



**WHITE SPUR LAKE EL 41/2006**  
**ANNUAL and FINAL REPORT**  
**FOR THE PERIOD ENDING 7<sup>th</sup> MAY 2011**

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## 1. SUMMARY

This report details work undertaken on exploration licence 41/2006 White Spur Lake during the full term of the licence (7<sup>th</sup> May 2007 to 7<sup>th</sup> May 2011). The principal exploration targets sought within the licence area are Hellyer or Rosebery-type VHMS Pb-Zn-Cu-Ag-Au massive sulphide deposits.

Due to unexpected corporate and financial conditions that affected OZ Minerals throughout 2008-2011, little work was conducted on any of the Tasmanian Tenements. Restructuring of the company and the formation of MMG has resulted in the re-ignition of the Tasmanian exploration projects in 2011.

Re-logging of 16 drillholes followed by lithogeochemical assessment was carried out in conjunction with a VTEM survey across the entire licence in the 2007-2009 period.

Field mapping and compilation of a 1:10,000 interpretive map and cross sectional analysis was completed during the 2009-2010 period. Several stratigraphic drill holes were designed to test conceptual targets on the western boundary of the tenement and were proposed to be drilled in the 2010 calendar year. Unexpected circumstances resulted in a deferral of this program.

Drilling will be followed by down hole geophysics including DHEM and tomography.

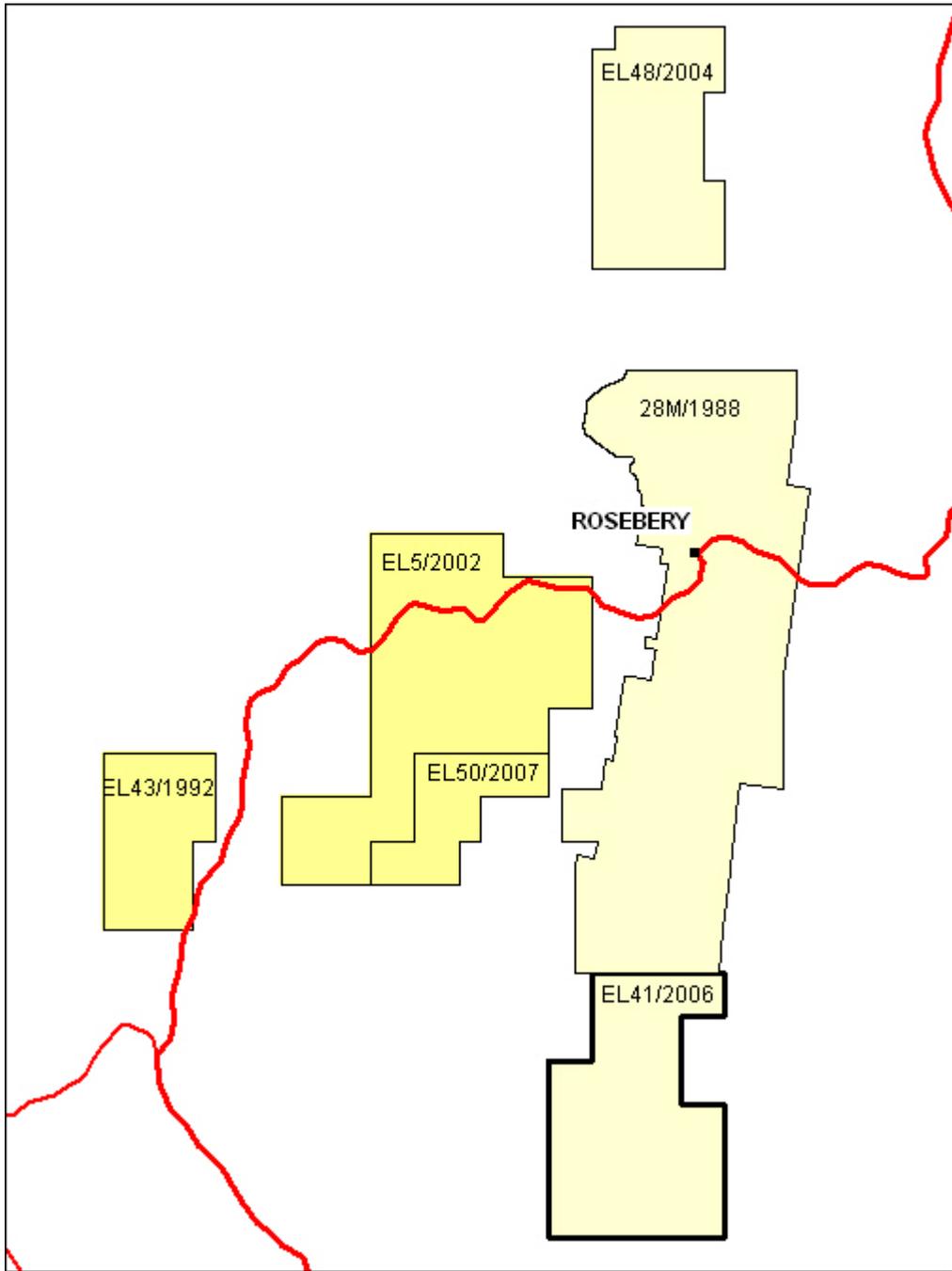
Acquiring an EL to the west of White Spur and the Rosebery ML is recommended to assist exploration of the district, particularly to the south along the Rosebery Fault.

## 2. INTRODUCTION

This report details work undertaken on exploration licence 41/2006 White Spur Lake (Figure 1), from 7<sup>th</sup> May 2007 and 7<sup>th</sup> May 2011.

The White Spur licence covers a portion of the Cambrian Mount Read Volcanics to the south of the Rosebery and Hercules Mines and to the west of the Henty Mine in Western Tasmania (Figure 2). The principal exploration targets sought within the licence area are Hellyer or Rosebery-type VHMS Pb-Zn-Cu-Ag-Au massive sulphide deposits. A 5 km strike length of the contact between the White Spur Formation (WSF) and the Central Volcanic Complex (CVC) runs through the centre of the tenement and has been the main target of recent exploration. The CVC – WSF contact has been considered to be a correlate of the Rosebery host horizon by previous workers (Hicks, 2009, Vicary, 1997). A second and less well understood target is the Jones Creek package, in the NE part of the tenement. This sequence of shales and fine volcanogenic sediments associated with rhyolitic intrusives is thought to correlate with the Rosebery host position, but correlations are not as clear as for the base of the White Spur Formation due to structural complications.

Access into the tenement is via Howards Rd. (off the Anthony Rd) or on 4WD tracks (in particular the Moores Pimple track) heading south from Mt Read and the Hercules Mine. Within the EL access is via a series of old logging tracks and a new HEC road, which follows a major canal.



**Figure 1. Location EL41/2006 White Spur**

### **3 LAND TENURE**

White Spur Lake EL 41/2006 (20 sq km) was granted to Zinifex Australia Ltd on 7 May, 2007 after a successful bid on ERA 679. Title was transferred to OZ Minerals, then MMG (Minerals and Metals Group Australia) during the reporting period.

Land covered by EL 41/2006 comprises land vested in the HEC (105 ha) with the remainder being Crown Land designated as Deferred Forests. The EL is almost entirely within the Mt Dundas Regional Reserve (exploration allowed, but programs must be approved by the MEWG).

### 3. GEOLOGY

The regional geology of EL 41/2006 White Spur is described on MRVP Map 3 (Corbett, 1986) and in Vicary (1997, 1998). Some areas have been mapped in more detail as Honours (Dugdale, 1992; Nunn, 1995) and M Econ. Geol. (Poltock, 1992) theses.

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 Black Bluff eastwards through Gowrie Park and Mole Creek, and the Southern MRB comprising areas west and south of Macquarie Harbour. EL 41/2006 is in the central part of the central MRB.

Basement in the Central and Northern MRB is of Precambrian age, comprising predominantly greenschist facies meta-sediments 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 east of the White Spur licence.

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 volcanoclastics, turbidites, carbonates, chert and minor evaporites. 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 area of EL 41/2006 can be subdivided into three main units; the WSF, CVC and Henty Fault Wedge Sequence. Of these only the first two are part of the VHMS prospective sequence.

The WSF was formally defined by Corbett and Lees (1987) as a west facing sequence of felsic tuff, siltstone, greywacke and slate that unconformably overlies the Central Volcanic Complex between the North Henty Fault and Williamsford. The WSF is conformably overlain by Dundas Group conglomerate, quartzwacke, mudstone and lithicwacke on the western end of Howards Road. The abundance of quartz-phyric detritus in the White Spur Formation may suggest derivation from Tyndall Group rocks located to the east of the Henty Fault Zone.

Detailed geological maps and of the WSF and CVC contact have been completed in the south and central areas by Vicary (1997, 1998), the north by McNeill (2005 and 2006) and Lees, (1988). Additional mapping of the western margin and synthesis of previous mapping programs was completed in this report. A compilation geological map is located in Enclosure 1.

The WSF can be divided into six mappable sedimentary lithofacies in the White Spur area (Vicary 1997, 1998). These are:

- A Black pyritic siltstones
- B Micaceous volcanoclastic sediments
- C Ashy volcanoclastic siltstones
- D Medium – fine grained volcanoclastic sandstones
- E Crystal-rich volcanoclastic sandstones
- F Coarse lithic rich volcanoclastic conglomerate

The internal stratigraphy of the WSF is complex, but, in general, in the northern part of EL 41/2006 the CVC are directly overlain by coarse mass flow deposits (Facies E and F), whereas to the south finer grained lithologies (particularly Facies A, B and E) predominate. In addition there are intrusive feldspar-quartz-phyric rhyolite and quartz-feldspar porphyry bodies at different levels in the sequence, particularly the eastern margin. Clasts of sulphide have been identified in the basal mass flow deposits of the WSF to the north of 5362200mN. These clasts are considered to have been derived from the erosion of the sulphide deposits by down-slope mass flow movements.

The WSF lies unconformably over the CVC, thickening to the south suggesting the CVC on the Rosebery Mine lease was a topographic high during onset of WSF volcanism. The CVC and eastern margin of the WSF are represented by proximal volcanic successions transgressing to deeper water sedimentation dominated by thickening black shale and volcanoclastic siltstone to the west. The volcanic architecture suggests the main volcanic centres were to the east and north.

The CVC comprises largely feldspar-phyric dacitic pumiceous sandstone and breccia, with lesser intrusive quartz-feldspar porphyry and minor feldspar-phyric rhyodacitic lava. In addition to these typical CVC lithologies, feldspar-pyroxene-hornblende-phyric pumice breccia and rhyolitic sills are present in some drill holes (e.g., WSP7; Allen, 1998).

In the Jones Creek area, typical CVC-“type” pumice breccia and lava hosts a package of up to 400m of shale, sandstones and crystal-rich (feldspar>quartz) volcanoclastic sandstones (Corbett, 1986; Corbett in Vicary and Dauth, 1999). It is possible that this “Jones Creek Shale Sequence” is a correlate of the Rosebery-Hercules hangingwall shale sequence. Parts of the Jones Creek Sequence are strongly sericite altered (but, without the pyrite typical of VHMS alteration) and mineralisation comprises disseminated and vein pyrite-pyrrhotite-sphalerite-galena, generally best developed in shale/sandstone units. The best overall intersection was 32m @ 0.22% Zn, 0.09% Pb in DDH JCP211 (drilled to the north of the current EL 41/2006).

Base-metal poor massive pyrite lenses are hosted in intensely sericite altered CVC close to the WSF contact, and the North Henty Fault, in the south of the licence (the Annaliese Prospect). This mineralisation has a possible Cambrian age, based on Pb isotopes (Vicary, 1997), but has extremely light S isotopes (-10 to -17‰), dissimilar to

any known Cambrian mineralisation from western Tasmania. No other significant mineralisation or alteration has been located in the CVC on the licence area.

Thin mafic dykes/sills (generally <5m, but up to 80m wide) are common within the Central Volcanic Complex in the eastern part of the EL and are correlated with the tholeiitic Henty Dyke swarm.

In the south eastern corner of the tenement the CVC is separated from the Henty Fault Wedge Sequence by the North Henty Fault (Figure 2). The Henty Fault Wedge Sequence (or Henty Valley Sequence; Poltock, 1992) comprises a west facing sequence of quartz sandstone, chert, hematitic greywacke/sandstone and minor tholeiitic basaltic andesite. These lithologies are considered to correlate with units in age from the Eo-Cambrian Crimson Creek Formation to the mid-Cambrian Mount Read Volcanics (Poltock, 1992). This sequence is not considered to be VHMS prospective.

Pleistocene glacial deposits, consisting predominantly of Cambrian volcanic, Cambro-Ordovician Owen Conglomerate and Jurassic dolerite (on the eastern slopes of Mt Dundas) derived clasts, are common throughout the tenement.

#### 4. PREVIOUS EXPLORATION

The area of EL 41/2006 White Spur has a long history of ‘modern’ exploration, commencing in the 1950’s, that has been reviewed in detail by several authors (Purvis et al., 1983; Poltock and Fitzgerald, 1991; Fitzgerald, 1987; Vicary, 1997 and Corbett, in Vicary and Dauth, 1999). All previous exploration is summarised on Tables 1 and 2.

In the period 1957-1962 the area was explored by Rio Tinto Australia Exploration as part of SPL320 and ELs 4/1959 and 6/1959. From 1962 onwards the area has a complicated tenement history, dominated by ELs 9/66 (RGC), to the south, and 1/62 (EZ Co.) to the north.

EL 1/62 was initially granted to the EZ Company, but after 1978 was subject to a joint venture with the Getty Oil Development Company (GODC). EZ managed the JV from 1978-1983 at which point GODC assumed management (thus permitting exploration in conjunction with that on EL 9/66 to the south). However, in 1985 GODC’s share of the JV was sold to Little River Goldfields NL and in October 1985 a new agreement was entered into between Shell Company of Australia, Little River Resources and the EZ Company, with Shell managing and operating the tenement. In January 1988 EL 1/62 was relinquished, with the northern part of the tenement being incorporated into the “Rosebery Extension leases” (MLs 10M/88, 11M/88 and 15M/88) and the remainder being incorporated into EL 11/85 (see below).

EL 9/66 was granted in August 1966 and in the period to 1980 was gradually amalgamated with other tenements to reach a maximum area of 637 sq. km. The tenement area was then progressively reduced through voluntary (in 1983 and 1984) and statutory (in 1985) reductions with complete relinquishment, apart from that area retained as the Henty Mine leases, in 1987. The tenement was explored by Renison Goldfields Consolidated Ltd. until 1976 when a Joint venture agreement was signed with GODC, who maintained an interest in the area until 1985 at which time their interest was sold to Little River Goldfields, later Little River Resources.

Following the statutory partial relinquishment of EL 9/66 in 1985 the vacant areas were picked up by Amoco Minerals Australia as EL 11/85. Title was then transferred to Cyprus Minerals (1985), Cyprus Gold (1988), Hudspeth and Company (1990) and finally to Arimco (1991). In this period the tenement was subject to two joint ventures, the second of which between Hudspeth and Co., Norgold and Pasminco commenced on 4 December 1990 and continued until relinquishment in 1995, with Pasminco as operators and managers of the JV.

**Table 1: Exploration on the area of EL 41/2006 prior to 1996**

<b>Reporting Period</b>	<b>Work Completed</b>
1957-60 (King, 1960; McCarthy et al., 1960)	Helicopter borne EM in 1957 failed to locate any conductors. In 1960 the area was grided, geologically mapped and a TURAM survey completed; the 3 significant anomalies located by this survey were followed-up by Vertical EM, gravity, SP and magnetics; costeaning and drilling was recommended.
1961? (Campana, 1962)	Drilling of DDH WSP103.
1969-70 (Newnham, 1970)	Grid cut in upper part of White Spur Creek.
1971-72 (McKibben, 1972)	White Spur Area: Re-open RTAE grids, mapping and limited rock-chip sampling.
1971-72 (Reinhardt, 1972)	Turair survey, line cutting mapping and soil sampling (Dalwitz and White Spur Grids).
1973-74 (Williams, 1974)	Geological mapping, grid extensions and soil sampling on the White Spur and Dalwitz grids.
1974-75 Stevens-Hoare, 1975)	Re-clear and extend grid, Re-log DDH WSP103, C horizon soil and rock-chip sampling and detailed mapping.
1974-75 (Williams, 1975)	Mapping and soil geochemistry on the White Spur and Dalwitz grids.
1975-76 (Stevens-Hoare, 1976)	Limited track cutting, further soil sampling (incomplete at the time of reporting) and mapping, which located a massive pyrite boulder (low base and precious metal assays).
1976-77 (Walter and Brophy, 1977)	Extended existing grid, gradient array IP and ground magnetics completed; defined 13 main IP anomalies. Soil sampling indicated black shale units have high base metals (to 1500 ppm Pb) and correspond to IP anomalies.
1977-78 (Walter, 1978)	White Spur Area: Infill gridding and EIP to follow-up anomalies; costeaning and soil sampling. Jones Creek Area: gridding, gradient array and dipole-dipole IP, ground magnetics, costeaning and associated rock-chip sampling, C horizon soil sampling and geological mapping; recommended that 2 x DDH test EIP anomalies.
1978-79 (Reid et al., 1979)	White Spur Area: Additional mapping, soil and rock-chip sampling, ground magnetics and EIP. Jones Creek Area: DDH WSP1 completed (hole drilled outside area of current EL); hole intersected weakly mineralised and altered volcanics. IP explained by zones of up to 2% pyrite.
1979-80 (Meares et al., 1980)	White Spur Area (EL 9/66): IP, Rock-chip and soil sampling to evaluate drill target on line 37.5N; DDH WSP2 tested this anomaly intersecting weak mineralisation in a black shale.
1979-80 (Mill et al., 1980)	Dobsons Creek Area (EL 1/62): Re-peg and infill previous EZ grid, gradient array IP, C Horizon soil sampling of new lines and over IP anomalies, limited geological mapping.
1980-81 (McDonald, 1981)	Dobsons Creek Area (EL 1/62): Mapping of grid and access tracks. Recommend drill testing combined IP/soil geochem target.

**Table 1: Exploration on the area of EL 41/2006 prior to 1996 cont....**

<b>Reporting Period</b>	<b>Work Completed</b>
1981-1982 (Mathison and McDonald, 1982a; McDonald and Mathison, 1982; Mathison and McDonald, 1982b)	Dobsons Creek Area (EL 1/62): Access track completed and DDH DCP235 (161.6m) drilled to test IP/geochem. target; downhole IP survey failed due to blocked hole. Best assay 0.7m @ 1.45% Pb, 2.2% Zn, 11 g/t Ag from a fault. Concluded that there was insufficient alteration to warrant further work.
1983 (Purvis et al., 1983)	Review of prospectivity of EL 9/66; reviewed previous work and did not recommend any further follow-up on the White Spur area.
1983-1984 (Fitzgerald et al., 1984)	Jones Creek Area: Jones and Dobsons Creek cut open for mapping and sampling, roads and creeks mapped and rock-chip sampled
1983-84 (Roberts and Cartwright, 1984; Fitzgerald and Pease, 1984)	White Spur Area: Exploration managed by Getty; reviewed previous exploration; concluded that further work warranted. Completed geological mapping, rock-chip sampling and a single loop UTEM survey. Some coverage by DIGHEM survey flown in December 1983.
1984 (Fitzgerald and McNaught, 1985)	Jones Creek Area: geological mapping, re-opening of the EZ imperial grid, UTEM survey and VLF-EM; a low amplitude EM response located in Jones Creek.
1985 (Purvis, 1985)	Jones Creek Area: Drilling of DDH JC1, which failed to intersect any significant mineralisation.
1985 (Corbett, 1985)	Tasmania Department of Mines drilled a 108.7m DDH (MR1) to determine the nature and attitude of the WSF/CVC contact.
1989 (Wyatt, 1990)	Helimag survey flown over EL 9/66 and vacant ground west of EL 9/66 by RGC; several anomalies and lineaments identified in the area of EL 5/1996.
1990-1991 (Poltock and Fitzgerald, 1991)	Reconnaissance geological mapping, rock geochemistry and a review of previous exploration. Mapping located additional sulphide clasts in the WSF.
1991-92 (Poltock, 1992)	Regional geological mapping (located a significant zone of Se-Fd-py alteration), lithogeochemical sampling, interpretation of gravity and magnetic data.
1992 (Dugdale, 1992)	Honours study on "Lithostratigraphy of the White Spur area, western Tasmania".
1992-93 (Quayle, 1993)	Geological mapping, collection of mag. Susc. data from outcrops, lithogeochemical sampling, interpretation of airmagnetic and radiometric data and a review of old geochemistry and IP surveys.
1993-94 (Quayle, 1994)	The WSF/CVC contact was tested by a single 430.5m DDH (YWS1); no significant mineralisation was intersected. S.G. and Mag. Susc. data collected from drill core, further lithogeochemical assaying of rock-chips and core.
1994-95 (Quayle, 1995)	Surface rock chip sampling of CVC/WSF contact in the area of DDH MR1; high AI values were recorded in some samples, however, it is unclear whether this indicates alteration or is a function of weathering.
1995 (Nunn, 1995)	Honours study on "The sedimentology, volcanology and structure of the lower Dundas Group, Hall Rivulet Canal, western Tasmania".

**Table 2: Exploration on EL 41/2006 from 1996 to present**

Reporting Period	Work Completed
1996-1997 (Vicary, 1997)	Relogging of old drill core; Location of a pyrite occurrence at the top of the CVC (Annaliere prospect) followed up by gridding (7.1 line km), soil and rock chip sampling, mapping, S and Pb Isotope analysis, ground magnetics, IP, VLF-EM and a 306.6m DDH (ANNE001) with DHEM; no significant anomalies worthy of follow-up. Roads and tracks on remainder of tenement mapped at 1:5,000 scale.
1997-98 (Vicary 1998)	20.7 line km of gridding (400m spaced lines covering the tenement) followed by mapping, rock-chip sampling, CSAMT, ground mag. and VLF-EM surveys. Historical IP data digitally compiled. 3759.3m of diamond drilling (9 holes) completed with DHEM in two holes; best result 17m @ 0.77% Zn and 0.4% Pb in WSP5. S, O and Pb isotopes on surface and drill samples; reviews of stratigraphy and alteration completed.
1998-99 (Vicary and Dauth, 1999)	DHEM results for 4 holes presented; Review of Jones Creek area completed; core from Jones Creek area relogged.
1999-2000 (Vicary, 2000)	No field work completed – a review of exploration by Goldfields was presented.
2000-2002 McNeill (2002)	Partial leach soil sampling (881 samples collected) and surveying (with DGPS) of the existing 400m spaced Goldfields grid over the CVC/White Spur Formation contact located 2 anomalous zones worthy of follow-up. Minor extensions (2.6 line km) to the existing grid were cut preparatory to partial leach soil sampling.
2002-2003 McNeill (2003)	Partial leach soil sampling (559 samples) and geological mapping of infill grid (9.5 line km cut) and extensions to the Goldfields grid over the CVC/White Spur Formation contact. This work was designed to follow-up the Central [Anomaly 2] and Northern [Anomaly 1] soil anomalies. Re-assaying of soils, from areas with anomalous partial leach results, by total digest methods (145 samples analysed). Completion of DHEM surveys in DDH YWS1, WSP6 and WSP10/10A.
2003-2004 McNeill (2004)	A two loop (2.275 line km) ground EM survey was completed to follow-up the DHEM responses in YWS1 and WSP6. As a result of problems with data quality no final interpretation could be made. Some geological mapping was completed in the north of the tenement. No significant changes to the structural or stratigraphic interpretation were made and no significant alteration or mineralisation was located. The 1997 RGC CSAMT survey of the tenement was re-processed and was being re-interpreted at the time the report was compiled.
2004-2005 McNeill (2005)	The YWS1/WSP6 DHEM anomaly was interpreted to result from an unusual, in Tasmania, IP effect. Additional geological mapping in the north of the tenement. DDH WSP13 (547.0m) was completed. A program of whole-rock analysis of drill core commenced. Review of the 1997 RGC CSAMT survey was completed.

**Table 2: Exploration on EL 41/2006 from 1996 to present cont...**

Reporting Period	Work Completed
<p>2005-2006 McNeill &amp; Skirka (2006)</p>	<p>Work completed during the reporting period included:</p> <ul style="list-style-type: none"> <li>• Drilling of DDH WSP14 (494.6m) and DDH WSP15 (401.2m).</li> <li>• DHEM surveys in DDH WSP12, WSP13, WSP14 and WSP15.</li> <li>• Surface Fixed Loop TEM survey in the northern part of the license.</li> <li>• Further geological mapping in the central part of the tenement.</li> <li>• Completion of an Honours project to assess the volcanic stratigraphy of the tenement.</li> </ul> <p>This work did not lead to the location of any significant VHMS mineralisation or alteration and the target CVC/WSF contact is considered to have been effectively tested to a depth of 250-400m throughout most of the licence.</p>
<p>2007-2008 Hicks and Purvis (2008)</p>	<p>Work completed during the reporting period included:</p> <ul style="list-style-type: none"> <li>• Relogging of 16 drillholes and collection of 230 samples for major, minor and trace element assay.</li> <li>• VTEM survey - 100 line kilometres of 200m spaced E-W coverage across the entire licence</li> </ul> <p>This work did not lead to the location of any significant VHMS mineralisation or alteration vectors, and the target CVC/WSF contact is considered to have been effectively tested to a depth of 250-400m throughout most of the licence. The VTEM survey failed to indicate significant responses outside of cultural features. One anomaly remained unexplained.</p>
<p>2008-2009 Hicks (2009)</p>	<p>Work completed during the reporting period included:</p> <p>Analysis of previous years VTEM survey. One moderate anomaly was detected at 5361950N, 376,500E. No further work was completed due to corporate and financial situation.</p>
<p>2009-2010 Callaghan (2010)</p>	<p>Work completed during the reporting period included:</p> <p>1:10,000 Geological Mapping and Interpretation with cross-sectional analysis.</p>

## 5. WORK COMPLETED 2007 - 2008 REPORTING PERIOD

(refer Hicks & Purvis, 2008)

### **Lithochemistry**

In March 2007 a project was initiated to define patterns of hydrothermal alteration in the felsic Footwall and Host Rock units within the Mt Read Volcanics at White Spur. The aim was to obtain vectors that might indicate parts of the property worthy of further drilling.

The project was intended to upgrade and refine earlier, similar but much less comprehensive alteration studies at White Spur by Goldfields Exploration.

Between March and August 2007, over 2700m from 16 drillholes which had intersected the Host Rock and/or Footwall units at White Spur was systematically litho-geochemically sampled. Nominally, samples comprised one metre of split NQ core taken at 10-metre intervals down the drillholes commencing at the top of the Host Rock unit. The samples were logged (geological logs are shown in Appendix 1) and great care was taken to exclude all veining from the samples. This meant that in most cases the samples actually comprised between 0.5 – 0.9m of core. A total of 230 samples were taken. The deepest sample was 450m into the Footwall (hole WSP7).

The samples were analysed at Amdel by ICP (Appendix 2) and the University of Tasmania by XRF (Appendix 3) for a suite of 50 elements and oxides.

The results indicate there is very little true hydrothermal alteration in these rocks at White Spur. Indications of the lack of strength of the alteration include a lowest Na<sub>2</sub>O value of 0.54%, a maximum Alteration Index value of 80, and a lowest McKay Index value of 43. The geochemical data confirms the observations that pink silica-albite-chlorite-hematite alteration was the most widespread alteration type in the sampled rocks. Even the apparently-altered bleached and cleaved zone in hole Anneliese 1 beside the North Henty Fault, had a maximum AI of just 61 and Na<sub>2</sub>O values from 1.5 – 2.3%, which indicates a lack of the hydrothermal depletion typical of VMS systems. Calculated alteration indices are located in Appendix 4.

The alteration patterns at White Spur, the effectiveness of the sampling and the interpretation of the results, are complicated by the unexpectedly common occurrence of felsic lavas amongst the Footwall pumice breccias. The lavas will have affected fluid flow in the Footwall.

### **Helicopter borne EM (VTEM)**

The entire White Spur EL 41/2006 was flown with the VTEM system in late April, 2008. The survey consisted of 200m spaced E-W flight lines at a nominal 80 metre

helicopter height and 30m EM sensor/loop height above ground level. Flight speed was a nominal 80 km/hr, but this was expected to vary in areas of rugged terrain.

Full details of the specifications of the survey are contained in Appendix 5, alternatively available at the contractors website ([www.geotechairborne.com](http://www.geotechairborne.com)).

Due to the timing of the survey, final data has not been received at the time of compiling this report, and will be fully documented and interpreted in the second Annual Report for this tenement in 2009.

## 6. WORK COMPLETED 2008 - 2009 REPORTING PERIOD

*(refer Hicks, 2009)*

The entire White Spur EL 41/2006 was flown with the VTEM system in late April, 2008. The survey consisted of 200m spaced E-W flight lines at a nominal 80 metre helicopter height and 30m EM sensor/loop height above ground level. Flight speed was a nominal 80 km/hr, but this varied in areas of rugged terrain.

Full details of the specifications of the survey are contained in Appendix 5 of Hicks & Purvis 2008, alternatively available at the contractors website ([www.geotechairborne.com](http://www.geotechairborne.com)) and Appendix 1 of this report.

Due to the timing of the survey, final data had not been received at the time of compiling the previous years report. This data has since been received and reviewed, with no change in interpretation – i.e., there were approximately 5 intermediate ranked anomalies detected in the late time data (see Figure 2). The most highly ranked anomaly (see Figure 2 and Appendix 1) lies approximately 280 metres north of drillholes WSP-4 and WSP-103 at approx 5,361,950mN – 376,500mE. Some additional modelling of this feature has been done, and is included in Appendix 1. Due to a corporate freeze on expenditure, no follow-up work has been done on this anomaly.

## 7. WORK COMPLETED 2009 - 2010 REPORTING PERIOD

*(refer Callaghan, 2010)*

Exploration on White Spur EL 41/2006 included geological mapping and interpretation early in 2010. No exploration was completed for much of 2009 due to the corporate and financial situation. Exploration recommenced after the formation of MMG in late 2009.

Field mapping and compilation of previous mapping and drill sections culminated in a 1:10,000 interpretive geological map and cross sectional interpretation throughout the EL (Enclosure 1). The work was design to estimate the depth to CVC-WSF contact beneath the thick WSF cover in the west of the EL.

Previous exploration has comprehensively tested the eastern margin of the EL where the CVC-WSF outcrops or is close to surface. An alteration study by Purvis and Hicks (2008) failed to identify any significant hydrothermal alteration from the previous drill holes with most Alteration Indices less than 80 and a lowest Na<sub>2</sub>O value of 0.54%. The most common alteration assemblage appears to have been early diagenetic silica-albite-chlorite-hematite.

Within the Que-Hellyer VHMS field, hydrothermal alteration zones and VHMS mineralisation occur in synclinal or anticlinal structures with fold hinges localising on phyllosilicate alteration during Devonian deformation.

Consequently the recent mapping and compilation of the WSF was focussed on identifying fold axis that may provide some indication of alteration zones or deeper structures within the underlying CVC that may possibly host similar alteration zones. The mapping was also used to estimate the depth to the CVC-WSF contact, with anticlinal highs representing more accessible targets for drill testing and down hole geophysics.

Four interpretive cross section were produced at 5,358,900mN, 5,352,500mN, 5,361,800mN and 5,364,300mN. The sections were chosen at spaced intervals across the EL utilising historic drilling for the section interpretation.

### **5,364,300mN**

A potential target in the north of the area studied is located on the southern Rosebery Mine Lease where an anticlinal high brings the CVC basement to within 200m of surface in a south plunging anticline. The CVC outcrops 200m to the north from the section and is not obviously altered. However mineralised CVC at the South Hercules deposit is located 800m along strike. A proposed drill hole of 700m length from the collar of WSP311 would test the CVC-WSF contact on both sides of the anticline (Figure 2).

### **5,362,500mN**

Section 5,362,500mN crosses an anticline and syncline with interpreted shallow level CVC underneath. The CVC-WSF contact has been tested beneath the syncline by drill holes WSP13 and WSP11, both of which failed to identify any significant alteration or mineralisation. The anticline is centred on 376,000mE crossing, the western boundary of the EL. The EL immediately west of EL41/2006 is held by Silver Mines Ltd as EL20/2008.

The CVC-WSF contact is estimated to be at around 200m depth on this section (Figure 3).

### **5,361,800mN**

Section 5,361,800mN transects the same fold structures to the south and are consequently significantly deeper in the south plunging sequence (Figure 4). A 1,000m drill hole has been proposed to test the WSF-CVC contact in the anticlinal hinge.

The 2009 VTEM survey identified a conductive anomaly centred on 5,361950N, 376,550E coinciding with the syncline (Figure 4). The anomaly may be associated with outcropping black shales but still represents an intriguing target possibly worthy of drill testing.

### **5,358,900mN**

The depth to the CVC-WSF contact in the south plunging sequence is interpreted to be too deep to viably test in the south of the EL (Figure 5). The overlying deepwater sediments and the volcanoclastic crystal sandstones thicken significantly to the south requiring a 100m+ drill hole to test the shallowest structure.

**8. WORK COMPLETED 2010 - 2011 REPORTING PERIOD**

No exploration was conducted on White Spur EL 41/2006 during the reporting period due to the corporate and financial situation of MMG.

## **9. CONCLUSIONS & RECOMMENDATIONS**

No work was completed during the fifth year of EL 41/2006 White Spur Lake. Future exploration in the area will follow on from recommendations made by Callaghan, (2010), which will include:

- Gridding and mapping of the western margin of the EL.
- Three stratigraphic drill holes to test the basement on sections 5,364,300mN and 5,361,800mN for a total of 2800m.
- The drill holes should be cased to allow down hole geophysics including DHEM and tomography.

## **10. ENVIRONMENT AND REHABILITATION**

There were no surface disturbance or rehabilitation activities undertaken during the reporting period.

## **11. EXPENDITURE**

Total expenditure for all work undertaken by MMG Exploration within White Spur EL 41/2006, for the full term of the licence period (07/05/07 to 07/05/11) was **\$110,630**.

## 12. KEYWORDS & LOCALITY

### Keywords

WHITE SPUR, GEOPHYSICS – VTEM, GEOLOGY, LITHOGEOCHEMISTRY, ALTERATION INDICES, WHITE SPUR FORMATION, CENTRAL VOLCANIC COMPLEX, MOUNT READ VOLCANICS

### Locality

1:250,000	QUEENSTOWN SK55-5
1:100,000	SOPHIA 8014, PIEMAN 7914
1:25,000	OCEANA 3635, DUNDAS 3636

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