EL 16/2005, SHEFFIELD

RELINQUISHMENT REPORT,

FINAL REPORT ON EXPLORATION ACTIVITIES

SEPTEMBER 2004 TO SEPTEMBER 2009

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLANS

LIST OF APPENDICES

1. SUMMARY

Three contiguous Exploration Licences, 16/2005, Sheffield, 17/2005, Nietta and 18/2005, Castra, covering some 300 square kilometres were granted to Zinifex Limited on 21 September 2005. Zinifex applied for, and was granted "group project status" for reporting purposes on 11 April, 2006. Thus work programs carried out over EL 16/2005, EL 17/2005 and 18/2005 (usually described as the *project tenements*) have been described collectively in internal and external reports of activities (Hicks, 2007, 2007a, 2008, 2008a and Hicks & Corbett, 2006)

This report details exploration work undertaken on EL 16/2005, Sheffield, (and collectively on EL 16/2005 Sheffield, EL 17/2005, Nietta and EL 18/2005, Castra) for its term of tenure, 21st September 2005 to 21st September 2009.

Work completed on the *project tenements* in Year 1 (Hicks & Corbett, 2006) comprised:

- Collection and analysis of 58 wholerock geochemical samples from surface outcrop across the 3 tenements, with minor sampling outside the tenement boundaries to assist with regional correlations.
- Thin section preparation and petrological description of 78 samples, including the 58 wholerock samples above.
- Reconnaissance and prospect scale mapping.
- Geological and lithochemical interpretations, correlations and assessment.

An approximate 50% reduction of the project tenements area was completed after this initial work program (Hicks, 2007). Work completed on the relinquished portions of the tenure was limited to a subset of the Year 1 work described above, with **13** whole rock geochemical samples from surface outcrop, and thin section preparation and petrological description of **20** samples (including the above suite). A proportionate amount of time was spent on interpretations, correlations and assessment of the ground to be relinquished.

Work completed on the *project tenements* in Year 2 (Hicks, 2007a) comprised:

- Cutting and gridding of major grids at McPhersons (EL 18/2005) and Castra Road (also known as the Prestons Grid) (EL 17/2005) prospects for a total of 9.85 and 17.65 line kilometres respectively
- Collection and analysis of 402 conventional soil geochemical samples from the McPhersons grid and 345 samples from the Castra Road grid (both including standards and duplicates)
- Detailed geological grid mapping of both grids
- Minor grab sampling of outcrop for assay

Work completed on the *project tenements* in Year 3 (Hicks, 2008) comprised:

- Ground EM on the McPherson's and Castra Road prospects for a total of 45 stations (1.125 line kms) and 196 stations (10.5 line kms) respectively
- Airborne EM coverage of all tenement areas using the VTEM helicopter borne EM system.

Following the Year 3 work programs, in the absence of obvious follow-up targets, the whole of EL 17/2005 was relinquished (Hicks 2008b).

During the Year 4 all the anomalous responses interpreted from the final VTEM data were assessed. Final interpretation considered them to be explained by cultural features and non-prospective geology (for Cambrian Rosebery or Hellyer type, Zn-Pb-Cu-Au-rich Volcanic Massive Sulphide mineralisation hosted by the Mount Read Volcanics).

Additional follow-up through, e.g., testing VTEM anomalies by field checking, geological mapping and sampling, ground-EM and diamond drilling was considered unwarranted in the light of this interpretation and the whole of EL 16/2005 Sheffield was recommended for relinquishment in September 2009.

2. INTRODUCTION

This report details exploration work undertaken on EL 16/2005, Sheffield, (and collectively on EL 16/2005 Sheffield, EL 17/2005, Nietta and EL 18/2005, Castra) for its term of tenure, 21st September 2005 to 21st September 2009.

Zinifex's main targets on the project tenements are Cambrian Rosebery or Hellyer type, Zn-Pb-Cu-Au-rich VHMS mineralisation hosted by the Mount Read Volcanics (MRV).

Zinifex planned to explore the project tenements using a combination of reviewing previous exploration data, geological mapping, whole rock and partial leach soil geochemistry, followed-up by selected ground time-domain EM, and then drilling of areas of interest.

The project tenements cover an area of moderate relief, which is occasionally heavily forested and incised (e.g. surrounding Lake Barrington, Leven River). It extends from the northeast slopes of Mount Roland (1233m ASL) near Beulah, west through the townships of Roland, West Kentish, Wilmot, Upper Castra and Nietta (Figure 1) towards the Loongana Range, as well as north through Preston and Central Castra towards Sprent. Access to the area is via numerous sealed arterial roads, minor sealed and unsealed roads, forestry tracks and numerous 4WD tracks in private property. The only area of difficult access is in the western half of EL 17/2005, in the Leven River valley.

3. LAND TENURE

EL 16/2005 Sheffield (105 sq km), EL 17/2005 Nietta (143 sq km) and EL 18/2005 Central Castra (52 sq km), were granted to Zinifex Ltd on 21 September 2005 for a period of 5 years. The project tenements cover ground that fell vacant on the relinquishment of numerous tenements over a number of years. The location of the project tenements is shown with respect to both geography and geology in Figures 1 and 2 respectively and the tenement history is addressed in some detail in Section 5 of this report.

After Year 1 the tenements were reduced substantially in size: EL 16/2005 from 102 sq km to 64 sq km; EL 17/2005 from 143 sq km to 60 sq km; and EL 18/2005 from 52 sq km to 24 sq km (see Figures 3 to 6).

The project tenements exclude approximately 34 ha of Mining Leases, including 1639P/M, 1202P/M and 1827P/M on EL 16/2005, 1308P/M on EL 17/2005 and 1402P/M on EL 18/2005. A further 67 hectares of land are excluded as State or public Reserves (eg Forth Falls State Reserve on EL16/2005).

Other land tenures within the project tenement area include State/Multiple Use Forest, MDC Informal Reserve, forest communities managed by prescription, proposed private land reserve (RFA), Tasmanian forest community agreement, Crown Land, Regional Reserve, Forest Reserve and abundant private property all of which are available for exploration under the Mineral Resources Development Act 1995.

4. GEOLOGY

4.1 Regional Setting

The regional geological framework of the Mt Read Belt (MRB) is subdivided, from an exploration perspective, into three elements. The central MRB covering the area of outcrop from south of Queenstown to north of Hellyer, the northern MRB covering the area from Back Bluff eastwards through Gowrie Park and Mole Creek, and the Southern MRB comprising areas west and south of Macquarie Harbour. The project tenements are in the east-central part of the northern MRB.

Basement in the Central and Northern MRB is of Precambrian age, comprising predominantly greenschist facies metasediments with minor basalts and dolerites. Higher grade amphibolite and eclogite facies are also present within the Precambrian. This Precambrian basement, termed the Tyennan Block, lies to the south of the project tenements.

Cambrian volcanism and sedimentation developed on the Precambrian continental crust and, in the Central MRB, is subdivided into the Eo-Cambrian Tholeiitic Crimson Creek Formation (CCF), the mid to late Cambrian Dundas Group and the predominantly calc-alkaline, Mt Read Volcanics (MRV).

The CCF was deposited in shallow but rapidly subsiding basins comprising basaltic lavas and volcaniclastics, turbidites, carbonates, chert and minor evaporites. This formation is not exposed in the licence area. Ultramafic cumulates and volcanic equivalents were thrust onto the CCF in the mid Cambrian. They are absent from the licence area.

The MRV, in the Central MRB, form a 200 km long by 20 km wide north-south trending belt along the eastern side of the Dundas Trough, adjacent to and in some areas onlapping and intruding the Precambrian basement. The northern extension of the MRV swings eastwards around the northern margin of the Tyennan Precambrian block. The volcanics include intermediate to felsic lavas, subvolcanic porphyries and granites, volcaniclastics and basement-derived sedimentary rocks. The MRV host five economically significant volcanic hosted massive sulphide deposits all of which lie in the Central MRB.

During late CVC to early Tyndall Group time, Cambrian granitoids intruded the volcanic pile. The majority of the granitoids occur along the eastern margin of the volcanics and stitch the volcanics to the Tyennan Block.

Cambrian volcanism and sedimentation was followed by predominantly basement derived late Cambrian to Devonian age sedimentation, including siliciclastic conglomerate, sandstone and limestone. These sequences occur within, and peripheral to, the project area.

At least two phases of regional compression were associated with the mid Devonian Tabberabberan Orogeny. The development of folding, cleavage and regional thrusts in lower Palaeozoic rocks were associated with this event. Fold trends in the licence area are variable, some NW, and lesser E-W.

Deformation was followed by the extensive intrusion of Devonian to Carboniferous granitoids of batholitic proportions. The Dalcoath Granite (and associated hornfels aureole) outcrops south of the licence, and the Housetop Granite outcrops across a large area to the northwest of the project tenements. The Devonian granites are associated with carbonate replacement Sn mineralisation at Renison Bell and Mount Bischoff, and the Pb-Zn-Ag vein deposits of Zeehan and possibly the Tullah Fields. A similar setting may be interpreted for the base metal vein deposits in the district (e.g., Round Hill workings).

The Ordovician and older rocks in the far eastern part of the licence are unconformably overlain by marine sediments, including tillite, forming the basal units of the Permian Parmeener Supergroup. Small bodies of Jurassic dolerite intrude the Permian sediments and older rocks.

After substantial erosion of this terrane, extensive Tertiary flood basalts and subvolcanic sediments were deposited. Basalt flows cover as much as 50% of the project area. In the Quaternary, talus deposits have developed on the lower slopes of Mt Roland and alluvial deposits have formed in the valley of major rivers.

4.2 Project Tenements

One of the main problems with exploring in the Fossey Mountain Trough was perceived to be making correlations with the well-known stratigraphy of the Central Mount Read Volcanics, in particular locating equivalents of the "Rosebery Host" (i.e. the top of the CVC or its equivalent). A recent review, using the whole-rock geochemical data from the Tasmanian 3D model and additional data in Zinfex's database, has defined several areas of felsic volcanics with geochemical signatures equivalent to the top of the CVC at Rosebery. The project tenements are designed to cover these areas of potential "Rosebery Host" stratigraphy.

A series of new maps have been produced by MRT, giving geological coverage at 1:25,000 across the project tenements (WTRMP). A comprehensive overview can be gained from the 1:100,000 WTRMP sheet and accompanying report (Corbett and McClenaghan, 2003) and, as will be discussed below, further mapping by Dr Corbett has been focussed on discriminating the affinities and correlates of inferred central MRV units in the project area.

5. PREVIOUS EXPLORATION

The area encompassed by the project tenements has had an irregular exploration history for base metals starting in the 1960's, with current philosophies and methods applied since the mid 1970's. It is believed that up to 6 surface drill holes have been collared on the project tenements, at a variety of geochemical and/or geophysical targets. The project tenements can still be considered under-explored, as the majority of work described below only partially overlaps with current tenure, with much of this current tenure rapidly discounted through early regional surveys.

Modern exploration commenced in the 1960's with regional geological compilations (eg. Burns, 1957, Whiting, 1970) and aeromagnetics surveys (eg Zarzavatjian, 1966; Webb, 1968; Chestnut, 1967) focusing on broad areas and less relevant commodities or styles of mineralisation.

As is often the case, the first phase of focussed exploration (1970's) delineated most of the currently known anomalies within and adjacent to the project tenements. Tenements EL 19/72 (see Porter, 1976, who provide comprehensive summaries of exploration on the tenement area to that date) and EL 7/73 (see Barker, 1975 and Clementson and Flis, 1983) have overlaps with the project tenements.

After a break of several years, exploration became more focussed on Cambrian VHMS style mineralisation, again with only partial overlap onto the project tenements. Work on EL 8/77 (Caithness, 1986), EL 36/79 (eg Wright, 1983), EL 33/83 (Vivian, 1984a & b), EL 43/85 (eg. Sise, 1987) and EL 49/87 (Randell, 1988) led to the identification of a limited number of new prospects. An apparent trend throughout the 1980's and early 1990's was for explorers to re-assess the geology, previous exploration and open-file data, complete variably detailed reconnaissance with some follow-up, and then relinquish the licence having deemed the area a low probability of significant base metal discovery. EL 19/90 (Jones, 1991) and EL 42/92 (Vicary, 1994) are good examples of this. Some quite focussed exploration was conducted by RGC exploration on EL 15/92 (Vicary, 1995a) but areas of interest did not overlap on the current tenure.

Zinifex has previously explored parts of the project tenement area. Geopeko managed exploration on behalf of the E.Z. Co. (who became Pasminco, who became Zinifex Ltd) in EL 96/87, which reverted to Pasminco control during 1990. There is some overlap of EL 96/87 into the project tenements (see Virgoe, 1990 and Fitzgerald, 1991). Other tenements held by Pasminco/Zinifex in the vicinity of the project tenements include EL 3/1998 (Lake Barrington) and EL 13/2000 (Paradise). Both tenements were prematurely relinquished in 2002, primarily due to internal factors at the time.

The ground which makes up the project tenements was vacant prior to the granting of EL's 16/2005, 17/2005 and 18/2005. The most recent exploration appears to be that of Pasminco on the Lake Barrington and Paradise tenements. However, none of the work completed by Pasminco on these licences overlaps onto the current project tenements.

Table 1 lists previous tenement holders in the Sheffield-Castra-Nietta area, and Table 2 gives an overview of work completed prior to the granting of the project tenements in September 2005.

TABLE 1: Previous tenement holders in the vicinity of the project tenements area

Company	Reference	EL	Granted	Relinquished / JV	Relevant Prospects	Previous Tenements
1. AMEG	Webb, 1968	8/65	?	?	Nil	Regional
2. BHP	Chesnut, 1967; Cochrane, 1970	15/65	1965	1970	Nil	Regional
3. Scamander Mining Co	Whiting, 1970	14/70	?1970	?	Nil	Regional
4. CRAE	Porter, 1976; Purvis, 1978	19/72	1972	?1978	1,2,3, ?4, 9, 10	10/73
5. Asarco	Barker, 1975	7/73	1973	JV to CRAE, 1975	5, 6, 7	-
6. CRAE	Clementson, 1982; Temby, 1985	7/73	CRAE post 1983	1988	7, 8	7/73
7. CRAE	Caithness, 1986	8/77	1985 JV	?1987	3, 1, ?9	?
8. Shell, CRAE	Wright, 1983; Hungerford, 1989, 1990	36/79	1980	1990	11, 3	2/76, 19/72
9. AMAX	Vivian, 1984a & b	33/83	1983	?1984	5, ?10	-
10. Aberfoyle	Sise, 1987; Wallace, 1991	43/85	1986	1991	8, 12	49/82
11. Billiton	Randell, 1988	49/87	1987	1988	Nil	-
12. Geopeko	Virgoe, 1990;	96/87	1987	JV to PasEx 1990	1,2,3, 4	-
13. Pasminco	Fitzgerald, 1991	96/87	1990	1991	1, 2, 3, 4	96/87
14. Noranda	Jones, 1991	19/90	1990	1991	?5	-
15. RGC Expl	Vicary, 1995c	15/92	1992	1995	12,	11/88, 15/92
16. RGC Expl	Vicary, 1995a, b	42/92	1993	1996	1, 2, 3, 11	Various

Prospects: 1= Crosby Ck, 2= Loyetea Nth, 3= Loyetea Sth [incl. Tulip Tree Ck], 4= Castra Rd, 5= Wilmot, 6= Razorback Ridge [?aka Loyetea Sth], 7= Lake Barrington Cu, 8= Stonebridge, 9= Prestons Ag, 10= McPhersons, 11= Challenger2 [aka - Native Track Tier], 12= Beulah.

TABLE 2: Previous work on the project tenements area by other Companies

Company	Year	Exploration Activities
1, 2, 3: AMEG, BHP, Scamander Mining Co.	1965 - 1970	Regional aeromagnetics, data review – old school thinking, no prospects of relevance, poorly documented, often without specific tenement information.
4. CRAE	1972 - 1978	CRAE conducted the first (and probably most successful) modern exploration program in the vicinity of the project tenements. The exploration program (EL 19/72) can be summarised chronologically as follows: • Geological compilation (1972) and inspection of known mineralisation, including **Preston** Ag and **McPhersons** prospects. • Stream sediment sampling program (1973, unknown no. of samples) detected only low level base metal concentrations. The best was from the **Crosby Creek** area (380ppm Zn, 70ppm Pb) • A 5-line 10m spaced soil sampling program was designed to follow-up this area 600ppm Zn, 1210ppm Pb, 480ppm Cu being peak values obtained) • More regional soil sampling in 1973-74: 15 km2 using 400m x 20m grid. Best results: 5100ppm Pb 244ppm Zn, 200ppm Cu – defined the **Castra** anomalies • Further regional soil sampling and mapping in 1975, at various scales. Reasons for sampling new areas were due to geological interpretation of depositional environments. Best results not given, but defined the **Loyetea North** and **Loyetea South** anomalies. • Airborne EM flown April 1975 across most of tenement • Magnetics, IP and auger sampling completed on **Crosby Creek** prospect in 1975. Best results from the auger work was 3000ppm Pb, 500ppm Zn and 400ppm Cu. • 3 diamond drillholes completed for 652m at Crosby Creek prospect in 1975 (DD 75 CC1 to DD 75 CC3) • Blanket gradient-array IP over **Crosby Creek** and **Loyetea** prospects • 2 diamond drillholes completed for 500.30m at **Loyetea South** prospect in 1976 (DD 76 LS1 & DD 76 LS2) • Concluded that the highest order anomalies have been tested, recommended some further work at Crosby Creek and Loyetea South prospects, proposed a JV of tenement.
5, 6: ASARCO, CRAE	1972 - 1978	There is some overlap of ground originally held by Asarco under EL 7/73. During tenure, Asarco completed the following • regional stream sediment (25 samples) and rockchip (67 samples) sampling, mapping and review/evaluation. They identified a low level anomalies at **Loyetea South** and **Wilmot** before the tenement was joint ventured with CRAE. CRAE joint ventured into this large tenement in 1976 to assess targets generated through Asarco's stream sampling programme. CRAE, who also held EL 10/76, explored the area from 1976-1988. The majority of prospects that were explored by CRAE in EL 7/73 were not on the current project tenements. However, the **Wilmot** anomaly (and possibly the

Company	Year	Exploration Activities
		Stonebridge anomaly) are, and were followed up with more detailed stream and soil geochemistry, as well as VLF-EM and ground magnetics. The eventual conclusion reached by CRAE was lack of evidence and tenor of mineralising systems, but still some (low) potential for such systems to occur in the district. CRA relinquished EL 7/73 in 1988.
7. CRAE	1985 - 1987	CRAE explored EL 8/77 (which has a small overlap with the project tenements) for a brief time by: • Regional drainage sampling program – unknown number of samples, but this program identified **Crosby Creek** and **Loyetea South** anomalies again. • Recommended re-sampling of **Crosby Creek** and **Loyetea South** drillcore to vector towards Au and base metal mineralisation.
8. SHELL (BILLITON) - CRAE JV	1980 - 1990	EL 36/79 has a small overlap with current tenure. Across EL 36/79, Shell completed the following: • Airborne magnetics and radiometrics • regional INPUT airborne EM • regional drainage and soil geochemistry. The one anomaly coincident with current tenure is **Tulip Creek** (also known as **Loyetea South**). Shell found only low order, sporadic anomalism and poor repeatability, so recommended no follow-up. CRAE began exploring this JV tenement in 1985, but focussed on areas outside current tenure. Detailed work has been completed on the Challenger II anomaly (also known as **Native Track Tier** anomaly) which has possible strike extensions into the western portion of EL 17/2005 Nietta.
9. AMAX	1983 – 1984?	EL 33/83 coincides with much of the central and southeastern parts of the project tenements. AMAX completed the following activities in 1983 and 1984: • Review of existing geophysical and geochemical data • Minor check sampling of anomalous drainages and rock chip locations • Reconnaissance and rock chip sampling (with samples sent for whole rock analysis) in the vicinity of **McPhersons** anomaly • Further stream (48 samples) and rock chip (20 samples) sampling • DIGHEM airborne EM (360 line km) over part of the tenement This latest work failed to highlight areas worthy of follow-up, and AMAX surrendered the tenement.
10. ABERFOYLE	1986 - 1991	The northern portion of EL 43/85 overlaps with part of the southeastern area in the project tenement. Aberfoyle completed significant exploration across their tenement, but only minor parts of interest coincide with current Zinifex tenure. Work completed on relevant areas includes: • Some regional mapping traverses, and limited grid mapping at the **Stonebridge** prospect • Minor portion of a UTEM survey on the **Stonebridge** grid, no anomalies detected. Aberfoyle downgraded the prospectivity of much of the overlapping areas of EL 43/85 and current tenure quite early in the tenement life, and therefore little work has been

Company	Year	Exploration Activities
		completed.
11. SHELL/BILLITON	1987 - 1988	Billiton tackled this area in a similar manner to previous explorers – regional reviews and stream sediment sampling programs. Details are: • 69 sample sites giving 1-3 sq km coverage, both conventional ¼"BLEG and -80# samples were collected. Sample sites where cultural interference was too high were either not sampled or flagged as possibly contaminated. Approximately 10 anomalies were identified (none within current Zinifex tenure) but almost all failed to reproduce when re-sampled. The tenement was abandoned based on these results and a re-assessment of the regional geology.
12, 13: GEOPEKO, PASMINCO	1987 - 1991	Geopeko (and Pasminco) document a thorough examination of existing data and clever application of further exploration methodology in their 1987-1991 tenure (EL 96/87). While no new anomalous areas were identified, several were re-visited, extended and probably fully tested to current thinking at the time. This work can be summarised by prospect as follows: **Loyetea South (Tulip Tree Creek** grid)**:** • 2 new lines cleared and sampled (rock chip instead of C-horizon due to scree cover) – only 3 of 30 samples anomalous (>200ppm Pb) – closes off anomalous zone on grid • Ground magnetics **Crosby Creek:** • A new 7-line grid of 11.5 kms was cut to the SE of CRAE's old grid, geologically mapped • Rock chip (162 samples) or C-horizon soils (291 samples) collected on these lines at 20m spacing – six samples anomalous in Pb, and 20 in Zn define a new area of interest southeast of CRAE's 1976 work. An offset Cu anomaly (low level) is also defined. • 4 BLEG and 2 standard stream sediment samples collected – assays at background levels. **Regional work**: • Eleven samples were analysed for Pb-isotopes – 5 from Tulip Tree Creek grid, 2 from McPhersons prospect, 1 from Preston Ag prospect, and 3 from CRAE diamond drillholes from Crosby Creek. All possess Cambrian Pb signatures, the significance of this noted. • 34 rock samples were submitted for detailed thin section petrological description.- mostly from Tulip Tree Creek and Crosby Creek, but also Preston Ag and Loyetea Sth drillholes. This petrology confirmed most field names used. • Zinc ratios were determined for 32 samples with >200ppm Pb from similar areas to those sent for petrology. Results suggest 6 samples (core form Crosby Creek, rockchip from McPherson's Prospect) have classic Cambrian VHMS signatures, while Prestons Ag Prospect and 2 other samples show Cambrian vein-style mineralisation signatures

<table>
<tr><th>Company</th><th>Year</th><th>Exploration Activities</th></tr>
<tr><td></td><td></td><td>An attempt was made to re-interpret regional aeromagnetics, radiometrics and gravity data for the tenement, but failed to see through local effects from numerous intrusive bodies.
The negative geochemical anomaly at Castra Road was interpreted to represent possible evidence of ore systems (hydrothermal depletion), and its prospectivity was highlighted by mapped zones of sericite-pyrite-silica alteration.
Management of exploration in EL 96/87 reverted to Pasminco in July 1990, after which time no new work was completed and the tenement was relinquished in April 1991.</td></tr>
<tr><td>14: NORANDA</td><td>1990 - 1991</td><td>No results of relevance to current Zinifex tenure arose from the very limited review Noranda completed across EL 19/90. There is a small overlap with parts of the Nietta tenement, but no anomalies were identified or recommendations for further work made by Noranda before relinquishment.</td></tr>
<tr><td>15, 16: RGC EXPL.</td><td>1993 - 1996</td><td>RGC Exploration were active in two areas in the mid 1990's.
1. The first of these (EL 15/92) has a very small overlap with current Zinifex tenure and no results of interest.
2. The second area was in EL 42/92, partly overlapping the Nietta portion of the project tenements. Work completed by RGC in this area consisted of:
1:10,000 geological mapping and compilation which tied the geological sequences at Tulip Tree Creek with the Crosby Creek area.
Collection and asssying 9 rock chip samples from the Leven Canyon area (outside current tenure)
Re-logging of the 3 Crosby Creek diamond holes.
RGC were discouraged by the lack of mapped hydrothermal alteration, and chose not to extend tenure.</td></tr>
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6. WORK COMPLETED

6.1 YEAR 1, 2005-2006

Work completed on the project tenements for the 2005-2006 reporting period consisted of:

- Reconnaissance and prospect scale mapping, geological and lithochemical interpretations, correlations and assessment as part of the geological investigation by Dr Keith Corbett (reproduced in its entirety in Appendix 1).
- Collection and analysis of 58 wholerock geochemical samples from surface outcrop across the 3 tenements, with minor sampling outside the tenement boundaries to assist with regional correlations (sample locations displayed in Plan 1).
- Thin section preparation and petrological description of 78 samples, including the 58 wholerock samples above (Appendix 2)

As a result of this regional investigation, portions of the project tenements were interpreted to have no further prospectivity and recommended for relinquishment.

6.2 YEAR 2, 2006-2007

Work completed on the project tenements for the 2006-2007 reporting period involved the gridding, geological mapping and soil sampling and assaying of two grids, McPhersons and Castra Road, whose locations are shown in Figure 7.

6.2.1 *McPhersons Grid*

6.2.1.1 Mapping

The McPhersons grid was mapped at 1:2000 scale in July 2007. The level of detail has varied according to land use, with several distinct zones. The soil profile in general is mature and well developed. To the west and east of the grid, and in places just impinging onto the grid, there is relatively flat agricultural land over Tertiary Basalt. The soil profile on the basalt creates poor to nil outcrop. Several forestry plantations of both Pine and Blue gum exist across the grid, particularly in the southeast corner and northern edge. Outcrop is very limited in these areas also, and some dispersion is apparent. The centre of the grid is dominated by the curved valley formed around the East Gawler River, with up to 120 metres of relief leading into the valley. Outcrop is common along the riverbed, but almost absent for considerable distances away from the river due to scree/soil slopes.

Mapping has revealed two main rock types across the grid - a variably feldspar-phyric dacitic volcanic (VLDA) and a fine grained ashy volcaniclastic siltstone (CFSI). Lesser units include coarser grained volcaniclastic sediments, greywacke, finer and coarser end members of the ashy siltstone, and Tertiary Basalt. Details of the outcrop geology for this grid are shown on Plan 2. These main units are thought to correlate to the Dundas Group of the Mt Read Volcanics (e.g. Corbett & McClenaghan, 2003).

These two main units are separated by an inferred fault as shown on the interpretive geology map (Plan 3) with an apparent sinistral offset of approximately 200 metres. There is no exposure of this inferred fault; however its position is coincidental with a change in river direction. The only other structural information collected on the grid was several bedding readings from the CFSI unit, indicating a steep NE to vertical dip to stratigraphy, generally trending north-westerly to northerly. The lack of significant outcrop prevented a coherent structural picture of the grid.

There is poorly exposed silica-sericite-pyrite alteration along several hundred metres of creek bed downstream of the McPhersons prospect (see Plan 2). Cherty silicified sediment with strong sericite alteration and iron oxide (? after pyrite) has also been mapped both north and south of this prospect, reflecting a possible correlation with the sinistral offset on the fault mentioned above. Quartz veining and disrupted bedding is evident in outcrop east of the river on lines 7900N and 8000N (see Plan 2).

No mineralisation was observed on this grid apart from the intense alteration around the McPhersons Prospect itself. Grab samples from the alteration are enriched in base metals (see Appendix 3), with sample #379105 reporting 214ppm Cu, 174ppm Pb and 461ppm Zn. Other grab samples from this grid reported background levels of base metals.

6.2.1.2 Soil sampling

The McPhersons grid was sampled on a 25m x 100m density; that is, every 100 metre cross line was sampled at 25 metre spacing. A 70mm diameter hand auger was used to collect approximately 0.5 kg of sample from between 20-50cm depth, over a period of 4 days in July, 2007. Field crews collected information on soil colour, depth of sample, surface vegetation and where possible, a GPS co-ordinate of each sample location. Sampling information is listed in Appendix 3.

Samples from this grid were dispatched to Amdel, Adelaide for analysis. Details of methods used, detection limits, etc are contained in the Laboratory report, also in Appendix 3. Plan 4 shows sample locations and samples numbers on this grid.

Assays have been presented as a series of colour contoured plans at 1:5000 scale in Appendix 4. Due to the lack of variance in the assay results for Au, Ag, Cd and Mo, these elements were not plotted or contoured. Remaining elements are discussed below.

Ni, Mn, Fe, Cu and Zn all show a clear lithological response to the peripheral basalts discussed in the mapping section above. There also appears to be a weak lithological trend displayed in the Mn, As, Fe, Pb and Zn assays, with different thresholds for the two major units across the grid (dacitic lava and ashy siltstone) evident. In this respect, the soil data is deemed reliable and correlates well with the mapped outlines of these units (c.f. Plan 3)

Anomalous assays indicative of mineralisation are less common and often of lower amplitude. Precious metals did not report any anomalous assays, and in fact reported below detection in virtually every sample. Indicator elements (As, Ba, Mn, Ni and Fe) show sporadic low-level anomalies, which are difficult to separate from the lithological trends mentioned above. There is an As-Ni response in the approximate centre of the grid, north of the mapped fault (see Plan 3). Base metals (Cu, Pb, and Zn) show a relatively coherent multi-sample anomaly centred on and north of the existing McPhersons prospect. Peak values are 3-4, ~5, and 4-10 times background for Cu, Pb and Zn respectively. . Other features from the base metal assays across this grid are single point spikes, and currently of lower interest.

6.2.2 ***Castra Road Grid (Prestons)***

6.2.2.1 Mapping

The Castra Road grid covers a large area of variable geology. It was mapped at 1:2,500 scale over several days in August 2007. The level of detail has also varied according to land use, with several distinct zones. The soil profile in general is mature and well developed, similar to the McPhersons grid to the north, but with variations due to poorer soil developed over large areas of Owen Conglomerate. The West Gawler River runs through this grid and outcrop is sporadic along the riverbed, almost absent for some distance away from the river due to scree/soil slopes except where the river cuts areas of Owen Conglomerate (resistive weathering). Forestry plantations of both Pine and Blue gum are more common on this grid compared to McPherson’s grid, particularly in the western half of the grid. Outcrop is very limited in these areas also, and significant dispersion is apparent. Recent harvesting and re-planting has further disguised and dispersed outcrop in these areas.

The west and central north of the grid (herein geographic references are to local grid) is dominated by outcrop and scree slopes of Owen Conglomerate. A significant ridge of Owen Conglomerate runs E-W along lines 4000N and 4200N, west into the smaller valley formed by the West Gawler River. A smaller but sharper ridge of Owen cuts diagonally across the southwest corner of the grid. There is one small window of Tertiary Basalt on the grid, in the far northeast corner, with poor to nil outcrop over private farmland.

Mapping has revealed several Mt Read Volcanics correlate rock types across the grid. The main units are again a variably feldspar-phyric dacitic volcanic (VLDA) and a fine-grained ashy volcaniclastic siltstone (CFSI). Other significant units linked to this stratigraphy include a quartz-feldspar porphyry intruding in both the central south and the mid east, and a well developed black shale to siltstone ?capping the volcano-sedimentary pile in the central west (and also seen near the Castra Road Prospect). Minor variations to the volcaniclastic siltstone include coarser? pumiceous units, and (along line 4400N) more rhyolitic volcanics. Details of the outcrop geology for this grid are shown on Plan 5.

The grid is cut by a series of faults as shown on the interpretive geology map (Plan 6) with an unknown offset or sense of movement. There is good exposure of these faults along Castra Road, and in every case, the position of the fault is marked by the strong development of pyrite-silica-sericite+/-tourmaline alteration and intense shearing. Extensions of these structures are evident in several locations on the grid away from road cuttings (e.g. Sample #379953). Vicary (2006) suggests the major fault within this set of structures may be a Cambrian structure re-activated during regional Devonian deformation. The only other structural information collected on the grid was several bedding readings, again from the CFSI unit, indicating a moderate to westerly dip to stratigraphy, generally trending to the north, but showing a broad folding consistent with the regional geology.

Apart from the structurally focussed alteration mentioned above, there is poorly exposed scattered weak chlorite-sericite alteration of the coarser volcaniclastic units, especially in the central south of the grid.

No base metal sulphides were observed on the grid except for traces of galena at the Prestons Ag Prospect. Pyrite was observed at several road cuttings where faulting has focussed (?remobilised) fluids. Grab samples from the pyritic alteration are enriched in base metals (see Appendix 5), with sample #379954 reporting 774ppm Cu, background Pb and Zn, but 659ppm As and 39ppb Au. Other grab samples from this grid reported background levels, or very slight enrichment, of base metals.

6.2.2.2 Soil sampling

The Castra Road grid was sampled on a 50m x 200m density; that is, every 200 metre cross line was sampled at 50 metre spacing. A 70mm diameter hand auger was used to collect approximately 0.5 kg of sample from between 20-50cm depth, over a period of 4 days in August, 2007. Field crews collected information on soil colour, depth of sample, surface vegetation and where possible, a GPS co-ordinate of each sample location. Sampling information is listed in Appendix 5.

Samples from this grid were dispatched to Genalysis, Adelaide for analysis. Details of methods used, detection limits, etc are contained in the Laboratory report, also in Appendix 5. Plan 7 shows sample locations and samples numbers on this grid.

Assays have been presented as a series of colour contoured plans at 1:10,000 scale in Appendix 6. Due to the lack of variance in the assay results for Au, Ag, Cd and Fe these elements were not plotted or contoured. Remaining elements are discussed below.

Ba and As +/- Zn, Ni, Pb and Mn all show a moderate to high lithological response to the Owen Conglomerate discussed in the mapping section above. In some cases, ground truthing is required to check the exact extent of the Owen boundaries as the soil assay data suggests clearly defined boundaries slightly offset from mapped boundaries in areas of poor outcrop.

There is a weak to moderate lithological trends displayed in the Mo, Mn, As, Ni, Pb and Zn assays, with both the black shale and the qtz-feld porphyry (QFP) easily outlined by these assays. In this respect, the soil data is deemed reliable and correlates well with the mapped outlines of these units (c.f. Plan 6). The expected "swamping" of data by the Owen Conglomerate has not eventuated, and more confidence can be placed on lower level anomalies

Anomalous assays indicative of mineralisation are less common and often of lower amplitude. Precious metals did not report any anomalous assays, and in fact reported below detection in virtually every sample. Indicator elements (As, Ba, Mn, Ni, Cd, Mo and Fe) show sporadic low-level anomalies, which are difficult to separate from the lithological trends mentioned above. There is a Ba-As-Ni coincident response of interest centred on the area SE side of Castra Road on lines 3800N and 3600N (see Plan 6 and Appendix 6). As, Ni, Mn and Mo assays create a multi-element feature on the southern most two gridlines between approx 3200E and 3500E, roughly coincident with a mapped coarse volcaniclastic conglomerate (see Plan 6)

Base metals (Cu, Pb, Zn) show a relatively coherent multi-element anomaly across several samples on lines 3400N and 3200N, which is along strike from the Prestons Ag Prospect. Some dispersion from the shale mapped here may be the cause however. There is also a smaller peak of Pb-Zn-Cu assays at approx 3400E on line 4400N that requires ground checking, due to cultural interference. Other features from the base metal assays across this grid are again single point spikes of lower interest.

6.3 YEAR 3, 2007-2008

Work completed on the project tenements for the 2007-2008 reporting period involved ground EM on two grids, and blanket coverage by airborne time-domain EM (VTEM).

6.3.1 *Ground EM*

Quantec Geoscience conducted ground-EM over two existing grids in January and February 2008. The McPherson's Grid (EL 18/2005) and the Castra Road Grid (EL 17/2005) were established during the second year of the tenements, and mapped and soil sampled soon after (see Hicks & Corbett, 2006). Quantec survey specifications are shown in Appendix 7, but briefly, the fixed loop EM specs are as follows. The receiver was a SMARTem with tri-axial fluxgate magnetometer sensors. A standard RVR coil receiver was also used to collect the vertical component of the impulse response. The transmitter used for this job was a Zonge GGT-10 running at 4.1667 Hz with a ramp time of 0.2 ms. Readings were attempted every 25m on the McPherson's grid and every 50m on the Castra Rd grid on lines 100m and 200m apart respectively. Data was inspected by Contract Geophysicist Rob Angus from RAMA Geoscience, Brisbane during the survey, as well as providing all interpretations herein.

Quantec attempted to read the **McPhersons grid** from two loops, as shown on Figure 8. It should be noted that for logistical reasons, the eastern edge of both loops were extended a few tens of metres further east so as to run along the edge of the road. Importantly, there was a low voltage power line which ran along this road in the vicinity of the loops. It was immediately apparent that there was an intense oscillation or ringing in the data, which swamped any genuine signal and this interference was evident in all channels (particularly at later times) along all lines attempted, with only a very small decrease in amplitude away from the loop edge. Several attempts to remove this interference failed, and test loops at an electromagnetically quiet area suggested that the instruments were working correctly so could not be the cause of this interference.

The decision was made to 'flip' the loop across the grid, in case the oscillation was being caused by a coupling between the loop and the powerline. The western edge of the loops was retained, while the eastern edges relocated to 6800mE (see figure 8) and cross-lines dragged west to complete the new loops. Unfortunately, the oscillation was still present (albeit at a smaller amplitude) and after examining two days worth of data, the decision was made to abandon this grid and move to the larger Castra Road grid. No useable data was collected on this grid.

Two transmitting loops were then established on the **Castra Road grid** as shown in Figure 9. The 200m spaced lines were read at 50m spacing along the grid lines shown on Figure 9. Apart from the size of the loops and station spacing, survey specifications for this grid are identical to the previous grid.

The collection of data at this grid proceeded smoothly with no interference or equipment problems. As interpreted by Rob Angus in Appendix 7 and 8, the data suggests quite clearly that there is a veneer of moderately conductive cover up to 50 metres thick over a uniformly resistive basement. Given the resistive environment, any slightly conductive targets would produce a significant contrast in this EM data. There were no such anomalous responses identified in the data unfortunately, and no features were recommended for follow-up. Profiles and 3-dimensional conductivity-depth images (CDI's) from the Fluxgate receiver are contained in Appendix 8.

6.3.2 *VTEM*

Geotech Airborne Pty Ltd flew airborne EM (VTEM) across the entire tenement package in March and April, 2008, as part of a larger survey of Zinifex tenure in Tasmania. Data presented here also includes the Groove Creek tenement (EL 16/2007) as this formed a contiguous block with the Castra tenement (EL 18/2005). Approximately 741.3 line kilometres of data was collected across these three project tenements (945.5 line kilometres when the adjacent Groove Creek tenement is included).

Due to differing regional strike across the project tenements, there were three different blocks of data collected with differing flight orientations. Block 3 (the Nietta tenement EL 17/2005) was flown in an AMG northeast-southwest direction, Block 4 (the Castra tenement EL 18/2005 and adjacent Groove Creek EL 16/2007) was flown AMG east-west, and Block 5 (the Sheffield tenement EL 16/2005) was flown AMG north-south (see Plan 8). Flight lines were a nominal 200 metres apart, and the helicopter flew at a nominal height of 80 metres at 80 km/hr, although topography and culture prevented this in some instances. The sensor was at a nominal 30 metre height above ground level.

Full details of all survey specifications and results are contained in Appendix 9, or alternatively available at the contractors website (www.geotechairborne.com).

Preliminary data was examined throughout the survey period by consultant Geophysicist Dr Jovan Silic, of Flagstaff GeoConsultants, Melbourne, Victoria. Numerous features were identified in the preliminary data. These were checked against topographic and land use maps to identify obvious cultural sources. After this first pass, only three features were recommended for further investigation. These features are listed in Table 3 below.

TABLE 3: List of VTEM anomalies recommended for further investigation

Target No.	**Easting** (AGD66_z55)	**Northing** (AGD66_z55)	**Easting** (WGS84_z55)	**Northing** (AGD66_z55)	**Comments**
Blk_04_5	431219	5430433	431331	5430615	Check for culture
Blk_04_6	430568	5430386	430680	5430568	Check for culture
Blk_05_5	442043	5412928	442155	5413110	Very strong IP effect

6.4 YEAR 4, 2007-2008

All the "anomalous" responses interpreted from the preliminary VTEM data were re-assessed upon receipt of the final data. Final interpretation considered them to be explained by cultural features and non-prospective geology (for Cambrian Rosebery or Hellyer type, Zn-Pb-Cu-Au-rich Volcanic Massive Sulphide mineralisation hosted by the Mount Read Volcanics).

A series of images have been produced for each of the three blocks Block 3, EL 17/2005; Block 4, EL 18/2005 & EL 16/2007; and Block 5, EL 16/2005, at early (channel 10), mid (channel 20) and late (channel 25) times, as shown on Figures 10 to 18.

Additional follow-up through, e.g., testing VTEM anomalies by field checking, geological mapping and sampling, ground-EM and diamond drilling was considered unwarranted in the light of this interpretation.

7. CONCLUSIONS & RECOMMENDATIONS

During the first year of tenure, work was of a regional nature and indicated a general lack of CVC-equivalents through the project tenements, as well as an absence of Rosebery Host Rock sequences and any large areas of hydrothermally altered rocks.

Several areas where there was insufficient evidence of target Cambrian VHMS mineralisation to warrant further work were relinquished.

During the second year of the tenement work focused on what were considered the two most prospective areas; the McPhersons Prospect and the Castra Road Grid.

The program during year 3 of the project tenements consisted of ground-EM follow-up of the McPhersons Prospect and the Castra Road Grid., and VTEM airborne EM over the entire tenement package.

Results from the ground EM were disappointing, with a technical failure on the first grid, and no anomalous responses identified on the second grid.

The entire tenement package was flown at 200m spacing with the helicopter borne deep searching airborne EM system (VTEM) at varying orientations tailored to best couple with inferred regional strike.

A number of anomalous responses were identified but the majority were downgraded as due to cultural features such as buildings and powerlines by reference to topographic maps and land use data.

In year 4 interpretation of final VTEM data downgraded the few anomalous responses recorded in the preliminary data and considered them to be explained by cultural features and non-prospective geology (for Cambrian Rosebery or Hellyer type, Zn-Pb-Cu-Au-rich Volcanic Massive Sulphide mineralisation hosted by the Mount Read Volcanics).

EL 16/2005 Sheffield was recommended for relinquishment following Year 4 of tenure.

8. KEYWORDS & LOCALITY

Keywords

Geology, Fossey Mountain Trough, Castra, Nietta, Sheffield, geochemistry–whole rock, thin section petrography, correlations, MRV, previous exploration, geological mapping, Tyndall Group, Western Volcano-Sedimentary Sequence, Crosby Creek Prospect, Preston Silver Mine, Loyetea South, Castra Road Prospect, McPhersons Prospect

Locality

1:250,000 BURNIE SK 55-3

1:100,000 INGLIS 8015, FORTH 8115.

1:25,000 CASTRA 4242, LOYETEA 4042, LOONGANA 4041, WILMOT 4241, SHEFFIELD 4441.

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