DUNDAS EL21/96

Helicopter-borne Electromagnetic Survey
over the Dundas Region Western Tasmania
(May 1999)

Assessment of Anomalies

PASMINCO
EXPLORATION

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Introduction

The Dundas area has a prolonged exploration history for base metals, tin and more recently gold, as indicated by the large number of prospects in the area. It is estimated that well over 100 surface drill holes have been collared on the EL at a variety of geological, geochemical and/or geophysical targets.

A high-resolution helicopter-borne frequency domain electromagnetic (HEM) and magnetic survey was conducted for Pasminco in April 1999 over the Dundas EL21/96 in Western Tasmania (McNeill & Simpson, 2000). The aim of the survey was to detect anomalous conductive responses in the EM data that could be directly targeted for base-metal mineralisation. An additional aim of the survey was to facilitate geological mapping of the Dundas region to assist in defining prospective horizons on which to focus more detailed exploration using alternative techniques.

A suite of anomalous EM responses was identified from an interpretation of the HEM survey in October 2000 (Dauth, 2000). A total of 15 HEM responses were determined, with 14 recommended for follow-up. This report is an analysis of the previous work undertaken on the HEM anomalies, and recommendations for future work.

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HISTORICAL WORK

The Dundas area has been the focus of extensive exploration activity since the 1930's, when modern exploration commenced. Weber & Murphy (1997) provide a comprehensive summary of previous exploration on the tenement area.

GEOLOGICAL SETTING

The Dundas area is geologically very complicated, with most of the geological units appearing to be faulted against each other. A synopsis of the geology within EL 21/96 has been taken from Crossing & Halley (1990) and is summarised below with modifications:

Oonah Formation:

- Proterozoic.
- Poorly sorted, carbonate-rich, matrix supported conglomerate, overlain by micaceous quartzite, grey to black graphitic siltstones & shales, often intensely sheared (≡ Concert Schist).

Crimson Creek Formation:

- Cambrian.
- Turbiditic volcaniclastic lithic wackes, derived from the erosion of mafic volcaniclastics, massive siltstones, mudstones and basaltic lava flows.

Numerous gabbros intrude this sequence in the vicinity of Renison Bell and occasional impure dolomite horizons have been recorded.

Dundas Group:

- Cambrian.
- Mixed epiclastic and minor volcaniclastic sediments. The group is dominantly comprised of turbiditic to shallow water sediments containing immature conglomerates, monotonous siltstones and shales containing some sandstone and grit interbeds. Towards the top of the sequence felsic to intermediate tuffs, related volcaniclastic sediments and minor lava flows (or intrusions) occur. These volcanic units generally show marked variations in facies and thickness over short distances and often appear to interfinger with one another making correlations very difficult.

Ultramafic Complexes:

- Cambrian.
- These outcrop at a number of locations throughout the licence area and have also been intersected by drilling at depth. They typically show strong serpentinite alteration and exhibit a high degree of internal deformation. The only exception to this is in the Serpentinite Hill area where pockets of unserpentinised dunite and pyroxenite have been intruded by gabbro dykes.

Pine Hill Granite:

- Devonian.
- The southeastern ‘tail’ of this intrusion occurs on the mid-western side of the Dundas licence. The intrusion is described as a porphyritic adamellite and is thought to consist of a series of intrusions. Locally it exhibits early silica and sericite alteration of the both the granite and country rocks, followed by later boron metasomatism.

Glacial

- Quaternary
- Glacial gravels occupy a N-S zone in the NE quadrant of the EL.

The Dundas licence area is one of structural complexity, making the determination of age relationships between the various stratigraphic units difficult. Shearing and faulting is often preferentially taken up by the more mafic and shale dominated units, thereby complicating stratigraphic relationships. The main folds generated during the Devonian include the Huskisson Syncline north west of the Dundas licence. The Renison Anticline (to the west of the Dundas licence) and the Dundas Anticline, where the Oonah Formation has been folded, NW of Mount Dundas.

Faulting appears to be closely associated with most of the mineralised systems. Generally there are two prominent groups of faults, a NNW trending steeply dipping group with limited dip slip to oblique slip movement and a steeply dipping NE trending set which show larger orders of displacement. A true estimate of the amount of displacement along these NE trending structures is difficult to quantify mainly due to a lack of recognisable marker

beds. The NE faults often occur along margins of the mafic-ultramafic complexes, whereas the NNW faults are more generally confined. These faults and the Cambrian thrusts (including the Rosebery Fault) also acted as zones of structural weakness during the Devonian which resulted in a secondary period of mineralisation and partial remobilisation of Cambrian ore.

DUNDAS FIELD MINERALISATION

There are numerous historical workings dating back to the turn of the last century, and a great number more prospects developed since in the Dundas mineral field. The following summary of mineralisation is compiled largely from the following: Crossing 1992, Crossing & Halley 1990, Discala 1974, Forsythe 1969, Macnamara 1979, Weber & Murphy 1997.

There are a variety of mineralisation styles present within Dundas EL 21/96. These range from Devonian Pb-Zn-Ag veins (Comet, Kosminsky), Devonian Sn-Cu-As veins (Greens, Frazer), Late Devonian replacement zones of Sn-Cu-As-W (Clifton, Colebrook Hill Skarn) and Quaternary placer Au-Sn (Laffer's Workings, Cornish's Workings).

The principal mineralising events are associated with hydrothermal mineralisation which accompanied the Devonian granite intrusion and the mineralogical zoning of the Zeehan-Dundas field. The dominant mineralisation style is fissure veins located in rocks ranging from Upper Proterozoic (Oonah Fmn) to Cambrian (Dundas Gp). The strike of the deposits is dominantly northwest, often with a westerly dip. No important lodes seem to be located along major fault planes, though mineralisation often occurs in proximity to them, probably associated with 'splays' off the main faults (i.e. Montezuma Fault). There are important known instances in which the lithology of the host rock has controlled the location of major ore shoots (i.e. Comet, Adelaide).

Mineralisation in the Dundas field is patchy and low grade. The occasional ore shoots are erratically distributed within the controlling structural features are erratically distributed within the controlling structural features, are small in size and alternating with long low grade or barren sections. Despite intensive exploration completed over the area since the early 1940s, only numerous small resources have been located. The greatest of these is the Kosminsky-South Comet mine with up to 60,000t @ 8.4%Pb, 7.4%Zn and 8ozAg/t. The mineralisation at South Comet comprises a series of multiple lenses within a well-defined shear zone, with true widths ranging from ¾m – 2.5m thick.

INTERPRETATION OF HEM DATA

Results of an interpretation of the HEM data are contained in a report by Dauth (2000). A total of 15 HEM anomalies were delineated from the HEM survey, these are listed in Table 1. All anomalies with the exception of D12 were recommended for follow-up (generally by looking at historical exploration data). The remaining 14 anomalies were interpreted as either shale

responses, cultural, or conductive cover. The most anomalous response is that produced by the Colebrook Hill Skarn system. No modelling has been conducted on the EM data, with the aim of the survey to identify anomalies for further investigation. It is estimated that all the identified EM responses are situated within the top 100-200m from surface. Therefore it is most likely that ground follow-up with geochemistry, further geophysics or simply geological mapping should be sufficient to determine whether drill testing is warranted.

Table 1. Summary of HEM Anomalies – Dundas EL21/96

Anomaly	Easting AMG	Northing AMG	Interpreted Source
D1	374900	5373600	Shale / mineralisation
D2	376500	5373400	Shale / mineralisation
D3	374100	5373200	Culture?
D4	374350	5372200	Shale / mineralisation
D5	375000	5371500	Colebrook Hill
D6	375750	5370900	Shale / mineralisation
D7	372750	5367400	Shale / mineralisation
D8	370150	5367800	Po veining
D9	370900	5367900	Po veining
D10	370300	5366200	Shale / mineralisation
D11	373000	5365300	Shale / mineralisation
D12	373850	5365000	Glacial
D13	371500	5364800	Shale / mineralisation
D14	372950	5364000	Shale / mineralisation
D15	371750	5361900	Shale / mineralisation

ASSESSMENT OF IDENTIFIED ANOMALIES

Evaluation of the historical work undertaken on the HEM anomalies was undertaken during late 2000 / early 2001 from reports within the Pasminco Exploration Library in Rosebery, and the MRT Library in Hobart. Field checking of the anomalies was undertaken between April –July 2001. The results have been presented as an A0 plot summarising the geology / geochemistry / geophysics / historical workings and drilling associated with each anomaly. The anomalies are discussed below, as well as a geochemical anomaly identified in the historical data:

D1

EM Response: Unknown.
Follow-up Rating: Low – Medium

This anomaly is located on the northern side of the Pieman River where there has been little done in the way of ground exploration. The region is covered by glacials, and as such there are no historical workings. Drilling at the nearby D2 anomaly has revealed a series of carbonaceous / graphitic pelites beneath the glacial cover.

D2

EM Response: Black Carbonaceous Shales.
Follow-up Rating: None Required

This anomaly is located on the northern side of the Pieman River. The only historical work that has been completed in this largely inaccessible area is a small grid (GAO) conducted by RGC Ltd over a VLF anomaly. Two drillholes on this grid intersected a sequence of black laminated carbonaceous pelites with minor traces of pyrite underneath 6-12m of glacial debris. This unit was considered sufficient to have caused the geophysical responses. No geochemical encouragement deterred further work.

D3

EM Response: Cultural (?)
Follow-up Rating: None Required

Located in the northern part of the EL, under glacial cover, government mapping along the Pieman River (anomaly centre) shows the anomaly to be within Undifferentiated Dundas Group. The EM response is a single line anomaly, and quite possibly cultural in origin. No previous work has focussed on this anomaly.

D4

EM Response: Colebrook Hill Skarn Mineralisation (?)
Follow-up Rating: None Required

Possible northern extension of the Colebrook Hill Skarn system with the same geophysical characteristics. No previous work has been focussed on this anomaly.

D5

EM Response: Colebrook Hill Skarn Mineralisation
Follow-up Rating: None Required

The Colebrook Hill area was extensively explored in the early 1980s by the EZ-Getty Oil JV over EL1/62. It is concluded that the area is a Cu-As-Sn-W skarn zone containing a steeply dipping lode hosting sub-economic copper mineralisation (max. 1.3m @ 3.02%Cu). The area is underlain by a geochemically anomalous granite.

D6

EM Response: Black Carbonaceous Shale
Follow-up Rating: None Required

Field checking and previous drillhole information show that the anomaly is coincident with a black carbonaceous shale unit which is surrounded by, and interbedded with a grey fg quartz sandstone / quartzite. These shales contain very minor Pb-Zn anomalism. There is a possible deep repetition of the Colebrook Hill skarn system supported by EM / magnetic data similarities to D4-D5.

D7

EM Response: Graphitic Shears in Fault Zones / Mineralisation
Follow-up Rating: Medium

This N-S / NE-SW trending EM anomaly over a length of 2.5km is closely parallel to a prominent fault zone. Drilling intersected zones of broad graphitic shears caused by the faulting of a sequence of carbonaceous and variably calcareous siltstones & shales. The area is predominantly comprised of turbiditic sediments, with a non-outcropping serpentinite complex intersected in drilling. Historical workings & prospects in the area (incl. Frazers, Greens, Montezuma & Godkin) are comprised of Late Devonian vein systems varying from Sn to Ag-Cu-Pb-Zn to Fe. Historical soil sampling in the Pasminco Database does not extend entirely over the anomaly, yet shows zones anomalous in As+Cu+Pb+Zn to the southwest.

D8

EM Response: Pyrrhotite Mineralisation
Follow-up Rating: None Required

Located on the south side of the contact between sediments (Dundas Gp) and an ultramafic unit to the north, the anomaly is within a zone of sericite-quartz alteration containing low-grade sulphides. The EM & Magnetic response is consistent with a pyrrhotite occurrence. The anomaly is located within the Renison Mine Lease.

D9

EM Response: Pyrrhotite Mineralisation
Follow-up Rating: None Required

The anomaly is located in a zone of qtz-py-po veining along the contact between sediments to the south (sltst–sst) with silica alteration near the contact with a very coarse-grained amphibole rich ultramafic unit which is altered to clay – sericite near the contact. The anomaly is located within the Renison Mine Lease.

D10

EM Response: Sheared Black Pyritic Shale along the Kapi Fault
Follow-up Rating: None Required

Coincident with an zone outcropping sheared black pyritic shale with a similar outcropping pattern to the EM response. Soil sampling shows anomalous Sn-Zn-Pb values which map out the location of the Kapi Fault as a N-S striking feature extending to the north of the anomaly. This fault hosts uneconomic copper mineralisation at the Kapi Mine. No significant mineralisation was encountered from drilling.

D11

EM Response: Sheared Shales / Mineralisation
Follow-up Rating: Medium – High

This suite of anomalies is coincident with a small portion of the Montezuma Fault, and is located at an inferred triple junction in the regional geology. The area contains anomalous surface geochemistry and numerous Late Devonian Vein deposits. Wallaces Prospect produced 20t of high-grade ore @ 2%Cu +

41.7%Pb + 1%Zn + 0.09%Sn + 217%Sb + 5.3g/tAg. Drilling has intersected replacement style mineralisation as well as vein / stringer intervals with grades including 1m @ 7.5%Pb + 1.95%Zn + 670g/tAg within a sedimentary breccia, and 3.3m @ 1.17%Zn + 7.11%As + 0.11%Sn within a volcaniclastic debris flow breccia. This anomaly has the second highest amplitude (after Colebrook Hill) in the survey.

D12

EM Response: Glacial
Follow-up Rating: None Required

A single line EM anomaly with no associated magnetic anomaly resembles glacial cover.

D13

EM Response: Unknown
Follow-up Rating: Medium

Very little information is known about this largely inaccessible anomaly. The strike length of approximately 1.4km and the sharp edges suggest a lithological source. The anomaly is located near a triple junction in the regional geology which may be of interest in potential mineralising systems. An assortment of unnamed Zn-Pb-Ag±Cu±As prospects are located in the vicinity of the anomaly. Anomalous Zn-Pb soil geochemistry is located in the vicinity of the anomaly (no coverage over the anomaly).

D14

EM Response: Pyrite-Veined Graphitic Black Shales
Follow-up Rating: None Required

Part of a series of long, parallel zones which extends up to D11. D14 has been extensively tested by drilling with no massive sulphide conductors intersected down hole. EM response attributed to pyritic black shales / graphitic schist which outcrops at surface. Minor Zn-Pb-Ag-Sn vein mineralisation is contained predominantly within the Oonah formation siltstones and quartzites. The anomalous Maestries Dolomitic Conglomerate at surface may be a groundwater reaction with the carbonate rather than primary mineralisation, as there were no significantly mineralised intervals intersected in drill core. Results discouraged further drilling with the Montezuma Fault system seen to have only weak mineralisation.

D15

EM Response: Unknown
Follow-up Rating: Medium

Drilling to the west, and previous company mapping show the region to be covered by a slate / sst sequence possibly belonging to the Concert Schist unit (Oonah Formation). This anomaly is largely inaccessible, but is located to the North East of the Great South Comet mine, and east of Kosminsky

mine. Anomalous Pb-Zn geochemistry is present in the rock chip and stream sediment sampling draining north of the anomaly.

C1

EM Response: Unknown
Follow-up Rating: Medium – High

A coherent Pb-Zn-Cu soil geochemistry anomaly (centred on 374,855mE / 5,367,010mN) was identified in analysis of the geochemistry over the identified HEM anomalies. The anomaly has a strike length of 900 metres, and at its widest point is 400 metres across and is located on the eastern edge of a circular magnetic high. Maximum values within this coherent anomaly include 1200ppm Zn, 810ppm Pb & 460ppm Cu. A small EM response is located with a similar orientation to the geochemical anomalism, but slightly offset to the south. There does not appear to be any historical workings associated with the anomaly, and the only previous drilling centered on the magnetic high (which remained unexplained). Mapping has identified a largely turbiditic horizon with a Mn-Py altered zone. The disseminated Pb-Zn-Ag-Cu Cambrian Hamilton Mine is located 700m to the east.

DISCUSSION & RECOMMENDATIONS

Table 2 summarises the outcomes of the assessment of the HEM anomalies:

Table 2. HEM Anomalies – Recommendations

Anomaly	Source	Follow Up	Ranking
D1	Unknown	L – M	5
D2	Black Carbonaceous Shale	NR	-
D3	Unknown – Cultural?	NR	-
D4	Colebrook Hill Skarn?	NR	-
D5	Colebrook Hill Skarn	NR	-
D6	Black Carbonaceous Shale	NR	-
D7	Graphitic Shearing / Mineralisation?	M	4
D8	Pyrrhotite Veining	NR	-
D9	Pyrrhotite Veining	NR	-
D10	Black Pyritic Shale	NR	-
D11	Sheared Shales / Mineralisation?	M – H	1
D12	Glacial	NR	-
D13	Unknown	M	2
D14	Pyrite Veined Graphitic Black Shale	NR	-
D15	Unknown	M	3
C1	Unknown	M - H	(1b)

(L – low; M – medium; H – high; NR – not recommended for follow-up)

RANKING:

Five anomalies have been ranked for follow-up from the HEM survey; the following recommendations and possible targets are listed in more detail:

HIGH RANK - EM

D11

Target: Devonian Pb-Zn-Cu vein / fault hosted mineralisation

Recommendations: This system of EM anomalies has a high amplitude, and is located in a tectonic setting favourable for development of a large sized base metal vein style deposit.
Access to the anomaly should be made, for geological mapping and ground truthing. Modelling of the depth to the conductors should be undertaken on the EM. Comparison should be made with the work undertaken over anomaly D14 that is in a similar setting.

MEDIUM RANK - EM

D13

Target: Devonian Pb-Zn replacement / vein style mineralisation

Recommendations: The large strike length of the EM anomaly could represent a replacement style system or a lithological control. Access should be made to field check the possibility of these observations. Additional soil sampling should also be undertaken in areas which are void of historical sampling.

D15

Target: Devonian Pb-Zn-Ag vein style mineralisation

Recommendations: The form of this anomaly and anomalous rock chip & soil sampling makes this prospect attractive. Access should be extended from the nearby Kosminsky Mine. Further follow-up soil sampling could also be undertaken, and a comparison of the nearby base metal rich South Comet – Kosminsky mineralised system.

D7

Target: Devonian Cu-Sn-Zn-Pb vein style mineralisation

Recommendations: A detailed assessment of all historical work in the area surrounding the D7 anomaly will need to be undertaken to reassess the prospectivity of this area to host significant mineralisation.

LOW RANK - EM

D1

Target: Unknown

Recommendations: The importance of the formational features at D2-D3 will need to be assessed to consider if this applies to D1. The lack of historical workings in the area, also significantly downgrades this anomaly. The possibility of base metal mineralisation buried underneath glacials will need to be considered, and techniques to see below this

may need to be applied (partial leach / groundwater sampling?).

HIGH RANK - GEOCHEM

C1

Target: Cambrian Pb-Zn-Cu-Ag metal mineralisation

Recommendations: A single line partial leach / conventional soil sampling orientation line was conducted over the peak of the anomaly; results from this will need to be interpreted. A pulp of the soil sample containing high lead is to be submitted for Pb-Isotope analysis to determine the age of mineralisation. Modelling of the potential small EM anomaly will need to be undertaken. Further geologically mapping is required to determine the source of this large C-horizon anomaly.

CONCLUSION

The use of electrical geophysical methods in the Dundas field to detect mineralisation is not completely successful because of the common occurrence of carbonaceous shales which become graphitic and thus conductive when deformed. The anomalies are all located within 100 – 200m of the surface which means that if they were due to base metal mineralisation they should already have been found by previous explorers. All base metal mineralisation so far located in the area as a result of extensive exploration by previous explorers has been Devonian in origin.

A total of five EM anomalies have been considered worthy of follow-up for potential base metal mineralisation potential. Many of these anomalies will require field checking only with creation of tracks for access. Others will require a more in depth analysis of any historical work pertaining to the anomaly, and a further determination of its potential as a target for further follow-up. The C1 geochemical anomaly will require further geological mapping, and modelling of the available geochemical and geophysical data to access its prospectivity.

The typical base metal vein systems of the Dundas Mineral Field would not provide a target large enough for Pasminco to be mined as a stand-alone target. The larger South Comet vein system has provided mill-feed for the Rosebery Mine in the past however. Base metal skarn and / or replacement deposits, such as the Colebrook Hill Cu-Sn-W system offer the potential for larger deposits, however the Colebrook Hill area is probably already over-explored. The remaining prospectivity of the Dundas field remains in its potential to provide “mill-feed” sized targets in the order of tens – hundreds of thousand tonnes of high-grade Pb-Zn-Ag vein systems. The possibility of a base metal VMS deposit is a remote possibility.

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