.

- Enhancement of the regional magnetic data, in TERRASCAN, reveals this low zone to be one of the deepest of all areas that Pasminco have thus far sampled in the belt. This is highlighted at 1:250,000 scale (Fig.2). At this scale, segmentation of the linear low is evident.

- Fig.3 shows the enhanced (step pseudocolour) low at 1:25.000 scale. The three-fold segmentation of the SVL into northern, central and southern areas appears related to NW trending cross faults. The southern end of the low is terminated by one such structure. Indentations along the eastern margins of the zone are evident in the central segment of the low. There is a close correspondence between the shape of these steps and topography. Geoff Dixon is confident that the terrain correction in this 1993 survey is good. The topography is characterised by steep slopes and cliffs in places. One would expect the chopper elevation to increase in these areas such that the magnetic response (whether low or high) would be diminished. The fact that the magnetic response is not diminished at the maximum topographic gradients indicates that the magnetic gradients are real.

- Fig.4 shows an enhanced image of the same area with grey scales for all values except the lowest, coloured blue. This processing shows a discrete anomaly, just east of the Turleys mineral occurrence , subsequently termed the "Cliffs Anomaly". It was a focus of attention in that it could reflect the area of most intense alteration. Its position corresponds to an interpreted NW trending structure on the magnetics, and correlates with air photo lineaments and topographic effects (Map1). However, Geoff Dixon (Feb '95 Report) has shown this low ("Anomaly A") as either a cultural effect or a data error (Fig.5); it appears on two adjacent lines which is peculiar and unexplained phenomenon.

- Billiton (Acacia) surveyed the area with UTEM but apparently did not adequately test this particular area due to topography effects on the data (P. Basford pers. comm.). Billiton also conducted a ground magnetic survey over the area which Pasminco should acquire as a priority.

- The northern area of the SVL is terminated in the vicinity of the Murchison Bridge. A major NW/WNW trending transfer zone is interpreted in this position from magnetics and gravity, termed the Murchison transfer zone (Map1). There is a major change in magnetic character north of this position. A discrete linear zone of high magnetic response within the Murchison volcanics, along the western face faults of Mt. Farrell, shows a close association with a lava unit (Emvl). This magnetic signature can be traced southwest as a 3km long linear zone to the Murchison transfer zone. South of the magnetic zone it is shifted, overall, to the east by *ca.* 1km, suggesting a sinistral jog of the interpreted magnetic lava unit (although not differentiated as such on the 1:25,000 geology maps).

- The interpreted high magnetic lava south of the transfer zone is segmented by a series of NW trending structures which also segment the Sterling Valley Low. One of these is interpreted to continue SE along the SW shore of Lake Murchison and to the NW it segments the Sterling Valley Low into northern and central areas (Map 1).

- Another NW structure to the south effects a major change in distribution of the high magnetic volcanic signature, in that there are two linear ridges to the SW of it compared to one on the NE. Despite the apparent major effects of these structures on the Murchison Volcanics, they do little to effect the trace of the Farrell Fault. The implication is that these structures could have originated as syn-volcanic faults (Fig.6a).

- The absence of the SVL north of the Murchison transfer zone corresponds with a closer juxtaposition between the high magnetic lava in the Murchison Volcanics and the Farrell Fault, (Map1) and with a greater preserved thickness of Farrell Slates between the Farrell and Henty Faults. The Farrell Slates in this area also contain abundant mineral deposits (Murchison and Farrell deposits). It is tempting to speculate that the SVL has been occluded in this area by the Farrell Fault, in which case the Farrell deposits could be remobilised from a large alteration system in Murchison Volcanics beneath the Farrell Slates. Deep drilling may be an option here.

## 3. Structural Interpretation

- The Farrell Fault has had a protracted displacement history at different crustal levels. Both in outcrop and core it is characterised by an intensification of cleavage (S1) strains and is interpreted as a west dipping syn-cleavage shear zone. Stretching lineations associated with the shearing are approximately down dip or slightly to the south at 80° . Kinematic indicators of the syn-cleavage displacement history include asymmetric quartz augen, asymmetric boudinage and SC fabric. These consistently indicate west block up movement, bringing Farrell Slates on top of Murchison Volcanics.

- The orientation of the zone is generally subparallel to cleavage and bedding in both units. However, the 1:25,000 geology map shows cleavage striking more northerly than the fault in the Sterling Valley. This has not been substantiated by current measurements of the strike of cleavage, paralleling the fault trace in this area. The 1:25,000 mapped position of the fault appears to be accurate from current observations.

- The parallelism of the fault with cleavage and bedding indicates it occupies the limb of a major isoclinal fold. It is to be expected that the fault does not maintain parallelism with bedding to great depths but stays parallel to cleavage throughout.

- "Facing" directions in the Murchison Volcanics, though sparse, indicate younging to the west. Facing directions in the Farrell Slates generally indicate younging to the west, away from the Farrell Fault. The exception is MM1A where the Farrell Slates are in an overturned anticline adjacent to the Farrell Fault. This also means that the fault cannot maintain parallelism with bedding throughout its dip extent.

- Given the facing evidence either side of the fault and the reverse/thrust displacement history, there is an enigma in that the fault brings younger on top of older rocks - opposite to that expected in a reverse fault. This geometry could result from an earlier phase of extension on the fault, such as would be predicted on a growth fault. No direct stratigraphic evidence for growth faulting is seen. However structural relationships are admissible for varying orientations of bedding, or differential tilting, in the Farrell Slates before they were cleaved. The evidence comes from variations in the plunge of the bedding/cleavage intersection lineation (L1) in exposures along the Murchison Dam road. Other explanations for this

variation could be plunge variations of F1 folds, or the cleavage is not axial planer to the folds; the latter explanation is less likely in an orthogonal compression regime .

- The post-cleavage structures associated with the Farrell Fault are brittle. They include drag folds (locally with S2 cleavage) and small scale faults with reverse/thrust components, west block up. An intersection lineation (L2) is developed approximately perpendicular to the stretching lineation (x) on the S1 cleavage. These are interpreted as representing a continuum from the more ductile, syn-cleavage displacements to thrust strains at higher crustal levels.

- The latest/youngest structures are kink bands. There is a conjugate set of these developed in the Farrell Slates which represent a phase of vertical shortening on the S1 cleavage and concomitant across strike extension. They indicate a form of stress "relaxation" or collapse following the thrust movements.

- Strike slip elements are rare, minor and late. Some shallow SW slickensides and kink bands suggest a small element of dextral slip. However this is not always consistent. Other conjugate kink bands in the southern part of the zone, close to the Henty Fault, show along strike shortening, evidenced by box fold geometries.

- Facing directions in the Farrell Slates suggest that the unit occupies a broadly synclinal position, with an overturned western limb towards the Henty Fault. If the Murchison Volcanics were deposited west of the Farrell Fault, then these should occupy the keel of the syncline.

## 4. Exploration Potential

- The Murchison Volcanics in the footwall of the Farrell Fault are significantly altered through silicification, sericitisation, local chloritisation, and significant amounts of pyrite. Though not altered to the same degree as the Rosebery footwall, this alteration system is very encouraging. The timing of alteration is at least syn-deformational but could be earlier, syn-volcanic with a strong deformation overprint. It is very unlikely, in my view, that the alteration is related to Devonian granite which Leaman models at relatively shallow depths. The granite is here interpreted as a post-cleavage intrusive that utilises pre-existing structure in a "passive" intrusion mode.

- Given the facing relationships, the Farrell Slates present a logical hangingwall sequence, with potential host rocks in the position of the Farrell Fault. Broad similarities may be drawn between the quartz-phyric Farrell "Slates" and the White Spur Formation in the hangingwall of the Rosebery deposit, although such a correlation would be hotly debated by some.

- If the Sterling Valley Low magnetic signature can be tied to the alteration system, as seems to be the case, then the Farrell Fault has "beheaded" the system (Fig.6b). However, the lack of significant strike slip on the fault allows us to explore the basal Farrell Slates/Farrell Fault directly across strike from the area with most intense alteration in the SVL.

- The magnitude of reverse displacements on the Farrell Fault is critical to evaluate, in terms of where the alteration system has been cut off - i.e. at this base, top or somewhere in between. There is no direct control on either where we are in the alteration system or how far the fault has moved. Quantitative assessments of fault displacements based on fault zone thickness in the brittle regime can vary over an order of magnitude. The situation is even worse in the ductile field. However, a qualitative assessment is that, as no true mylonites are developed, the strains were not extreme and, as younger over older rocks are preserved, the magnitude of displacement is less than the thickness of the Farrell Slates. Something in the order of 300-500m is envisaged. The subsequent extensional collapse and stike slip components have contributed little to the overall displacement.

- The Farrell lodes occur as blocks in a fault zone subparallel to the Henty Fault. If this fault had reverse, west block up displacement (as the Henty and Farrell Faults have) then the lodes may have been detached from a major basemetal body at depth in the footwall of the fault, east of the Farrell deposits (Fig.6c). They represent "natures window" to the orebody.

## 5. Recommendations

- A thorough analysis of the SVL and its relationship to alteration is a primary goal. Defining the area of maximum alteration through magnetics and geochemistry is important in giving a vector to mineralisation. Acquisitions of Billiton's ground magnetics is a priority.

- Drill testing of the SVL, utilising reprocessed magnetics and alteration indices to target the best areas.

- Oxygen isotopes may help in defining the type of alteration system we are dealing with - whether synvolcanic or syntectonic.

- Having assessed the SVL, and depending on results and resources, the area north of the Murchison transfer zone offers potential for a blind alteration system and preserved footwall volcanics in the Farrell area. Deep drill would be needed. There are discrete magnetic targets in the Farrell area which are untested.

Figure No. 1: Tullah Sterling Valley area showing field localities and drill holes examined

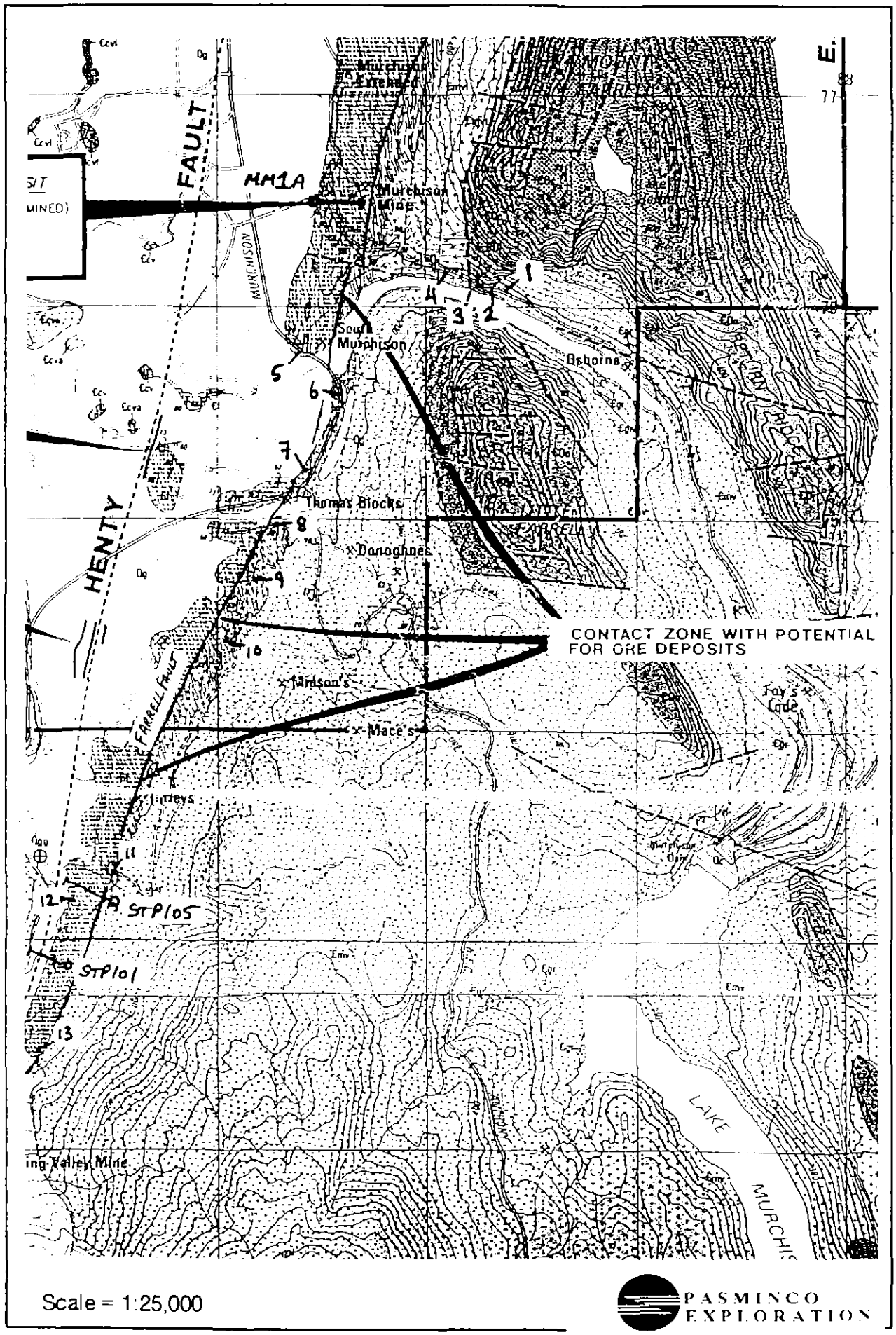
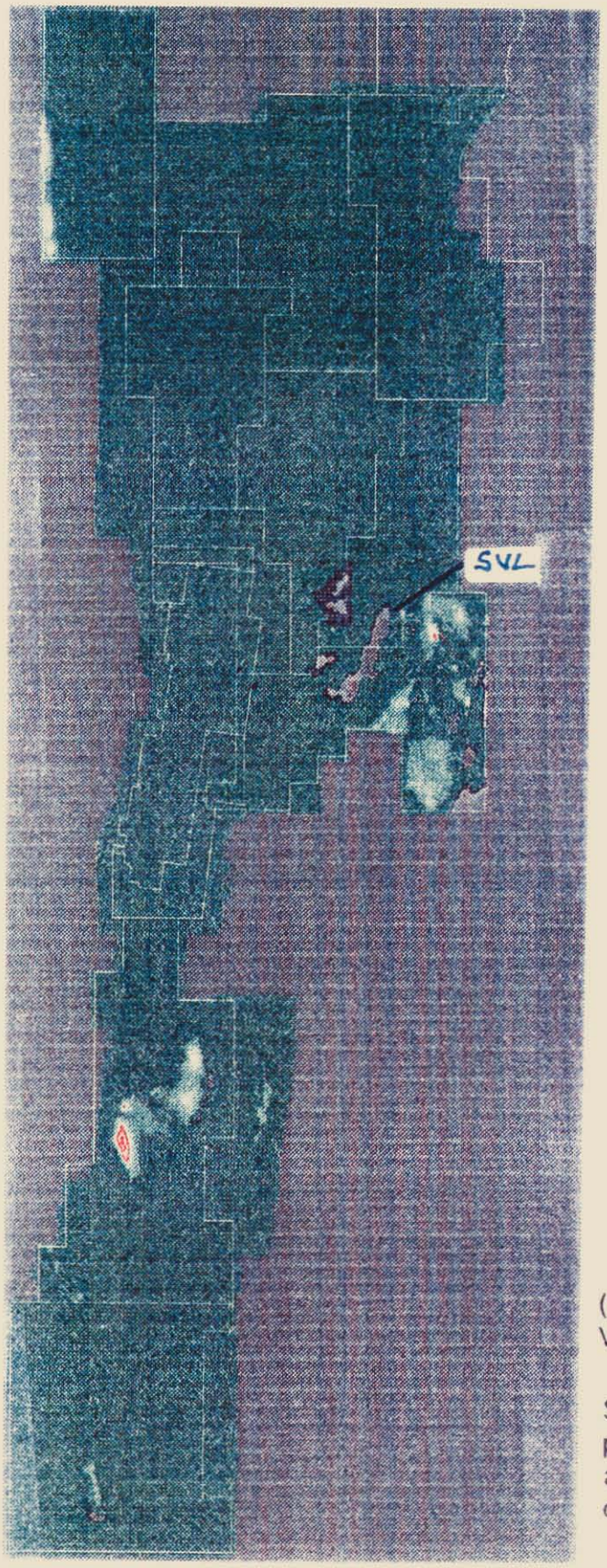


Figure No. 2: Aeromagnetic image of Western Tasmania with TERRASCAN processing.




(SVL = Sterling Valley Low)

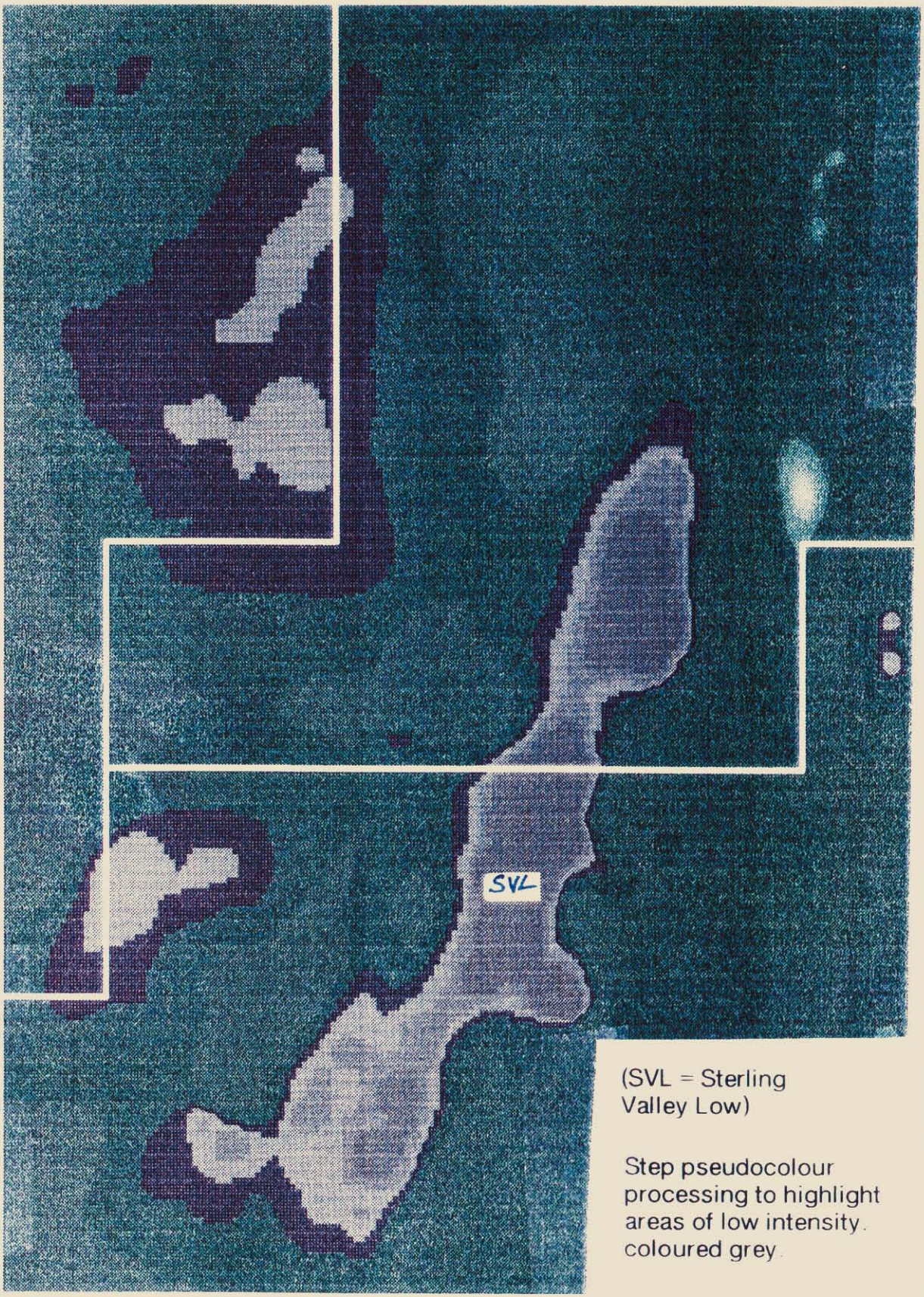
Step pseudocolour processing to highlight areas of low intensity. coloured grey.

Scale = 1:250,000

PASMINCO EXPLORATION

5 cm

Figure No. 3: Aeromagnetic image of Sterling Valley Low with TERRASCAN processing.




(SVL = Sterling Valley Low)

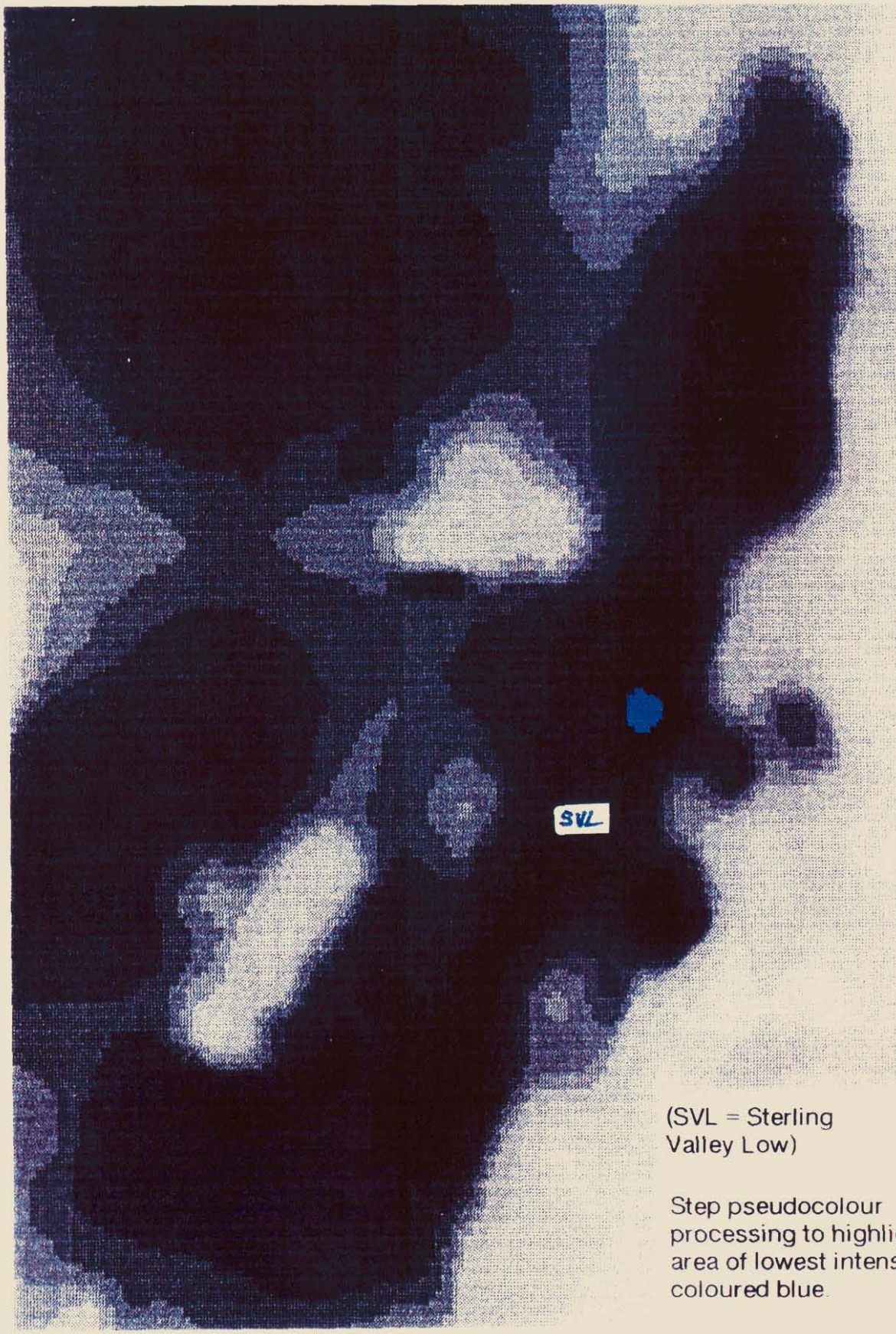
Step pseudocolour processing to highlight areas of low intensity, coloured grey.

Scale = 1:25,000

PASMINCO EXPLORATION

5 cm

Figure No. 4: Aeromagnetic image of Sterling Valley Low with TERRASCAN processing.

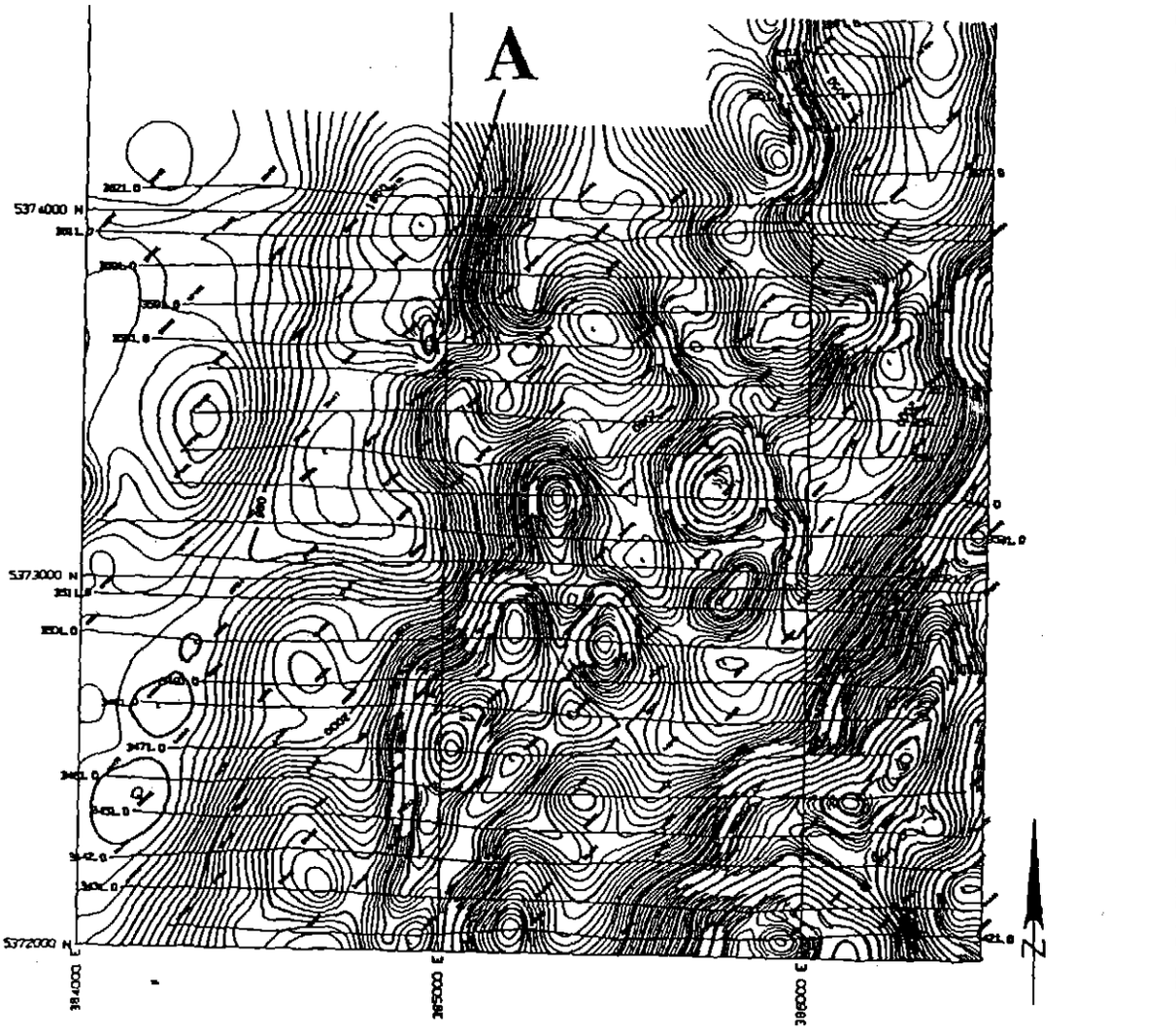



(SVL = Sterling Valley Low)

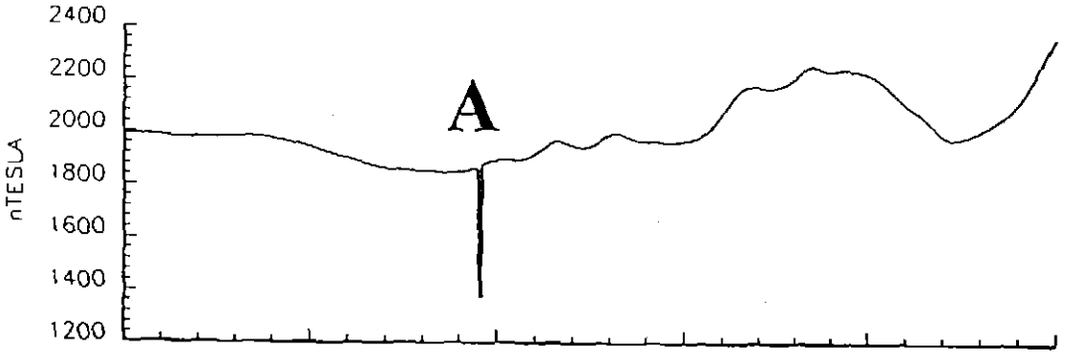
Step pseudocolour processing to highlight area of lowest intensity, coloured blue.

PASMINCO EXPLORATION

Figure No. 5: Raw magnetic data highlighting "Anomaly A".



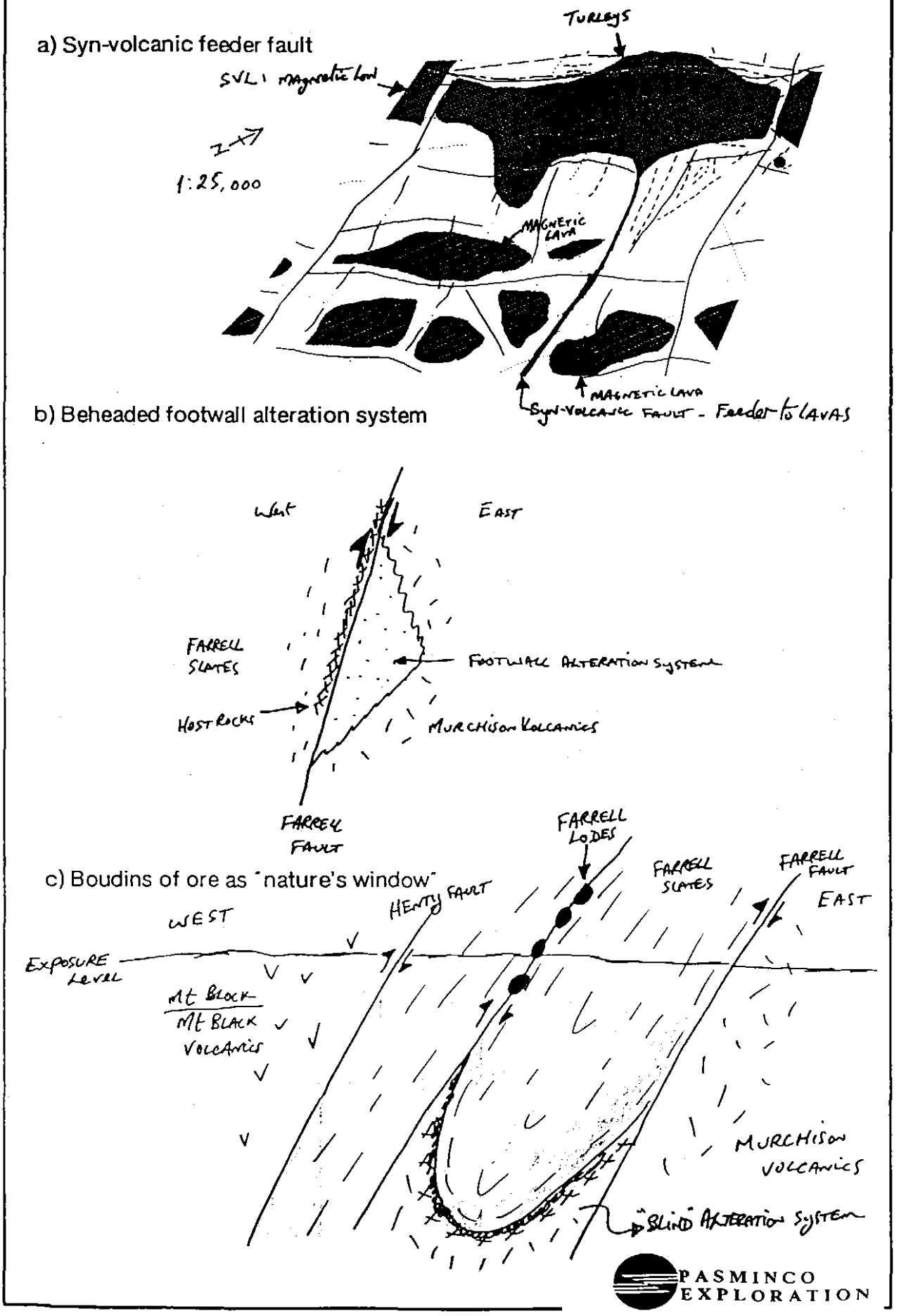

LINE 3581.0




(From Geoff Dixon Report Feb 1995)

PASMINCO EXPLORATION

Figure No. 6: Structural controls and models applied to the Tullah Sterling Valley area.



Project : TULLAH STERLING
Logged by: FCM
Date : 1/95

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. MM1A



754965

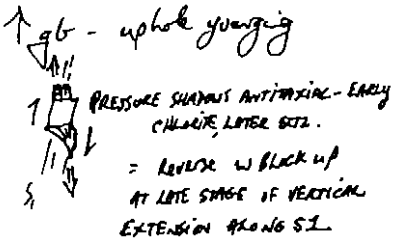
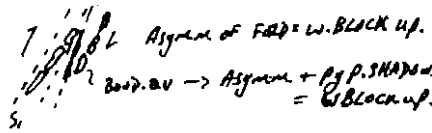
| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding ~S2, c = cleavage ~S1, f = fault, Angles to LCA | GRAPHIC LOG (0.06 mud, 0.5, 2, 8, 32, 64 mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 249 | | STRONG CLEAVAGE (S1) REFRACTION in thin bdd sst/slt units | | ↓ gb sst/slts<br>DOWN HOLE E younging – ANTIFORM N.<br>1/1 Post-S1 shears quill So shear down to west movement<br>Post S1 vein bands, mm scale, flatter<br>S1 So | |
| 250 | SOME CALCITE veins | | | | |
| 251 | | | | | |
| 252 | | So/S1 angle inc. | | Inc. pyrite downhole in calcareous slty/fine sst | |
| 253 | | So LCA ~80<br>SMALL F1 FOLD + CARB VNS | | | |
| 254 | | | | S1 So Carbonate vein – Syn Folding<br>S1 offset So<br>small SI/I shear ?E side up. | |
| 255 | | | | | |
| 256 | S1 Hydraulic Frac. in SST So | inc PRESSURE SOLN + FOLDING<br>So 25° LCA, inc sst. | | S1 gb So | |
| 257 | | Bioturbated SST | | | |
| 258 | | So disrupted by S1 | | inc SLTS | |
| 259 | LOT OF CARBONATE VNS in more COMPETENT BEDS<br>SUBPARALLEL FRACTURE | inc BRECCIA + FOLDING<br>Intrinsic<br>POST-S1 BRECCIA | | Thin bdd facies | inc ANKN<br>Pervasive CHLORITIC |
| 260 | Alt'n vn | | | S1 shallower than So ⇒ Anticline?<br>gb? | |
| 261 | | 1/1 SMALL FAULT, POST S1 NORMAL, E Dip. | | FARRELL SLATES | |
| 262 | inc vns ~1/1 So | | | | |
| 263 | S2 S1 So | Loc. OVERPRINT OF S1 By S2 CRENULATION ASSOC. WITH KINK-LIKE FOLDS AND VEINS. | | Loc. SZ. disrupts S1 + VNS. LENTICULAR Bdd, v. thin bdd. | inc CARBONATE ALTN. |
| 264 | | | | SMALL SCALE SHEAR BANDS WITH DOWN DIP SRS<br>26° LCA.<br>Extensional<br>Down to E<br>POST-S1. | |
| 265 | | | | | |
| 266 | Reverse, W dip SHEAR SENSE FROM VEINS | STRONG CLEAVAGE S1<br>SYNTHETIC SHEAR PLANES TO S1 SHOW W BLOCK up | FARRELL FAULT ZONE | SILICIFIED SH/SLT<br>WELL DEVELOPED DOWN DIP LINEATION X.<br>LCA Downdip<br>Reverse offset So.<br>Qtz. Py. Gn vein network<br>Q/L VN<br>L>LATE | |
| 267 | | Inc. Post-S1 FOLDING AND BRECCIATION | | | |
| 268 | 2cm GOUGE/FAULT | | | V. FRACTURED + SILICIFIED<br>SHS + VNS w/R SHEARS – W BLOCK up<br>LCA DH<br>F<br>Post-S1 MAG FOLD<br>⇒ W BLOCK up<br>So | Py / Qtz / Siderite(?) ALTN |
| 269 | | | | | |
| 270 | | | | | |
| 271 | | | | Rel. unaltered volcaniclastics – Murchison Volcanics | |
| 272 | | | | | |

Project : TOLLAH STERLING
Logged by: FCM
Date : 1/95

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. MM1A



| m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding, c = cleavage, f = fault, Angles to LCA) | GRAPHIC LOG (0.005 mm, 0.5, 2, 20, 200 mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 280 | | LATE STAGE EUHEDRAL PYRITE WITH PRESSURE SHADOWS | | ↑gb - uphole younging<br>  <br> | |
| 290 | SER/ALBITE ALTN | Augen CLASTIC COMPONENTS - REVERSE ASYMMETRY ⇒ W BLOCK UP. | | | |
| 300 | - QZ VEINLETS | FSPAR PORPHYRY | | - LOC. IN-SITU BRECC/FRAGMENTATION OF FSPARS (RIGID COMPONENTS) - SOME SOME ASYMMETRY + OFSET FRAGMENTS = REVERSE, W BLOCK UP DISPLACEMENT. | |
| 310 | SILICA ALTN + MM SP. | SPACED FRACTURES ALL CODE TO S1 - ALTN AT LATE STAGE IN ZONE PYRITE CONC. ON DARK CLEAVAGE FOLIA | | BULBOUS QV FOLDED + BOUDINAGED IN S1.<br>  <br> | |
| 320 | | | | | |
| 330 | BRECCIA + VNS ~ll S1. | QV BOUDINAGED in S1 Asymm = W BLOCK up. CUT BY SUBVERTICAL SHEAR - BRITTLE FAULT WITH Py, mrkst - SHOWS E BLOCK DOWN EXT. (~ 3mm SLIP) | | CONSISTENT STEEP X LIN ON S1. - moderate cleavage development. | |
| 340 | | | | | |
| 350 | | SPACED CLEAVAGE DARK FOLIA SHALLOWER THAN S1. | | Amygdoidal - flattened but generally symmetric shapes, RARELY ones show REVERSE W BLOCK SENSES. | |
| 360 | QTZ/ALBITE VNS | VITRIC UNIT with SPACED CLEAVAGE FOLIA ⇒ STEEPER THAN S1. | | ↑gb in epiclastic unit | |
| 370 | | | | | |
| 380 | BTL VN FAULT gn/py/sp | Post-S1 small FAULT with ~DOWN DIP SKS | | | |
| 390 | | | | | |
| 400 | | | | | |

Project : TULLAH STERLING
Logged by: FCM
Date : 1/95

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** STP 101



| Feet | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding - So, c = cleavage - S1, f = fault, Angles to LCA) | GRAPHIC LOG (CORE, 0.5, 2, 8, 32, BEE) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 20 | LCA 20° | STRONG S1 CLEAVAGE WITH DOWN DIP STRETCHING LINEATION X. | | Bleached, sericite, altered Rhyodacite. | |
| 40 | | Asymmetric Augen = REVERSE, W BLOCK UP | | ~~~ SHEAR ZONE Syn-S1. COMPOSITE FABRIC - LOC. SHEAR BANDS SHALLOWER THAN S1 - SC FABRIC = REVERSE, W BLOCK UP. | |
| 60 | | ↓ DEC. CLEAVAGE INTENSITY | | | |
| 80 | ~ QV + BRECCIA - V. OXDY. | Symmetric Augen - flattened. | | | Moderate to STRONG CLEAVAGE STRAINS |
| 100 | STRONG SER/Py ALTN ALONG S1. | LCA 25° | | MORE SILIC UNIT LESS PORPHYRITIC INC CHLORITE DOWNHOLE VARIABLY CRYSTALLINE | |
| 120 | ~ Qtz, CHL VN + FAULT | LOCAL REVERSE AUGEN + WEAK SC FABRIC = W. BLOCK UP. | | ↓ DOWN HOLE W. YOUNGING FROM grain size VARIATION | |
| 140 | STRONG ALTN - MN + MNR Cu oxide. | | | | |
| 160 | | LCA 35° | | LOC. VITRIC UNIT | |
| 180 | ~ Qtz, Py VN. | SC FABRIC + Asymm Augen = W. BLOCK UP. | | Fine gr. v. homogeneous. | |
| 200 | LOC CHLORITIC ~ Qtz, Py/LIMONITE VN | LCA 45° moderate S1. Qtz Augen - symmetric and Asymmetric - REVERSE. - WEAK SC FABRIC. | | | MURCHISON VOLCANICS |
| 220 | | LCA 40° | | | |
| 240 | SMALL post-S1 FAULT | DRAG SUGGESTS REVERSE + CHLORITE VNS. | | SILICEOUS. Qtz plano LESS STRAINED | |
| 260 | INC. ALTN. ↓ | Asymm. Qtz Augen = REVERSE, W. BLOCK UP STRONG S1 LCA 40° | | | ↓ INC STRAIN |
| 280 | LIMONITIC STAINED | | | STRONG S1 + DOWN DIP LINEATION X. GRAIN SIZE REDUCTION - HIGH STRAIN ZONE SHEAR ZONE ~~~ + ALTERATION PULL APART Qtz plano = REVERSE. - WEST BLOCK UP. ↓ INC SHALE COMPONENT. | FARRELL FAULT - Syn-S1. |
| 300 | ~~~ + pyrite ~~~ ~~~ | Asymm qtz Augen: REVERSE LCA 42° LATE KINKS | | | ↑ INC STRAIN |
| 320 | | LCA 50° STRONG S1 IR compositional LAYERING (So?) | | | |
| 340 | v. altered + broken core - lot pyrite | | | MORE HOMOGENEOUS SLTS DOWNHOLE | |
| 360 | SILIC ALTN + Py/cpy. | | | | FARRELL 'SLATES' |
| 380 | | | | | |
| 400 | LOT of veining Sil/Py/cpy. | LCA 70° | | SLTST. | |
| 420 | | | | | |
| 440 | | | | | |
| 460 | | | | | |
| 480 | | | | | |

P5412.CGM

Project : TULLAH STERLING
Logged by: FCM
Date : 1/95

# PASMINCO EXPLORATION DIAMOND DRILL LOG

HOLE No. STP101



| ft | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE b = bedding $S_0$, c = cleavage $S_1$, f = fault. Angles to LCA | GRAPHIC LOG (0.06 mm, 0.5, 2, 8, 32, 64 mm) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 500 | | | | gj SLTST + SILIC ALTN | |
| 520 | Post S1 pyrite VNS LLCA 20° | LCA 70°-S1. | | moderate S1 ~/// $S_0$ | |
| 540 | | LOT OF SMALL SCALE post-S1 FAULTS | | | FARRELL SLATES |
| 560 | | | | Dk gj SLT/SH | |
| 580 | | | | SPLIT CORE + CORE LOSS | |
| 600 | | ↓ inc STRAIN | | | |
| 620 | | | | | |
| 640 | ~~~~ | V. STRONG PLATY S1 FABRIC | | HIGH STRAIN ZONE - PROTOMYLONITE | ? HENTY FAULT ? |
| 660 | ~~~~ | LCA 80° X DOWNDIP to 70°S. ↑ inc STRAIN | | Augen CLASTS = REVERSE, U.S. BLOCK up. | |
| 680 | STRONGLY Pyritic BRECCIATED & ALTERED | | | | |
| 700 | | LCA 80-90 | | | |
| 720 | | | | Fine gr sst/sh - t/facies? | ? "CVC" ? |
| 740 | | LOW STRAIN | | | |
| 760 | | | | | |
| 780 | | | | | |
| 800 | | | | | |
| 820 | | | | | |
| 840 | | | | | |
| 860 | | | | | |
| | EOH 870' | | | | |

P5842665

Project : TULLAH STERLING
Logged by: FCM
Date : 1/95

# PASMINCO EXPLORATION DIAMOND DRILL LOG

**HOLE No.** STP105



| Ft / m | VEINING and ALTERATION (1 = weak, 4 = intense) | STRUCTURE (b = bedding So, c = cleavage S1, f = fault, Angles to LCA) | GRAPHIC LOG (0.06 MUD, 0.5, 2, 8, 32, MM) | LITHOLOGY | MINERALISATION |
|---|---|---|---|---|---|
| 20 | | S1 moderate, spaced CLEAVAGE | | Silic. Rhyodacite qtz eye alt WEAK. | |
| 40 | | LCA 15° S1 | | qtz phenocrysts relatively unstretched. NO PHENOCRYSTS STRETCHING LINEATION. | |
| 60 | | | | | |
| 80 | → ← | LCA 5° DUCTILE SHEAR STRIKE SWING | | VITRIC CLASTS TOWARDS CONTACT WITH CRYSTALLITHIC UNIT BELOW. Pyroxene CLASTS AT TOP OF FLOW → ↓ y. down hole? | |
| 100 | | So 11 S1 × Better developed | | ALTERNATING PATCHES VITRIC + CRYSTALLITHIC | |
| 120 | | LCA 40° | | | |
| 140 | | LCA 30° | | Diffuse Bdd., more chloritic patches | |
| 160 | Py/ser alt'n | MORE FLATTENING OF QTZ phenos, STRONGER CLEAVAGE | | | |
| 180 | | LCA 30° | | Variation in cleavage intensity probably lithology controlled. — no major shears. | |
| 200 | Fine pyritic ols / | LCA 25° MODERATELY STRONG QTZ NOW STRONGLY STRAINED | | Fine gr, vitric, few qtz phenos. | |
| 220 | Pyritic alt'n, patchy but strong // ≈ QV, CH, Py, Ser. | moderate dev. × lin DOWN DIP in Fine gr. lith. | | Heterogeneous lith grainsize variation. | |
| 240 | | LCA 40° DOWN DIP × BLEACHED | | | |
| 260 | STRONGLY ALTERED Py/siderite? | LCA 35° DOWN DIP× in CHLORITIC LITH. Moderate S1 × Down Dip. | | Heterolithic volcaniclastic + 10' tuffaceous shale bed. | Muchison Volcanics |
| 280 | | | | | |
| 300 | ≈ FLAT QV - vert. ext / post-S1 + Py/cpy = ~~~~ QV FAULT | S1 SHALLOWS into FAULT ← LCA 5° | | Loc. Breccia of QV. Loc. composite cleavage + mnt. shear bands | |
| 320 | | LCA 35° → Kinking of S1 | | | |
| 340 | Loc. v. pyrite on S1 cleavage folia / fine pyrite in fine gr lith | LCA 5° ← Broad Shear Core No plano. | | Lam. So/S1 11 sericitic, vitric Syn S1 SHEAR ZONE - NO KINEMATIC INDICATORS in FINE GR LITH. NO EVID OF grain size Reduction. V. pyritic. | |
| 360 | | LCA 35° QTZ-Symmetric Augen | | | |
| 380 | LOT OF LATE Pyrite | LCA 35° Fine S1-parallel QV | | SILICIFIED. S1 defined by chlorite seams 11 to compositional layering × ~70°S QTZ phenos NOT STRONGLY FLATTENED. Thin flat QV = vertical extension, cut by wide spaced cleavage folia but not folded By S1 = continuum, late S1 vert. extn. Asym boudinage of siliceous layers + qtz pressure shadows = REVERSE, W-block up V. STRONG S1 11 to So, STRONG COLOUR BANDING on mm/cm scale, lenticular | ~~~ FARRELL FAULT ~~~ |
| 400 | Differentiated Cleavage / siliceous lithons + chloritic seams + pyrite // | LCA 40° S1 spaced folia post QV | Broad Shear Zone Syn cleavage. Reverse = W-block up Late Relaxation | | |
| 420 | | QTZ Symmetric Augen — REVERSE FLAT Kink BANDS ⊥ to × = vert. shortening of S1 | | | |
| 440 | | LCA 35° | | Inc. clts / sst. ↓ | FARRELL 'SLATES' |
| 460 | | ↓ Dec. CLEAVAGE Intensity | | ↓ V - weak grading. | |
| 480 | | | | | |

FCM 1/95

Tullah/Farley Valley Review (GP) JAN '95

24/1 Core Compound

MM1A Logging

Drilled to east thro Farrell Slates

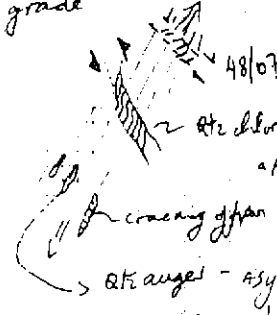
& Murchison rocks

Murchison Dam Road.

loc 1 2 bend in Much rocks, view over Lake Farley

Qtz phyric volcaniclastics/flows? + feldspar phyric

strong S1 anastomosing cleavage, steep lineation, calcite grade




S1 - 72/274

X - 80 S

To east in section - massive flow gtz tuff - finer gtz - contact with massive flow with pinkish grey alter - GTK units

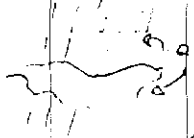
73427.0

cut by fluvial erosion gvs => vert extn, thrust component - also + dunes => lies.
Contact of units oblique to $S_1$, steeper than $S_1$,
= Rom Barrys ∈ growth fault??
= post S1 fault drag into fault 2 normal disp.

W ← 80/300 — ? syn-kinks

$S_1$ 70/270

Loc 2:
To West on beach live chalk/sarc altn along fd.
Low magnetic gvs ⊥ to $S_1$, toffschalk infill $S_1$ 2 mm pg.



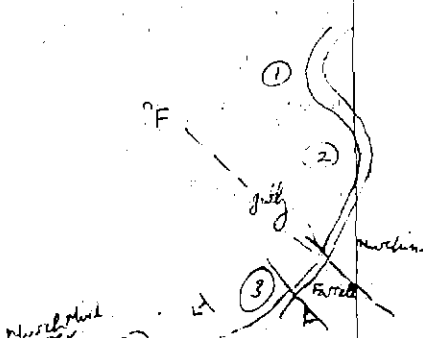

$S_1$ 70/262 - slight strike swing

Slip/flat gvs - post $S_1$, massive, milky
48/080 loc. offschalk stopper
- best in whole complex, less cleaved units

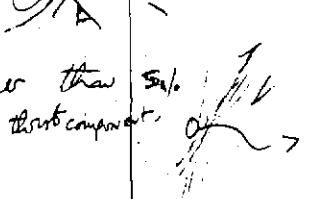
75/090

More felsic components to W before gully.

Loc 3:
Farrell Slates - fd dot to 66/250 into brittle f.
<78s
F 56/280 diffuse margins

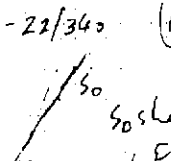



F is ~~go~~ shallower than $S_1$/.
- poss drag of $S_1$ ~ thrust component.




26/1
S. of Turlegs
$S_1$ 70/260 - Murchison volcs - loc. autoclastic + volcaniclastic to east - more cleaved 60/260.

Murchison Dam Rd
Loc 3 (contd) FAULT ZONE.
normal kinks - 22/340 (Ph 1)




$S_0$ shallower than $S_1$ in FW of fault.
(Ph 2)
Lowscale beds - limited

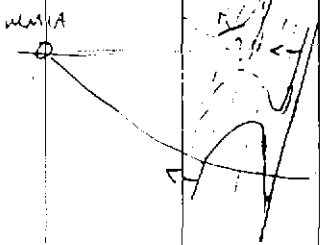
$S_0$ 58/260
$S_1$ 62/260

CSIRO

Hw of F. - lx. $S_2$ cren 120°N on $S_1$ 264/60
× 88°S
Immed W - in N side of road exp.
- lin. bed, slow grading -> W younging
> upward facing on $S_1$
- c/ NM1A



Ph 3 - Lizard




On Road to W - $S_1$ 60/264 $S_0$ - shallower
$L_1$ 14N
F 54/262 - SKS surface
SKS 80S - steps - reverse
shaded grey
TPL4

$S_1$ 46/252 - pre-kink shear surface
SKS 36S

$S_1$ 54/254
$L_1$ 30N
$S_0$ 54/250
$S_1$ 68/260
$L_1$ 20N

$S_1$ 58/260
× 90 - stretched pyrite
$L_1$ 34N
- L1 variation ≈ isoclinal folds? NAP?

**Lock:** Exp of Fasnall Slate just E. of corner @ intersects with Silverdale Silverstack 1145
major change in plunge of $L_1$ - to South.

$S_0$ 38/234
$S_1$ 56/262
$L_1$ 32°S
× 82S
$L_2$ 8N - v. weak

$S_0$ 40/240 V?
- poss grad - set-based in E.W.N facies

DV 24/050 - normal dyke

>10 m strike length & anastomosing

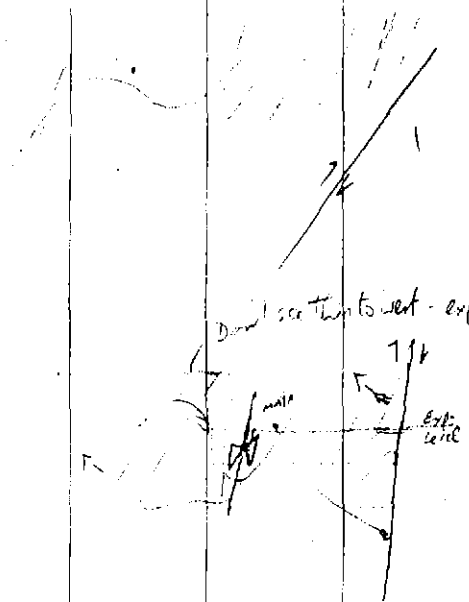
assoc with joints & pod-KWVs

DV 54/240 - ? normal - pre flat-DV
SKS 90 subtle $S_1$

To E/ end of outcrop - $S_1$/$S_0$ suggest the closure to W is a S

<- W

21284




## Loc 5: Highway - exp just N. of Murchison Bridge

sst/slt - bed cross bed in fold closure
- upward facing
- gentle E short dip

S1 78/270
L1 24S

Loc massive qtz pl sst
+ shale rafts.

S1 62/262 (So 11 L)
X 825

Loc top of fine gr sst unit - So shallower than S1 - W younging
L1 shallow <5° to South

So 64/280
Pg/DV 82/248
SKS 805, 505

## 27/1

## Loc 6: Highway S. of Murchison Bridge

Q/F phyric, altered Rhyodacite precursor?

S1 62/264
X 824 N

Dark chlorite VNS - subvert 86/210 ½ qtz, pat-S.

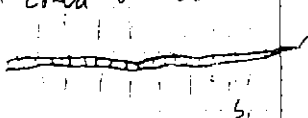
Qtz - seric/chlor/silica - pervasive
- cleavage varies in intensity - loc massive bit

Cleavage Ext BV 36/074

Fibres in VNS 11R to X lin on S1
= ∴ assoc with vert ext = thrust component

+ DARK chlorite in VNS BV 20/090 Ph 6+7
- same colour as subvert dark chlorite VNS

Flat Q/C VNS v. planar - v. weak brecciation S1 = late vert. ext 11R to X - brittle mode → uplift to higher crustal level than that which generated S1 but could be continuum.



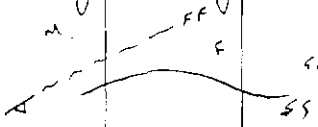

Ph-8

To South - pass into epiclastic bit - boundary is strongly altered and cleaved - looks like syn S1 shear zone. Ph 9 FARRell Frm?

FAULT = $S_1$ 62/240 - loc 5m in the gorge.
× 82 N

- sericitic altn - qtz ribbons not very stretched
HW unit - feldspar phyric epiclastic - fsparrs flattened but little evid of stretching ⊇ Ph11
Good evid for weak C crenulation shallower than $S_1$ esp on weathered surfaces = thrust component
× 2 planes = Reverse sense. - SAMPLE.
Mnr small sulphide clasts - pyrite & limonite

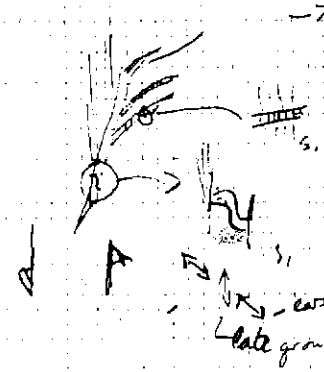
Corrugated surface, down $S_1$, 5m Amplitude, plunging down ×




$S_1$ 50/250
× 80 N

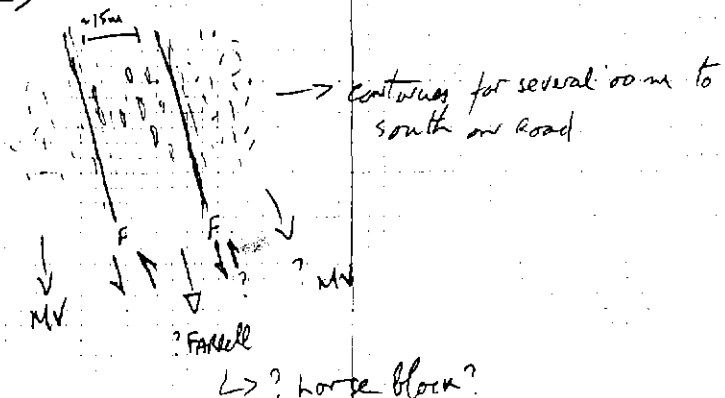
Becomes more conglomeratic - mass flow - need down to south - lot of fine gr phyodacite clasts, long axes gen down dip elongation Ph12
Some asymm clasts consistent with reverse but this is not always the case - a few outriders - lot depends on orig clast ortn & degree of rotation
- also wide spaced fol shallower than $S_1$ - cplanes - thrust

Ph13
$S_0$ ∥ll $S_1$ - comp. banding - shale, fspar phyric epiclastic ∥ll to $S_1$
Pass into vole'flow' - like orig Mrch Hill rhyodac & altered ⊇ lot of veining - more corrugated.




? Are epiclastics + shale (mnr) this unit in thrusting or is Mrch / F contact repeated / sliced up?

$S_0/S_1$ 70/250 - boundary of epi & vole
× 84 N
SKS. 325




15274

Loc 7: Massive mV becomes more cleaved to bend in road - dex. chlorite clots in S1
- inc actic + limonite alts.

close to Thomas Blocks S1 62/258

Stream down to Lane R. [Ph16] x 88 S - chlor clay
- diffuse mn/vitric banding ?
- strong cleavage, lo. shear zone with qv developed - includes pyrite, dogtooth qtz in vuggy centre + ? sphalerite ?

INC alts - limonitic VN 82/268 SKS 90.
in zone of veining S1 64/270
strong cleavage

Branching Vns - block + anticlock of S1 [Ph16]




- suggests extn down dip post/late S1

ON Road, along strike from stream exp.
- vein system lo with pink gospar assoc + black blades mn - hematite (similar to that in stream vns)
10 cm thick VN 80/258




Contact of Murchison + Farrell - 1m wide v. cleaved zone with diffuse colour change between the units, subtle to S1 + thin lighter straw granulated gouge zones, steeper than S1 but overall boundary is ||le to S1/S0 gouge 70/280

[Ph17] no diving tetrahedrites




Volcaniclastics fine gr massive sst @ base Farrell
- makes distinction difficult between the two

@ Python vein/fault 66/264 + ? sphalerite

[Ph18] + ||le qv. vuggy ≈ extends into wide space.

Another bulbous zone - 30m to south - shallower than S1 - 70/270
Litt - more clastic - e.g. loc. VN - 60/260
SKS - 46W
Similarity with schist due to erosion at Farrell?
- oblique dextral




[Ph19]

Loc 8: Anthony Rd

Farrell slates [Ph20] Bedding qV in S1 Asymm
S1 80/264 Boudin Axis 10N => reverse
+ 80S L2 2N

79421

- buckle axis ⊥ to ↗ = sym - S1
=> thrust component.

L2 loc better than elsewhere - appear related to buckle folds with reverse sense, bedded in same layers consistent with construction of rev. shearing

Ph20



S1 78/262

Loc9: Track to Turlays.

- @ small stream - shales S1 70/266 (S0 ~ AP)
- ~ 30m to S on track QF vol. RM S1 68/266
  - strong S1 + alts
  - + shaley hilt adj 2m to W - ? contact thickening

Loc10: Sheared/altered/cleaved mV ? Rhyol. S1 70/260

Loc11: TRACK in south (from HEC track to Billiluna grid) towards S.V. Mine
Sheared mV - ? Quartz-calcite in places, Outgen. homog. Rhyol.
Lineation/intersection/joint/cleavage S1 60/260
QV 90/080 - pol S1, planar/bullion × 84S
ext. vein

Across small gully S1 54/270 (subhill S0)
to W, Farrell claim L2 65

Loc12: ~400m S. of track junction, on HEC track
striped thinly bedded sh + fine sst/slts on 2 cm scale.
S0 ~ 68/266
S1 ~ 72/256
≈ up facing to W? ← ⊥ S1
Arguably W verging

Loc13: Adjacent to HT Powerline
crenulated slates - chevron/kink style folds
steeply plunging, loc. assoc with slip surfaces,
post-QVS.
↑W
S1 90/270
Asym = Sin shear.
S1/S0 ~ 10
SS 88/282
Ph21

Also: dex kink folds
Pl 72 NW on 80/060 AP



conjugate = Buckfold vergence
= Along strike shortening.

Pl 72 NE on 82/340 AP.

75429

754277

# Appendix 13

## Geological Transect Across the Sterling Valley & Murchison Volcanics, Tasmania

(RL Allen)

754278

# GEOLOGICAL TRANSECT ACROSS THE STERLING VALLEY AND MURCHISON VOLCANICS, TASMANIA

R. L. Allen, January 1995

Report to Pasminco Exploration, Tasmania

754279

# GEOLOGICAL TRANSECT ACROSS THE STERLING VALLEY AND MURCHISON VOLCANICS, TASMANIA

## Summary

An east-west geological transect has been made across Pasminco Exploration's Sterling Valley - Tullah project areas. 16 days were spent on site, mainly logging drill core. Results and recommendations from this work including a detailed geological cross section, strip maps, petrographic thin section descriptions, geochemical data tables and geochemical graphical plots are presented in this report.

The region contains four main NNE striking, west dipping and west younging stratigraphic units; from west to east these are: Mount Black Volcanics, Sterling Valley Volcanics, Farrell Slate, and Murchison Volcanics. Two main faults occur: a relatively brittle fault forming the contact between the Sterling Valley Volcanics and Farrell Slate (the Henty Fault); and a more ductile shear on the contact of the Farrell Slate and Murchison Volcanics (Farrell Fault). Both faults are slightly oblique to bedding in both dip and strike. Major displacement has occurred along the Henty Fault, and stratigraphic units either side of the fault are unrelated. Much less displacement is interpreted across the Farrell fault, and the Farrell Slate is interpreted to reflect the waning end of the Murchison Volcanics eruptive cycle.

The Sterling Valley Volcanics and Mount Black Volcanics appear to be in primary stratigraphic contact, and petrographically and chemically related. The Sterling Valley Volcanics occur in the core of the major anticline of the northern Central Volcanics Complex (CVC), which suggests they are the lowest exposed stratigraphic level of the CVC. They consist of greater than 1 km true thickness of normal graded, basaltic to dacitic clastic mass flow units, minor siltstone, and numerous basaltic to dacitic sills. The formation is mainly basaltic in chemistry. The Sterling Valley Volcanics are interpreted as the structural relic of a large marine mafic to intermediate stratovolcano that was active early in the volcanic history of the CVC. The Rosebery-Hercules footwall volcanics could represent the climactic caldera-forming felsic eruptive phase of this evolving, fractionating, magmatic complex (the CVC).

The Murchison Volcanics comprise a rhyolitic pile of lava domes, sills and pyroclastic debris, invaded by an enormous swarm of rhyolite porphyry sills and the Murchison Granite. The top of the Murchison Volcanics is interpreted as a subaqueous rhyolite dome-sill-tuff cone package, which is very prospective for massive sulphide ores. Most known mineralization in the area is fault and tectonic breccia hosted Pb-Ag-Zn and pyrh-pyr-arsenopy-Au-Cu-Sn vein mineralization, and further potential exists for similar mineralization. However, volcanic-related massive sulphide mineralization is a more attractive target for Pasminco. The most prospective target area is at the coincidence of: (1) a stratigraphic interval of about 400 m straddling the original depositional boundary between the Murchison Volcanics and Farrell Slate, (2) the proximal (central) facies association of the rhyolite-dome-tuff cone volcano at the top of the

Murchison Volcanics, and (3) the most intense part of the quartz-sericite-base metal alteration zone at the top of the Murchison Volcanics. Present indications are that this prospective area lies around drill hole STP105 and further south. More mapping, core logging and drilling are necessary to determine more precisely where the centre of the rhyolite dome-sill-tuff cone complex and intense alteration are; and to determine the orientation and displacement vector of the Farrell Fault shear zone. Preliminary work in this study suggests the shear zone is steeper than bedding in dip, and trends more easterly (clockwise) than bedding in strike.

The area east of the top contact of the Murchison Volcanics has strong chlorite-epidote-iron oxide-pyrite alteration, especially within the Murchison Granite and rhyolite porphyry sills. This area has potential for structurally controlled (fault and breccia hosted) chlorite-pyrite-cpy mineralization, but is less prospective for volcanic-hosted massive sulphides.

754281

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## Appendices

**Appendix 1:** Thin section descriptions

**Appendix 2:** Volcanological - Structural graphic drill logs of drill core logged for this study.

## Introduction

This report presents the main data and results of a geological transect made across the Tullah-Sterling Valley project area by R. Allen in November 1994 (Figure 1). The aims of this study are to produce a stratigraphic and structural framework for the area enclosing the Sterling Valley mineralization, interpret the rock types, stratigraphy and depositional environments especially of the Murchison Volcanics, and interpret the best areas for mineralization. This study complements recent work in the area by G. Purvis (1993, 1994) and G. Blackwell (1992).

16 days were spent on site, mostly logging drill core (Table 1, Appendix 2). A few days were spent mapping sections of the Murchison Highway on Mount Black (Figure 3), Anthony Road (Figure 4) and Murchison Dam road (Figure 5). A number of petrographic thin sections (Appendix 1) and whole rock and trace element analyses (Tables 2-5) were made to test field interpretations and enlarge the data base for the area. From this data a cross section is presented for the central part of the transect (Figure 2), and tables and graphs of geochemical data are presented that highlight possible volcanic suites and correlations (Tables 2-5, Figures 6-9).

Table 1: drill core logged for this study

| drill hole number | detailed log Nov. 1994 |
|---|---|
| SVD89-3 | 0 - 364.2 m (end of hole) |
| STP105 | 0 - 1062 ft (end of hole) |
| STP218 | 0 - 165.3 m (end of hole) |
| STP220 | 0 - 268.8 m (end of hole) |
| STP221 | 0 - 203.25 m (end of hole) |
| STP234 | 0 - 342.5 m (end of hole) |
| STP284 | 0 - 116.7 m (end of hole) |
| MM1a | 250 - 400.7 m (end of hole) |
| Total: 8 holes | 1935 m |

## Regional structure and stratigraphy

The region contains four main NNE striking stratigraphic units; from west to east these are: Mount Black Volcanics, Sterling Valley Volcanics, Farrell Slate, and Murchison Volcanics. A northerly trending spine of Devonian granite is interpreted from gravity and magnetics surveys to shallowly underlie the central two units. The Sterling Valley volcanics, Farrell Slate and Murchison Volcanics all dip steeply west, and many new stratigraphic younging data (mainly graded bedding) and structural vergence data (bedding/cleavage relationships) indicate that these units also stratigraphically young to the west (Figure 2). No evidence was observed for the strike, dip and stratigraphic facing of the eastern edge of the Mount Black Volcanics.

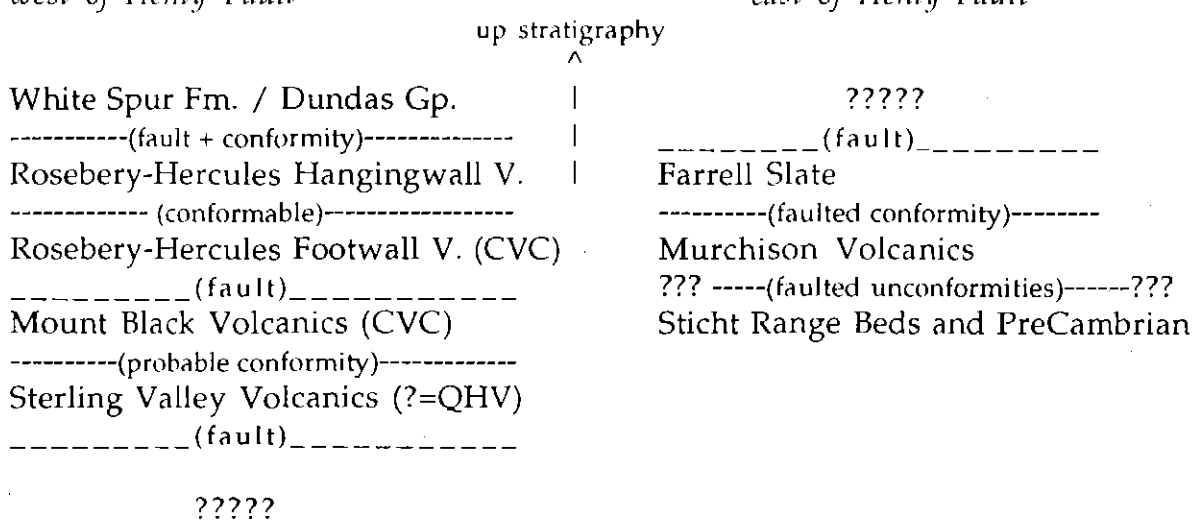
Faults are common in the Farrell Slate and Murchison Volcanics, but two appear most important. The first comprises the contact between the Sterling Valley Volcanics and Farrell Slate and is interpreted to be the Henty Fault. The second occurs on the contact of the Farrell Slate and Murchison Volcanics and has been reported previously as the Farrell Fault (G. Purvis, pers comm.). The Henty Fault comprises 3-13 m of intensely broken, brittle-ductile sheared, quartz-veined rock, within a broader zone of moderate shearing and silicification. The fault is slightly oblique to bedding (in both adjacent stratigraphic units) in both cross section and map view. In map view this discordance is reflected in the southward truncation of both the Farrell Slates and Sterling Valley Volcanics. This structural discordance and the completely different, unrelated facies character of the Sterling Valley Volcanics and Farrell Slates, indicate there has been major displacement on the Henty Fault. The original stratigraphic relationship between the Sterling Valley Volcanics and Farrell Slates is uncertain.

The Farrell Fault varies from a 3 m interval of intense ductile, mylonitic foliation overlying an intensely cleaved footwall (drill hole STP105), to a 13 m interval of moderate to strong brittle-ductile shearing overprinted by narrow brittle faults (drill hole MM1a). Like the Henty Fault, the Farrell Fault is oblique to bedding in dip and probably also in strike, resulting in truncation of underlying and overlying strata (Figure 2). Although a marked change in rock type occurs across the fault, indicating fault displacement, the composition, facies characteristics and depositional environment of the top of the Murchison Volcanics and Farrell Slates are similar (see discussion below). From this data the Murchison Volcanics and Farrell Slates are interpreted to be in their correct relative stratigraphic position, dipping and younging to the west. However, the amount of stratigraphy missing from the contact zone is uncertain.

No significant faults were noted west of the Henty fault, however, numerous other brittle-ductile faults occur eastwards through the Farrell Slate and top of the Murchison Volcanics. Cleavage strikes northerly, dips steeply to moderately west, is steeper than bedding in both the Sterling Valley Volcanics and Murchison Volcanics, but subparallel to bedding in the Farrell Slates. The cleavage swings into parallel with the Henty fault, close to the fault, but away from the fault is discordant, especially in the hangingwall (Sterling Valley Volcanics; Figure 2).

To the west, the Sterling Valley Volcanics and Mount Black Volcanics appear petrographically and chemically related (see discussion below), and show no evidence of a sheared, faulted contact on the Murchison Highway where the position of the contact can be determined to within a few metres (Figure 3). These units are therefore interpreted to lie in their correct relative stratigraphic position, dipping and younging to the west under Mount Black. Regionally, the Sterling Valley Volcanics occur in the core of the major anticline of the northern Central Volcanics Complex (CVC) structural block (Allen, 1991, Fig. 1), which suggests that the Sterling Valley Volcanics are probably the lowest exposed stratigraphic level in this structural block.

From this data and the facies characteristics, volcanology, petrography and geochemistry briefly discussed below, the following regional stratigraphy is interpreted.




The above reconstruction of stratigraphy east of the Henty Fault is incomplete. In particular there seems little direct evidence for the relationship between the Murchison Volcanics- Farrell Slate succession, and the CVC-Tyndall Gp succession. There is no good evidence at this time to correlate the Murchison Volcanics and Tyndall Group. The abundance of quartz-phyric volcanics in both units is insufficient evidence for correlation.

The Sterling Valley Volcanics have a substantial thickness, facies types, petrographic types (and possibly chemistry?), basaltic to dacitic compositional range, and paucity of rhyolitic interbeds, which is similar to the Que-Hellyer footwall volcanics (for example as exposed in MCH-1 and other drill core). For these reasons, and the likely stratigraphic correlation of the Hellyer hangingwall with Sock Creek-Burns Peak and hence the top of the CVC/Mount Black structural block, I think it is possible that the Sterling Valley Volcanics are stratigraphic equivalents of the Que-Hellyer Volcanics (QHV). This raises several other questions, such as whether the top of the Farrell Slate is equivalent to the Animal Creek Greywacke, which underlies the Que-Hellyer Volcanics.

## Internal stratigraphy, structure and facies interpretation of major rock units

### Murchison Volcanics

The Murchison Volcanics are overwhelmingly of quartz-phyric rhyolitic composition, except for a few dacitic to basaltic sills (Appendix 1, Tables 2 and 5, Figures 4-9). However, most of the Murchison Volcanics up to the top (= western-most) 200-400 m is a complex of thick feldspar-quartz-biotite-hornblende-

magnetite porphyritic rhyolite sills (Appendix 1, Figs. 4 and 5). These sills have intruded into a rhyolitic volcanic succession. However, the sills are so abundant that they far exceed the host succession in volume. The host succession occurs as several thin screens between the sills (Fig. 4). It is unlikely that the host volcanics have been stoped out by the sills, so the thin screens are interpreted as separated layers of a multiply bifurcated and vertically extended original succession. Many brittle and brittle-ductile faults have utilized the competancy contrast along the contacts between the sills and host volcaniclastics (Fig. 2).

The uppermost porphyritic rhyolite sill (location MV10, 11, 12) has a fine grained perlitic to spherulitic groundmass, indicating rapid cooling, whereas the lower sills have coarser grained, in places granophyric subgranitic groundmass textures (Appendix 1). Petrographically the sills have textural and mineralogical similarities to the feldspar-quartz-biotite-hornblende Murchison Granite, which underlies them or intrudes into them in the eastern half of the Murchison Volcanics. The margin of the granite is porphyritic, with both quartz-phyric and non-quartz-phyric phases. Both the sills and the granite have strong chlorite-epidote-Fe oxide-pyrite alteration. I suggest that it is likely that the sills and granite are genetically and temporally related. The sills may represent a precurser, high level sill swarm, that grades from volcanic in texture at the top, to granophyric subgranitic at deeper levels, and which was subsequently intruded by plutonic phases (the Murchison Granite). Polya, Solomon and Walshe reported years ago that the Murchison Volcanics are chemically related to the Murchison Granite. Considering the abundance of rhyolite porphyry sills, it is likely that many of their Murchison Volcanics geochemical samples were of the sills rather than the host succession to the sills.

The host succession to the sills is best preserved at the top (west) of the formation. Here, feldspar-quartz-minor biotite porphyritic rhyolite lava domes and sills have invaded a clastic succession of thick, mainly pumiceous beds of similar rhyolitic composition. The beds are mainly normal-graded with sandy pumiceous tops and poorly sorted, coarser grained, crystal ± lithic rich bases (Appendix 2, MM1a, SVD89-3). The textural and bedform characteristics indicate rapid deposition of juvenile pumiceous pyroclastic debris in a predominantly subaqueous depositional environment, below wave base. Crystal-rich rhyolitic sandstones with poorly graded bedforms are interbedded with tuffaceous siltstones at the faulted top of the Murchison Volcanics in drill hole MM1a. These are interpreted as reworked pyroclastic debris, deposited subaqueously, but possibly in shallower water.

Below the top of the Murchison Volcanics, the thin screens in amongst the rhyolite porphyry sill complex, comprise massive, feldspar-quartz crystal-bearing rhyolitic volcanic sandstones, and at least one thin interval (location MV13) of laminated grey ash-siltstone. The rhyolitic sandstones are most likely syn-eruptive to reworked rhyolitic pyroclastic debris. No preservation of bedforms precludes interpretation of depositional environment for the rhyolitic sandstones. However, the laminated ash-siltstone is a subaqueous suspension deposit, emplaced below wave base.

The rhyolite lava domes and sills are characterized by great textural variation from massive coherent lava-like texture, to pseudo-fiamme ignimbrite-like texture, to clastic breccia texture. Howver, gradational contacts between these variants and widespread perlitic matrix textures in all variants, in both outcrop and thin section (Fig. 4, Appendix 1), indicate these are textural variations within coherent to quench and auto-brecciated rhyolites. Such textural variations make the rhyolites seem superficially very heterogeneous and complex. However, these variations are typical of hydrothermally altered, subaqueous rhyolite lavas, and are almost identical to the footwall rhyolites at the Benambra massive sulphide deposits, Victoria (Allen, 1988).

The top of the Murchison Volcanics is interpreted as a subaqueous rhyolite dome-tuff cone package. Early phases of eruption were explosive, generating a succession of pumiceous mass flow units. These were subsequently invaded by passive non-explosive injection of degassed rhyolite as lava domes and sills. The whole complex has been pervasively quartz-sericite altered. I emphasize that this style of rhyolite dome/sill-tuff cone complex is the classic, most common and most prospective volcanic setting for volcanic-hosted massive sulphide ores on earth.

**Farrell Slate**

Although tightly folded and faulted, the Farrell Slate formation youngs mainly from east to west in the area covered by this study (Fig. 2). The formation appears less tectonically disrupted than current folklore would suggest, and stratigraphy can be reconstructed in the several thick panels between brittle faults (Fig. 2). In terms of stratigraphy the formation appears relatively simple, comprising grey to black siltstone, with abundant thin to thick bedded, feldspar-quartz-mica sandstone turbidites interbedded in the upper part, and abundant very thick pumiceous to crystal-rich rhyolitic mass flow units interbedded in the lower part. The top and base of the formation have been displaced by faulting, and were not located in this study.

The entire formation comprises clastic sediments and volcaniclastics deposited below wave base in a subaqueous environment. The volcaniclastic beds are syn-eruptive to post-eruptive subaqueous mass flow units of juvenile to slightly reworked pumice-crystal-rich pyroclastic debris. The grey feldspar-quartz-mica sandstones are turbidites, derived from a mixed source terrain of reworked felsic volcanics and PreCambrian basement schists, gneisses and quartzites. The apparent progression up stratigraphy from abundant pumiceous rhyolitic mass flow units to abundant polymict reworked sandstones, suggests that the Farrell Slate is the record in a subaqeuous basin, of the end of a major rhyolitic eruptive stage. The pumice-crystal mass flow units interbedded with siltstones, record episodic major pyroclastic events in the source area, separated by more quiescent periods of reworking. The textural, mineralogical and facies characteristics of the pumice-crystal mass flow units of the Farrell Slate are similar to the pumice-crystal mass flow units in the top of the Murchison Volcanics. It is a logical conclusion therefore that the Farrell Slate records the end of the Murchison Volcanics eruptive stage of the Mount Read Volcanics. The amount of

stratigraphy removed by faulting at the base of the Farrell Slate and top of the Murchison Volcanics is unknown at present, but could be small, in the order of hundreds of metres.

### Sterling Valley Volcanics

The Sterling Valley Volcanics are probably not prospective for massive sulphides, but provide important information about the regional stratigraphy and volcanology of the Mount Read Volcanics. The unit is so different to adjacent units that I suggest it be given separate formation status. The formation consists of greater than 1 km true thickness of normal graded, basaltic to dacitic clastic mass flow units, minor siltstone, and numerous basaltic to dacitic sills. Despite being regarded previously as dominantly andesitic, the geochemistry of representative facies types carried out in this study indicates clearly that the formation is mainly basaltic (Tables 3 and 4, Figs. 5-9). Least altered examples of mass flow units, one of the main individual clast types in the mass flow units, intrusions, and a possible lava were all chemically analysed. This data indicate that most units mapped in the field and drill core as andesitic, are in fact basaltic. The mass flow succession can be subdivided into intervals of different clast type or different mixtures of clast types (Fig. 2, Appendix 2 drill logs), and includes relatively monomict packages as well as polymict packages. Rhyolite clasts are virtually absent, and the dacitic to basaltic clasts range from dacitic pumiceous clasts to quenched basaltic lava clasts and coarse grained dioritic-gabbroic intrusive clasts. This thick succession of transported debris records the history of eruptive and erosional events of a major mafic volcano or series of mafic volcanoes. The clastic succession was deposited entirely in a subaqueous environment below wave base. Abundant fine grained, quench fragmented lava clasts and lava clasts with chilled margin segments, suggest at least part of the source volcano was subaqueous, but the summit could have emerged above sea level.

Previously, most fine grained mafic rocks near the Henty Fault zone have been regarded (by myself included) as Henty dyke swarm tholeiitic intrusions, whereas the feldspar- and feldspar-pyroxene-hornblende porphyritic rocks have been regarded as part of the "normal" CVC succession. However, this perception must now be radically changed. In the Sterling Valley Volcanics, the clastic succession, the moderately to strongly porphyritic intrusions, and some fine grained intrusions (previously regarded as Henty dyke swarm), have chemistry that I would regard as a medium to high K, high alumina, arc suite (e.g. samples 38901, 08 and 23). These rocks have high alumina (>17% in basalts), moderately high K, and relatively low Ti. On the other hand, some of the fine grained basaltic sills have different chemistry (low alumina, low K, high Ti and high Fe) and are probably tholeiitic, and possibly part of a "Henty dyke swarm" (e.g. sample 38909). Unfortunately Tony Crawford's $TiO_2$ versus $SiO_2$ and Ti/Zr versus $SiO_2$ plots *do not* separate the Sterling Valley Volcanics from his Henty dyke swarm suite 4 as it is currently delineated. Furthermore, mafic members of the high alumina, moderately high K suite, including clastic rocks that are definitely part of the CVC stratigraphy, have relatively high Ti/Zr numbers (around 70), which Tony previously regarded as characteristic of the Henty dyke swarm. The data collected

in this study suggest that shifting the boundary of suite 4 (Henty dyke swarm) up to Ti/Zr > 80 may work to distinguish these suites (this should be tested with a larger data base).

The conclusion must be that either (1) the Henty dyke swarm and Sterling Valley Volcanics are unrelated, but a number of intrusions previously regarded as Henty dyke swarm are in fact part of the Sterling Valley Volcanics; (perhaps only those basalts with very high TiO2 and Ti/Zr > 80 are true Henty dyke swarm), or (2) there is only one volcano-stratigraphic mafic complex, and the intrusive component of this complex includes both high alumina and tholeiitic intrusions.

A further very interesting feature is that the Sterling Valley Volcanics and Mount Black dacites may be genetically and stratigraphically related. Five points are pertinent to this: (1) The Mount Black Volcanics occur directly stratigraphically above the Sterling Valley Volcanics. (2) The Mount Black Volcanics and Sterling Valley Volcanics are both riddled with similar mafic sills and dykes, whereas these intrusions are rare to absent from the adjacent units including the Rosebery-Hercules sequence and the Farrell Slate-Murchison Volcanics sequence. (3) The abrupt change in the Sterling Valley area from abundant mafic sills west of the Henty Fault to no sills directly east of the fault, indicates that all extrusive and intrusive mafic events in the area pre-date the main displacement on the Henty Fault. (4) On the basis of mineralogy, compositions, and TiO2 versus SiO2 trend, the Mount Black dacites could be a more fractionated silicic end member of the Sterling Valley Volcanics magmas. More work should be done to test this. (5) The more silicic rocks within the Sterling Valley Volcanics are feldspar-pyroxene-hornblende dacite, which are close in texture, mineralogy, and chemistry to the dacites of the Mount Black Volcanics sampled in this study (compare samples 38904 and 6 with samples 389120 and 21).

The regional significance of the Sterling Valley Volcanics is that they are the structural relic of the medial facies association of a large marine mafic volcano or complex of volcanoes that were active early in the volcanic history of the Central Volcanic Complex. This early volcano was substantially basaltic, but also produced more fractionated magmas at least as felsic as mafic dacite. The volcanics and intrusions appear to include high alumina arc-like compositions. These data collectively suggest the volcano was most likely a large mafic to intermediate stratovolcano. The base of the volcano has been removed by displacement on the Henty Fault.

Dacite sills of the Mount Black Volcanics are potentially evolved felsic members of the same volcanic complex. These sills swarmed into the upper part of the succession late in its development. The Rosebery-Hercules footwall rhyolitic-dacitic pumice breccias have minor but very distinctive mafic clasts, which I interpreted previously as dissaggregated quenched magma blobs from mafic magma injected into the magma chamber during or prior to the caldera-forming pumice eruption (Allen, 1991). These mafic clasts are similar in texture to fine grained basalts of the Sterling Valley Volcanics. It is therefore consistent with the geology of the CVC, and analogous to the evolution of many arc volcanoes, that the Rosebery-Hercules footwall volcanics could represent the climactic caldera-

forming felsic eruptive phase of an evolving, fractionating, mafic to felsic magmatic complex (the CVC). This is a very exciting hypothesis that may conceptually link the mainly felsic CVC to more mafic volcanic successions within the Mount Read Volcanics. These ideas are testable and I will be keen to do this in the future.

## Mineralization

Most known mineralization in the area is fault and tectonic breccia hosted Pb-Ag-Zn and pyrh-pyr-arsenopy-Au-Cu-Sn vein mineralization. Individual subeconomic resources of up to 750, 000 tonnes are known. Considering that the area is ideally structurally prepared for such mineralization and also is underlain by a ridge from a known metalliferous granite suite, there should be potential for more small to moderate tonnage base and precious metal prospects along the Henty Fault Zone. Furthermore, using Renison as an analogy, there could be potential for fault-hosted Sn mineralization at depth.

However, considering Pasminco's interests the most prospective target is for volcanic-related, stratiform to stratibound Zn-Pb-Cu-Au-Ag massive sulphide mineralization. I believe the stratigraphy, volcanology, depositional environments and alteration, all point to the top contact zone of the Murchison Volcanics as being an ideal massive sulphide target. Specifically, the favourable conditions are the coincidence of: (1) polyphase pervasive quartz-sericite-disseminated base metal alteration, (2) the top of a major felsic volcanic eruptive cycle, (3) deep water (below wave base) depositional environment, and (4) a classic "Kuroko-style" footwall rhyolite dome-sill-pyroclastic tuff cone complex forming the top of the Murchison Volcanics eruptive cycle.

I emphasize that rhyolite dome-sill-tuff cone complexes such as the one at the top of the Murchison Volcanics, are the classic, most common volcanic setting for volcanic-hosted massive sulphide ores. I could list numerous examples, but a few suffice: virtually all the Kuroko deposits, over half the Skellefte deposits (Sweden), the best British Columbia deposits, the Benambra deposits (Victoria), and possibly Kidd Creek and Horne (the "big ones" in Canada).

The alteration style at the top of the Murchison Volcanics shows the typical elements of volcanic-related massive sulphide alteration: sodic depletion, intensification of quartz-sericite, patchy disseminated base metals, and pseudobreccia - pseudofiamme alteration textures caused by polyphase hydrothermal alteration. The great variations in rock texture of the rhyolites are typical of hydrothermally altered, subaqueous rhyolite lavas, especially those in good hydrothermal systems, and are almost identical to the footwall rhyolites to the Benambra massive sulphide ores (Allen, 1988). Although the data base of drill cores and outcrops studied in the Sterling Valley area is incomplete, it seems that both alteration intensity and proximity to the centre of the dome-sill-tuff cone complex increase to the south in the area studied. The STP 105 - SVD89-3 - MV1 (Anthony Road field location) are within the volcanologically proximal part of the dome-sill-tuff cone complex (area dominated by multiple, variably

fragmented, originally glassy domes and intrusions). Quartz-sericite alteration and base metal dissemination increase from drill hole SVD89-3 to STP105. I am not familiar with the geology and alteration south of STP105, but this clearly is a high priority area to follow up.

By analogy with many other similar volcanic environments where massive sulphides are known, the prospective stratigraphic interval where massive sulphides are most likely to occur is from 200 m above the original top contact of the rhyolite dome-sill-tuff cone complex to 200 m below the original top contact. The main problem in the Sterling Valley area is that the present top contact of the Murchison Volcanics is a ductile and brittle shear zone, and the amount of stratigraphy removed, and where it is displaced to, are unknown. Drill core studied so far suggest that the shear zone is steeper than bedding in dip, and trends more easterly (clockwise) than bedding in strike. This would suggest that in the eastern structural block the intact top of the Murchison Volcanics should occur up-dip and to the south. Vectors toward the displaced top of the Murchison Volcanics in the western (Farrel Slate) structural block are not yet determined. In STP105 alteration intensity increases up-stratigraphy in the rhyolite footwall toward the ductile shear zone, suggesting that the most prospective zone has been removed. Tuffaceous mass flow units within the base of the Farrell Slate are strongly altered and impregnated with base metals. This impregnation mineralization may be a dispersion halo around and above more massive mineralization at the top of the rhyolite complex, or using Rosebery as an example, could itself be the lateral fringe of stratabound replacement mineralization within permeable pumiceous beds above the rhyolite complex.

## Recommendations

(1) The most prospective target area for volcanic-related massive sulphides in the Sterling Valley area is at the coincidence of: (1) a stratigraphic interval of about 400 m straddling the original depositional boundary between the Murchison Volcanics and Farrell Slate, (2) the proximal (central) facies association of the rhyolite-dome-tuff cone volcano at the top of the Murchison Volcanics, and (3) the most intense part of the quartz-sericite-base metal alteration zone at the top of the Murchison Volcanics.

(2) More mapping, core logging and drilling are necessary to determine where the centre of the rhyolite dome-sill-tuff cone complex and intense alteration are. This work is also necessary to determine the orientation between bedding in the Murchison Volcanics and the shear zone at the top contact, and the main displacement vector along the shear zone. Drill core studied so far suggest that the shear zone is steeper than bedding in dip, and trends more easterly (clockwise) than bedding in strike. This would suggest that in the eastern structural block the intact top of the Murchison Volcanics should occur up-dip and to the south. Vectors toward the displaced top of the Murchison Volcanics in the western (Farrell Slate) structural block are not yet determined.

(3) Strong chlorite-epidote-iron oxide-pyrite alteration occurs over an extensive area within the Murchison Volcanics, and appears to be spatially associated with the Murchison Granite and an extensive swarm of thick rhyolite porphyry sills. There is potential for structurally controlled (fault and breccia hosted) chlorite-pyrite-cpy mineralization similar to the Jukes mineralization south of Queenstown. However, this area east of the top contact of the Murchison Volcanics does not appear to be a good area to explore for volcanic-hosted massive sulphides.

## References

Allen, R. L. 1988. False pyroclastic textures in altered silicic lavas, with implications for volcanic-associated mineralization. Econ. Geol., v. 83, p. 1424-1446.

Allen, R. L. 1991. Stratigraphy, structure, volcanology and ore genesis of the Rosebery - Hercules ZnPbCuAu massive sulphide district, Tasmania. Report to Pasminco Exploration, Melbourne Australia. 3 volumes.

Blackwell, J.D., 1992. Summary Report, Sterling Valley and Tullah Area, Tasmania. Unpubl. Report to Pasminco Exploration, March 1992.

Purvis, J.G., 1993. Tullah EL 22/90 and Sterling River EL 24/91, Annual Report October 1992 - September 1993. 2 vols. Unpubl. Report to Pasminco Exploration, September 1993.

---., 1994. Tullah EL 22/90 and Sterling River EL 24/91, Annual Report, September 1993 - September 1994. 2 vols. Unpubl. Report to Pasminco Exploration, September 1994.

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| Porphyritic rhyolites at top of Murchison Volcanics | | | | | | | |
|---|---|---|---|---|---|---|---|
| | perlitic feld-qtz-rhyolite lava/sill | massive feld-qtz-rhyolite sill | massive feld-qtz-rhyolite sill | pseudo-fiamme feld-qtz-rhyolite | pseudo-fiamme feld-qtz-rhyolite | pseudo-fiamme feld-qtz-rhyolite | pseudo-fiamme feld-qtz-rhyolite |
| location | SVD89-3 | MM1a | MM1a | STP105 | STP105 | STP105 | STP105 |
| sample no. | 38912 | 38924 | 38925 | 38940 | 38941 | 38942 | 38943 |
| | | | | | | | |
| SiO2 | 77.50 | 74.30 | 73.60 | 75.80 | 73.50 | 70.60 | 74.20 |
| TiO2 | 0.10 | 0.19 | 0.24 | 0.17 | 0.19 | 0.15 | 0.23 |
| Al2O3 | 11.96 | 12.61 | 12.01 | 12.85 | 13.68 | 11.30 | 11.83 |
| Fe2O3 | 1.68 | 4.02 | 2.86 | 1.75 | 1.80 | 1.56 | 2.57 |
| MnO | 0.03 | 0.03 | 0.14 | 0.03 | 0.05 | 0.18 | 0.07 |
| MgO | 0.35 | 0.28 | 0.35 | 0.42 | 0.42 | 0.34 | 0.66 |
| CaO | 0.35 | 0.42 | 2.16 | 0.47 | 1.02 | 5.45 | 1.58 |
| Na2O | 3.32 | 4.15 | 2.17 | 2.41 | 2.09 | 1.42 | 0.10 |
| K2O | 3.54 | 2.86 | 3.13 | 4.59 | 5.22 | 3.56 | 4.23 |
| P2O5 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 |
| SO3 | 0.04 | 0.01 | 0.10 | 0.08 | 0.02 | 0.05 | 1.45 |
| LOI | 0.83 | 0.72 | 2.65 | 1.23 | 1.76 | 4.87 | 2.85 |
| Total | 99.90 | 99.80 | 99.60 | 100.00 | 99.90 | 99.50 | 99.90 |
| | | | | | | | |
| Zr | 138 | 214 | 265 | 147 | 158 | 128 | 260 |
| Cr | 8 | 7 | <5 | <5 | 5 | <5 | <5 |
| V | 9 | <5 | 5 | <5 | 7 | 8 | 7 |
| Rb | 153 | 106 | 132 | 196 | 229 | 171 | 183 |
| Sr | 49 | 169 | 86 | 40 | 42 | 72 | 22 |
| Nb | 10 | 17 | 14 | 13 | 15 | 10 | 11 |
| Y | 34 | 26 | 48 | 23 | 30 | 46 | 32 |
| Cu | 13 | 10 | 28 | 7 | 3 | 122 | 62 |
| Pb | 100 | 4 | 16 | 53 | 11 | 0 | 546 |
| Zn | 67 | 83 | 124 | 54 | 49 | 23 | 509 |
| Ag | <1 | <1 | <1 | <1 | <1 | <1 | 2 |
| Au | | | | | | | |
| As | 1.4 | <0.5 | 1 | 4.6 | 1 | 3.9 | 28 |
| Ba | 975 | 1455 | 1010 | 1215 | 1390 | 640 | 965 |
| | | | | | | | |
| Zr/TiO2 | 0.138 | 0.1126 | 0.1104 | 0.0865 | 0.0831 | 0.0853 | 0.113 |
| Ti/Zr | 4.3 | 5.3 | 5.4 | 6.9 | 7.2 | 7 | 5.3 |

| Sterling Valley Volcanics | | | | | | | |
|---|---|---|---|---|---|---|---|
| | basaltic sandstone | andesite mass flow | feld-px-dacite | ?basalt mass flow | feld-px/hb-?basalt clast | feld-px-basalt | feld-px-basalt |
| location | STP218 | STP218 | STP218 | STP234 | STP234 | outcrop | outcrop |
| sample no. | 38903 | 38904 | 38906 | 38907 | 38908 | 38922 | 38923 |
| | | | | | | | |
| SiO2 | 52.30 | 62.22 | 64.63 | 49.70 | 48.60 | 50.80 | 50.10 |
| TiO2 | 0.92 | 0.74 | 0.63 | 0.76 | 0.69 | 0.89 | 0.97 |
| Al2O3 | 17.37 | 15.68 | 14.72 | 17.21 | 18.45 | 17.92 | 18.03 |
| Fe2O3 | 9.79 | 6.84 | 5.85 | 9.32 | 7.65 | 10.23 | 10.44 |
| MnO | 0.18 | 0.11 | 0.12 | 0.17 | 0.13 | 0.26 | 0.17 |
| MgO | 4.46 | 3.31 | 2.72 | 4.55 | 4.31 | 4.71 | 4.58 |
| CaO | 10.65 | 7.47 | 4.06 | 9.47 | 10.07 | 7.60 | 8.02 |
| Na2O | 2.59 | 1.35 | 4.40 | 2.43 | 3.00 | 3.22 | 2.06 |
| K2O | 1.61 | 2.14 | 2.75 | 1.20 | 2.19 | 0.90 | 2.34 |
| P2O5 | 0.12 | 0.12 | 0.12 | 0.12 | 0.10 | 0.10 | 0.11 |
| SO3 | | | | | | 0.01 | 0.01 |
| LOI | 8.11 | 3.33 | 1.20 | 5.01 | 4.33 | 2.89 | 2.90 |
| Total | | | | 100.10 | 99.60 | 99.60 | 99.90 |
| | | | | | | | |
| Zr | 85 | 195 | 239 | 69 | 56 | 76 | 80 |
| Cr | 54 | 53 | 53 | 76 | 72 | 84 | 49 |
| V | 218 | 139 | 116 | 192 | 193 | 246 | 271 |
| Rb | 76 | 111 | 94 | 33 | 52 | 30 | 69 |
| Sr | 275 | 293 | 206 | 345 | 353 | 464 | 303 |
| Nb | 3 | 9 | 10 | <3 | <3 | <3 | <3 |
| Y | 27 | 29 | 32 | 17 | 15 | 24 | 25 |
| Cu | 69 | 19 | 27 | 102 | 88 | 98 | 107 |
| Pb | 11 | 11 | 8 | 5 | 8 | 34 | 7 |
| Zn | 114 | 56 | 73 | 89 | 93 | 114 | 86 |
| Ag | | | | <1 | <1 | <1 | <1 |
| Au | | | | 0 | 0 | | |
| As | | | | 7.5 | 12.5 | 2.5 | 1.5 |
| Ba | 293 | 965 | 667 | 415 | 985 | 505 | 1075 |
| | | | | | | | |
| Zr/TiO2 | 0.0092 | 0.0264 | 0.0379 | 0.0091 | 0.0081 | 0.0085 | 0.0082 |
| Ti/Zr | 65 | 23 | 16 | 66 | 73.9 | 70.2 | 72.7 |

Table 4

| Aphyric to weakly porphyritic intrusions in Sterling Valley Volcanics | | | | |
|---|---|---|---|---|
| | feld-basalt | feld-basaltic andesite | fg basalt-dolerite | fg basalt |
| location | STP218 | STP218 | STP218 | STP234 |
| sample no. | 38901 | 38902 | 38905 | 38909 |
| | | | | |
| SiO2 | 51.12 | 53.67 | 49.46 | 48.2 |
| TiO2 | 0.93 | 0.94 | 0.8 | 1.75 |
| Al2O3 | 18.45 | 16.63 | 17.52 | 13.73 |
| Fe2O3 | 9.30 | 10.56 | 9.97 | 12.84 |
| MnO | 0.16 | 0.18 | 0.2 | 0.27 |
| MgO | 3.80 | 5.65 | 8.76 | 4.38 |
| CaO | 11.78 | 7.13 | 8.85 | 7.94 |
| Na2O | 2.88 | 4.65 | 1.6 | 3.28 |
| K2O | 1.39 | 0.48 | 2.74 | 0.08 |
| P2O5 | 0.17 | 0.1 | 0.1 | 0.19 |
| SO3 | | | | 0.56 |
| LOI | 5.42 | 2.27 | 3.91 | 6.58 |
| Total | | | | 99.8 |
| | | | | |
| Zr | 92 | 82 | 66 | 88 |
| Cr | 91 | 22 | 313 | <5 |
| V | 224 | 212 | 215 | 356 |
| Rb | 67 | 14 | 122 | <5 |
| Sr | 369 | 199 | 317 | 183 |
| Nb | <3 | <3 | <3 | <3 |
| Y | 28 | 24 | 22 | 26 |
| Cu | 105 | 62 | 19 | 70 |
| Pb | 22 | 24 | 13 | <3 |
| Zn | 106 | 98 | 93 | 350 |
| Ag | | | | <1 |
| Au | | | | 0 |
| As | | | | 3.5 |
| Ba | 467 | 220 | 663 | <10 |
| | | | | |
| Zr/TiO2 | 0.0099 | 0.0087 | 0.0083 | 0.005 |
| Ti/Zr | 61 | 69 | 73 | 119 |

| Mount Black dacite, dacite and andesite intrusions in Murchison Volcanics, and chlorite-tourmaline alteration | | | | | | |
|---|---|---|---|---|---|---|
| | feld-hb-px-dacite | feld-hb-px-dacite | feld-hb/px-dacite sill | fg feld-dacite | feld-px/hb-basaltic andesite sill | chlor-feld-tourmaline alteration in fg dacite |
| location | outcrop,Mt Black | outcrop,Mt Black | SVD89-3 | SVD89-3 | outcrop, Anthony Rd | SVD89-3 |
| sample no. | 38920 | 38921 | 38919 | 38910 | 38930 | 38911 |
| | | | | | | |
| SiO2 | 68.80 | 68.40 | 67.90 | 69.00 | 56.20 | 49.30 |
| TiO2 | 0.50 | 0.45 | 0.42 | 0.50 | 0.68 | 0.73 |
| Al2O3 | 15.20 | 14.82 | 14.19 | 12.49 | 19.60 | 15.66 |
| Fe2O3 | 4.24 | 4.30 | 4.98 | 5.05 | 8.80 | 16.14 |
| MnO | 0.07 | 0.07 | 0.10 | 0.08 | 0.14 | 0.44 |
| MgO | 1.18 | 1.12 | 1.64 | 0.95 | 2.89 | 2.90 |
| CaO | 2.81 | 2.88 | 0.85 | 1.59 | 0.26 | 2.10 |
| Na2O | 5.16 | 3.58 | 3.57 | 2.60 | 1.50 | 0.16 |
| K2O | 0.29 | 2.80 | 4.08 | 5.43 | 5.67 | 8.00 |
| P2O5 | 0.12 | 0.12 | 0.10 | 0.10 | 0.12 | 0.18 |
| SO3 | 0.01 | 0.01 | 0.04 | 0.35 | 0.00 | 0.30 |
| LOI | 1.53 | 1.26 | 1.59 | 1.55 | 3.68 | 3.59 |
| Total | 100.00 | 99.90 | 99.70 | 99.80 | 99.70 | 99.90 |
| | | | | | | |
| Zr | 221 | 209 | 233 | 231 | 133 | 116 |
| Cr | <5 | 7 | 8 | 8 | 45 | 12 |
| V | 39 | 43 | 69 | 34 | 235 | 230 |
| Rb | 12 | 80 | 126 | 96 | 276 | 337 |
| Sr | 570 | 291 | 107 | 86 | 45 | 98 |
| Nb | 10 | 10 | 9 | 10 | 5 | 6 |
| Y | 28 | 33 | 24 | 62 | 23 | 26 |
| Cu | 4 | 5 | 8 | 41 | 61 | 184 |
| Pb | 3 | 24 | 4 | 47 | 124 | 57 |
| Zn | 49 | 76 | 111 | 86 | 246 | 269 |
| Ag | <1 | <1 | <1 | <1 | <1 | <1 |
| Au | | | | | | |
| As | 1 | 1 | 1 | 2 | <0.5 | 6 |
| Ba | 88 | 780 | 1905 | 1440 | 1190 | 3080 |
| Sn | 4 | 6 | 4 | 7 | 3 | 6 |
| W | <10 | <10 | <10 | <10 | <10 | 20 |
| | | | | | | |
| Zr/TiO2 | 0.0442 | 0.0464 | 0.0555 | 0.0462 | 0.0196 | 0.0159 |
| Ti/Zr | 13.6 | 12.9 | 10.8 | 13 | 30.7 | 37.7 |

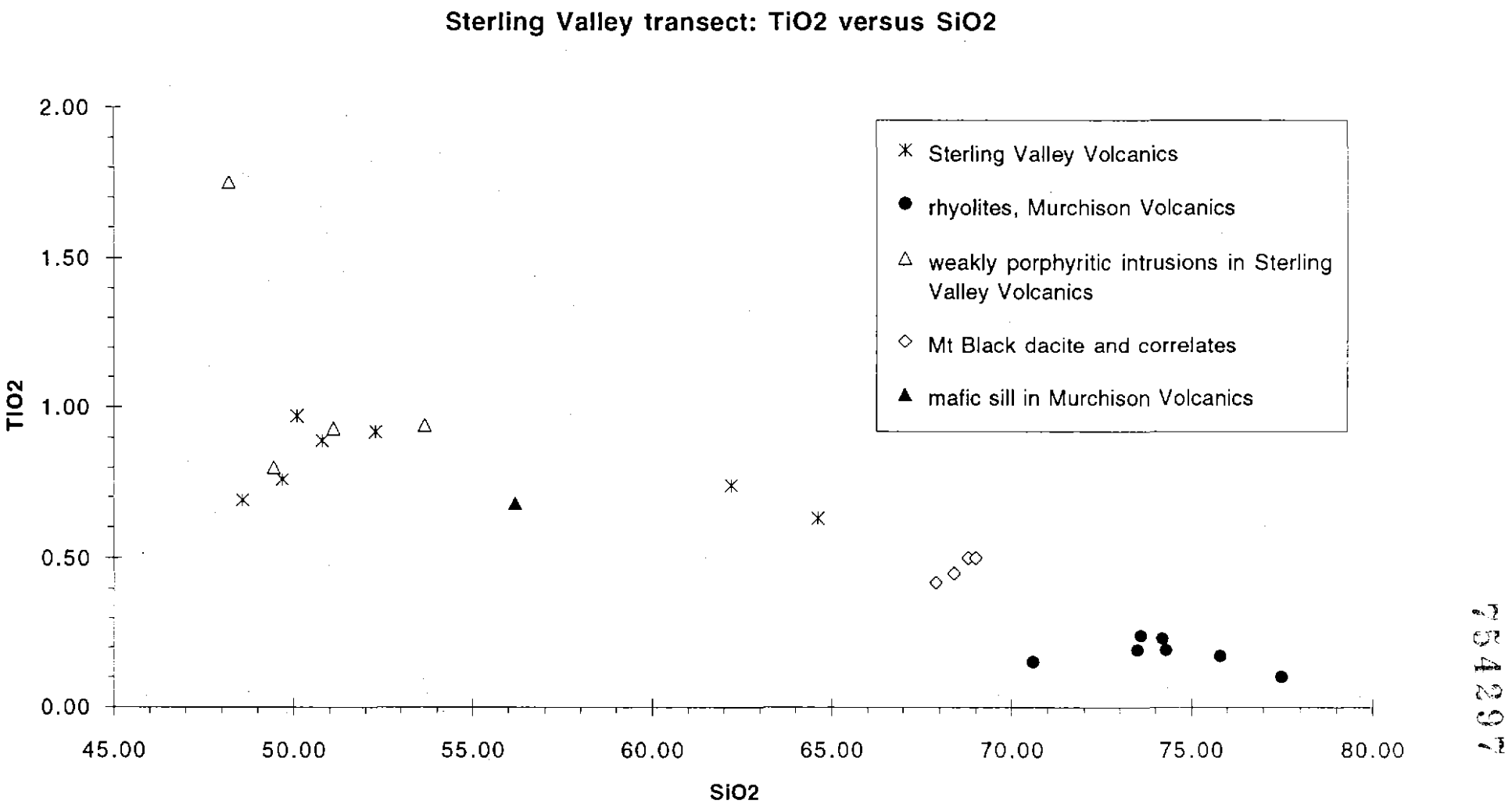
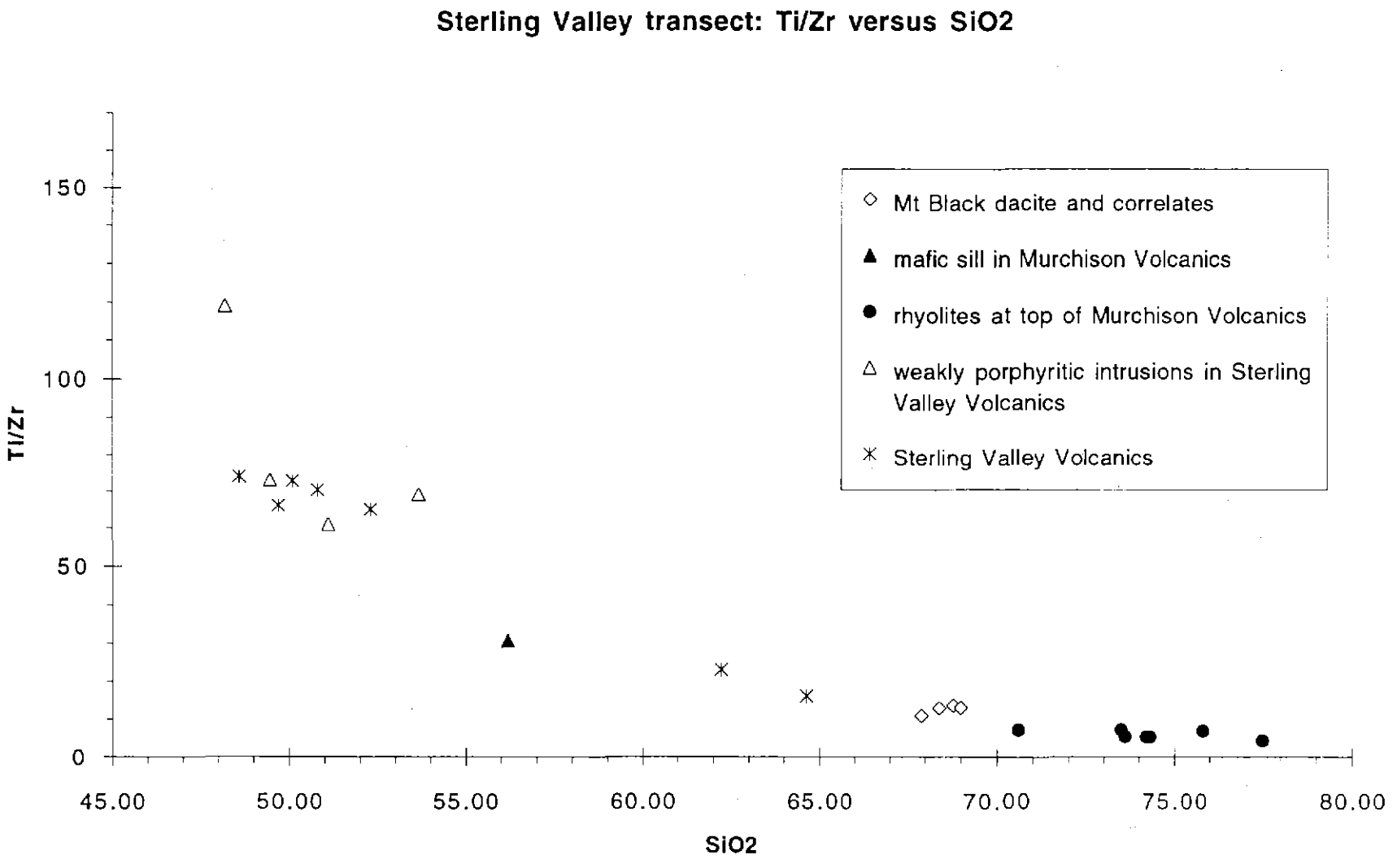



Figure 6; page 19


Sterling Valley transect: Ti/Zr versus SiO2
Ti/Zr
150
100
50
0
45.00
50.00
55.00
60.00
65.00
70.00
75.00
80.00
SiO2
Mt Black dacite and correlates
mafic sill in Murchison Volcanics
rhyolites at top of Murchison Volcanics
weakly porphyritic intrusions in Sterling Valley Volcanics
Sterling Valley Volcanics

63423

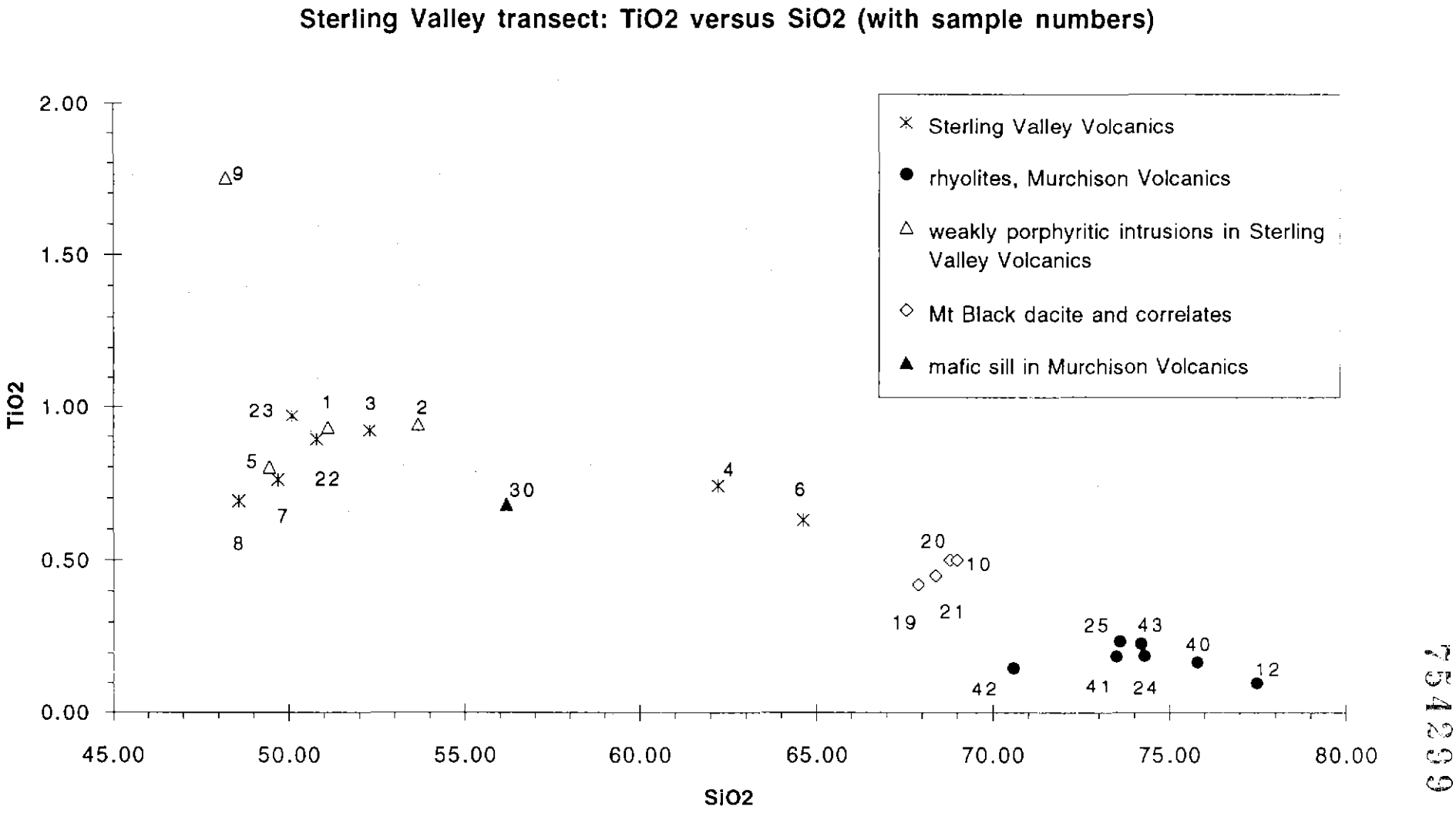



Figure 8; page 21

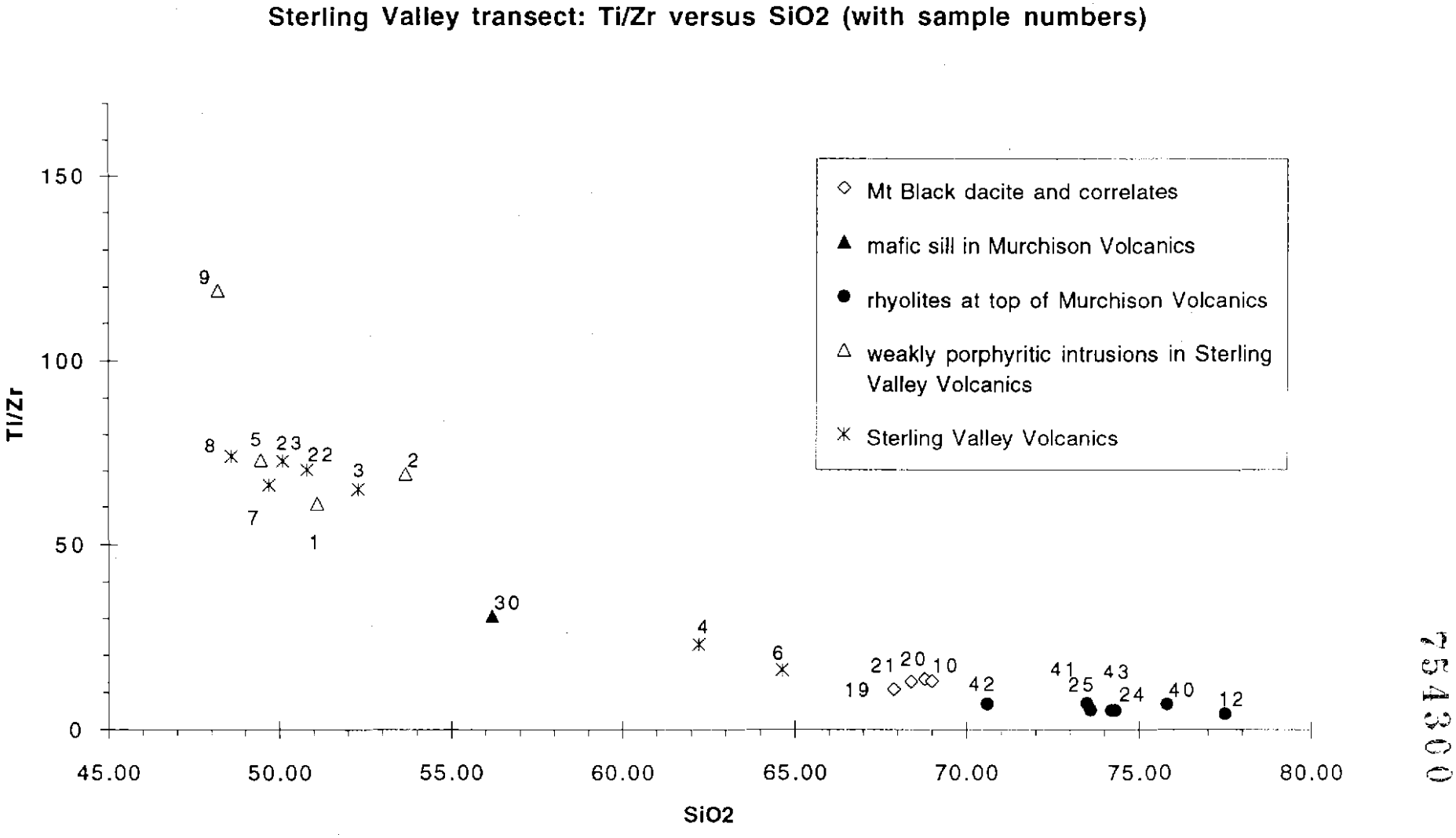



Figure 9; page 22

## Appendix 1: Thin section descriptions (R. Allen)

**Sample number 38911; drill hole SVD89-3, 296.9 m**

Summary: Fracture controlled chlorite-feldspar-tourmaline-pyrite alteration in fine-grained feldspathic silicic dacite.

Important features: Host rock to mineralization is fine-grained extremely feldspathic silicic dacite (?intrusive) composed of a massive interlocking mat of simple twinned feldspar. The dark green mica alteration seen in hand specimen is clearly chlorite in thin section. Tourmaline, clear feldspar, minor carbonate and possibly other unidentified minerals occur within the chlorite. Tourmaline appears to be partially replaced by the chlorite. Variations in colour and pleochroism of the chlorite in different areas suggests variation in composition of the chlorite. The chlorite mainly fills a brittle fracture network and throughgoing veins. Some chlorite veins are unfoliated whereas others are overprinted by a strong foliation, parallel to the throughgoing veins. The relationships in drill core and thin section suggest that the chloritic alteration fills a brittle fracture network, which has subsequently been deformed by heterogeneous strong foliation probably related to shearing.

**Sample numbers 38913-4; drill hole SVD89-3, 278.7 m**

Summary: Perlitic rhyolite lava or intrusive with dark green sericitic pseudofiamme.

Important features: 20% 2 mm phenocrysts of plagioclase > K-feldspar, quartz. Phenos mainly euhedral to subhedral unbroken, but some broken crystals occur. The pseudofiamme are strongly sericite replaced patches and preserve a distinct non-clastic feldspar-quartz porphyritic texture. Margins of pseudofiamme vary from sharp to gradational with the apparent matrix domain, which is slightly to moderately sericite-altered, strongly perlitic rhyolite. The apparent matrix domain superficially appears very clastic due to the effect of alteration overprinting and partially obscuring the perlitic texture. The perlitic texture is only locally distinct, but can locally be seen to grade into the more intensely sericitic pseudofiamme. Perlite varies from classical to ladder perlite and is stretched parallel to the strong tectonic foliation. In 38913 there is a faint flow lamination perpendicular to the tectonic foliation. The perlitic texure and lack of any clastic textures indicates the rock was originally a coherent glassy rhyolite.

**Sample numbers 38915-8; drill hole SVD89-3, 245.0 m, 232.0 m, 175.8 m, 166.7 m**

Summary: Perlitic rhyolite lava or intrusive with coherent and granulated areas.

Important features: 20% 2 mm phenocrysts of plagioclase > quartz, K-feldspar > chlorite after ?biotite. Hand specimens and thin sections contain areas of evenly porphyritic texture with unbroken phenocrysts, and areas of clastic granulated

texture with smaller, mainly broken crystal fragments. The coherent (non-clastic) areas have faint to distinct perlitic texture,variably overprinted and obscured by weak to moderate sericitic alteration. This coherent perlitic texture appears to grade into the clastic areas, which also contain small faint relicts of perlitic texture, and no distinct pyroclastic clasts such as glass shards or pumice. These features suggest that the clastic areas developed more or less in situ by quench and autoclastic granulation of originally glassy rhyolite. The coherent perlitic areas are non-clastic remnants of the glassy rhyolite. These textural relationships (intimate irregular mixtures of coherent glassy and clastic glassy rhyolite) are common in subaqueous quench fragmented rhyolites (e.g. Benambra, Victoria). 38918 has abundant small, rounded, recrystallized quartz-filled ?amygdales, and therefore was originally moderately vesicular rhyolite.

**Sample number 38919; drill hole SVD89-3, 68.7 m**

Summary: Plagioclase-phyric and microlitic dacite intrusion.

Important features: 15% 1-2 mm average, euhedral to subhedral plagioclase phenocrysts and glomerocrysts (crystal clusters), set in coherent, moderately to strongly plagioclase microlitic and micropoikilitic groundmass. Plagioclase phenocrysts are rich in fine inclusions and commonly faint relict concentric zoned and sieve textured. 2% 0.5-2 mm sericite-chlorite patches after ?ferromagnesium phenocrysts, 1% small magnetite/ilmenite phenocrysts, and rare quartz phenocrysts (one in this thin section). A typical silicic dacite with originally moderately glassy groundmass.

**Sample numbers 38920-1; outcrops along Murchison Highway high on Mount Black**

Summary: Moderately epidote-altered, plagioclase-hornblende-pyroxene-magnetite-phyric dacite lava or intrusion.

Important features: 15% 1.5 mm average, euhedral to subhedral phenocrysts comprising: 10% weakly epidote-sericite-altered plagioclase crystals and glomerocrysts, 3% intensely epidote and epidote-chlorite altered hornblende > pyroxene phenocrysts, 1% small euhedral to embayed magnetite/ilmenite phenocrysts, and rare small embayed quartz phenocrysts. Groundmass is coherent, finely intensely granular-spotty, feldspar-rich, interpreted as recrystallized intense fine spherulitic texture. Note, this rock is very similar in mineralogy and composition to the dacite within the Murchison Volcanics (38919).

**Sample numbers 38924-5; drill hole MM1a, 288.6 m, 301.6 m**

Summary: Feldspar-quartz porphyritic coherent rhyolite sills.

Important features: 15-20% 2 mm average, feldspar ≥ quartz phenocrysts, set in homogeneous, very fine-grained, quartz-sericite groundmass. Phenocrysts are tectonically fractured and in various stages of tectonic dismemberment. Fragmented crystals are strung out parallel to the moderate to strong tectonic foliation. Quartz phenocrysts are strongly embayed, and have thin spongey rims, probably due to reaction (resorbtion) from the groundmass (when it was still liquid). These are the thin white rims seen on the quartz crystals in hand specimen. Minor sericite-opaque altered small ?biotite crystals occur. Apart from the tectonic dismembering of phenocrysts there are no primary clastic textures.

**Sample number 38926; outcrop along Anthony Road, Murchison Volcanics (field location MV1, Fig.4)**

Summary: Perlitic, coherent and granulated rhyolite lava or intrusion

Important features: Coherent areas comprise 7-10% 1.5 mm average, feldspar > quartz phenocrysts (quartz crystals 2-3%), and 1% sericite-opaque altered ?biotite phenocrysts, set in strongly perlitic coherent groundmass. Granulated clastic areas comprise 7-10% smaller broken feldspar and quartz crystals set in fragmented perlitic matix. Boundaries between coherent and clastic areas vary from sharp to gradational, and the clastic areas look like in situ granulated variants of the coherent perlitic areas. Interpreted as heterogeneously quench granulated rhyolite. Similar texturally to 38915-17 but less phenocryst-rich. This rhyolite and SVD89-3 rhyolite could be two similar glassy rhyolite emplacement units of the same rhyolite lava-intrusion complex.

**Sample numbers 38927-8; outcrop along Anthony Road, Murchison Volcanics (field location MV3, Fig.4)**

Summary: Matrix-supported rhyolite breccia with tuffaceous or granulated hyaloclastic sandy clastic matrix.

Important features: Coherent rhyolite lava or pumice with 15-20% 2 mm euhedral to subhedral unbroken feldspar and quartz phenocrysts, occurs as areas/clasts set in sandy textured rhyolitic clastic rock of similar composition. The sandy component comprises angular sericite-quartz altered glass fragments and 5-15% small broken quartz and feldspar crystal fragments. Uncertain whether the altered glass fragments are glassy lava fragments (i.e. granulated hyaloclastite) or are dense to pumiceous pyroclasts.

emplacement. The rock is overprinted by a brittle fracture network with chlorite-opaque (sulphide) veinlets. Field relationships suggest the fracture network is tectonic, related to a nearby brittle fault.

**Sample numbers 38936; outcrop along Anthony Road, Murchison Volcanics (field location MV14b, Fig.4)**

Summary: Massive, feldspar-quartz-biotite-hornblende porphyritic rhyolite intrusive with weak to moderate chlorite-epidote alteration.

Important features: 25% 3 mm average (up to 6 mm), feldspar > quartz > biotite = hornblende (biot +hb 3-5%) > magnetite (1%) phenocrysts. Feldspar is euhedral, concentrically zoned, simple and multiple twinned plagioclase, and is distinctly smaller than quartz (unusual for most volcanics). No K-feldspar noted. Quartz phenocrysts are subhedral, embayed, unbroken. Biotite is chlorite altered, and hornblende is chlorite-epidote altered. Matrix is fine-grained, granular and very feldspar-quartz-rich with 2% scattered fine-grained alteration chlorite-sericite-epidote. The matrix texture is half way between a densely spherulitic and granular-granophyric coherent groundmass texture. The groundmass has a weak tectonic foliation. This sample has a somewhat similar phenocryst mineralogy and groundmass texture to the 38933-5, 38938 group of rhyolites. The groundmass texture is most typical of high level felsic intrusions (sills and dykes).

**Sample number 38937; outcrop along Anthony Road, Murchison Volcanics (field location MV18, Fig.4)**

Summary: Granophyric, feldspar-quartz-biotite-hornblende porphyritic rhyolite intrusion with moderate chlorite-epidote-carbonate alteration.

Important features: 25-30% 2.5 mm average (range 0.5-5 mm) feldspar > quartz > biotite (3-4%) > hornblende > opaque (magnetite + pyrite?) > orthopyroxene (<1%) phenocrysts. Phenocrysts are euhedral to subhedral, unbroken, and are set in a heterogeneous, variably recrystallized, finely "wormy" to subgranular granophyric groundmass. This is an intrusive subgranitic groundmass texture. The rock has moderate chlorite-epidote-carbonate-opaque (?pyrite) alteration; all biotite phenocrysts are chloritized. There is a weak to moderate, spaced tectonic foliation.

**Sample number 38929; outcrop along Anthony Road, Murchison Volcanics (field location MV4, Fig.4)**

Summary: Perlitic rhyolite with sericite pseudofiamme

Important features: 20% 2 mm average plagioclase > quartz phenocrysts, set in variably preserved perlitic groundmass. Phenocrysts are moderately tectonically broken, but there is no definite evidence of primary clastic textures. Similar rock to 38915. Pseudofiamme are alteration lenses of more sericitic composition.

**Sample numbers 38931-2; outcrop along Anthony Road, Murchison Volcanics (field location MV6, Fig.4)**

Summary: Massive rhyolite with evenly porphyritic domains and granular clastic domains.

Important features: Evenly porphyritic domains comprise 20% unbroken, euhedral to subhedral plagioclase > quartz phenocrysts and minor chlorite-sericite-opaque altered biotite phenocrysts, set in fine-grained sericite-quartz groundmass. No definite K-feldspar phenocrysts, but a few could occur. Granular clastic domains contain smaller and mainly broken feldspar and quartz crystals set in a faintly clastic textured sericite-quartz matrix. No definite perlitic textures noted in these thin sections but perlitic textures were observed on the outcrop. No definite evidence in thin section whether this rock is a variably granulated rhyolite lava/intrusion like 38915-18, or is a massive pyroclastic unit with diffuse pumice clasts (the coarsely porphyritic patches) in a finer tuffaceous matix. However, field observations suggest the former.

**Sample numbers 38933-5, 38938; outcrops along Anthony Road, Murchison Volcanics (field locations MV10, 11, 12, Fig.4)**

Summary: Massive, feldspar-quartz-biotite porphyritic rhyolite lava or intrusion

Important features: 20-25% 2mm average, feldspar > quartz > chlorite-opaque after biotite ± hornblende phenocrysts. Quartz phenocrysts 7%; biotite ± hornblende 2%, and biotite much more abundant than possible hornblende. Both broken and unbroken quartz phenocrysts are common. The broken crystals give the rock a superficial clastic, ignimbritic appearance in hand specimen. Unbroken quartz phenocrysts are subhedral embayed. Feldspar phenocrysts are strongly sericite altered and stretched in the tectonic cleavage-lineation. The goundmass is a very homogeneous, fine-grained, weakly altered, siliceous quartz-feldspar groundmass, and is interpreted as a weakly to moderately recrystallized glassy or finely spherulitic coherent groundmass typical of the core of felsic lavas or the margin of intrusions. If the rock were an ignimbrite, the groundmass should be more heterogeneous and poorly sorted with common angular crystal fragments of various sizes. The coherent groundmass indicates the rock is not clastic, and the broken crystals must therefore have formed by the pulling apart or shearing of original whole crystals in the viscous magma during

754306

# THIN SECTION DESCRIPTIONS BY A.CRAWFORD

Hi Rod:

Petrographic descriptions of your 9 samples are attached herein. Gerald provided me with analytical data for 38901-06, and a list of recalculated (volatile-free) analyses is also attached.

For samples 01-06, the petrography was cut and dried, and totally supported by the analytical data, that samples 01, 02, 03, and 05 are Henty Dyke Swarm basaltic intrusives, ranging from quite evolved compositions (01) through to quite mafic variants (05). I didn't have a thin section provided for 03 and o4, but it is clear from the analyses that 03 is Henty Dyke Swarm, and 04 is a typical MRV andesitic rock. The differences between the two suites (HDS vs MRV) are shown on the accompanying simple variation diagrams, and are best shown perhaps by the Ti/Zr values of the two groups; the HDS samples reported herein have Ti/Zr values >60, and highest (73) in the most primitive sample 05. All samples plot at the low end of the HDS compositional range that we had when these diags were drawn in 1991, but they are typical of the HDS data I now have. Samples 04 and 06 are typical CVC Group 1 andesitic lavas.

Of the samples for which no analytical data were provided, I offer the following comments. Sample 38922 is definitely a MRV andesite lava, petrographically (and probably compositionally) very similar to 38906. Samples 38923 and 38930 are far more strongly altered, and thus more difficult to diagnose. The former is probably a strongly epidote-altered evolved Henty Dyke Swarm basaltic intrusive rock. The latter likewise, but this rock has suffered far more intense hydrothermal alteration than 38923. As is obvious from the above, analyses for just TiO2 and Zr, (both quite immobile on a cm-scale even during strong alteration), would provide definite characterizations for these two samples.

Please fax me 002-232547 before Dec 23rd or after Jan 4th for any further comments or problems you have on this stuff. Enjoy your non-Aus white Xmas. I will copy this report to Gerald/Fergus and send the 9 sections back to them. See ya, AJC

Tony Crawford

20/12

**SAMPLE NUMBER: R ALLEN: 38930 Dyke in Murchison Volcs, Anthony Rd**

SUMMARY:

This is a weakly foliated, intensely altered andesitic to evolved basaltic rock in which the primary mineralogy, and much of the original texture, have been obliterated. It is possible to recognize former plagioclase phenocrysts as now rather stretched albitized crystals that are riddled with fine-grained sericite and chlorite. Former augite phenocrysts were less abundant than plagioclase phenocrysts and are totally chloritized. The groundmass of this sample is a porous and heterogeneous and messy quartz-chlorite-actinolite-leucoxene intergrowth. This sample has been hydrothermally altered, and it is impossible to be certain whether this rock began life as a Henty Dyke Swarm basalt or a Mt Read Volcanics intrusive andesite. Wholerock geochemical data could certainly provide a distinction in spite of the hydrothermal alteration.

**SAMPLE NUMBER: R ALLEN: Tullah-Sterling Valley 38939 STP 105 at 420 ft.**

SUMMARY:

This is an almost phyllitic sericite schist with typical Farrell Slate style carbonate- (siderite?) and less abundant quartz veining. The foliation, common cleavage-parallel faults, and fault-bounded rows of kinks are typical of deformation in a high strain zone at the brittle ductile transition. Occasional angular quartz clasts (<1mm across) show no-, or extremely limited rotation and subgrain recrystallization, so that I wouldn't call this a mylonite sensu stricto.

**SAMPLE NUMBER: R ALLEN: Tullah-Sterling Valley 38922**
**Outcrop on Murchison Hwy**

SUMMARY:

This is an andesitic lava originally similar to 38906 but perhaps slightly less mafic (i.e. with less augite phenocrysts). It now consists of around 10-15 modal% of altered plagioclase phenocrysts and perhaps 3 modal% of chlorite-altered augite phenocrysts, in a groundmass that was more crystalline than that of 38906, but still closer to a lava than an intrusive in my opinion. Plagioclase phenocrysts are riddle with fine-grained epidote and sericite. Former FeTi oxides, either as phenocrysts or groundmass grains, have been obliterated by the alteration, and appear to be composed of fine-grained epidote. The groundmass consists of small albite microlites and more granular altered augite grains set in devitrified glass that has recrystallized to quartzo-feldspathic material and common chlorite and epidote. This is another Mount Read Volcanics andesitic lava, and not a Henty Dyke Swarm basalt.

**SAMPLE NUMBER: R ALLEN: Tullah-Sterling Valley 38923**
**Outcrop on Murchison Hwy**

SUMMARY:

This is a strongly epidote-altered rock of andesitic to evolved basaltic composition. It originally consisted of blocky plagioclase phenocrysts (~ 5 modal%) and less abundant augite phenocrysts in a holocrystalline groundmass composed largely of plagioclase laths and granular augite, with common fine-grained FeTi oxides. Plagioclase phenocrysts are replaced by messy epidote and chlorite, and are difficult to recognize in the strongly epidote-altered groundmass. Augite phenocrysts and groundmass grains are replaced by chlorite anc actinolite, and FeTi oxides by leucoxene. This sample is probably close to a more epidote-altered version of 38901, and is therefore probably to be Henty Dyke Swarm related, although the strong alteration makes me less confident of this diagnosis than that for 38901.

**SAMPLE NUMBER: R ALLEN: Tullah-Sterling Valley 38905 STP218 24.5-25.0m**

SUMMARY:

This is a relatively fine-grained, aphyric intrusive basalt with a low greenschist facies metamorphic assemblage. It is more mafic than the previous two samples, with abundant altered augite in the groundmass. It originally consisted of an intersertal intergrowth of tabular small plagioclase laths and slightly more blocky augite grains, with subordinate but common, equant FeTi oxides. Augite is mainly replaced by fibrous actinolite, but cores of fresh augite are not uncommon. Plagioclase is albitized and overprinted by sericite and microcrystalline epidote alteration. FeTi oxides are all replaced by messy brown leucoxene. Interstitial chlorite, epidote, minor calcite and secondary silica are present. A few narrow quartz-calcite veinlets transect this sample. This is another Henty Dyke Swarm basaltic intrusive, rather more mafic than the other, but petrographically quite unlike any Mount Read Volcanics.

**SAMPLE NUMBER: R ALLEN: Tullah-Sterling Valley 38906 STP218 14.6-14.75m**

SUMMARY:

This sample was originally a strongly plagioclase+augite+FeTi oxide-phyric basaltic andesite lava, quite unlike the three previous samples. It now shows a low greenschist facies regional metamorphic mineral assemblage. Albitized plagioclase phenocrysts, often in clusters of 3-10 crystals, and discrete albitized plagioclase phenocrysts with quite blocky prismatic shapes, are all partially replaced by or riddled with fine-grained epidote. Former augite phenocrysts are less abundant than the plagioclase, but still make up probably 3-5 modal% of this rock. They are entirely replaced by fibrous pale green actinolite and chlorite. FeTi oxide phenocrysts are not uncommon, and are all replaced by leucoxene. The groundmass of this sample was quite fine-grained, probably originally partially glassy, and now consists of tiny albite microlites in an even-textured quartzo-feldspathic matrix probably after devitrified glass. Irregular fractures defined by seams of dirty brown microcrystalline epidote separate domains of slightly different grainsize and textural detail, and probably represent original fractures through a weakly brecciated flow. This is a typical Mount Read Volcanics andesite, and definitely not a Henty Dyle Swarm lithology.

## SAMPLE NUMBER: R ALLEN: Tullah-Sterling Valley 38901 STP218 108.05-108.25m

SUMMARY:

This is a low greenschist facies regional metamorphosed, evolved basaltic shallow intrusive rock. It consists of around 10 modal% of sericite +microcrystalline epidote-altered plagioclase phenocrysts, some up to 3mm long, and <1 modal% of smaller, equant augite phenocrysts that are altered to chlorite and actinolite. The groundmass consists of a holocrystalline but quite fine-grained intergrowth of actinolite-altered augite and partially epidote+sericite-altered plagioclase laths, with common small FeTi oxides replaced by messy leucoxene, and chlorite and calcite replacing interstitial mesostasis. This is likely to be a Henty Dyke Swarm representative, as the amount of FeTi oxides, and the holocrystalline texture are atypical of basaltic lavas in the Mount Read Volcanics.

## SAMPLE NUMBER: R ALLEN: Tullah-Sterling Valley 38902 STP218 162.8-163.0m

SUMMARY:

This is another low greenschist facies metabasaltic shallow intrusive rock, originally similar in most respects to the previous sample, but much better preserved. This sample contains less plagioclase phenocrysts than 38901; these are albitized, but lack the fine-grained dirty epidote that is so abundant in that rock. The albitized plagioclase phenocrysts often occur in clots of four or five intergrown crystals, sometimes enclosing smaller former augite phenocrysts that are altered to fibrous pale green actinolite. Former FeTi oxide phenocrysts are smaller than in 38901, but quite common, and all are altered to leucoxene. Minor phases replacing groundmass mesostasis include chlorite, calcite and epidote. This is another Henty Dyke Swarm basaltic intrusive, for the same reasons as the previous sample.

SAMPLE NUMBER: R ALLEN: Tullah-Sterling Valley 38942
STP105 289.5ft

SUMMARY:

This is a strongly foliated rock derived from a felsic volcanic or pyroclastic rock. About 3 modal% of the rock consists of entire euhedral, to (mainly) broken quartz phenocrysts, some containing rounded, recrystallized melt inclusions. A few clasts stretched into the foliation still retain enough textural evidnce to suggest that they were small (mainly 1-2mm long) tube pumice fragments. The remainder of this rock consists of lozenge-shaped domains of fine-grained quartzo-feldspathic material almost certainly after felsic glass, separated by subparallel bands and seams of sericite. A few patches of calcite overprint the sericite-silica. I think that this was either a rhyolitic poorly-sorted pumice breccia, or perhaps more likely a proximal epiclastic derived from felsic pyroclastic material, including a major vitric ash fraction. The alteration is essentially silica-sericite±minor disseminated pyrite, and may have accompanied the development of foliation in a high strain fault zone.

# DIAMOND DRILL LOG

project: Mt Reaa Volcanics
location: Sterling Valley
coords:

hole no. STP 218
page 1 of 4
RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 10.11.94

| m | structure | log | grainsize: pud, s, 0.5, 2, ∞, gr, max mm | Samples TS results | description |
|---|---|---|---|---|---|
| 0 | | | | | Till / overburden to 2-18m |
| | | ? | | | pale green, massive, fine sandy textured ?andesite. Interp: chilled margin of intrusive andesite. |
| | | | | | 6-20m sharp contact obscured by broken core (no fault) |
| 10 | | | | | pale green, massive, 25% 2-3mm feld-hornbl-ilmen-porphyritic andesite. 20% 1-5mm euhedral concentric zoned plag; 3-5% 1-3mm blocky laths & irreg patches chl-epid after hornblende; 2% ≤1mm black ilmenite phenocrysts & white leucoxene after ?ilmenite. |
| | | | | | weak ser-chl-epid-$CO_3$ to 35m |
| | | | | Sample 14.60 pet + chem | |
| | | | | | pale green massive fg ?andesite with ≤5% euhedral feld laths. |
| | | | | | gradational |
| 20 | | | | 19 fg granular plag-hb-ilm aggregate | Monomict andesite breccia, same composition as above, clast-support. Interp: autoclastic margin of andesite lava or intrusion. |
| | | | | | 23.90m sharp probably intrusive contact |
| | sharp contact 50° offset by micro-fault | | | Sample 24.5m pet chem | grey-green, massive, granular sandy textured andesite sill/dyke. Fg strongly plag microlitic margins (extremely similar in texture to lithic clasts of Rosebery-Hercs pumice bx) with minor small feld phenos; cg granular plag >> chl after ferromag dolerite textured centre. 2% 0.5mm leucoxene. |
| 30 | | | | | 35m |
| | | | | | 37.30m sharp contact, minor brecciation |
| | | ? | | | 1-3% ≤1cm veins of q-musc-arspy, q-py/pyrh, fluorite with thin bleached margins throughout |
| 40 | | | | 40.4m | grey-green massive 20% 2mm feld-phyric ?andesite |
| | | | | | few granular plag-ferromag aggregates; 2-3% leucox? |
| | | | | | sharp contact |
| | | | | | 5% 1-2mm feldphyric in centre |
| | sharp contact 42° | | | | Fg andesite sill/dyke |
| | | | | | 44.20 sharp, no fault |
| 50 | | | | | moderate green epid-ser-chl-$CO_3$ alteration throughout |

5 cm

754312

# DIAMOND DRILL LOG

project Mt Read Volcanics
location Sterling Valley
coords

hole no. STP 218
page 2 of 4
RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 10.11.94

| m | structure | log | grainsize | Samples TS results | description |
|---|---|---|---|---|---|
| 50 | | | | | Massive, grey-green, coherent to clast-supported 20% 2mm feld-phyric andesite breccia. Monomict but has minor white silicified blocks. Bx texture diffuse. Interp: autoclastic andesite lava or intrusion (alternative is base of mass flow unit) |
| | | | | | 58 m (irreg slightly mixed contact) |
| 60 | $S_0$ 62° cl. 58° | | | sample 62.3m chem | Same composition as unit above. |
| | gb | | | | Green-grey, normal graded, andesitic subaqueous mass flow breccia. Poorly sorted base with blocks up to 30cm. Well sorted graded top. Clasts monomict 15-20% 1.5mm feld-andesite with broadly curved to moderately ragged angular margins, except minor fg andesite & cg plag xtal-rich intrusive clasts as below. Interp: resedimented andesite hyaloclastite or phreatomag bx. |
| 70 | | | | moderate epid-ser-chl-$CO_3$ throughout | |
| | | | | 300 | 75-20m irreg, mixed, rapid change |
| 80 | gb | | | | green-grey, normal graded, polylithic andesitic-basaltic subaqueous mass flow breccia. Poorly sorted, matrix to clast-supported lower part with several texturally different clast types; including: (1) fg green-grey microlitic basalt/andesite with angular curviplanar margins (2) 10-5% 1-2mm f-phyric grey basalt/andesite (3) 15-20% 3mm feld-phyric andesite (4) moderately rounded pale grey to white plag-leucox microdiorite comprising interlocking plag-leucox xtal aggregate with interstitial ? qtz. (5) laminated andesitic sandst-siltst. |
| 90 | main cleav 45° | | | aggl 15% 3mm f-andesite | Upper part of unit mainly irreg lenticular pumiceous andesitic clasts flattened in $S_1$ foliation to varying degrees |
| 250 | | | | | 95m |
| | | | | | 96.50m Interp: resedimented andesite-basalt lava & pyroclastic debris |
| 100 | | | | | 95-100m has more pyritic veinlets (aspy-py) |

5 cm

754313

# DIAMOND DRILL LOG

project: Mt Read Volcanics
location: Sterling Valley
coords:

hole no. STP 218
page 3 of 4
RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 10.11.94

| m | structure | log | grainsize (mud, s, v, f, m, c, max mm) | Samples TS results | description |
|---|---|---|---|---|---|

pale grey-green 10% 2mm plag lath phyric andesite/basalt. 1-2cm dark green chl-altered inter-hyaloclastite glassy margins spaced every 0.5-1m through units: these either pillow margins or glass selvages along fractures. Up to 7% ≤1cm q & chl amygds.

104.0m

(same unit as above 96.50m)

106.1m

Interp: irregular intrusions into wet unlithified mass flow bx or large blocks/rafts of pillow lava / quench fractured massive lava, within the mass flow bx.

Sample 108.05m petchem

109.0m

sharp contact 55°

gb

green, normal graded, basaltic/andesitic subaqueous mass flow bxs

Poorly sorted matrix-supported base. Lithic clasts mainly poorly f-phyric green fg ?basalt with or without amygs. Matrix epid altered with 5-8% 1-2 mm feld xtals. Mafic sandstone graded tops.

weakly sheared bed base So 55°

gb

dyke/sill

Sample 125.5m chem

Below 123m mainly mafic sandst. Probably still subaqueous mass flow deposits, but beds not well defined. Clasts are mainly fg green to cream mafic with curvi-planar angular margins. Couple larger fragments of quenched ?pillow or bomb margin.

gb

lam^ 62°

layers with matrix-supported andesitic/dacitic 15% 1-2mm feld-phyric pumice clasts up to 3cm.

cl. 34°

5 cm

TS4314

# DIAMOND DRILL LOG

project: Mt Read Volcanics
Location: Sterling Valley
coords:

hole no. STP 218
page 4 of 4
Scale 1:200
Logged by Rod Allen
date 11.11.94

| m | structure | lag | grainsize (mud, 0.06, 0.5, 2, 8, 32, max mm) | Samples TS results | RL | AZ | INCL | description |
|---|---|---|---|---|---|---|---|---|
| 150 | | | | | | | | |
| | | | | | 156.50m | | | sharp irreg contact |
| | | | | | | | | Green massive fg ? basalt with 10–15% 2mm feld phenos & strongly feld microlitic groundmass. Amygd's at margin |
| 160 | | | | Sample 163.0 pet+chem | | | | Interp: mafic lava or intrusion. |
| | 40cm strong cl 37° | | | | | | | |
| | | | | | | | | EOH ~165.3m |
| 170 | | | | | | | | |

5 cm

754315

# DIAMOND DRILL LOG

project: Mount Read Volcanics
location: Sterling Valley
coords:

hole no. STP 234
page 1 of 7

RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 11.11.94

| m | structure | log | grainsize (vf f m c vc) | max mm | samples TS results | description |
|---|---|---|---|---|---|---|
| 0 | | | | | | |
| 10 | | | | | | |
| 20 | | | | | | core starts 20.0m |
| 30 | | | | | | green, normal graded, andesitic subaqueous mass flow breccia |
| 40 | | | | | | |
| 50 | | | | | | |

Moderately to well sorted, clast supported breccia. Polylithic, with (1) 25% 2mm feld > hb andesite, (2) 10-20% feld-andesite > (3) fg green basalt/andesite.

Rare felsic clasts.

Clasts angular, some have 1cm green chloritic fg chilled margin on one side.

Clasts average 2-5cm, various shades of green-grey

2-5mm av.

8mm av.

patchy roughy brown weathering down to 83m

weak to moderate chl-epid alteration throughout andesite sequence

gb

Interpretation: thick sequence of andesitic lava ± phreatic/phreatomagmatic pyroclastic debris, deposited in deep water (below wave base) by subaqueous mass flow process. This clastic sequence intruded by fg basalt & feld-andesite

5 cm

754316

# DIAMOND DRILL LOG

project: Mount Read Volcanics
location: Sterling Valley
coords:
hole no. STP 234
page 2 of 7
RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 11.11.94

| m | structure | log | grainsize (mud, s, m, c, max mm) | samples / TS results | description |
|---|---|---|---|---|---|

sills or dykes. The very thick pile of andesitic debris indicates a major andesite volcano source area, and virtually no felsic volcanism in this area.

Some relict glassy quenched margins on clasts indicate source of debris probably at least partly subaqueous.

50

60

300 25°, 0.2m, f>fb andesite

70

dark green massive fg basalt dyke/sill

300 amygl 20°, 0.2mm f>fb andesite

80

patchy weathering down to 83m

83m

contacts 70°

dark green fg massive basalt dyke/sill

90m — gradational

90

increasing intensity q-white $CO_3$ veins toward faulted andesite/sandst contact at 265m

5 cm

160

TS 4317

# DIAMOND DRILL LOG

project: Mount Read Volcanics
location: Sterling Valley
coords:
hole no. STP 234
page 3 of 7
RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 12.11.94

754318

| m | structure | log | grainsize (mud, sand, gran, peb, max mm) | samples / TS results | description |
|---|---|---|---|---|---|
| 100 | mod-strong cleavage 53-63 stretching lin down dip | | | | |
| | | | | | 107.40m ← green 5-10% 1-2mm feld-andesite/basalt dyke/sill. Margins have deformed insitu brx texture |
| 110 | | | | | 112m |
| | | | | | 115m mixed irreg contact |
| | | | | | ← dark green, massive, weak-moderately foliated fg ?feld-microlitic basaltic rock; probably dyke/sill. |
| 120 | | | | | 115–162m: alternating 10-20% 2mm feld-phyric ?andesite and fg massive 2-5% 1-2mm feld-phyric ?basalt |
| | | | | | all rocks green chloritic |
| 130 | | | | | Interp: paucity of hyaloclastite & alternating relationship suggests both rock types may be intrusive, or feld-andesite is lava, intruded by the fg basalt. |
| 140 | | | | | |
| | strong rolling & veining | | | | minor py-cpy |
| 150 | | | | | 5 cm |

# DIAMOND DRILL LOG

project: Mount Read Volcanics | hole no. STP 234
location: Sterling Valley | page 4 of 7
coords | RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 12-11-94

| m | structure | log | grainsize (mud, 0.06, 0.5, 2, 8, 64, max mm) | Samples TS results | description |
|---|---|---|---|---|---|
| 150 | | | | | |
| | | | | | strongly chloritic ↑ ↓ green, foliated, 15% 2mm feld-andesite. Appears coherent. |
| 160 | sharp contact 60° | | | | 162.30 well sorted basaltic/andesitic fine breccia. Ragged angular clasts of 10-20% feld (chl altered) phyric andesite/basalt. |
| | | | | 100 | 167m Green 15% 2mm feld-andesite bx > thin intervals fg dark green basaltic intrusion or siltst. Local moderately sorted fine bx matrix like rock above 167m |
| 170 | | | | | 172.8m (gradational contact) |
| | possible grading | | | | moderately sorted fine basaltic/andesitic bx |
| 180 | | | | | ← possible insitu bx |
| | | | | | 185.30m = 25cm Sp>> q-CO3 vein |
| | | | | | 187m abundant py-pyh-arspy veins parallel to cleavage, fracture/bx hosted. |
| 190 | | | | | 190m |
| | | | | | 191.5 massive, grey-green, polylithic andesite bx. Poor sorting, matrix to clast-supported, 3-10% 1-2mm feld-andesite clasts ≈ 15-20% 2mm andesite. Fg andesite clasts paler more siliceous? strongly porphyritic andesite medium to dark green chl-altered & difficult to distinguish from matrix. Clasts angular |
| 200 | | | | | |

5 cm

754319

# DIAMOND DRILL LOG

project: Mount Read Volcanics
location: Sterling Valley
coords:

hole no. STP 234
page 5 of 7

RL | AZ | INCL | Scale 1:200
Logged by Rod Alle
date 13.11.94

| m | structure | log | grainsize (vf s c g p max mm) | Samples TS results | description |
|---|---|---|---|---|---|
| 200 | | | | | |
| | | | | | ← q-sulphide veining |
| 210 | | | | | |
| 220 | | | | | moderate q-$CO_3$ veining, minor sulphide |
| 230 | | | | | |
| 240 | | | | 1000 1m giant 25% 2-3m fold-andesite block | 240m — stepup in intensity of q veining + silicification + q-sulphide veining (appears to overprint chl-epid alteration) |
| 250 | | | | | |

754320

5 cm

# DIAMOND DRILL LOG

project: Mount Read Volcanics
location: Sterling Valley
coords:

hole no. STP 234
page 6 of 7

RL | AZ | INCL | Scale 1:200

Logged by Rod Allen
date 13.11.94

| m | structure | log | grainsize (vf f m c vc) | max mm | Samples TS results | description |
|---|---|---|---|---|---|---|

250

260

265m

**Henty Fault:** 3m intense milky q veining & brecciation within broader zone of silicification, q veining, brittle-ductile deformation & py-pyh-asenpy veining

268m

270

gb

small folds

280

gb

gb

290

So + cleav 73°

gb

300

Medium to thick bedded, fg-mg q-feld-musc sandst turbidites > dk grey siltst.

Mica-rich composition & absence of any distinct juvenile volcanic components suggests these sediments derived from Pre€ sandstone-schist basement ± reworked felsic volcanic landmass

Overall, this sediment package is younging from east to west. Graded bedding is fairly consistant & well defined, although local small folds & facing reversals do occur.

Deposition in deep water below wave base

5 cm

754321

# DIAMOND DRILL LOG

project Mount Read Volcanics
location Sterling Valley
coords

hole no. SIP 234
page 7 of 7

RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 13.11.94

m | structure | log | grainsize (mud, vf, f, m, c, vc, max mm) | Samples TS results | description

300
310
320
330
340
350

gb
gb
small folds
gb
So tcl cav 70-80°
gb
small folds ?, definite good gb
gb

minor to moderate q-pyrh-arspy-py-cpy veining in brittle fracture + bx intervals

322m

minor q ± q-$CO_3$ veining with minor pyrh-py-arspy.

EOH 342.5m

5 cm

7543922

# DIAMOND DRILL LOG

project: Mount Read Volcanics
Location: Sterling Valley
coords:

hole no. STP 221
page 1 of 5

RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 15.11.94

| m | structure | Log | grainsize (vf f m c vc max mm) | Samples TS results | description |
|---|---|---|---|---|---|
| 0 | | | | | |
| 10 | | | | | No core down to 21.7m |
| 20 | | | | | 21.7m |
| | probable facing from fg sandy top | | | | 24m: weak to moderate pervasive chl-epid-$CO_3$ ↓ brown to cream q-oxidized $CO_3$ (? ankerite) -chl +moderate q-white $CO_3$-brown $CO_3$ veining |
| 30 | | | | | 30m |
| | | | | | Intense q-arspy-pyh-py veining overprints andesitic clastics and the intrusives. Q veins brecciated in places, with sulphide matrix. |
| 40 | | | | | 39.2m: green q-chl ± chl-epid-$CO_3$ altered rock with 1-5% scattered thin (≤10cm) q-pyh-arspy-py ± q-fluorite pyh-arspy-py veins & some white $CO_3$ veins |
| 50 | | | | | |

5 cm

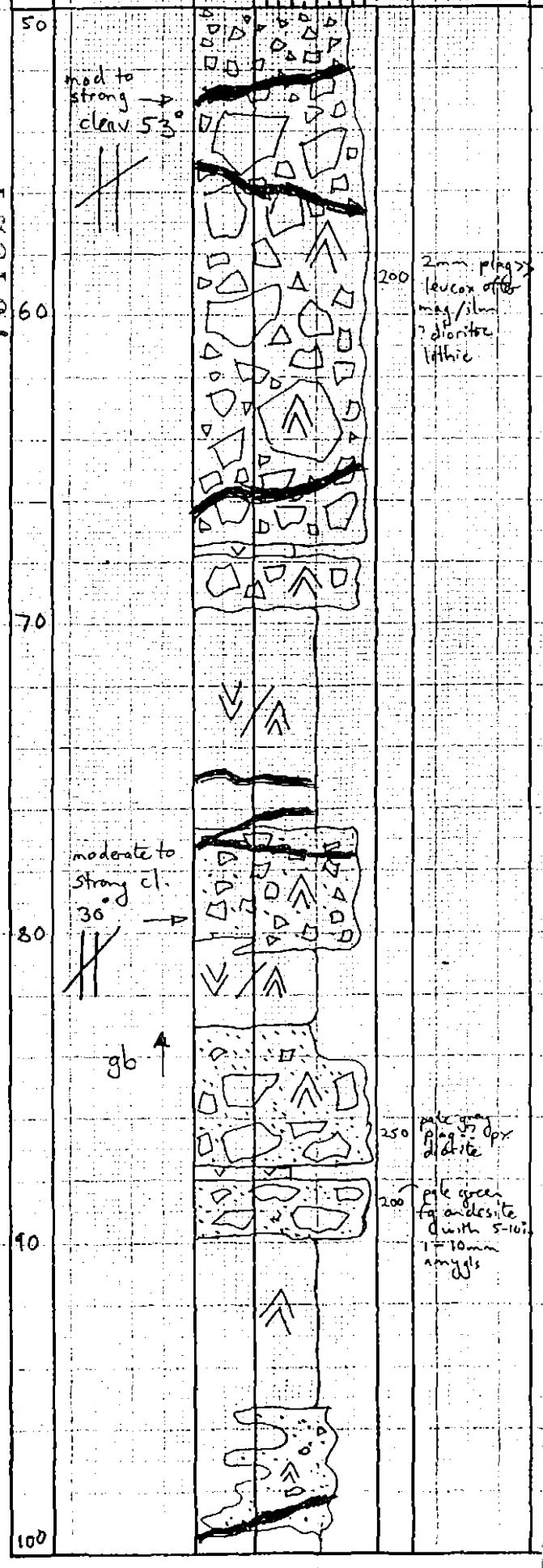
754323

# DIAMOND DRILL LOG

project: Mount Read Volcanics
location: Sterling Valley
coords:

hole no. STP 221
page 2 of 5

RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 15.11.94




alternating massive to normal graded polylithic andesitic mass flow breccia, and fg to 25% 1-2mm feld phyric andesite/basalt sills/dykes

Appears to be one originally continuous sequence of andesitic subaqueous mass flows split up by numerous intrusions.

Mass flows have poorly sorted lower parts, matrix to clast-sup, with cg sandy feld-xtal-rich matrix; Local well sorted sandy granular tops with few scattered lithic clasts.

Most common lithics are 15-25% 1-2mm feld-andesite ± 2-5% 1-2mm feld-phyric amygdaloidal andesite ± basalt.

moderate dk green chl-epid alteration in dykes/sills; chl-epid-q in clastres.

Scattered q-$CO_3$; q-fluor-chl-py-pyh-arspy veining

dark green, 15% 1-2mm feld-andesite/basalt sill/dyke

dk green fg microlitic basalt dyke/sill

green, massive, 15-20% 2mm feld-phyric andesite ? sill

Several definite 1-2mm feld xtal-rich and andesite-lithic bearing clastic intervals toward base of unit suggests mixed intrusive contact. Either that or the andesite is a series of very large blocks (≥1m) within the andesitic volcaniclastics.

5 cm

# DIAMOND DRILL LOG

project: Mount Read Volcanics
location: Sterling Valley
coords:
hole no. STP 221
page 3 of 5
RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 14.11.94

| m | structure | log | grainsize (mud, 0.06, 0.5, 2, 8, 64, max mm) | samples TS results | description |
|---|---|---|---|---|---|
| 100 | ?gb ↑ clss bed 72 | | | | mixed contact |
| | ? gb ↑ | | | | green, moderate chlorite alteration ↓ |
| | | | | | Thick bedded 20-40% feld crystal, andesitic tuffaceous sandst >> siltst. Comprises feld xtals in green chl > ser-CO3 q matrix. Local wispy foliated ? pumiceous textures. |
| | | | | | 107m |
| 110 | very broken rubbly core | | | | |
| | Rock strongly foliated | | | | |
| | | | | | Henty Fault: rapid change in rock type within wider zone of sheared, q-veined, broken core. |
| 120 | | | | | |
| | | | | | 123.5 |
| | | | | | weak to moderate patchy silicification ↓ & q-chlorite alteration, & widely spaced q-py-pyh >> cpy, asPy veins up to 10cm wide. |
| 130 | gb ↑ | | | | |
| 140 | gb ↓ | | | | abundant cg feld ≥ q grains |
| 150 | | | | | |

5 cm

# DIAMOND DRILL LOG

project Mount Read Volcanics
Location Sterling Valley
coords

hole no. STP 221
page 4 of 5

RL | AZ | INCL | Scale 1:200

Logged by Rod Allen
date 14.11.94

| m | structure | lag | grainsize (mud, silt, vf, f, m, c, vc, gran, pebble, max mm) | Samples TS results | description |
|---|---|---|---|---|---|
| 150 | | | | | |
| 160 | mod to strong clear 71° | | | | |
| 170 | gb | | | | ← 10% 1-3mm volc q xtals<br>grey, thick bedded, mg q-feld musc sandst > dark grey siltst<br>local graded bedding, but typically grading not distinct, in part due to small folds, alteration + weathering of core.<br>Minor coarser bed bases with 10% 1-3mm volc q xtal grains. |
| 180 | gb<br>no distinct gb | | | | Interpretation: sandst turbidites deposited in deep water; Proc basement ± reworked felsic volc source terrain. |
| 190 | bed + clear 72° | | | | |
| 200 | gb | | | | 5 cm |

# DIAMOND DRILL LOG

project: Mount Read Volcanics
Location: Sterling Valley
coords:

hole no. STP 221
page 5 of 5

RL | AZ | INCL | Scale 1:200

Logged by Rod Allen
date 14.11.94

| m | structure | log | grainsize (mud, 0.06, 0.5, 2, 8, 32, max mm) | Samples TS results | description |
|---|---|---|---|---|---|
| 200 | ?jb | | | | |
| | | | | | EOH 203.25 m |
| 210 | | | | | |

5 cm

754327

# DIAMOND DRILL LOG

project: Mount Read Volcanics
location: Sterling Valley
coords:

hole no. STP 284
page 1 of 3

RL | AZ | INCL | Scale 1:200

Logged by Rod Allen
date 14.11.94

754328

| m | structure | log | grainsize (vf f m c vc max mm) | Samples TS results | description |
|---|---|---|---|---|---|
| 0 | | | | | |
| 10 | | | | | |
| 20 | | | | | Till & alluvials to 21.30m |
| | v. strong clear. 57° kink/cren 10° ↑ cl cren | | | | moderate q-ser alteration & strong deformation (clear) 26m ↑ moderate silicification + abundant milky q > $CO_3$ veining with minor py > pyrh-arspy. |
| 30 | indistinct gb ± small folds | | | | 38m moderate white q > $CO_3$ veining with v. minor sulphide. Veins fill brittle fractures related to deformation |
| 40 | gb | | | | |
| 50 | ?gb | | | | 5 cm |

# DIAMOND DRILL LOG

project: Mount Read Volcanics | hole no. STP 284
Location: Sterling Valley | page 2 of 3
coords | RL | AZ | INCL | Scale 1:200
Logged by Rod Allan
date 14.11.94

| m | structure | log | grainsize: mud, vf, f, m, c, vc, max mm | Samples TS results | description |
|---|---|---|---|---|---|

grey, mg q-feld-musc. sandst turbidites > dk grey siltst

Thick bedded. Local good graded bedding.

Small folds common.

gb

?gb

gb

gb

gb

bed 75°

probable small fold

gb

cg q + feld grains in base of sandst bed.

?

gb

gb

bed/lam 35°

small folds

grey ; minor to moderate grey-cream $CO_3$ beds

94m

(gradational)

brown oxidised carbonate staining pervasive in sandst beds

5 cm

RL 1329

# DIAMOND DRILL LOG

project: Mount Read Volcanics
Location: Sterling Valley
coords:

hole no. STP 284
page 3 of 3

RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 14.11.94

| m | structure | log | grainsize (mud, 0.06, 0.5, 2, 8, 32, max mm) | Samples TS results | description |
|---|---|---|---|---|---|
| 100 | gb | | | | |
| 110 | small folds; clear 51°; gb | | | | |
| 120 | | | | | EOH 116.7m |

5 cm

254330

# DIAMOND DRILL LOG

project: Mount Read Volcanics
Location: Sterling Valley
coords:
hole no. STP 220
page 1 of 6
RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 15.11.94

RC 4331

| m | structure | log | grainsize (mud, silt, vf, f, m, c, max mm) | Samples TS results | description |
|---|---|---|---|---|---|
| 0 | | | | | alluvials |
| | main cleavage is folded, brecciated severely | | | | black slate with minor thin sandstone laminae |
| 10 | | | | | slate black with abundant deformed q veins + minor rusty oxidized fg staining |
| | strong clev. 38° gb | | | | (sharp, conformable, slightly sheared) |
| 20 | | | | | Pale grey, massive, normal graded rhyolitic sandstone mass flow units. 8-10% 1-2.5mm q xtals at bed bases; 2-3% 0.5mm q xtal fragments in rest of unit. Uncertain % ser-$CO_3$ altered feld xtals. Matrix is xtal-poor, probably fg pumiceous tuffaceous (now foliated ser-q-rich) |
| | | | | | weak q-ser trace py |
| | 40cm strong shearing 62° + tectonic brecciation = Fault | | | | 24.50m Fault contact |
| 30 | | | | | slate oxidized dk brown due to abundant fg Carbonate (+Mn) |
| | gb bed 50 cl. 30° | | | | Laminated grey siltstone-mudst and brown weathered $CO_3$-rich mudst & pyritic mudst >> thin feld > q xtal rhyolitic sandst turbidites |
| | | | | | Turbidites have 5-10% 1-2mm q xtals at base & 15-30% feld xtals. |
| 40 | cl+bed 61° | | | | 38m alternating rusty stained pyritic mudst, brown $CO_3$-rich mudst & fresher grey mudst |
| | | | | | Mudst-siltst has abundant cleavage parallel q-$CO_3$ veinlets. |
| 50 | | | | | 5 cm |

# DIAMOND DRILL LOG

project: Mount Read Volcanics
Location: Sterling Valley
coords:

hole no. STP 220
page 2 of 6
RL | AZ | INCL | Scale 1 : 200
Logged by Rod Allen
date 17.11.94

| m | structure | log | grainsize mud / s / sd / g / max mm | Samples TS results | description |
|---|---|---|---|---|---|
| 50 | gb; 57° bed; cl 30° | | | | |
| 60 | So 90°; gb; So 45° | | | 10 5%, 0.5-1mm q ± f plag rhyolite lithics | |
| 70 | gb; So + cl 55° | | | | |
| 80 | moderately sheared; gb; gb | | | | 80m<br>moderate to strong pale grey q-ser-minor py alteration ± minor 1cm py-ars py veins |
| 90 | ?gb; shear sense indicates reverse, West block up sense (shearing 63°) | | | | 5 cm |
| 100 | gb | | | | 98m |

75433?

# DIAMOND DRILL LOG

project: Mount Read Volcanics
location: Sterling Valley
coords:

hole no. STP 220
page 3 of 6

RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 18.11.94

RS 4333

| m | structure | log | grainsize (mud, s, v, f, m, c, max mm) | Samples Ts results | description |
|---|---|---|---|---|---|
| 100 | | | | | ← 3% 0.2–1.5mm q xtal grains |
| | | | | | medium grey, pumiceous 10% f≥q (1.5cm) phyric rhyolitic mass flow units |
| | | | | | Qtz xtals 1.5m–2mm average at base, but 0.5–1mm average above base. xtal content & size decreases up unit defining normal grading. Lithic poor; few fg to poorly f-q phyric rhyolite lithics. Feld replaced by ser-chl. Matrix is ser-q foliated xtal-poor |
| | | | | | ← 5% 0.5–2mm q xtals probable compacted pumice shreds. |
| 110 | | | | | weak to moderate (grey with cream spots) ser-CO3 alteration |
| | | | 20 | black mudst | |
| | | | 50 | black mudst | 2–4% dk grey fiamme |
| | | | 10 | grey 5% 1–2mm feld± q rhydite | |
| 120 | | | | | From 80m Mass flow beds >> black to grey mudst. |
| | gb | | 40 | black mudst | |
| | | | 10 | cream fg felsic ?lava | ← 90cm grey mudst bed, or raft in base of mass flow unit |
| | | | 60 | 10% 1–10mm feld andesite? | |
| | | | 200 | grey mudst | |
| 130 | gb | | | | |
| | clear 70° gb | | | | 138.3m |
| | | | 20 | fg felsic | minor py-ga-sp veins - up to 5cm associated with ← Fault within sheared interval ← 10% 0.5–2mm q xtals at bed base |
| | brittle bx of black slate, milky veins q buff fault gouge rock = Fault. | | | | patchy brown oxidized CO3 staining & minor–moderate brittle fractures with green ser/chl-py-CO3 veinlet fill. ↓ Most veins post-cleavage & eg ser/chl suggests granite derived |
| 140 | | | | | Black to dark grey mudstone >> sandst. strongly cleaved |
| 150 | | | | | |

5 cm

# DIAMOND DRILL LOG

project Mount Read Volcanics | hole no. STP 220
Location Sterling Valley | page 4 of 6
coords | RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 18.11.94

| m | structure | log | grainsize (dust, s, m, c, max mm) | Samples TS results | description |
|---|---|---|---|---|---|

150

feld-q phyric sericitic (pumiceous) rhyolite turbidites.

Waterssettled rhyolite pumice bed

← 3cm sericitic bed with 20% feld=q porphyritic texture. Feld 2mm, q av. 3mm, upto 5mm

gb

160

Possible minor fault ? gb

162-1m — sharp contact, obscured by 40cm milky q vein

← 35-40% 2-3mm feld > q xtals. Qtz 5-7% 1-5mm

pale grey weak ser-$CO_3$ alteration

Normal graded, feld>q xtal-rich (35-60% 2mm) rhyolitic sandstone subaqueous mass flow unit. Qtz xtals 15% at base, decreasing to 7% toward faulted top. Qtz xtals up to 5mm, same as in pumiceous beds above & below.

170

gb

25

pale grey-green fg rhyolite with 3% 0.5-1mm q + f phenos.

← 50-60% 2-3mm xtals; q 10-15% 1-5mm

15

strongly cleaved buckled & milky q-$CO_3$ veined = tectonic deformed zone. Probably no major fault.

weak ser-$CO_3$ alteration

pale grey Normal graded, pumiceous rhyolite subaqueous mass flow package. Comprises 15% fzq (q 7% 1mm) xtals in ser matrix at base and 5% 0.3mm q xtals + feld xtals in ser matrix at top. Grey wispy foliated matrix interpreted as altered compacted pumice

Coarser ser pumice beds above main graded mass flow bed are at least in part suspension settled coarse pumice beds alternating with rhyolite tuffaceous siltst-fg sandst suspension sediment.

180

gb

gb, loads

190

bed 75°

cleav. 78°

← 5% 1-1.5mm q xtals at base

5 cm

gb

200

← 5% 0.3-0.5mm av q xtal grains.

754334

# DIAMOND DRILL LOG

project: Mount Read Volcanics
Location: Sterling Valley
coords:

hole no. STP 220
page 5 of 6

RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 18.11.94

| m | structure | log | grainsize mud / sand / gravel / max mm | Samples TS results | description |
|---|---|---|---|---|---|
| 200 | | | | | |
| 210 | gb ↑ | | | 30 black mudst<br>15 15% 2mm rhyolite f-g<br>30 fg poorly g-f phyric rhyolite; 10-15% 1-2mm f-andesite | 212m<br>↑ moderately abundant fine q-$CO_3$-pyrh veinlets ↓ |
| 220 | ? gb ↑ | | | | 220.3m<br>interbedded medium to dark grey mudst & feld-qtz-phyric sericitic puniceous rhyolitic sandst turbidites & suspension beds.<br>Rhyolitic sericitic beds vary from xtal poor to xtal-rich. Most in this interval are sericitic, puniceous.<br>↑ weak q-ser-$CO_3$ alteration, minor q-$CO_3$-py-pyrh veinlets ↓ |
| 230 | strong clear 70° | | | | |
| | gb ↑ | | | | ← 10% 1mm q xtals. |
| 240 | gb ↑ | | | | ← 10-15% 2-3mm av. q xtals |
| | bedding → clear 90° | | | | |
| 250 | | | | | 5 cm |

25433

# DIAMOND DRILL LOG

project: Mount Read Volcanics
Location: Sterling Valley
coords:

hole no. STP 220
page 6 of 6

RL | AZ | INCL | Scale 1:200

Logged by Rod Allen
date 18-11-94

| m | structure | log | grainsize (clay, silt, vf, f, m, c, vc, max mm) | Samples TIS results | description |
|---|---|---|---|---|---|
| 250 | gb<br>gb | | | | green grey q-f-lithic fg sandst turbidites & siltst. |
| 260 | | | | | |
| | | | | | 268.8m |
| 270 | | | | | EOH 268.8m |

5 cm

754336

# DIAMOND DRILL LOG

project: Mount Read Volcanics | hole no. SVD 89-3
Location: Sterling Valley | page 1 of 8
coords | RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 19.11.94

| m | structure | log | grainsize (clay, silt, sand, gran, pebble, max mm) | Samples TS results | description |
|---|---|---|---|---|---|
| 0 | | | | | Core starts 3.6m |
| | Strong stretching lineation 75°→N | | | | 5.0m — 4% 1cm py-sp-qtz veinlets in q-ser altered rock! — 5.7m |
| | | | | | Massive, pale green grey, feld-qtz-phyric rhyolitic subaqueous mass flow unit. Xtals 25-30% 1.5mm average at base; 15-20% 1-1.5mm av. at top. Qtz xtals 5-10%, great range in size 0.2-3mm, ± heterogeneous distribution, ± increase abundance towards base of unit (defining normal grading) indicates is clastic mass flow. Feld replaced by ser-q; matrix inferred to be altered pumiceous composition |
| 10 | cleavage 61° | | | | moderate q-ser alt^ to 33.9m |
| | gb | | | | 16.6m — sharp conformable |
| 20 | cleav 68° | | | | ▲ 1-2% 0.5mm q xtals. Diffuse stratified, rhyolitic pumiceous sandst + pumice breccia. Characterized by 1-2% 0.5mm q phenos in matrix ± ser pumice framme, indicates different source pyroclastic eruption to unit above 16.6m |
| | framme 90° | | | | 24.4m — sharp conformable |
| 30 | | | | 10 subrounded 5-10% 1-2m q-phyric rhyolite | Massive, cream, 20% 2mm feld-qtz rhyolite. Qtz xtals 2mm av., euhedral, evenly porphyritic. Feld xtals ser altered. Coherent groundmass with local relict granular? perlitic texture. Local pseudo framme. Minor lithic clasts. Euhedral phenos + evenly microgranular grdmass suggests is coherent nonclastic. |
| | sharp contact 65° | | | | 33.9m — sharp, conformable |
| | cl. 68° | | | | relatively unaltered |
| 40 | | | | | Greenish medium grey, massive, 15% 1-2mm feld-phyric dacite intrusion. Texturally same as Mt Black dacite sills. Groundmass becomes progressively more granular (probably spherulitic) away from upper contact |
| 50 | | | | | Coherent non-clastic texture. No brecciation at upper contact. |

5 cm

RD4337

# DIAMOND DRILL LOG

project: Mount Read Volcanics
location: Sterling Valley
coords:

hole no. SVD 89-3
page 2 of 8
RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 19.11.94

| m | structure | log | grainsize (vf f m c vc max mm) | Samples TS results | description |
|---|---|---|---|---|---|
| 50 | | | | | much less foliated than overlying rhyolitic rocks, & less altered |
| | | | | | Scattered (1-3%) dark grey fg inclusions & streaks of similar but finer-grained composition. |
| | | | | | 55m — |
| | | | | | ↓ weak to moderate pink feld-chl-mag alteration |
| | | | | | Feldspar phenos concentrically zoned beautifully euhedral. |
| 60 | | | | | |
| | | | | | Minor fine post-cleavage chl/biot-q veinlets, & $CO_3$-q veins throughout. |
| | | | | | Same rhyolite unit either side of this - dacite suggests dacite is intrusion that post-dates the rhyolite. |
| | | | | Sample 68.7m TS + chem 38919 | |
| 70 | | | | | |
| 80 | | | | | |
| 90 | | | | | |
| 100 | | | | | |

5 cm

7543238

# DIAMOND DRILL LOG

project Mount Read Volcanics | hole no. SVD 89-3
Location Sterling Valley | page 3 of 8
coords | RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 19.11.94

| m | structure | log (mud / grainsize: 0.06 0.5 2 ∞ 32 max mm) | Samples TS results | description |
|---|---|---|---|---|
| 100 | | | | |
| 110 | | | | |
| 120 | | | | |
| 128·5 — 131 — | rubbly broken core with fluorite veining | | | |
| 130 | as above | | | |
| 140 | | | | 140·2 — Sharp non faulted contact |
| | apparent gb | | 20 fg pink rhyolite with ≤10% 2mm f-g phenos. | weak q-ser alteration |
| 150 | | | | |

5 cm

Cream to pale grey, mainly massive 20% 2mm feld > q phyric rhyolite.

Same unit as above dacite intrusion.

Many areas have coherent evenly porphyritic texture of euhedral q phenos with thin

254339

# DIAMOND DRILL LOG

project Mount Read Volcanics | hole no. SVD 89-3
location Sterling Valley | page 4 of 8
coords | RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 19.11.94

| m | structure | log | grainsize (phi, mm, max mm) | Samples TS results | description |
|---|---|---|---|---|---|
| 150 | | | | | white to grey ? spherulitic rims ? evenly microgranular spherulitic or perlitic matrix. This texture suggests rock is coherent non-clastic. However some areas have fg to 20% 2mm q-f phyric lithic clasts, sericitic fiamme-like lenses, and locally 0.5-1mm granular clastic textures including broken 0.5-1mm q xtal fragments. (see observations at 230m) |
| | | | | 50 | clean 20% fsq 2mm rhyolite |
| 160 | | | | | |
| | | | | | TS Sample 166.7 (38918) |
| 170 | | | | | |
| | | | | | TS Sample 175.8m (38917) |
| 180 | | | | | |
| 190 | | | | | |
| 200 | Moderate clav. 63° | | | | |

5 cm

7541340

# DIAMOND DRILL LOG

project: Mount Read Volcanics | hole no. SVD 89-3
location: Sterling Valley | page 5 of 8
coords | RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 19.11.94

| m | structure | log | grainsize (mud, s, m, f, c, vc, max mm) | Samples TS results | description |
|---|---|---|---|---|---|
| 200 | | | | | |
| 210 | | | | | |
| 220 | | | | | weak q-ser-$CO_3$ ± sec feld alteration, local patchy v. fine dissem gn |
| 230 | | | | TS Sample 232.0m (38916) Sample geochem 232.2m (38917) | vital clues to origin of unit in this area. Unit is massive with pink patches of clearly coherent porphyry up to 30cm clast to matrix-supported with matrix and "veins" of more finely porphyritic clastic or coherent rhyolite. Both rhyolites have micro granular probably perlitic groundmass texture. Some scattered pseudo fiamme diffuse lenses; some of these are more xtal-rich (but still coherent) than the normal porphyry i.e. may be xtal clusters. This textural variation is extremely similar to the Wilga FW rhyolite at Berambra & must have same origin |
| 240 | | | | TS Sample 245.0m 38915 | Interpretation: Rhyolite lava or intrusive dome, intensely quenched, originally glassy, now relict perlitic throughout. |
| 250 | 2A&1 massive white veins ? > f | q-f | | | |

5 cm

754341

# DIAMOND DRILL LOG

project: Mount Read Volcanics | hole no. SVD89-3
location: Sterling Valley | page 6 of 8
coords | RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 19.11.94

| m | structure | log | grainsize fluid / vf f m c vc | max mm | Samples TS results | description |
|---|---|---|---|---|---|---|
| 250 | | | | | | either variable xtal content on 10cm scale or two or more intimately mixed emplacement generations, one intruded into other; first generation could be pyroclastic proximal cone. Intensely glassy throughout suggests probably subaqueous emplacement. |
| | | | | | | patchy pale grey, cream & pink ser-$CO_3$ secondary feld alteration + minor dissem gn-py ± sp |
| 260 | | | | | | gradational — increasing brittle fracturing + grey green pink blue q-chl/biot-feld alteration |
| | | | | | | ← 2cm cpy-py vein |
| | | | | | | interpreted as silic^n tq-chl/biot associated with Devonian granite-related brittle brecciation and veining |
| 270 | | | | | | Note this is similar style alteration + veining as occurs in Rosebery Hw mass flow units toward Mt Black Fault |
| | | | | | | pseudo fiamme zone: of ser ± chl matrix dark "fiamme"-like lenses in paler q-ser-feld apparent matrix domain |
| | | | | | TS Samples 278-7a,b 38913 38914 | |
| 280 | | | | | | |
| | | | | | | |
| 290 | | | | | | |
| | possible Fault zone intruded by dykes, then rebrecciated | | | | Samples TS+chem 296.9m (38911) | fg feldspathic microlitic/granophyric felsic dykes over-printed by intense chl/biot alteration with py-cpy-pyrh veining, in turn overprinting pink sec feld alteration. Appears post to syn-fracturing-shearing, post-cleavage Devonian alteration |
| 300 | | | | | | |

5cm

754342

# DIAMOND DRILL LOG

project Mount Read Volcanics | hole no. SVD89-3
Location Sterling Valley | page 7 of 8
coords | RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 20.11.94

RL343

| m | structure | log | grainsize mud / max mm | Samples TS results | description |
|---|---|---|---|---|---|
| 300 | Irreg white q vein | | | | fracturing, chl/biot veining, & patchy silicification - chl/biot alteration so strong difficult to be certain if the 20% 1-2mm q-f rhyolite is clastic or coherent here. Local relict coherent patches suggest is same unit as above. |
| | contact + clearage 63° | | | | (sharp, moderately sheared contact) |
| 310 | | | | | both dyke/sill & wall rocks strongly brecciated & q-chl/biot altered. grey brown, massive, strongly tectonic or hydrothermal fractured 5% 1mm feld-phyric dacite/rhyolite dyke or sill |
| | | | | | (sharp slightly sheared) |
| 320 | contact 70° | | | | ← grey brown fg felsic dyke/sill as above |
| | 321.7m 10cm fault gouge & prg | | | | Fault |
| | | | | | Massive, moderately sorted, gravelly rhyolitic volcaniclastic sandst and fine breccia. Characterized by granular sandy matrix texture & 10% 0.5-0.7mm q xtals (ie smaller than unit above, but similar to sandy matrix phase in unit above) Best preserved primary texture 344-350m. Total xtals 15-30%; xtals + larger rhyolite clasts matrix-supported. |
| 330 | | | | | silicification + sec feld + chl/biot veinlets |
| | | | | 100 | 20-25% 2-3mm q-f rhyolite |
| | | | | | 334.2 |
| | strong cleavy/ shear fabric 70° | | | | intense dark green chl/biot > $CO_3$ dark green, strongly sheared, fg ?mafic dyke/sills interbanded with 20% 2mm q-f-phyric rhyolite coherent or clastic rock |
| | | | | | 339m |
| 340 | contacts 90-50° | | | | Gravel size clasts are 15-25% 1-2mm f-q rhyolite mainly. |
| | | | | | Interpretation: reworked or resedimented rhyolitic clastic debris from pyroclastic & autoclastic lava source. Could be subaerial or subaqueous deposit. |
| 350 | | | | | |

5cm

# DIAMOND DRILL LOG

project: Mount Read Volcanics
location: Sterling Valley
coords:

hole no. SVD89-3
page 8 of 8
RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 20.11.94

| m | structure | Log | grainsize mud / vf / f / m / c / max mm | Samples TS results | description |
|---|---|---|---|---|---|
| 350 | strong clay contact 73° | | | | 350.0m<br>brown to grey, massive, strongly tectonically brittle brecciated 5% 1mm feld-phyric dacite/rhyolite dykes/sills interbanded with q-phyric rhyolitic rock. Minor fg dark green ? mafic dykes.<br>fresh brown rhyolite/dacite intensely brecciated & veined by chl/bio, & local q-fluorite |
| 360 | | | | sample chem 359.2m (38910) | |
| | | | | | 364.2m |
| 370 | | | | | EOH 364.2m |

5 cm

25434

# DIAMOND DRILL LOG

project: Mount Read Volcanics
Location coords: Sterling Valley

hole no. STP 105
page 1 of 8

RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 21.11.94

| ft / m | structure | log | grainsize: mud, vf, f, m, c, vc | max mm | Samples TS results | description |
|---|---|---|---|---|---|---|
| 0 | | | | | | moderate to strong 2 phase q-ser alteration with minor dissem py |
| 30 | cleavage fanning 25° | | | | | |
| 60 | cleavage fanning 14° | | | | | |
| 90 | | | | | | |
| 120 | | | | | | |
| 150 | | | | 35 | white fine laminae of cleaved weak f-q phyric rhyolite | |

Strongly cleaved, massive 15-20% 1-2mm feld > qtz phyric rhyolite with bold pseudofiamme texture of dark yellow-grey-green sericite-rich lenses & streaks, enclosed by paler yellow-cream q-ser continuous pseudomatrix domains.

Qtz + feld phenos commonly distinct within ser pseudofiamme domains, & qtz-only or no phenos detectable in pale q-ser pseudomatrix domain. This preservation interpreted as alteration effect on originally evenly porphyritic rhyolite. Where phenos distinct, q xtals are subhedral subrounded, non-broken & relatively even size & even distribution, suggesting primary rock coherent non clastic.

Rhyolite lithic clasts occur locally, but many apparent grey siliceous clasts

5 cm

RD343425

# DIAMOND DRILL LOG

project: Mount Read Volcanics
location coords: Sterling Valley

hole no. STP105
page 2 of 8

RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 21.11.94

| ft / m | structure | log | grainsize (v f / f / m / c / v c / max mm) | Samples TS results | description |
|---|---|---|---|---|---|
| 150 | | | | | interpreted as silicification spots, and tectonically pulled apart patches of silicified rhyolite. Pseudoframme aligned parallel to strong cleavage, and do not appear to have any pre-cleavage $S_1$ foliation, which occurs in pumice bx mass flow units. |
| 180 | | | | | |
| 210 | cleav + framme 28° | | | | Interpretation: 2 phase q-ser alteration (dark sericite overprinted by paler q-ser?) resulting in pseudoframme alteration texture, within coherent rhyolite, lava or intrusive. |
| 240 | | | | | * Important Comparisons: This alteration style, the occurrence within it of more restricted disseminated + veinlet sulphide, the rhyolite lava or intrusive facies type, and the occurrence of these just below black slaty fg sediments, are an association of features characteristic of the footwall of some volcanic-related massive sulphides. In particular this zone is extremely similar to footwall of the Wilga deposit at Benambra Victoria. |
| 270 | | | | | |
| 300 | | | | | |

5cm

754346

# DIAMOND DRILL LOG

project: Mount Read Volcanics
location: Sterling Valley
coords:

hole no. STP105
page 3 of 8

RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 21.11.94

| ft / m | structure | log | grainsize (vf f m c vc g max mm) | Samples TS results | description |
|---|---|---|---|---|---|
| 300 | | | | | 308½' gradational<br>q-chl alteration only trace sulphide<br>granular sandy pseudoclastic texture with local relics of f-q porphyritic texture & pseudo flamme texture like adjacent q-ser alteration zone.<br>326' very rapid change |
| 330 | extensive interval of intense cleavage increasing in intensity toward mylonite at 417' | | | | Massive v. strong cleaved f-q-phyric rhyolitic rock with relict pseudo flamme texture & pyritic > sphalerite disseminations & streaks/veins transposed into cleavage.<br>moderate to strong q-ser-1-3% py + minor Sp disseminations + veinlets<br>Most likely same rock type & same unit as at top of hole. |
| 360 | strong cleav 31° | | | | |
| | cleav 40° E | | | | |
| 390 | lin pitch 70→S | | | | 388' (sharp)<br>moderate ser-chl-<br>Strong foliated, massive, ?5% 1mm feld-phyric ?dacite. Green grey chl-ser-q composition. Probably dacite sill.<br>411' (position of contact uncertain)<br>strong q-ser minor $CO_3$<br>417' |
| | cleav 37° E | | | | |
| | lin pitch 75°→N. | | | | |
| | cleav 42° | | | | |
| 420 | cleav 43° E | | | | Mylonitic shear zone: intense laminar tectonic fabric; rhyolite & grey sed interleaved on 1-10cm scale in centre of zone. Top & bottom contacts gradational, & top especially, grades into extensive zone of intense cleaved rhyolite with strong tectonic grainsize reduction & thin mylonites<br>427' |
| | stretch lin 70° →S pitch | | | | |
| 450 | | | | | |

5 cm

15434?

# DIAMOND DRILL LOG

project: Mount Read Volcanics
location: Sterling Valley
coords:

hole no. STP105
page 4 of 8

RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 21.11.94

| ft / m | structure | log | grainsize (sr silt vf f m c vc max mm) | Samples TS results | description |
|---|---|---|---|---|---|
| 450 | | | | | ↑ moderate chl-ser alteration ± minor py > sp veins ↓ |
| | cleav 33° | | | | Grey, thin to thick bedded, fg-mg tuffaceous sandstone >> black ± grey siltst |
| 480 | | | | | Probably turbidites but no systematic grading observed |
| | cleav + bed 53° | | | | |
| 510 | | | | | |
| | | | | | gradational |
| 540 | | | | | ↑ silic" + 1-3% py >> sp streaks parallel to cleavage, + post cleav cross cutting $CO_3$-q-py-sp ± fluorite veinlets ↓ |
| | | | | | Laminated black pyritic mudstone (slate) |
| 570 | | | | | |
| | 585' brittle Fault zone with milky q veins buckled & cleav bx intervals | | | | ↑ abundant post-cleav py-sp veinlets ↓ |
| 600 | | | | | Fault zone, probably not major displacement. |

5 cm

754348

# DIAMOND DRILL LOG

project: Mount Read Volcanics
Location coords: Sterling Valley

hole no. STP 105
page 5 of 8

RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 21.11.94

754349

| ft / m | structure | log | grainsize (pst sdo silt vf f m c max mm) | Samples TS results | description |
|---|---|---|---|---|---|
| 600 | | | | | 603' |
| | 3cm brittle fault 58° | | | 300 black mudst | Grey, normal graded feld-qtz-phyric pumiceous rhyditic subaqueous mass flow unit. |
| | intense clay 35° | | | | strong silicification + 1-2% patchy dissem + veinlet sp>py. Post clay chl/biot-qtz-tour-fluor veins increasing in intensity down hole |
| 630 | gb | | | | Xtal-rich, including 5-10% 1-2mm qtz xtals, and black mudst intraclast-rich at base. |
| | | | | | 2-3%, 0.5-1mm qtz xtals toward top. |
| 660 | | | | | Several areas with relict tuba pumice clasts. |
| | clay + flamme 63° | | | | 1-5% scattered dk green small flamme. |
| 690 | | | | | Sp mineralization is impregnation-replacement |
| | | | | | 5cm |
| 720 | | | | | |
| 750 | | | | | |

# DIAMOND DRILL LOG

project: Mount Read Volcanics
location: Sterling Valley
coords
hole no. SIP105
page 6 of 8

RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 21.11.94

| ft / m | structure | log | grainsize: mud, 0.06, 2.0, sd, gr, max mm | Samples TS results | description |
|---|---|---|---|---|---|
| 750 | | | | | |
| 780 | | | | | |
| 810 | | | | | |
| 840 | gb | | | | |
| | | | | | 854 |
| 870 | | | | | |
| 900 | | | | | |

Interbedded grey felsic tuffaceous sandst mass flow beds & grey to black mudst

5cm

754350

# DIAMOND DRILL LOG

project: Mount Read Volcanics
Location coords: Sterling Valley

hole no. STP105
page 7 of 8

RL | AZ | INCL | Scale 1:200

Logged by Rod Allen
date 21.11.94

| ft / m | structure | log | grainsize (vf f m c vc g p max mm) | Samples TS results | description |
|---|---|---|---|---|---|
| 900 | | | | | |
| 930 | | | | | |
| 960 | | | | | |
| 990 | gb | | | | pervasive moderate q-ser alteration + minor (1%) dissem + veinlet sp-py |
| 1020 | lam 82° clean 85° | | | | grey to cream, normal graded tuffaceous rhyolitic xtal-poor mass flow units > black slate<br>Qtz + feld phyric<br>Qtz 2–5% .0.5–1mm |
| 1050 | gb | | | | |

5cm

754351

# DIAMOND DRILL LOG

project: Mount Read Volcanics
location: Sterling Valley
coords:

hole no. STP105
page 8 of 8

RL | AZ | INCL | Scale 1:200

Logged by Rod Allen
date 21.11.94

| ft / m | structure | log | grainsize (vf f m c vc p mm) max mm | Samples TS results | description |
|---|---|---|---|---|---|
| 1050 | | | | | |
| | | | | | 1062' |
| 1030 | | | | | EOH approx 1062' |

754352

5 cm

# DIAMOND DRILL LOG

project: Mount Read Volcanics
location: Tullah - Sterling Valley
coords
hole no. MM1a
page 1 of 3
RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 22.11.94

| m | structure | log | grainsize (mud, s, v, f, m, c, vc, max mm) | Samples TS results | description |
|---|---|---|---|---|---|
| 250 | gb | | | | minor disseminated py. Thinly interbedded brown oxidized $CO_3$ stained vfg sandst turbidites > dk grey siltst ≫ packages of cg-fg lithic-q-f-mica sandst turbidites (as at 256m) |
| | | | | | 254m |
| | gb | | | | Fault zone with main displacement at 266.7-267.3m. 3 generations deformation (1) cleavage, increasing in intensity to subparallelism towards fault (2) buckling & fault brecciation of intensely cleaved rock (3) 1-3cm pug cataclasite @ 267.3m. Strong deformation only continues for 3.7m into rhyolite package E. of Fault (downhole) |
| 260 | progressively increasing intensity of cleavage & buckling, crenulation & bx" of cleavage | | | Above Fault this is Only "juvenile" rhyolithic cg bed, rest are lithic-micaceous sandst beds. | minor disseminated py. silicification in fault zone, & local py-gn impregnation in brittle fault bx |
| | Fault planes 70° | | | | 267.3m sharp, Fault |
| 270 | strong cleav | | | 60 abundant grey mudst ripup clasts | pale grey strong foliated felsic tuffaceous fg sandst-siltst bed or raft in mass flow |
| | gb | | | 20 10% 2-3mm q-f phyric rhyolite & grey siltst | Interbedded grey green tuffaceous silts-fg sandst & vcg xtal-rich (up to 25% q xtals, total xtals 50-60%) rhyolitic q-f xtal-rich sandst xtals angular. Grading poorly developed & inconsistent even though no evidence for small folds. This indicates bedforms not typical turbiditic mass flows. xtals set in sericitic probably pumiceous matrix. Interp: reworked pyroclastics, subaqueous, ?proximal poorly graded turbidites. |
| | gb | | | | weak ser-q-mag-hem alteration probably Dev" (much weaker alteration than STP105) |
| | gb | | | | |
| 280 | | | | | (sharp or rapid gradational with 5cm mixed zone of q-f porphyry clasts up to 4cm within base of xtal-rich sandst) |
| 10 cm | | | | 50 35 grey siltst with clasts intercalated with xtal sandst. green q-f porphyry clasts at contact | Mottled dk brown to green to pink to cream very massive 20% 2-3mm average q≈f-phyric rhyolite. Feld xtals only locally detectable (ser altered). Qtz seams euhedral but ranges 0.5-5mm in size & moderately irreg in distribution. Interp: rhyolite intrusion or pumice bx, former is preferred. |
| | 5 cm | | | 288.6 Sample 38924 Geochem TTS | |
| 290 | | | | | (sharp planar contact but 5cm interval also occurs 80cm below contact = ? irregular intrusive contact.) |
| | ?gb | | | | weak ser-q |
| | ?gb | | | | grey mg-cg xtal-rich well sorted q-f rhyolitic sandst ≥ vcg pumiceous q-f-phyric sandst/pumice bx. Diffuse normal grading. |
| | | | | 30 5% 1-2 q-f rhyolite & 10-15% 2-3 rhyolite clasts | ← 0.5-4mm 20% q-f phyric pumice bx or intrusion? |
| | bed 66° | | | | 299.7 (sharp conformable contact) |
| 300 | | | | | |

RS4333

# DIAMOND DRILL LOG

project Mount Read Volcanics | hole no. MR19
Location Tullah - Sterling Valley | page 2 of 3
coords | RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 22-11-94

| m | structure | log | grainsize (clay, silt, vf, f, m, c, vc, max mm) | Samples TS results | description |
|---|---|---|---|---|---|
| 300 | phenos become smaller | | | sample 301-6 geochem + TS 38925 | ↑ weak ser-$CO_3$ alteration ↓ 310.7m |
| 310 | phenos become smaller; gb | | | | ↑ weak ser-$CO_3$ ↓ |
| | 3cm silicified cherty shear 66° | | | | |
| 320 | | | | | |
| 330 | strong cleav 67° | | | | ↑ weak ser-$CO_3$ spotty alteration ↓ |
| 340 | | | | | |
| 350 | | | | | |

grey-green, massive, 15% 1-1.5 mm av. f>q phyric coherent rhyolite intrusive. 1 metre finer grained margins; q xtals great range in size 0.2-3mm av. ~1mm; patchy distributn on 1-3cm scale, but are euhedral to subhedral with thin white spherulitic rims. rapid change or sharp

grey green, massive feld>>q phyric pumiceous rhyolitic mass flow units Qtz xtals up to 5-7% at bed bases but mainly 1-2% 0.5-1mm av. ie less & smaller than above 310.7m. Feld xtals 5-10% 1-2mm

Wispy patchy sericitic texture after foliated pumice. Dk green fiamme scattered through coarser parts.

Grainsize drawn on xtal size as pumice size generally obscured.

← green-grey, massive fq 1-2%, 0.2-1mm q-phyric tuffaceous sandst, or felsic sill. Irreg xtal distributn + wispy ser clasts suggest former. Many patches of isolated to close-packed 2-5 mm q-chl-ser spots with q or white $CO_3$ cores and commonly nucleated on q & feld xtals: probably alteratn spots.

5cm

754354

# DIAMOND DRILL LOG

project Mount Read Volcanics | hole no. MM1q
Location Tullah - Sterling Valley | page 3 of 3
coords | RL | AZ | INCL | Scale 1:200
Logged by Rod Allen
date 22.11.94

| m | structure | log | grainsize (0.06 mud, 0.5, vf, f, m, c, vc, max mm) | Samples TS results | description |
|---|---|---|---|---|---|
| 350 | gb ↑ | | | | 350.4m<br>351.8m |
| | xtal size | | | | green-grey, normal graded pumiceous feld-q-phyric rhyolitic subaqueous mass flow units. Xtal-rich (30% 1-2 mm feld-q) bases with matrix-supported fg felsic lithics + minor black phyllite. Fg pumiceous top with 7% 0.7mm av q xtals |
| | good gb | | | | weak ser-CO3 alteration |
| 360 | | | 50 | white fg felsic lava or siltst | 361m |
| | | | | | moderate-strong q-ser-CO3 alteration |
| | | | | | Pumice framme have 10-15% 1-2mm f-q xtals. Qtz xtals up to 5mm in matrix, rarely within framme |
| | | | | | 366m<br>366.6m |
| | q-f pegmatite veins | | | | irregular milky to pink vcg q-f pegmatite veins |
| 370 | | | | perlitic | pervasive weak ser-q-CO3 alteration |
| | | | | | Lower unit grainsize profile is estimate of average pumice clast size. Pumice framme texture well preserved above 364m & below 398m. (interfingering ? contact) |
| 380 | | | | | Massive 15% 1.5-2mm q-phyric rhyolite intrusive. |
| | | | | 385.7 JCP TS 34246 march'93. adjacent piece of core appears perlitic | Strongly perlitic groundmass. dark yellow-green sericite pseudoframme in several areas, |
| | | | | | Perlitic texture + lack of $S_1$ framme foliation (ie framme entirely in $S_2$) distinguishes this unit from adjacent mass flows. |
| 390 | | | | | 391.5m (position approximate because boundary obscure) |
| | cleav. 65° framme $S_1$ 0° | | | | Pumiceous feld-q-phyric rhyolitic subaqueous mass flow unit similar to above 366.6m |
| | | | 100 | 10% 1-2mm q-f rhyolite | |
| | gb ↑ | | | | 398m<br>green-grey weak ser-chl |
| 400 | | | 30 | | EOH 400.7m |

754355

5cm

754356

383 000mE

385 000mE

387 000mE

5 375 000mN

5 373 000mN

TULLAH

MM1, MM1A

LAKE ROSEBERY

E.L. 22/90

Murchison Dam Road

Mapped Interval
Murchison Dam Road
(See figure 5)

Mapped Interval
Anthony Road
(See figure 4)

MT. BLACK VOLCANICS

STERLING VALLEY VOLCANICS

FARRELL SLATES

STP218

STP234

STP221

STP284

STP217

STP220

SVD89-3

Trace of Cross Section
(See figure 2)

E.L. 24/91

Mapped Interval
Murchison Highway
(See figure 3)

Murchison Highway

ROSEBERY

Henty River Fault

Farrell Fault

MURCHISON VOLCANICS

STP105

HEC Transmission Lines

Anthony Road

Sterling

LAKE MURCHISON

5 cm

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

| | |
|---|---|
| COMPILED : R. Allen | E.L. 22/90 – TULLAH<br>E.L. 24/91 – STERLING RIVER<br>STERLING VALLEY<br>SUMMARY GEOLOGY & LOCATION OF GEOLOGICAL CROSS SECTION, MAPPING TRAVERSES & DRILL CORES INTERPRETED IN THIS STUDY |
| DATE : Dec., 1994 | |
| DRAWN : G.M.B. | |
| REVISIONS : | |
| FILE : 15_SVGRA | |
| DRAWING No. | SCALE 1:15,000 (0 – 300 m) FIG. No. 1 |

754357

5 373 500mN

382 500mE

383 000mE

383 500mE

384 000mE

5 374 000mN

MOUNT BLACK VOLCANICS

STERLING VALLEY VOLCANICS

MURCHISON HIGHWAY

Fooks Creek

River

STP283

SVD87-1

SVD87-1A

Same rock type as 38920. Contains a 3mm mag pheno + weak epid. alteration.

38921

Granular spherulitic grd mass.

38920

Pale brown, massive coherent 10–15% 1.5mm (av.) feld–phyric + 2–3% hb phyric < hb plag xtal aggregates + <1% 0.5mm q, dacite lava/sill.

Pale green slightly chloritic, lineated, 15–20% 1–2mm plag–phyric andesite/basalt, with few chl. streaks after hb/px phenos. Same unit as further E.

NB Neither dacite nor basalt/andesite strongly deformed adjacent to contact. Very subtle change in rock type suggests not fault contact.

Medium green, 15–20% 0.5–3mm (1–2mm av) plag, 3–4% 1–2mm hb–phyric coherent andesite/basalt. Varies weak to strong foliated and steep lineated. Probable perlitic grd mass or plag microlitic. On fresh surfaces hb more distinct than plag.

38922

Pale brown deep weathered to dk green intensely coarsely plag microlitic, plag > ferromag ? doleritic mafic, with ? 5% 1mm plag phenos. Could be the Basalt/Andesite unit or less porphyritic andesite/dolerite dyke/sill.

38923

Andesite/basalt as further Nth. but here becoming progressively coarser grained. Groundmass: to 0.5mm granular plag + ferromag.

Bruce Creek

5 373 000mN

5 373 500mN

## KEY

5 cm

- V — Fine grained basaltic
- V̈ — Strongly porphyritic basaltic
- Fine grained to weakly porphyritic dacite/rhyolite
- • — Traverse observation point
- 38923 × — Rock sample

**PASMINCO EXPLORATION**
A Division of Pasminco Australia Limited

| | |
|---|---|
| COMPILED : R. Allen | E.L. 22/90 – TULLAH |
| DATE : Dec., 1994 | MT. BLACK |
| DRAWN : G.M.B. | **GEOLOGY ALONG THE MURCHISON HIGHWAY** |
| REVISIONS : | |
| FILE : 5_GAMHI | |
| DRAWING No. | SCALE 1:5000 (0 100 m) — FIG. No. 3 |

754358

Intensely chloritised + pyritic 7–10% 2–3mm quartz–phyric rhyolite porphyry. Probably coherent. No evidence for clastic. Embayed subhedral quartz.

fg quartz–phyric chl–hb–rich granite.

V. chloritic after hb ± biot quartz–phyric granite.

Granite like MV20 but finer grained.

15% 2mm quartz–phyric granite.

LAKE

ROSEBERY

LAKE MACKINTOSH

5 375 000mN

5 374 500mN

5 374 000mN

387 000mE

387 500mE

+518.9

+532.1

+532.0

545.3 +

+542.8

+481.7

+467.0

508.8 +

+287.0

+263.6

■MV20

More hb than MV19 (15%) and has 5–10% q as 3mm phenos and interstitial matrix.

■MV19

quartz–poor adamellite

zoned plag phenos pale greenish cream

chloritised 10% hb–biot

pink matrix of kspar >> quartz

## KEY

5 cm

Murchison Granite

Quartz + feldspar phyric rhyolite

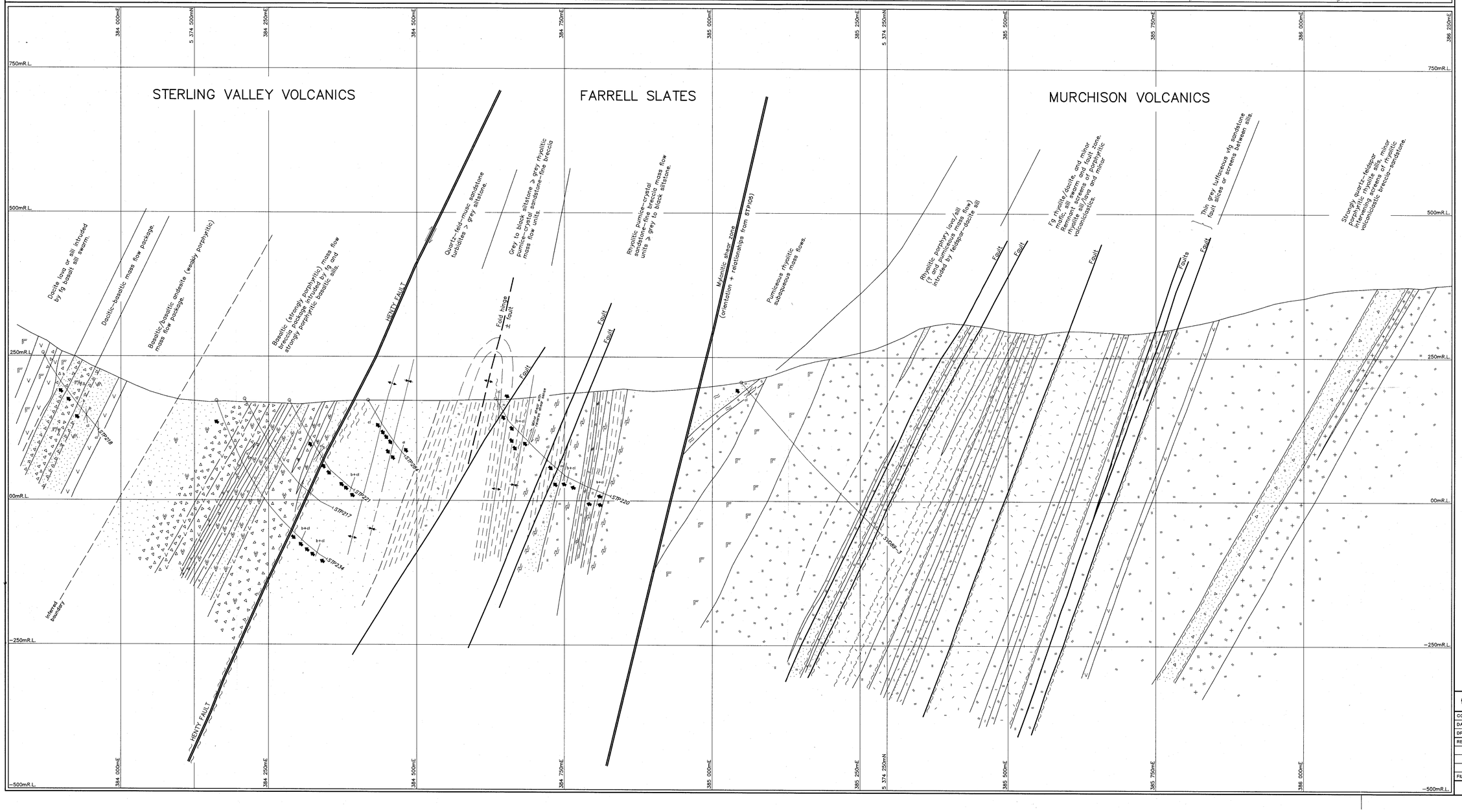
Traverse observation point

■MV19 Rock Sample

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| | |
|---|---|
| COMPILED : R. Allen | E.L. 22/90 – TULLAH |
| DATE : Dec., 1994 | MURCHISON VALLEY |
| DRAWN : G.M.B. | GEOLOGY ALONG THE MURCHISON DAM ROAD |
| REVISIONS : | |
| FILE : MV_GAMDR | |
| DRAWING No. | SCALE 1:5000 (0 100 m) FIG. No. 5 |




## LEGEND

- Pumice rich
- Fine grained basaltic
- Strongly porphyritic basaltic
- Fine grained andesitic
- Strongly porphyritic andesitic
- Thin volcanic units (dykes and sills)
- Very crystal rich quartz + feldspar phyric rhyolite intrusive
- Quartz + feldspar phyric rhyolite
- Strongly porphyritic dacite
- Weakly porphyritic dacite/rhyolite
- Breccia
- Sandstone to fine breccia texture
- Grey to black siltstone
- Fault
- Geological boundary
- Geological boundary position approximate
- Bed boundary and bedding trends
- Bedding orientation
- Cleavage orientation
- Flamme orientation
- Stratigraphic younging direction
- Strongly sheared and/or tectonic brecciated rocks
- Anticline
- Syncline

# 95-3783

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PASMINCO - TULLAH EL 22/90 & STERLING RIVER EL 24/91 ANNUAL REPORT 1994-95 - FURVIS J G

754359

5 cm

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| | |
|---|---|
| COMPILED : R. Allen | E.L. 22/90 – TULLAH<br>E.L. 24/91 – STERLING RIVER |
| DATE : Nov., 1994 | **GEOLOGICAL CROSS SECTION OF STERLING VALLEY** |
| DRAWN : G.M.B. | MT. READ VOLCANICS – TASMANIA |
| REVISIONS : | |
| FILE :SV_GXSRA | |
| DRAWING No. | SCALE 1:2500 0 50 100 m |
| | FIG. No. 2 |

Lake
Rosebery

MR2
MR1

MURCHISON HIGHWAY

5 375 000mN

5 374 500mN

5 374 000mN

385 500mE

386 000mE

386 500mE

387 000mE

754300

FARRELL SLATES

FARRELL FAULT (Approximate position)

MURCHISON VOLCANICS

ANTHONY ROAD

MV1
Pseudoclastic intense perlitic 2–3% 1mm qtz–phyric rhyolite, with ser–qtz±chl alteration along perlite fractures resulting in granular pseudoclastic texture.

4cm

In–situ bx of perlitic 2–3% 1mm qtz–phyric rhyolite.

70

qtz–sp>py veins hosted in small fault

Massive, moderately–strongly lineated 15% 1.5mm feld > qtz phyric strongly perlitic rhyolite. Weak–moderate qtz–ser altn. Qtz xtals 2–5% 0.5–3mm mainly euhedral, some broken

Pseudoflamme common

Possible unit boundary

White angular rhyolite ?autoclasts or lithics with 3% 1–2mm qtz±f phenos

Granular, finely spotty perlitic matrix

Pseudoflamme with euhedral porphyritic texture and more and larger phenos than can be detected even in unaltered parts of matrix

Local insitu brecciated white matrix areas with internal granular ? perlitic texture.

Texturally variable with perlitic matrix, dark sericitic pseudo flamme, rhyolite lithic ? autoclasts of white perlitic/spherulitic 3% 1–2mm qtz–f rhyolite, fg sandy ? granulated perlitic pseudomatrix domains.

NOTE: This unit and it's textural variation v. similar to rhyolite in SVD89–3

MV2
Thin intervals fg granular rhyolitic sandst with dark ser–flamme or rhyolite clasts. These are true fg clastic intervals with sericitic pumice clasts or with peperitic rhyolite clasts.

5cm

MV4
Pseudoflamme rock with continuous, even, 20% 1–2mm f > qtz porphyritic texture in flamme and matrix. More xtal–rich than MV1 rock.

10cm

MV5
15% 1–1.5mm feld >> ? pyrox–phyric dark green andesite or basalt silt/dyke.

MV3
Pile of white rhyolite blocks on roadside.

357°

Marked increase in sheeting intensity in section to strongly sheeted pink & grey ser–chl–mag altered post ?mag with abundant post ?mag dark–felsic qtz vein/dyke

White patches with diffuse gradational margins into rest of rock and internal faint but definite perlitic texture.

q phenos

1cm

S2 (cleavage)

MV6
Same unit from MV4 to here. More qtz xtal–rich than MV1 unit. (here 7% 0.5–3mm qtz) Massive, no lithics, pervasive v. fine granular foliated matrix texture like MV2, MV4. Locally (esp. block in gutter 6–10m N from end of road cut on W side of road) good relict perlitic texture. Indicates is pseudoclastic perlitic qtz–f porphyry. Great range in size of qtz xtals gives clastic appearance and at MV6 seem to be common broken xtals. Qtz xtals have thin white milky rims = spherulitic rims or silicification rinds. Diffuse pseudoflamme. Weak ser–co3 alteration.

Grey green fg? tuffaceous siltst within green & pink altered strongly tectonic + hydrothermal brecciated fg? dacite with 5–15% 1–2mm feld phenos. Similar to brecciated green pink interval near base of SVD89–3. Shears & faults mineralized py–gn–sp±cpy.

SVD89–3

Rapid change back to relatively unaltered white weathering weak q–ser altered 20% 1.5–2mm f > qtz phyric coherent rhyolite with fine granular spherulitic groundmass. Probably same unit as MV4–6 and here am reasonably certain groundmass texture is spherulitic texture.

Massive to tectonic brecciated dark brown, 5% 2mm feld–phyric dacite/rhyolite same as in base of SVD89–3. Strongly spherulitic granular groundmass.

Strong tectonic brecciation shearing & pink & green chl–feld alteration. qtz–feld–fluorite–sulph veining overprints all rock types.

Green chl–minor py altered fg spherulite groundmass qtz–phyric & qtz absent felsic dykes?

10–15% 0.5mm qtz±f broken xtal matrix–supported sandstone. Possible fg ignimbrite or resedimented pyroclastic.

Yellow green where ser–chl–py altered.

Fault contact 008° mag

MV10–12
White weathered surfaces have superb ? pseudo welded shard–rich, pumice–poor ?pseudoignimbrite texture. 15–25% f > qtz > hb/biot (2%)

1cm

Abundant distinctly broken xtals not noticed in MV1–6. qtz 7% up to 10%, total qtz+f xtals 15–25% 1–2mm

Ultrafine spotty to streaky ? welded shard texture. (NB: is similar to matrix textures of MV1–8!!)

Local good perlite especially in MV11a Lithics rare.

? MV11a
Has good intensely finely perlitic groundmass but doesn't have distinct clastic texture. This sample appears to be intense perlitic coherent rhyolite which in turn suggests MV10, 11b & 12 have pseudo shard matrix resulting from fine flow texture & alteration of perlite.

MV13
Fault ± intrusive contacts either side of 5m wide interval of laminated to thin bedded green grey ash–siltst, suggests subaqueous depositional environment.

15% 2mm f >> qtz finely spherulitic coherent rhyolite and 2nd thin green–grey silt or fg dyke

65

Pink/green feld–chl–mag altn in brown 5% 2mm feld–rhyolite

MV14
Strongly foliated pink & green feld–chl–mag altered massive 20–25% 2–3mm f > qtz > biot–hb porphyry. Rounded & strongly embayed large q phenocrysts, spherulitic groundmass, coherent. Very chloritic in places. Minor sulphide? py±cpy. Some broken qtz xtal shapes occur, but this is clearly coherent non clastic rock. Qtz phenos commonly have thin milky rims = spherulite rims. Biot/hb phenos 2% 1–3mm. Qtz xtals 5–10%

Strong foliated mafic dyke

MV14b

5cm

MV15
Massive matrix–supported sandy volc bx and vcg gravelly sanst of up to 20cm angular 5% 1– 4mm qtz–phyric cream rhyolite clasts in moderately sorted vcg feld–qtz xtal sandst matrix comprising intense lineated, tectonically dismembered 15% (up to 20%) 2–3m qtz xtals and uknown % feld xtals. Total xtals in matrix ⩾ 30% Thin similar textured unit at MV9 is Reworked Volc Sandst.

Outcrop in drain at roadside

Qtz xtals euhedral to broken 7% 1–5mm.

MV16
Uncleaved, white weathering 30–35% 2–3mm f=q phyric rhyolite
Has strong foliated, lineated margins.
Either Devonian dykes with sheared margins or are undeformed cores of Cambrian dykes.

MV17
Intensed lineated 25% f=q 2mm f–qtz±hb/biot porphyry with spherulite groundmass. qtz 7–10%.

lin 61° – 235

MV18
Less strong lineated, but same rock type as MV17.

Alternating pink and green chl–feld alteration ± mag–py and pale grey q–ser±py alteration

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## LEGEND

- Strongly porphyritic andesitic
- Very crystal rich quartz + feldspar phyric rhyolite intrusive
- Quartz + feldspar phyric rhyolite
- Fine grained to weakly porphyritic dacite/rhyolite
- Weakly porphyritic dacite/rhyolite
- Breccia
- Sandstone to fine breccia texture
- Fault
- Geological boundary
- Geological boundary position approximate

■ MV16 Rock sample

5 cm

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| | |
|---|---|
| COMPILED : R. Allen | E.L. 22/90 – TULLAH |
| DATE : Dec., 1994 | E.L. 24/91 – STERLING RIVER |
| DRAWN : G.M.B. | GEOLOGY ALONG THE ANTHONY ROAD |
| REVISIONS : | |
| FILE : SV_GATAR | |
| DRAWING No. | SCALE 1:2500 (0, 50, 100 m) FIG. No. 4 |

# 95-3783

754361

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EL 24/91 ANNUAL REPORT 1994-95 - PURVIS J G

MICROFILMED
FICHE No. 013742-50

**PASMINCO EXPLORATION**

# TULLAH EL 22/90
# &
# STERLING RIVER EL 24/91

## ANNUAL REPORT
## SEPTEMBER 1994 - SEPTEMBER 1995

**Volume 2 of 2**

OPEN FILE

FILE NO.
15 OCT 1995
DOC. REF.

AUTHOR: JG Purvis

DATE: September 1995

REPORT No.: T95-13

SUBMITTED TO: Regional Exploration Manager - Tasmania

DISTRIBUTION: Tasmania Development & Resources Industry Safety & Mines Division - Hobart

Pasminco Exploration - Burnie
- Melbourne
- Rosebery

SUBMITTED BY: J. G. Purvis

ACCEPTED BY:

BURNIE
September
1995

754362

# FIGURES

WEST

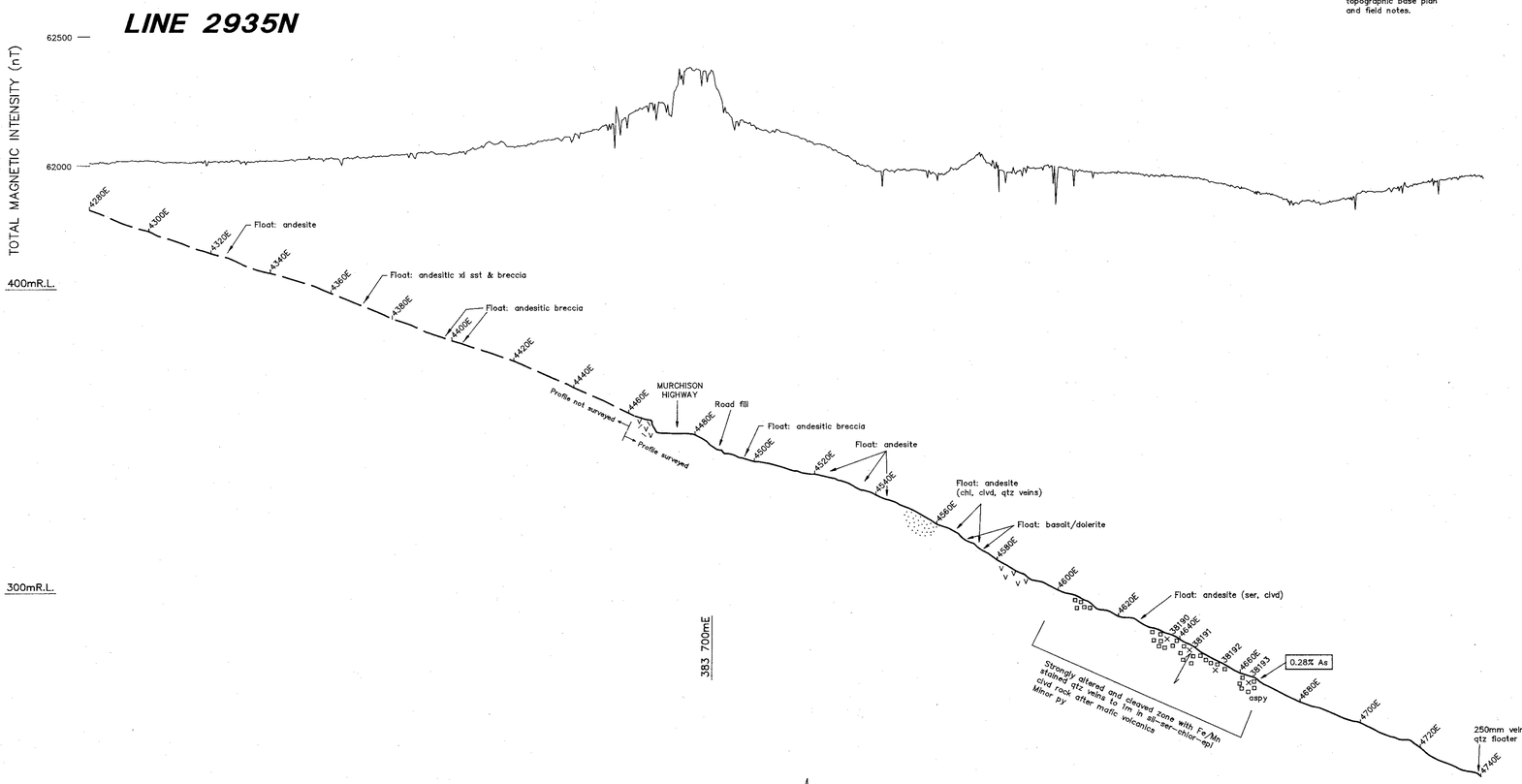
EAST

## LINE 2985N

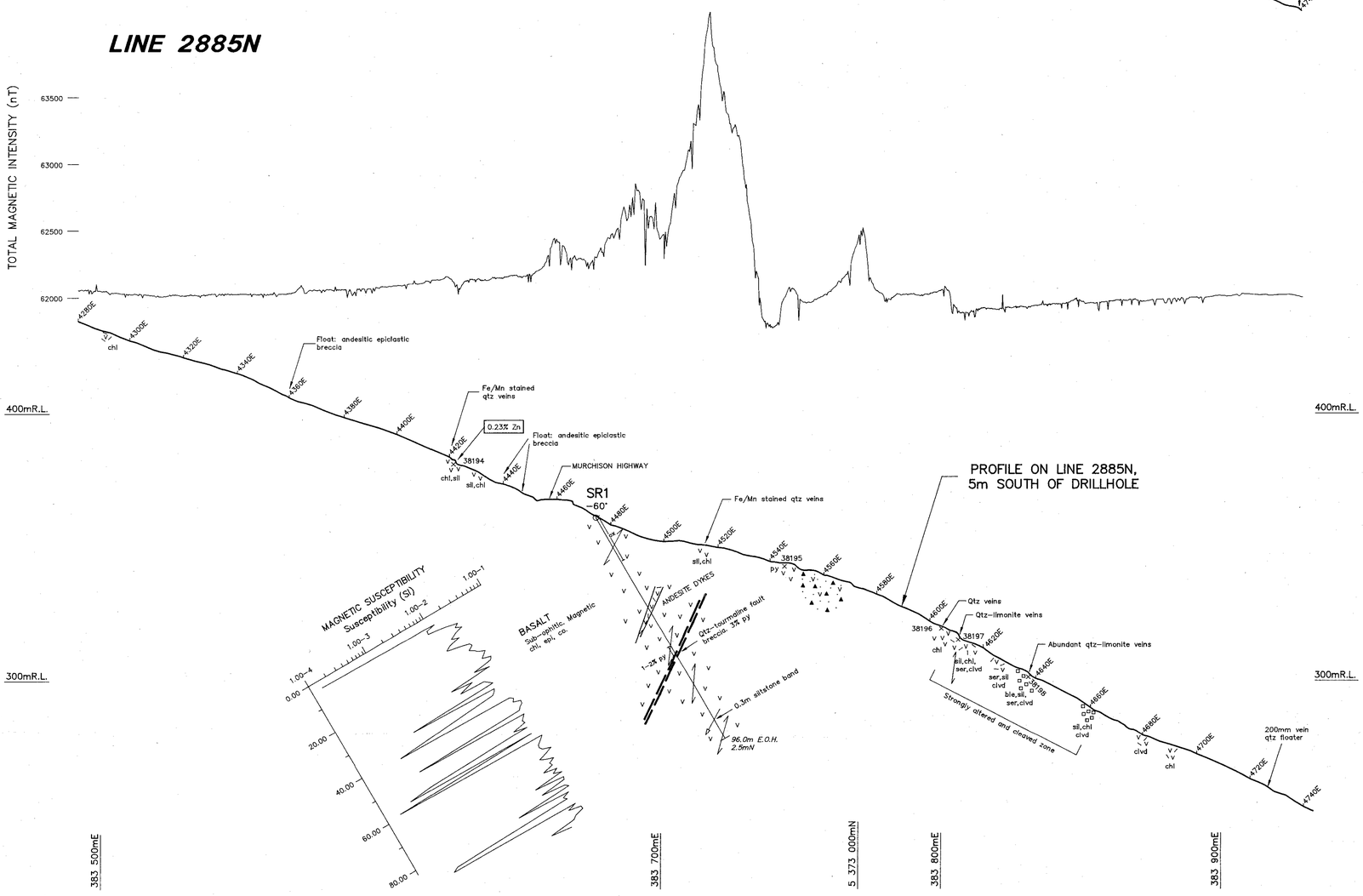



NOTE
Line not surveyed.
Profile from Pasminco topographic base plan and field notes.

## LINE 2935N




## LINE 2885N




### LEGEND

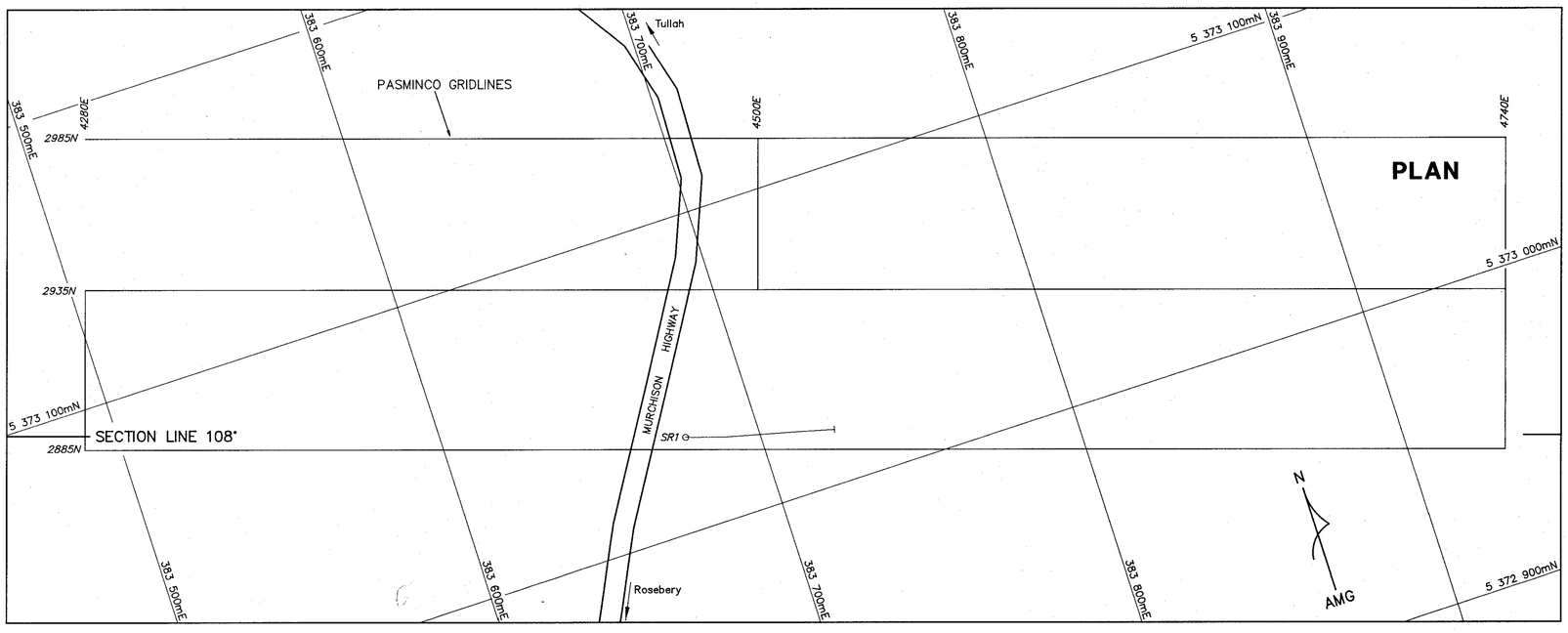
MT READ VOLCANICS (Cambrian)

- Basalt/Dolerite
- Andesite
- Andesitic siltstone/sandstone
- Andesitic epiclastic breccia
- Hornfels: silica–sericite–chlorite (thermally metamorphosed mafic volcanics)

- Brittle Fault
- Geological contact – inferred
- Geological contact – measured
- Cleavage
- Bedding
- Zones of disseminated sulphides
- Significant assay intervals

Abbreviations

| | |
|---|---|
| ca | carbonatised |
| chl | chloritised |
| ser | sericitised |
| epl | epidotised |
| sil | silicified |
| ble | bleached |
| clvd | cleaved |




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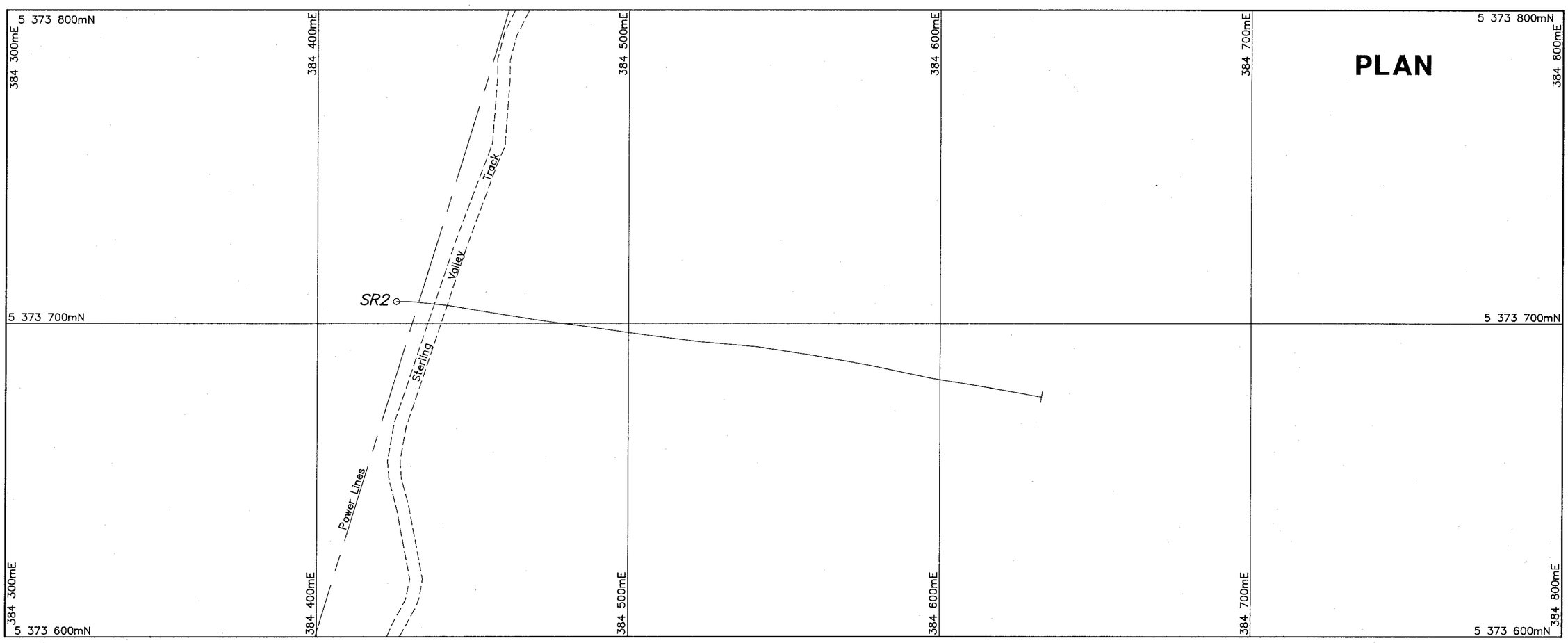
754363

5 cm

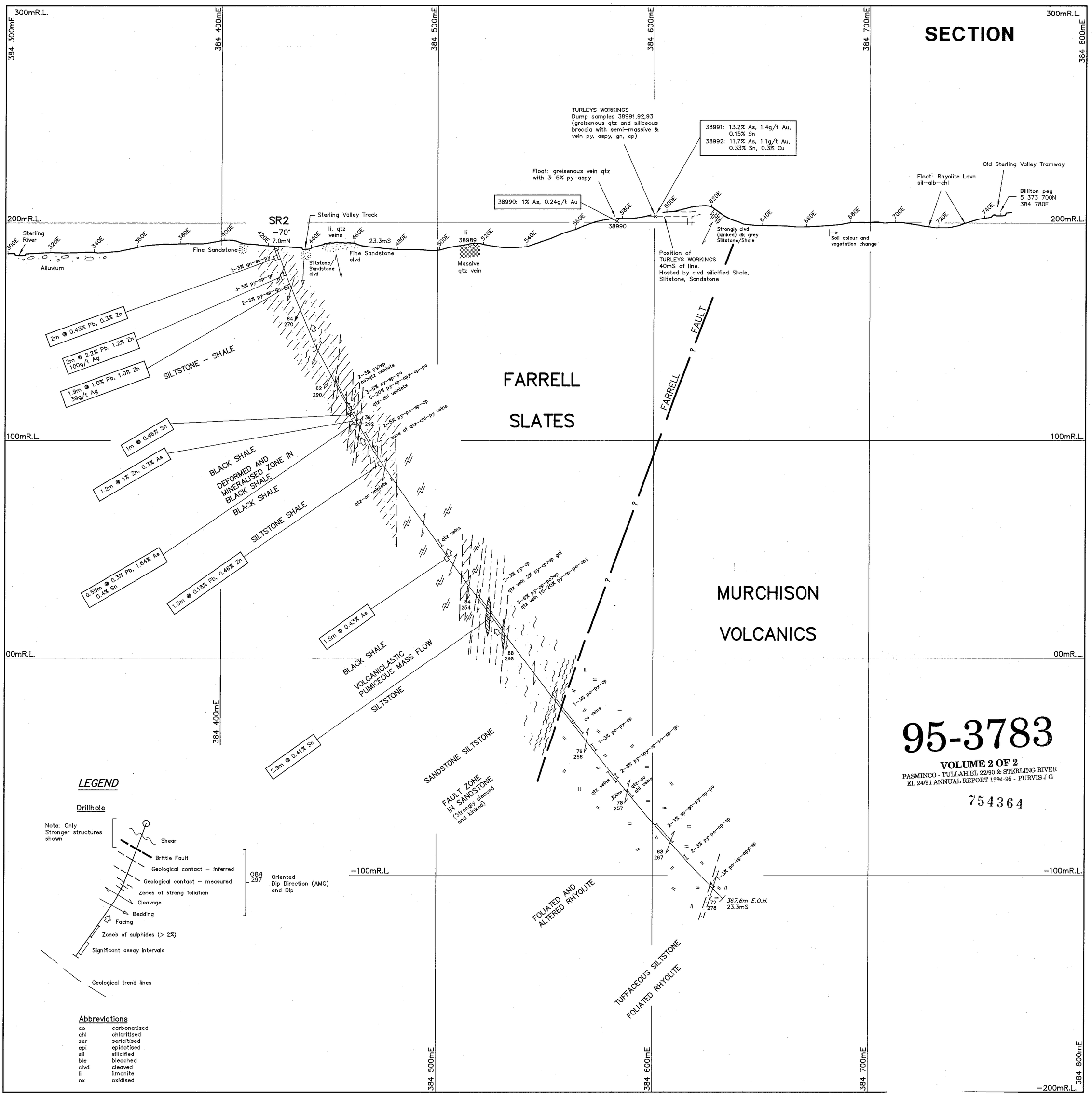
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| | |
|---|---|
| COMPILED : J.G.P. | E.L. 24/91 – STERLING RIVER |
| DATE : March 1995 | MAGNETIC ANOMALY 'C' |
| DRAWN : G.M.B. | **MAGNETIC PROFILES AND SECTION THROUGH HOLE SR1** |
| REVISIONS : J.G.P. | BEARING 108° AMG |
| DATE : Sept., 1995 | |
| FILE : SR1_A1 | |
| DRAWING No. | SCALE 1:1000 0 20 40 m |
| | FIG. No. 13 |

# PLAN




# SECTION




## LEGEND

**Drillhole**

Note: Only Stronger structures shown

- Shear
- Brittle Fault
- Geological contact − inferred
- Geological contact − measured
- Zones of strong foliation
- Cleavage
- Bedding
- Facing
- Zones of sulphides (> 2%)
- Significant assay intervals
- Geological trend lines

084 297 Oriented Dip Direction (AMG) and Dip

**Abbreviations**

| | |
|---|---|
| co | carbonatised |
| chl | chloritised |
| ser | sericitised |
| epi | epidotised |
| sil | silicified |
| ble | bleached |
| clvd | cleaved |
| li | limonite |
| ox | oxidised |

5 cm

**95-3783**

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754364

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| | |
|---|---|
| COMPILED : NKM | E.L. 24/91 − STERLING RIVER |
| DATE : Sept., 1995 | STERLING VALLEY |
| DRAWN : G.M.B. | **SECTION 5 373 700mN SHOWING DRILLHOLE SR2** |
| REVISIONS : | |
| FILE : SR2_A1 | |
| DRAWING No. | SCALE 1:1000 0 20 40 m |
| | FIG. No. 14 |

# PLAN

5 372 000mN

5 371 900mN

383 700mE

383 800mE

383 900mE

384 000mE

384 100mE

Railway

Abandoned

SR3

STP98

Creek

STP300

STP301

STP96

STP299

SECTION LINE 5 371 940mN

# SECTION

300mR.L.

200mR.L.

100mR.L.

00mR.L.

−100mR.L.

−200mR.L.

640E 660E 680E 700E 720E 740E 760E 780E 800E 820E 840E 860E 880E 900E 920E 940E 960E 980E 1000E 1020E 1040E 1060E 1080E 1100E 1120E 1140E 1160E 1180E

SR3 −70.25

STP98 0.6mN

STP299 36.3mS

STP300 8.3mN

STP301 22.0mS

STP96 26.5mS

39947

Sterling Valley Track

Billiton gridline 1880N/4875E

Creek

Drill track

Entrance adit to Sterling Valley Mine (Pb−Zn−Ag−Au)

Black Shale

Old trench

Owen Conglomerate boulders to 3m

5m x 3m Owen Conglomerate boulder

Large creek

Owen Conglomerate Scree

Fluvioglacials

Black Shale kinked, brecciated highly pyritic

qtz−py veins

Siltstone/ Shale ser

3−5% py

Owen Conglomerate Scree

Tuffaceous rhyodacitic Volcanic ble,sil,ser,py

ALTERED RHYODACITIC VOLCANIC
Unidentified, possibly tuffaceous
ser, ble, sil, py

qtz veins

3−4% py

2−3% py

GLASSY DACITE
Foliated
ser, chi, sil

oxt

2m @ 3% Pb, 2.3% Zn
99g/t Ag, 0.36g/t Au
0.8% As

Qtz−py−gn−aspy Lode Zone

1m @ 2.4% Pb, 2.4% Zn
74g/t Ag, 0.4g/t Au
0.8% As

70.1m E.O.H.
16.6mS

79.5m E.O.H.
28.9mN

2.7m @ 0.6% Pb, 0.5% Zn
38g/t Ag, 0.95g/t Au
3.1% As

142.7m E.O.H.
22.0mS

ANDESITIC VOLCANICS
Clastics and dykes/flows.
Faulted & broken.
chl, co

STERLING VALLEY VOLCANICS

MIXED FAULTED ZONE
Deformed andesite.
Minor qtz sst & black shale.
ser, ble
qtz veins

0.4m qtz−tourm vein

HENTY FAULT
Sheared & bx black shale & qtz sst

200'

400'

50mS

240
89

100m

DEFORMED QUARTZOSE SANDSTONE
Strongly foliated, boudinaged, brecciated

5−10% py>aspy>sp

STRONG FAULT

3−5% py>sp

2−3% py>sp

FARRELL SLATES

FARRELL SLATES
Sandstone, siltstone and black shale.
co

INTERSECTION IN STP98
80m SOUTH OF SECTION
0.9m @ 3% Pb, 9.4% Zn,
1% Cu, 653 g/t Ag, 3g/t Au

MURCHISON VOLCANICS

FOLIATED DACITE
chl, ser

FOLIATED ALTERED RHYOLITE
ble, sil,ser, py

strongly cleaved and kinked
limit of relogging

600'

700'

2.75m @ 12.9% Pb, 8.1% Zn
218g/t Ag, 1.1g/t Au

Qtz−gn−sp−py Lode Zone

785' E.O.H.
28.7mN

FOLIATED BLACK SHALE

co−tourm veinlets

10−15% py>aspy−sp

3% py>aspy−sp

FINE SANDSTONE

200m

2.1m @ 2.65% Pb, 2.9% Zn
1.1% As, 41g/t Ag, 0.23g/t Au

MAJOR MINERALIZED FAULT
Black shale bx with qtz−sulph−co−tourm−chl veins

qtz−co−chl tourm veinlets

1.5m @ 0.7% Pb, 0.4% Zn

3% sp−py−gn>aspy

BLACK SHALE

MAJOR STRUCTURAL DISLOCATION

FARRELL SLATES

QUARTZOSE & VITRIC SANDSTONE/SILTSTONE MASS FLOWS
Pumiceous?

7−10% py−aspy>sp

1m @ 5% As, 0.63g/t Au, 0.07% Sn

MINERALIZED FAULT
Black shale bx cemented by qtz−sulph

tourm

1m @ 0.9% Pb, 0.4% Zn

300m

3−5% py>sp>gn−aspy

DEFORMED CARBONACEOUS SANDSTONE
qtz−sericite(muscovite) − graphite schist

135
80

0.75m @ 0.3% Sn

TECTONICALLY DISTURBED GRAPHITIC SHALE
Veins & bx−fill of chl−qtz−co−tourm

boudinaged

093
82

Dacite

Mafic Dyke

5.5m @ 0.2% Pb, 0.4% Zn

SANDSTONE, SILTSTONE, SHALE

FOLIATED BASALT
chl, co

2−3% po−py

3−5%py

3% py

84
297

400m

5% py

MURCHISON VOLCANICS

INTENSELY ALTERED RHYOLITIC VOLCANICS
(Mainly fine epiclastics?)
CUT BY DACITIC & MAFIC INTRUSIVES
sil, ser, ble, py

Rhyolitic Tuffaceous Siltstone/Sandstone

5−7% py

10% py

zone of qtz−chl−py veins

aspy veinlets

sp−gn−py veinlets

Mafic dyke

2% sp>gn veinlets

GLASSY DACITE INTRUSIVES
ser, ble

FOLIATED RHYOLITE
ser, sil

1m @ 1% Zn

GLASSY RHYOLITIC VOLCANICLASTIC
Wispy−textured, foliated
ser, chi, sil

512.0m E.O.H.
10.2mS

RHYOLITE
sil, ser

## LEGEND

### Drillhole

Note: Only Stronger structures shown

- Shear
- Brittle Fault
- Geological contact − inferred
- Geological contact − measured
- Zones of strong foliation
- Cleavage
- Bedding
- Facing
- Zones of sulphides (> 2%)
- Significant assay intervals

297 / 084 — Oriented Dip Direction (AMG) and Dip

Geological trend lines

### Abbreviations

| | |
|---|---|
| co | carbonatised |
| chl | chloritised |
| ser | sericitised |
| epi | epidotised |
| sil | silicified |
| ble | bleached |
| clvd | cleaved |
| li | limonite |
| ox | oxidised |

383 700mE

383 800mE

383 900mE

384 000mE

95-3783

**VOLUME 2 OF 2**

PASMINCO - TULLAH EL 22/90 & STERLING RIVER
EL 24/91 ANNUAL REPORT 1994-95 - PURVIS J G

754365

5 cm

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| | |
|---|---|
| COMPILED : J.G.P. | E.L. 24/91 − STERLING RIVER |
| DATE : Sept., 1995 | STERLING VALLEY MINE |
| DRAWN : G.M.B. | SECTION 5 371 940mN SHOWING |
| REVISIONS : J.G.P. | DRILLHOLE SR3 |
| DATE : Sept., 1995 | |
| FILE : SR3_A1 | |
| DRAWING No. | SCALE 1:1000 (0 20 40 m) — FIG. No. 15 |

385 400mE
385 500mE
385 600mE
385 700mE
385 800mE
385 900mE
386 000mE
386 100mE
386 200mE
386 300mE

400mR.L.
300mR.L.
200mR.L.
100mR.L.
00mR.L.
-100mR.L.
-200mR.L.
-300mR.L.

Gravity station 6529
5m north of line
Dacite qtz-chl veins
Float: Weekly magnetic andesite (strongly chl)
Dacite ail, alb, chl
qtz veins
old track
sparse float: cleaved felsic volcanics
TF1
-62.5
7.2mN, 0°
felsic volcanic (tuffaceous?) ser, clvd
Mafic Dykes
vein qtz float
4WD bike track
vein qtz float
Dacite ail-alb-chl ser, clvd
Tuffaceous shale ser, bio, clvd
Float: Qtz-ser schist after vitric felsic ast/siltst
Prospecting trench with vein qtz frags to 300mm
Old track
Kinked & deformed Black Shale
Float: Tuffaceous Shale
Old track
Float: Micaceous sandstone
Black Shale
Walking track
Float: Black Shale
Float: Black Shale
Prospecting trench
Float: Vein Quartz to 0.4m
Quartz vein (+ 0.3m) in Black Shale 1m
Small Creek
Water Race?
Tuffaceous siltstone and crystal sandstone ail, ser, clvd
Pumiceous-lithic fine breccia Bie volc frags av <40mm ail, ser, bie, clvd
Qtz veins
Crystal sandstone and vitric siltstone
Fine breccia Epiclastic: Qtz xl rich
Shale rip-ups in bx to 1m long (plunge 42° to south)
Creek
Float: Vein Quartz and Black Shale
Grey shale and sandstone, Micaceous

FARRELL SLATES
MURCHISON VOLCANICS
MT. BLACK VOLCANICS
FARRELL SLATES
FARRELL SLATES
MURCHISON VOLCANICS

DACITE AND MINOR MAFIC DYKES
ail, alb, ser
Mafic Dike
Basalt Dykes
Mafic Dykes
HENRY FAULT
FARRELL FAULT
SANDSTONE/ SILTSTONE calcareous
BLACK SHALE Strongly foliated
CRYSTAL-LITHIC SANDSTONE Upper fining fluvial/ turbidite mass flow
FARRELL LODE POSITION Strongly foliated BLACK SHALE with siliceous veins
BLACK SHALE
SANDSTONE/ SILTSTONE AND SHALE
PUMICEOUS CRYSTAL-QUARTZ SANDSTONE
CALCAREOUS SANDSTONE SILTSTONE AND SHALE Minor immature limestone. Sst: 50-300mm thick turbidites
QUARTZ LODE ZONE qtz with lenses and bands of bx-comp
SANDSTONE AND SILTSTONE Lithic micaceous Sst turbidites av 0.5 - 1m
GREY-BLACK SHALE
SANDSTONE SILTSTONE AND SHALE Mod-moderately calcareous Lithic micaceous Sst: 50-300mm thick turbidites
VITRIC QUARTZ-CRYSTAL SANDSTONE Partly pumiceous. wr
CALCAREOUS SANDSTONE SILTSTONE AND SHALE Minor immature limestone. Rhythmic turbidites: sst/slst (av 100-300mm)
PUMICEOUS QUARTZ CRYSTAL-LITHIC SANDSTONE Epiclastic mass flow wr, ss, sc, cong
VITRIC SILTSTONE/SHALE Siltstones
QUARTZ-FELDSPR CRYSTAL SANDSTONE Epiclastic mass flow ss, wr
1.00m @ 2.24 Pb, 50g/t Ag
LODE ZONE: SS, SCC-wr, gr ss, minor v grn-dk siltst-mdst/sh
1m @ 0.31% Zn
LODE ZONE: SS, SCC-wr, gr ss, minor v grn-dk siltst-mdst/sh
Sandstone beds
Siltstone beds
Sandstone beds
Siltstone beds
Sandstone beds
Siltstone beds
Sandstone beds
Siltstone beds
STRONG SHEAR ZONE
Sandstone beds
Siltstone beds
Sandstone beds
Siltstone beds
Sandstone beds
Siltstone beds
Sandstone beds
Siltstone beds

380 000mE
382 000mE
384 000mE
386 000mE
388 000mE
5 380 000mN
5 378 000mN
5 376 000mN
5 374 000mN
5 372 000mN
5 370 000mN

HEC TRANSMISSION LINES
Road
Creek
Farm
Mackintosh
Mackintosh Bridge
BUTTRESS HILL
MURCHISON HWAY
End
North
NEW NORTH MT. FARRELL (Pb–Zn–Ag)
NORTH MT. FARRELL (Pb–Zn–Ag)
FARRELL SLATES
FARM INLET
LAKE ROSEBERY
TULLAH
TULLAH VILLAGE
FAULT
MURCHISON VOLCANICS
FARRELL
Lake Mackintosh
MOUNT FARRELL
Lake Herbert
Murchison Mine (Pb–Zn–Ag–Au)
QUARRY BAY
E.L. 22/90 BOUNDARY
Murchison Dam
Murchison Bridge
STERLNG INLET
MOUNT BLACK
Sterling
Sterling Valley Mine (Pb–Zn–Ag–Au)
AREA OF INTENSE POTASSIC ALTERATION IN CLIFF RHYOLITES
Mountain Creek
Dalmeny Creek
Saddle Creek
Anthony
HEC TRANSMISSION (Under construction) LINE
E.L. 24/91 BOUNDARY

TF1 RL: −265m 53m
STP100 RL: 125m 40m
STP96 RL: 150m 34m
STP98 RL: 80m 8m
SR3 RL: −50m 90m
SR2 RL: −25m 75m
STP105 RL: 115m 88m
STP101 RL: 155m 77m
MM1a RL: −55m 64m

## LEGEND

Horizontal width of total sampled section at 1:1000 scale showing individual sample intervals.

$Na_2O$ value (%)

RL of drillhole intersection on Farrell Fault

Horizontal distance from Farrell Fault to eastern end of sampling in Murchison Volcanics

Farrell Slates | Murchison Volcanics | Farrell Fault

1.14 Rock Sample with $Na_2O$ value (%)

<0.25%
0.25 – 0.5%
0.5 – 1%
+1%
$Na_2O$ Sample Values

FARRELL FAULT and CROSS FAULTS (Pasminco Mapping):

85° Position known, with dip

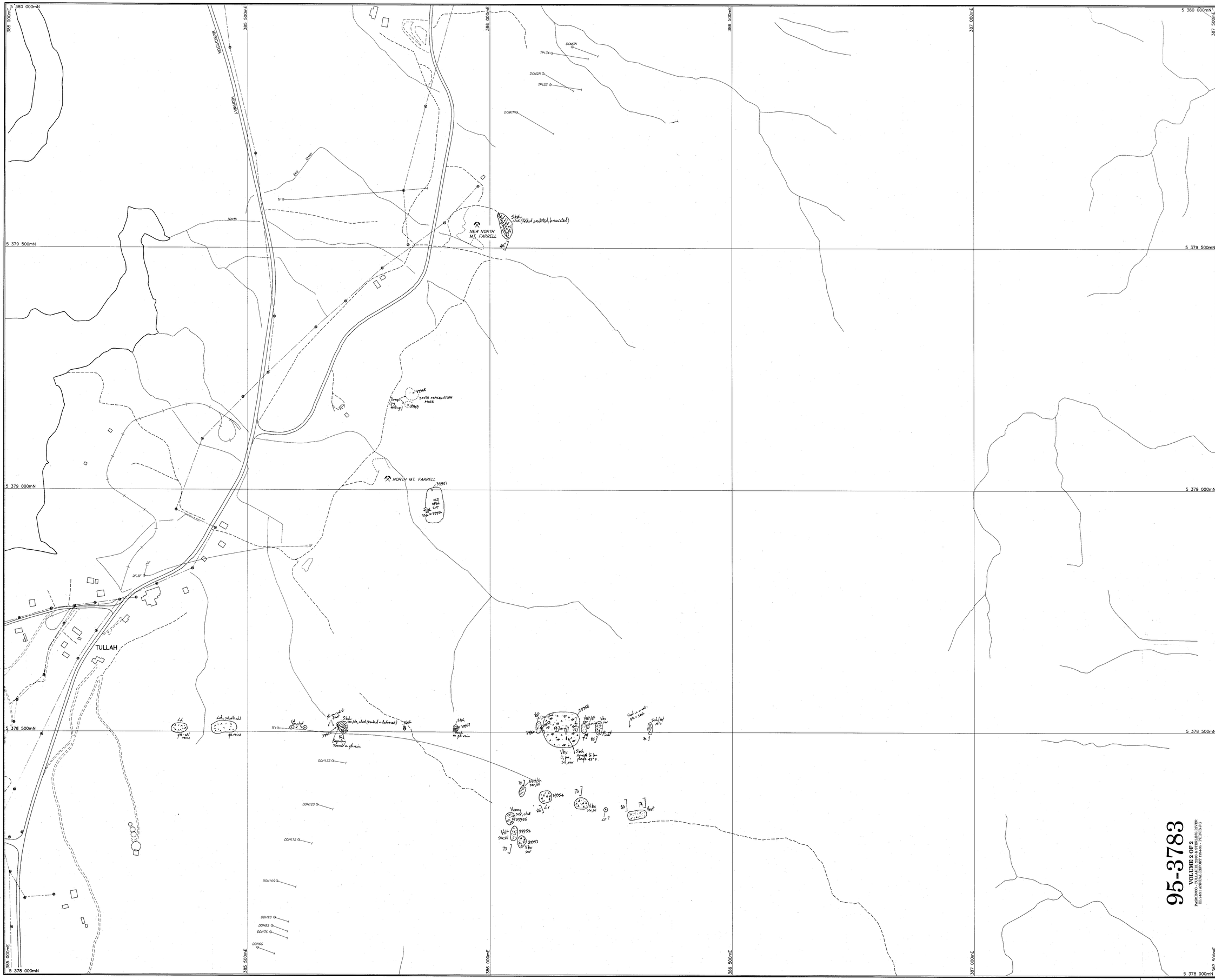
754367 Position inferred

5 cm

95-3783
VOLUME 2 OF 2
VOLUME III: 22/90 & STERLING RIVER
EL 22/90 ANNUAL REPORT 1994-95 - PURVIS J G

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

| | |
|---|---|
| COMPILED : J.G.P. | E.L. 22/90 – TULLAH |
| DATE : Sept., 1995 | E.L. 24/91 – STERLING RIVER |
| DRAWN : G.M.B. | **MAP OF ALTERATION ALONG FARRELL FAULT ($Na_2O$ VALUES)** |
| REVISIONS : | |
| FILE : 10_ALTFF | |
| DRAWING No. | SCALE 1:10,000 0 200 400 m. FIG. No. 17 |


5 380 000mN
385 000mE
385 500mE
386 000mE
386 500mE
387 000mE
387 500mE
5 379 500mN
5 379 000mN
5 378 500mN
5 378 000mN
MURCHISON HIGHWAY
TULLAH
NEW NORTH MT. FARRELL
NORTH MT. FARRELL
SOUTH MACKINTOSH MINE
DOM3N
DOM2N
DOM1N
TP134
TP133
DDH13S
DDH12S
DDH11S
DDH10S
DDH9S
DDH8S
DDH7S
DDH6S
End Dam
North
1F
2F
3F
4F
5F
TF1
Sbrk
Sbrk, bx, chrd (faulted + deformed)
Sbrk, chrd (faulted, cavitated, brecciated)
Vbx
Vbx, sil, py
Vbx, py, sil, sev
Vbx, py, sil, sev
Vbx, py, sil, sev

5 376 000mN
5 375 500mN
5 375 000mN
5 374 500mN
5 374 000mN
382 500mE
383 000mE
383 500mE
384 000mE
384 500mE
385 000mE

STERLING INLET

LAKE ROSEBERY

RED87-10
RED86-1
RED87-8
RED88-1
RED87-7
MRP233
RED87-2
RED87-3
RED88-4
RED87-5
MRP212
RED87-6
RED88-2
MRP2
MRP1
MRP219
STP218
STP232, STP232A
STP332
STP234
STP221
STP217
STP284
STP231
SVD87-2
STP220
SVD87
River
MURCHISON
HIGHWAY

# LEGEND

## 1. GENERAL FORM

Rock type, colour, grain size, overall texture, constituents and textures, alteration, mineralisation.
Rock Types can be combined using & :
Subordinate Rock Types are separated by /
Each Descriptor Group is separated by ,
Descriptors within a group are separated by -

Derwent series 19 colours (in brackets) are intended for the Cambrian sequences.

## 2. ROCK TYPES

| | | | | |
|---|---|---|---|---|
| **Lavas or Intrusives or Volcaniclastics** | L I V | a | (-) | acid |
| | | an | (-) | intermediate |
| | | b | (49) | basic |
| | | u | (23) | ultrabasic |
| | | r | (-) | rhyolite |
| | | d | (11) | dacite |
| | | n | (46) | andesite |
| | | ba | (49) | basalt |
| | | g | (50) | granite |
| | | di | (22) | diorite |
| | | do | (45) | dolerite |
| | | gb | (21) | gabbro |
| | | s | (23) | serpentinite |
| **Sediments or Volcaniclastics** | S V | bsh | (35) | black shale |
| | | sh | (36) | shale |
| | | slt | (31) | siltstone |
| | | sst | (39) | sandstone |
| | | w | (37) | greywacke |
| | | cong | (38) | conglomerate |
| | | bx | | breccia |
| | | tbd | | turbidite |
| | | msf | | mass flow |
| | | cht | (34) | chert |
| | | ls | (45) | limestone |
| | | dol | (45) | dolomite |
| | | Fe | (64) | iron formation |
| | | gl | (4) | glacial deposits |
| | | fg | (4) | fluvioglacial deposits |
| | | alv | (4) | alluvial deposits |
| | | cvl | (4) | colluvial deposits (talus) |
| | | qzt | | quartzite |
| **Metamorphic and Tectonic Rocks** | M | sht | (38) | schist |
| | | qzt | (40) | quartzite |
| | | hf | (58) | hornfels |
| | | sk | (60) | skarn |
| | | mb | (48) | marble |
| | | m | | mylonite |
| | | fz | | fault breccia (pug) |
| Colours should be hatched | | | | Use alone or as a qualifier to other rock types where uncertain |
| **Unassigned** | | ? | | |

## 3. DESCRIPTORS

**Colour :**

| | | | |
|---|---|---|---|
| ple | pale | bl | blue |
| dk | dark | wht | white |
| gy | grey | yel | yellow |
| or | orange | buf | buff |
| blk | black | grn | green |
| pk | pink | ppl | purple |
| rd | red | crm | cream |
| brn | brown | khk | khaki |

**Grainsize :**

| | |
|---|---|
| fg | fine grained |
| mg | medium grained |
| cg | coarse grained |
| vcg | very coarse grained |

## 4. MAPPING SYMBOLS

- Strike and Dip of Strata (25)
- Strike and dip of inverted strata
- Strike and dip of cleavage or foliation (60)
- Plunge of lineation (50)
- Geological boundary position accurate
- Geological boundary position approximate
- Mine
- Abandoned prospect or mine
- Costean or trench
- Diamond drill hole, including projection
- Unconformity
- Fault
- Fault with dip (70)
- Thrust Fault
- Plunging antiform
- Plunging synform
- Shear/strong cleavage
- Vein

## DESCRIPTORS continued

**Overall Texture :**

| | |
|---|---|
| fc | flow banded |
| fbr | flow brecciated |
| hy | hyaloclastic |
| pill | pillowed |
| peo | peroritic |
| mav | massive |
| bio | blocky |
| aph | aphyric |
| por | porphyric |
| per | peroritic |
| bd | bedded |
| xbd | cross bedded |
| ufs | upwards fining sequence |
| ps | poorly sorted |
| cs | clast supported |
| ms | matrix supported |
| fol | foliated |
| clvd | cleaved |
| shd | sheared |
| bx | brecciated |
| aug | augen |
| vnd | veined |

**Constituents & Internal Texture :**

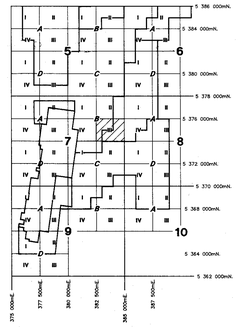
| | |
|---|---|
| ply | polymict |
| li | lithic |
| pm | pumice |
| xl | crystal |
| vit | vitric |
| sph | spherulites |
| ves | vesicles |
| amy | amygdales |
| wtp | wisps |
| sty | stylolites |
| f | feldspar |
| q | quartz |
| calc | calcareous |
| cal | calcareous |
| px | pyroxene |
| hb | hornablende |
| cr | chromite |
| mag | magnetite |

**Alteration :**

| | |
|---|---|
| bch | bleached |
| dx | de-textured |
| ox | oxidised |
| alb | albitised |
| cb | carbonatised |
| chl | chloritised |
| ser | sericitised |
| kao | kaolinitised |
| ep | epidotised |
| sil | silicified |
| f | feldspar |
| fuc | fuchsitic |

**Mineralisation :**

| | |
|---|---|
| dis | disseminated |
| v | vein |
| str | stringer |
| mav | massive |
| bnd | banded |
| cla | clasts |
| gos | gossan |
| ox | oxidised |
| py | pyrite |
| po | pyrrhotite |
| asp | arsenopyrite |
| gn | galena |
| sp | sphalerite |
| cp | chalcopyrite |
| ba | barite |
| mag | magnetite |
| hm | haematite |
| lm | limonite |
| au | gold |
| ag | silver |
| to | tourmaline |
| q | quartz |
| cb | carbonate |
| sd | siderite |
| mn | manganese carbonate |
| fl | fluorite |




GRID CONVERGENCE 1.0
GRID/MAGNETIC 12.0

5 cm

754369

95-3783
VOLUME 2 OF 2
PASMINCO - TULLAH EL 22/90 & STERLING RIVER EL 24/91 ANNUAL REPORT 1994-95 - PLATES 2-0

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

| | |
|---|---|
| COMPILED : | A.M.P. |
| DATE : | Sept. 1995 |
| DRAWN : | |
| REFERENCE : | |
| REVISIONS : | |
| DRAWING No. | |

E.L. 22/90 - TULLAH

**OUTCROP GEOLOGY AND ROCK SAMPLE LOCATIONS**

SHEET 70 - 2

SCALE 1:2500 (0, 50, 100 m)

FIG. No. 70

5 374 000mN

382 500mE

383 000mE

383 500mE

384 000mE

384 500mE

385 000mE

5 373 500mN

5 373 000mN

5 372 500mN

5 372 000mN

HIGHWAY

MURCHISON

Fooks Creek

Bruce Creek

Ellen Stacey

TRANSMISSION LINE

STP283

SVD87–1

SVD87–14

SV1

SV2

STP105

STP101

SVD89–1

STP100

TO STP80

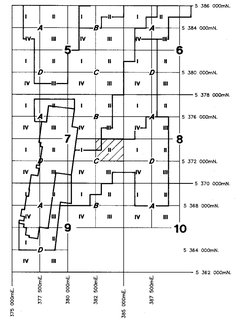
TSV1

SR2

SR1

TOKEAYS LODE (Pb–Sn–Cu–Ag)

(Image concentration)




# LEGEND

## 1. GENERAL FORM

Rock type, colour, grain size, overall texture, constituents and textures, alteration, mineralisation.
Rock Types can be combined using a -
Subordinate Rock Types are separated by /
Each Descriptor Group is separated by ,
Descriptors within a group are separated by .
Derwent series 19 colours (in brackets) are intended for the Cambrian sequences.

## 2. ROCK TYPES

| | | | | |
|---|---|---|---|---|
| **Lavas or Intrusives or Volcaniclastics** | **L I V** | a | (14) | acid |
| | | i | (48) | intermediate |
| | | b | (49) | basic |
| | | u | (33) | ultrabasic |
| | | r | | rhyolite |
| | | d | (11) | dacite |
| | | n | (48) | andesite |
| | | ba | (46) | basalt |
| | | g | (23) | granite |
| | | di | (22) | diorite |
| | | do | (45) | dolerite |
| | | ga | (20) | gabbro |
| | | s | (23) | serpentinite |
| **Sediments or Volcaniclastics** | **S V** | bsh | (35) | black shale |
| | | sh | (36) | shale |
| | | slt | (28) | siltstone |
| | | sst | (39) | sandstone |
| | | w | (37) | greywacke |
| | | cong | (38) | conglomerate |
| | | bx | | breccia |
| | | tbd | | turbidite |
| | | mst | | mass flow |
| | | cht | (34) | chert |
| | | lst | (65) | limestone |
| | | dol | (66) | dolomite |
| | | Fe | (64) | iron formation |
| | | gl | (4) | glacial deposits |
| | | fgl | (4) | fluvioglacial deposits |
| | | alv | (4) | alluvial deposits |
| | | cvl | (4) | colluvial deposits (talus) |
| | | qzt | | quartzite |
| **Metamorphic and Tectonic Rocks** | **M** | sht | (58) | schist |
| | | qzt | (40) | quartzite |
| | | hf | (50) | hornfels |
| | | sk | (50) | skarn |
| | | mb | (48) | marble |
| | | m | | mylonite |
| | | fz | | fault breccia (pug) |
| Colours should be hatched | | | | |
| **Unassigned** | | ? | | Use alone or as a qualifier to other rock types where uncertain |

## 3. DESCRIPTORS

**Colour :**

| | | | |
|---|---|---|---|
| ple | pale | bl | blue |
| dk | dark | wht | white |
| gy | grey | ylw | yellow |
| or | orange | buf | buff |
| blk | black | grn | green |
| pk | pink | ppl | purple |
| rd | red | crm | cream |
| brn | brown | khk | khaki |

**Grainsize :**

fg fine grained
mg medium grained
cg coarse grained
vcg very coarse grained

## 4. MAPPING SYMBOLS

- Strike and Dip of Strata (25)
- Strike and dip of inverted strata
- Strike and dip of cleavage or foliation (65)
- Plunge of lineation (30)
- Geological boundary position accurate
- Geological boundary position approximate
- Mine
- Abandoned prospect or mine
- Costean or trench
- Diamond drill hole, including projection
- Unconformity
- Fault
- Fault with dip (70)
- Thrust Fault
- Plunging antiform
- Plunging synform
- Shear/strong cleavage
- Vein

## DESCRIPTORS continued

**Overall Texture :**

| | |
|---|---|
| fb | flow banded |
| fbr | flow brecciated |
| hyl | hyaloclastic |
| pill | pillowed |
| pep | peperitic |
| mav | massive |
| blo | blocky |
| aph | aphyric |
| por | porphyric |
| peg | pegmatitic |
| bd | bedded |
| xbd | cross bedded |
| ufs | upwards fining sequence |
| ss | syndepositional |
| cs | clast supported |
| ms | matrix supported |
| fol | foliated |
| clvd | cleaved |
| shd | sheared |
| bx | brecciated |
| aug | augen |
| vnd | veined |

**Constituents & Internal Texture :**

| | |
|---|---|
| ply | polymict |
| li | lithic |
| pm | pumice |
| xl | crystal |
| vit | vitric |
| sph | spherulites |
| ves | vesicles |
| amy | amygdales |
| wsp | wisps |
| lap | lapilli |
| fsp | feldspar |
| q | quartz |
| mic | micaceous |
| cal | calcareous |
| px | pyroxene |
| hb | hornblende |
| cr | chromite |
| mag | magnetite |

**Alteration :**

| | |
|---|---|
| bch | bleached |
| dtx | de-textured |
| ox | oxidised |
| alb | albitised |
| co | carbonatised |
| chl | chloritised |
| ser | sericitised |
| kao | kaolinitised |
| ep | epidotised |
| sil | silicified |
| t | tectonite |
| fluc | fluctuite |

**Mineralisation :**

| | |
|---|---|
| dis | disseminated |
| v | vein |
| str | stringer |
| mav | massive |
| bnd | banded |
| cla | clasts |
| gos | gossan |
| sul | sulphides |
| py | pyrite |
| po | pyrrhotite |
| asp | arsenopyrite |
| gn | galena |
| sp | sphalerite |
| cp | chalcopyrite |
| ba | barite |
| mag | magnetite |
| hm | haematite |
| lm | limonite |
| au | gold |
| ag | silver |
| to | tourmaline |
| q | quartz |
| cb | carbonate |
| sid | siderite |
| mn | manganese carbonate |
| fl | fluorite |

# 95-3783

**VOLUME 2 OF 2**

PASMINCO - TULLAH EL 22/91 & STERLING RIVER
EL 24/91 ANNUAL REPORT 1994-95 - PURVIS J G

GN
TN
MN
GRID CONVERGENCE 1.0°
GRID/MAGNETIC 12.0°

754370

5 cm

**PASMINCO EXPLORATION**
A Division of Pasminco Australia Limited

| | |
|---|---|
| COMPILED : J.G.P. | E.L. 24/91 - STERLING RIVER |
| DATE : Sept.1995 | OUTCROP GEOLOGY AND ROCK SAMPLE LOCATIONS |
| DRAWN : | SHEET 7C - 2 |
| REFERENCE : | |
| REVISIONS : | |
| DRAWING No. | SCALE 1:2500 (0 50 100 m) |
| | FIG. No. 20 |

5 372 000mN
382 500mE
383 000mE
383 500mE
384 000mE
384 500mE
385 000mE
5 371 500mN
5 371 000mN
5 370 500mN
5 370 000mN

STP300
STP301
STP75
STP74
STP96
STP299
STP302
STP76
STP77
STP78
STP79
SR3
SVD89-2
Railway
Abandoned
Road
Stirling

# LEGEND

## 1. GENERAL FORM

Rock type, colour, grain size, overall texture, constituents and textures, alteration, mineralisation.
Rock Types can be combined using a -
Subordinate Rock Types are separated by /
Each Descriptor Group is separated by ,
Descriptors within a group are separated by .
Derwent series 19 colours (in brackets) are intended for the Cambrian sequences.

## 2. ROCK TYPES

| | | | | |
|---|---|---|---|---|
| **Lavas Intrusives or Volcaniclastics** | **L I V** | a | (14) | acid |
| | | i | (48) | intermediate |
| | | b | (46) | basic |
| | | u | (23) | ultrabasic |
| | | r | | rhyolite |
| | | d | (11) | dacite |
| | | n | (46) | andesite |
| | | ba | (49) | basalt |
| | | g | (20) | granite |
| | | di | (22) | diorite |
| | | do | (45) | dolerite |
| | | gb | (25) | gabbro |
| | | s | (23) | serpentinite |
| **Sediments or Volcaniclastics** | **S V** | bsh | (35) | black shale |
| | | sh | (36) | shale |
| | | slt | (35) | siltstone |
| | | sst | (39) | sandstone |
| | | w | (37) | greywacke |
| | | cong | (39) | conglomerate |
| | | bx | | breccia |
| | | tbd | | turbidite |
| | | msf | | mass flow |
| | | cht | (34) | chert |
| | | lst | (65) | limestone |
| | | dol | (65) | dolomite |
| | | Fe | (64) | iron formation |
| | | gl | (4) | glacial deposits |
| | | fg | (4) | fluvioglacial deposits |
| | | alv | (4) | alluvial deposits |
| | | cvl | (4) | colluvial deposits (talus) |
| | | qzt | | quartzite |
| **Metamorphic and Tectonic Rocks** | **M** | sht | (36) | schist |
| | | qzt | (40) | quartzite |
| | | hf | (50) | hornfels |
| | | sk | (50) | skarn |
| | | mb | (48) | marble |
| | | m | | mylonite |
| | | fz | | fault breccia (pug) |
| Colours should be hatched | | | | |
| **Unassigned** | | ? | | Use alone or as a qualifier to other rock types where uncertain |

## 3. DESCRIPTORS

**Colour :**

| | | | |
|---|---|---|---|
| ple | pale | bl | blue |
| dk | dark | wht | white |
| gy | grey | yel | yellow |
| or | orange | buf | buff |
| blk | black | grn | green |
| pk | pink | ppl | purple |
| rd | red | crm | cream |
| brn | brown | khk | khaki |

**Grainsize :**

| | |
|---|---|
| fg | fine grained |
| mg | medium grained |
| cg | coarse grained |
| vcg | very coarse grained |

**DESCRIPTORS continued**

**Overall Texture :**

| | |
|---|---|
| fb | flow banded |
| fbx | flow brecciated |
| hyl | hyaloclastic |
| pill | pillowed |
| peg | pegvetitic |
| msv | massive |
| blo | blocky |
| aph | aphyric |
| por | porphyric |
| peg | pegmatitic |
| bd | bedded |
| xbd | cross bedded |
| ufs | upwards fining sequence |
| ps | poorly sorted |
| cs | clast supported |
| ms | matrix supported |
| fol | foliated |
| clvd | cleaved |
| shd | sheared |
| bx | brecciated |
| aug | augen |
| vnd | veined |

**Constituents & Internal Texture :**

| | |
|---|---|
| ply | polymict |
| mic | (thin) |
| pm | pumice |
| xl | crystal |
| vit | vitric |
| sph | spherulites |
| ves | vesicles |
| amy | amygdales |
| wsp | wisps |
| sty | stylolites |
| f | feldspar |
| q | quartz |
| mic | micaceous |
| cal | calcareous |
| px | pyroxene |
| hb | hornblende |
| cr | chromite |
| mag | magnetite |

**Alteration :**

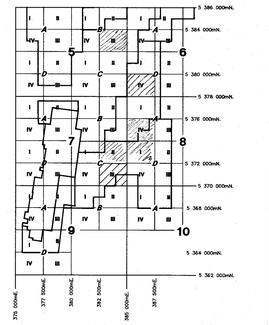
| | |
|---|---|
| bch | bleached |
| dx | de-textured |
| ox | oxidised |
| alb | albitised |
| cc | carbonatised |
| chl | chloritised |
| ser | sericitised |
| kao | kaolinitised |
| ep | epidotised |
| sil | silicified |
| f | feldspar |
| fuc | fuchsitic |

**Mineralisation :**

| | |
|---|---|
| dis | disseminated |
| v | vein |
| str | stringer |
| msv | massive |
| bnd | banded |
| cla | clasts |
| gos | gossan |
| sul | sulphides |
| py | pyrite |
| po | pyrrhotite |
| aso | arsenopyrite |
| gn | galena |
| sp | sphalerite |
| cp | chalcopyrite |
| ba | baste |
| mag | magnetite |
| hm | haematite |
| lm | limonite |
| au | gold |
| ag | silver |
| to | tourmaline |
| q | quartz |
| cb | carbonate |
| sd | siderite |
| mn | manganese carbonate |
| fl | fluorite |

## 4. MAPPING SYMBOLS

- Strike and Dip of Strata (25)
- Strike and dip of Inverted strata
- Strike and dip of cleavage or foliation (60)
- Plunge of lineation (50)
- Geological boundary position accurate
- Geological boundary position approximate
- Mine
- Abandoned prospect or mine
- Costean or trench
- Diamond drill hole, including projection
- Unconformity
- Fault
- Fault with dip (70)
- Thrust Fault
- Plunging antiform
- Plunging synform
- Shear/strong cleavage
- Vein




GN
TN
MN
GRID CONVERGENCE 1.0°
GRID/MAGNETIC 12.0°
5 cm

754371

95-3783
VOLUME 2 OF 2
PASMINCO - TULLABARDINE AND STERLING RIVER
EL 24/91 ANNUAL REPORT 1994-95 - PURSUIT J G

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

| | |
|---|---|
| COMPILED : | J.G.P. |
| DATE : | Sept.1995 |
| DRAWN : | |
| REFERENCE : | |
| REVISIONS : | |
| DRAWING No. | |

E.L. 24/91 - STERLING RIVER

**OUTCROP GEOLOGY AND ROCK SAMPLE LOCATIONS**

SHEET 7C - 3

SCALE 1:2500 (0 50 100 m)

FIG. No. 21

5 376 000mN
385 000mE
385 500mE
386 000mE
386 500mE
387 000mE
387 500mE
5 375 500mN
5 375 000mN
5 374 500mN
5 374 000mN

Murchison Bridge
MURCHISON GORGE
Lake Rosebery
MURCHISON ROAD
ANTHONY ROAD
RED86-1
MR2
MR1
STK89-3

# LEGEND

## 1. GENERAL FORM

Rock type, colour, grain size, overall texture, constituents and textures, alteration, mineralisation.
Rock Types can be combined using a -
Subordinate Rock Types are separated by /
Each Descriptor Group is separated by ,
Descriptors within a group are separated by
Derwent series 19 colours (in brackets) are intended for the Cambrian sequences.

## 2. ROCK TYPES

| | | | | |
|---|---|---|---|---|
| **Lavas Intrusives or Volcaniclastics** | **L I V** | a | (14) | acid |
| | | i | (46) | intermediate |
| | | b | (49) | basic |
| | | u | (23) | ultrabasic |
| | | r | | rhyolite |
| | | d | (11) | dacite |
| | | n | (46) | andesite |
| | | ba | (48) | basalt |
| | | g | (20) | granite |
| | | di | (22) | diorite |
| | | do | (45) | dolerite |
| | | gb | (25) | gabbro |
| | | s | (23) | serpentinite |
| **Sediments or Volcaniclastics** | **S V** | bsh | (35) | black shale |
| | | sh | (36) | shale |
| | | slt | (35) | siltstone |
| | | sst | (39) | sandstone |
| | | w | (37) | greywacke |
| | | cong | (39) | conglomerate |
| | | bx | | breccia |
| | | tbd | | turbidite |
| | | mst | | mass flow |
| | | cht | (34) | chert |
| | | ls | (66) | limestone |
| | | dol | (65) | dolomite |
| | | Fe | (64) | iron formation |
| | | gl | (4) | glacial deposits |
| | | fgl | (4) | fluvioglacial deposits |
| | | alv | (4) | alluvial deposits |
| | | col | (4) | colluvial deposits (talus) |
| | | qzt | | quartzite |
| **Metamorphic and Tectonic Rocks** | **M** | sht | (38) | schist |
| | | qzt | (40) | quartzite |
| | | hf | (52) | hornfels |
| | | sk | (50) | skarn |
| | | mb | (48) | marble |
| | | m | | mylonite |
| Colours should be hatched | | fz | | fault breccia (pug) |
| **Unassigned** | | ? | | Use alone or as a qualifier to other rock types where uncertain |

## 3. DESCRIPTORS

**Colour :**

| | | | |
|---|---|---|---|
| ple | pale | bl | blue |
| dk | dark | wht | white |
| gy | grey | yel | yellow |
| or | orange | buf | buff |
| blk | black | grn | green |
| pk | pink | ppl | purple |
| rd | red | crm | cream |
| brn | brown | khk | khaki |

**Grainsize :**

fg fine grained
mg medium grained
cg coarse grained
vcg very coarse grained

**DESCRIPTORS continued**

**Overall Texture :**

| | |
|---|---|
| fb | flow banded |
| fbx | flow brecciated |
| hyl | hyaloclastic |
| pil | pillowed |
| pep | pepentic |
| mav | massive |
| blo | blocky |
| aph | aphyric |
| por | porphyric |
| peg | pegmatitic |
| bd | bedded |
| xbd | cross bedded |
| ufs | upwards fining sequence |
| ps | poorly sorted |
| cs | clast supported |
| ms | matrix supported |
| fol | foliated |
| clvd | cleaved |
| shd | sheared |
| bxc | brecciated |
| aug | augen |
| vnd | veined |

**Constituents & Internal Texture :**

| | |
|---|---|
| ply | polymict |
| li | lithic |
| pm | pumice |
| xl | crystal |
| vit | vitric |
| sph | spherulites |
| ves | vesicles |
| amy | amygdales |
| wsp | wisps |
| sty | stylolites |
| f | feldspar |
| q | quartz |
| mic | micaceous |
| cal | calcareous |
| px | pyroxene |
| hb | hornablende |
| cr | chromite |
| mag | magnetite |

**Alteration :**

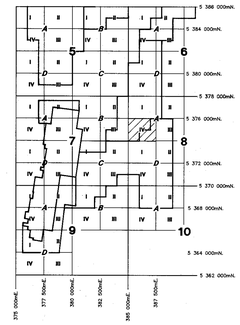
| | |
|---|---|
| bch | bleached |
| dtx | de-textured |
| ox | oxidised |
| alb | albitised |
| co | carbonatised |
| chl | chloritised |
| ser | sericitised |
| kao | kaolinitised |
| ep | epidotised |
| sil | silicified |
| f | feldspar |
| fuc | fuchsitic |

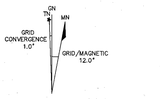
**Mineralisation :**

| | |
|---|---|
| dis | disseminated |
| v | vein |
| str | stringer |
| mav | massive |
| bnd | banded |
| cla | clasts |
| gos | gossan |
| sul | sulphides |
| py | pyrite |
| cpy | cymcotite |
| asp | arsenopyrite |
| gn | galena |
| sp | sphalerite |
| cp | chalcopyrite |
| ba | barite |
| mag | magnetite |
| hm | haematite |
| im | limonite |
| au | gold |
| ag | silver |
| to | tourmaline |
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| cb | carbonate |
| sd | siderite |
| mn | manganese carbonate |
| fl | fluorite |

## 4. MAPPING SYMBOLS

- Strike and Dip of Strata (25)
- Strike and dip of inverted strata
- Strike and dip of cleavage or foliation (60)
- Plunge of lineation (50)
- Geological boundary position accurate
- Geological boundary position approximate
- Mine
- Abandoned prospect or mine
- Costean or trench
- Diamond drill hole, including projection
- Unconformity
- Fault
- Fault with dip (70, 35)
- Thrust Fault
- Plunging antiform
- Plunging synform
- Shear/strong cleavage
- Vein




754372

95-3783
VOLUME 2 OF 2
PASMINCO - VOLLARD & STERLING RIVER
EL 24/91 ANNUAL REPORT 1994-95 - PLATES 2 & 3

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

| | |
|---|---|
| COMPILED : J.G.P. | E.L. 22/90 - TULLAH |
| DATE : Sept.1995 | E.L. 24/91 - STERLING RIVER |
| DRAWN : | OUTCROP GEOLOGY AND ROCK SAMPLE LOCATIONS |
| REFERENCE : | SHEET #A - 4 |
| REVISIONS : | |
| DRAWING No. | SCALE 1:2500 (0, 50, 100 m) |
| | FIG. No. 22 |

# 95-3783

**VOLUME 2 OF 2**

PASMINCO - TULLAN EL 23/90 & STERLING RIVER
EL 24/91 ANNUAL REPORT 1994-95 - PURVIS J G

5 374 000mN
5 373 500mN
5 373 000mN
5 372 500mN
5 372 000mN
385 000mE
385 500mE
386 000mE
386 500mE
387 000mE
387 500mE

Murchison Dam

LAKE MURCHISON

ANTHONY

HEC TRANSMISSION LINE

ROAD

95-3783
VOLUME 2 OF 2
PASMINCO - TULLAN EL 23/90 & STERLING RIVER
EL 24/91 ANNUAL REPORT 1994-95 - PURVIS J G

## LEGEND

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| | | | | |
|---|---|---|---|---|
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| | | i | (46) | intermediate |
| | | b | (48) | basic |
| | | u | (23) | ultrabasic |
| | | r | | rhyolite |
| | | d | (11) | dacite |
| | | n | (46) | andesite |
| | | ba | (49) | basalt |
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| | | di | (22) | diorite |
| | | do | (45) | dolerite |
| | | gb | (25) | gabbro |
| | | s | (23) | serpentinite |
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| | | sh | (36) | shale |
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| | | fz | | fault breccia (pug) |
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| xbd | cross bedded |
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| ms | matrix supported |
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| clvd | cleaved |
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| aug | augen |
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| wsp | wisps |
| sty | stylolites |
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| q | quartz |
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| cal | calcareous |
| px | pyroxene |
| hb | hornblende |
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**Alteration :**

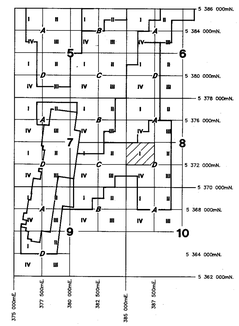
| | |
|---|---|
| bch | bleached |
| dtx | de-textured |
| ox | oxidised |
| alb | albitised |
| cb | carbonatised |
| chl | chloritised |
| ser | sericitised |
| kao | kaolinitised |
| ep | epidotised |
| sil | silicified |
| f | feldspar |
| fuc | fuchsitic |

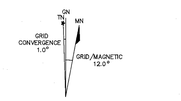
**Mineralisation :**

| | |
|---|---|
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| v | vein |
| str | stringer |
| mav | massive |
| bnd | banded |
| cls | clasts |
| gos | gossan |
| sul | sulphides |
| py | pyrite |
| po | pyrrhotite |
| asp | arsenopyrite |
| sp | sphalerite |
| gn | galena |
| cp | chalcopyrite |
| ba | barite |
| mag | magnetite |
| hm | haematite |
| lm | limonite |
| au | gold |
| ag | silver |
| to | tourmaline |
| q | quartz |
| cb | carbonate |
| sd | siderite |
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- Plunging synform
- Shear/strong cleavage
- Vein




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| | |
|---|---|
| COMPILED : J.G.P. | E.L. 24/91 - STERLING RIVER |
| DATE : Sept.1995 | OUTCROP GEOLOGY AND ROCK SAMPLE LOCATIONS |
| DRAWN : | SHEET SD - 1 |
| REFERENCE : | |
| REVISIONS : | |
| DRAWING No. | SCALE 1:2500 (0, 50, 100 m) |
| | FIG. No. 23 |