



# **Unicorn Resource Estimation Procedure Report**

**October 2011**

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## **1. INTRODUCTION**

The Unicorn Mo-Cu-Ag deposit is located entirely within unrestricted crown land, some 20kms south of the township of Corryong, in the Towong Shire of North-East Victoria. Corryong is located 120kms east of the major regional centre of Albury/Wodonga, and geographically around halfway between Melbourne and Sydney. This region is a mountainous area, adjacent to the Victoria – New South Wales state boundary.

The area has a long history of predominantly small scale vein / lode hosted gold and tin / tungsten mining, and associated alluvial deposits dating back to the mid-19th century. Mineral exploration in recent history however has been cursory and very limited consideration has been given to large scale porphyry style deposits such Unicorn.

## **2. REGIONAL GEOLOGY**

The Unicorn porphyry Mo-Cu-Ag deposit is located within the Lachlan Fold Belt (LFB) that covers an area of 200,000 km<sup>2</sup> of south-eastern Australia. The LFB is composed of a variety of folded, faulted and metamorphosed sediments, along with associated igneous intrusions of a large scale orogenic belt. The dominant structural feature of the LFB is the Gilmore suture and its associated splays, which run from northern-central NSW, to the Upper Murray border region within Victoria, where the suture arcs back towards the south-southwest (see Figure 1).

The LFB formed in the Middle Palaeozoic Era (~450Ma-350Ma) as a part of the Gondwana supercontinent. The igneous porphyry intrusions in the south-east LFB, that hosts the Unicorn deposit have never been accurately dated, but are believed to be from late Silurian to early Devonian periods with an age of approximately 420Ma, during a period of crustal thinning and rifting between the Benambran and Bindian orogenies, proximal to the Gilmore suture and the Murray River Fracture Zone, in a back arc environment

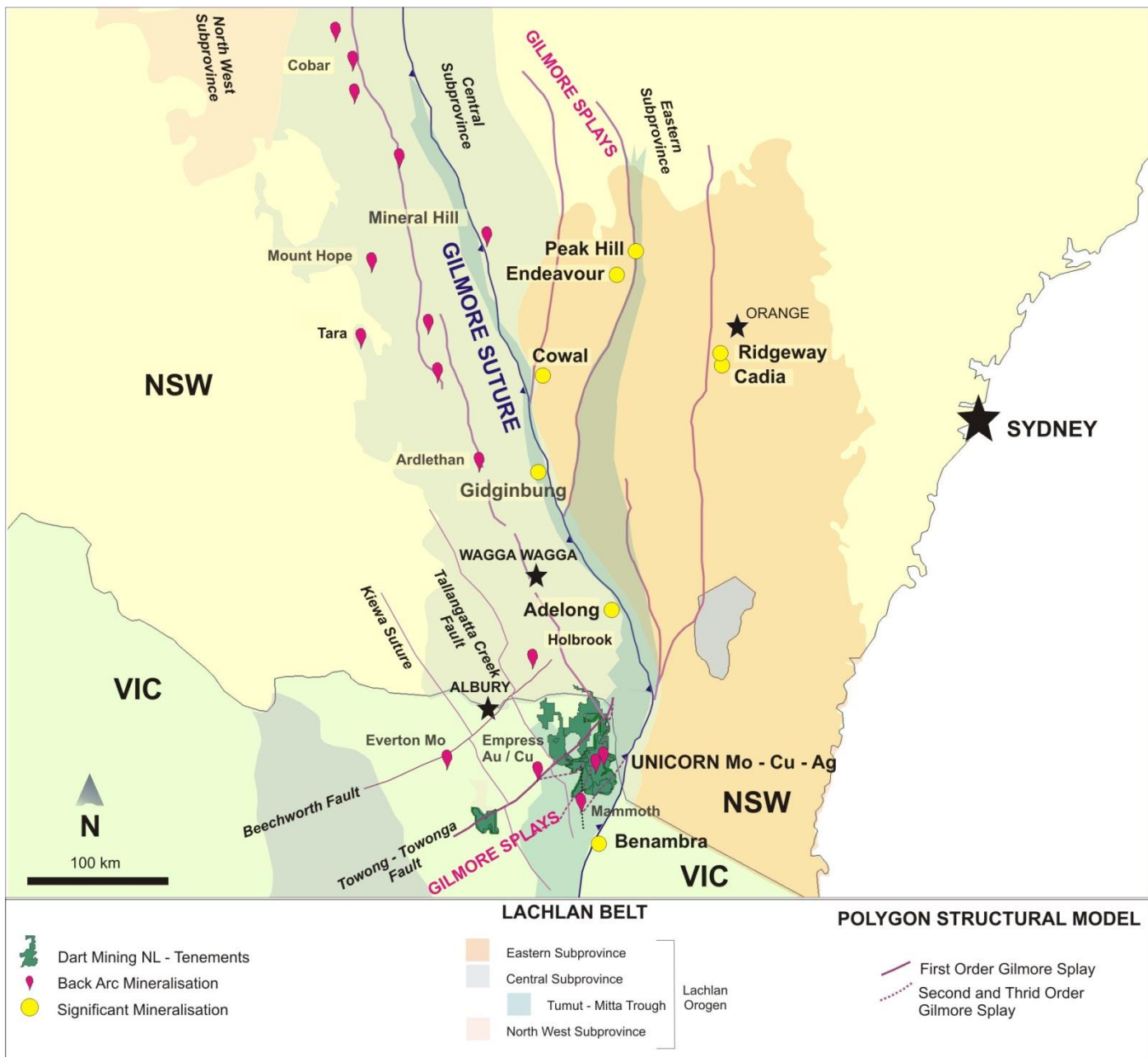


Figure 1 The Lachlan Fold Belt.

### 3. DEPOSIT GEOLOGY

The Unicorn deposit is hosted primarily in a series of Quartz-Pyrite-Molybdenite +/- Chalcopyrite stockwork (SW) veins, originating from several phases of the igneous host Rhyolitic Quartz Feldspar Porphyry (QFP) injections. Whilst the mineralisation is primarily SW vein hosted, Mo-Cu mineralisation is also disseminated throughout the QFP, and within the quartz-flooded Silica-lithocap (SLC) mantos, as well as mineralised SW veins projecting several hundreds of metres into the surrounding hornfensed sediments and within the Southern Collapse Breccia that make up the Unicorn deposit. At the surface the +50ppm Mo zone covers an area of approximately 0.6km<sup>2</sup> that roughly marks the lateral extent of the mineralised zone recognised to date (see Figure 2).

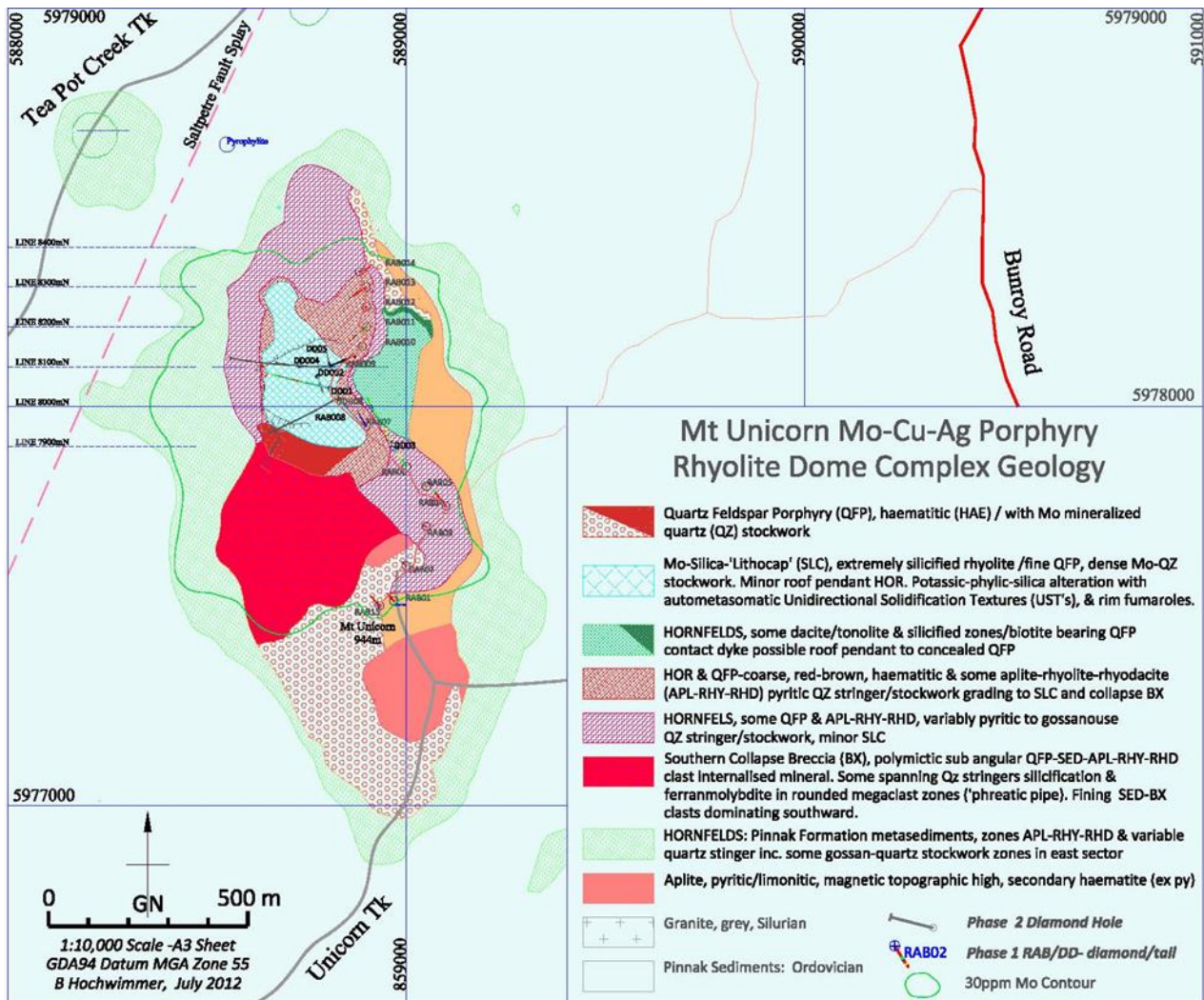


Figure 2. Simplified Unicorn Deposit Geology

Pelitic and psammitic metasediments of the Pinnak formation surround the Unicorn porphyry intrusion, and are locally hornfensed due to contact metamorphism with the igneous body, as well as being hydrothermally altered by the ore forming fluids, producing a zone of Mo mineralised SW veins adjacent to the contact.

The QFP intrusive host and source of the Mo-mineralising fluids, is actually made up of several phases, or pulses, of porphyritic material sourced from the same rhyolite/rhyodacite parent rock at a deeper crustal level. This has resulted in a slightly variable composition and mineralogy, and variability in the mineral textures from fine-grained rhyolite, to porphyritic (with variable phenocryst sizes and mineralogy) and zones of essentially micro-granitic textures. These units are generally all grouped together under the name Quartz-Feldspar Porphyry (QFP), with the variations described in more detail where necessary, but for most purposes the general term is appropriate due to the common source and equivalent mineralisation throughout.

Hydrothermal alteration has substantially affected the QFP at Unicorn, with the 4 main alteration styles typically associated with porphyry deposits recognised. The alteration styles are spatially related to the deposit, as they are a function of the autometasomatic fluid temperature, composition and conditions.

The 4 main porphyry alteration types are listed below.

- 1) Potassic Zone – characterised by the production of secondary orthoclase, biotite, chlorite and minor sericite that replaces the primary orthoclase, plagioclase and mafic minerals. This generally affects the majority of the rocks at Unicorn (however is often overprinted by the other forms of alteration) and can be identified by the destruction of primary Plagioclase and a pink-haematite staining of the porphyry groundmass, due to the release of Fe from the mafic minerals.
- 2) Phyllic Zone – characterised by the development of quartz, sericite, and pyrite assemblages, with minor chlorite, illite and rutile. The sericitisation is a consequence of the breakdown the feldspars and biotite, which also releases a substantial amount of silica, and subsequent silicification and quartz production elsewhere in the system, for example the quartz flooded SLC seen at Unicorn.
- 3) Argillic Zone – characterised by the formation of clay minerals beginning to dominate, with kaolinite proximal to the ore zone and montmorillonite further away.
- 4) Propylitic Zone – Chlorite is almost always present as the main mineral, along with pyrite, calcite and epidote. Primary Plagioclase may be unaffected, with mafic minerals partially replaced by chlorite and carbonates. This zone gradually grades into the surrounding rock.

The QFP system is topped by a mineralised, silica-flooded zone termed the Silicalithocap (SLC or Mo-SLC) that outcrops on the northwest ridge of Mt Unicorn. The SLC is due to the autometasomatic replacement of the primary rock textures by a silica/quartz flood.

The Southern Collapse Breccia is comprised of a mixture of fragmented clasts from the surrounding rock types. The breccia is thought to be slightly later or co-genetic with the igneous intrusions and Mo-mineralisation, evidenced by the presence of SW veined, mineralised QFP, SLC and sediments clasts, some of which are overprinted by later silica-molybdenite veining.

#### **4. DRILLING, LOGGING AND DATA VALIDATION**

The diamond drilling is comprised of a mixture of predominantly HQ diameter and some NQ diameter drill core. All hole location and down hole survey details are recorded and the drill core geologically logged and assay sample intervals defined and recorded. Other data that relates to the drill holes also make up the full drill hole database records as outlined below:

**4.1 DRILL HOLE COLLAR** – All drill hole locations are recorded relative to MGA94 (Zone 55) using a standard GPS (Drill holes DUNDD006,7,8 & 9) and a differential GPS (Drill holes DUNDD001,2,3,4 and 5). The collar file also records the total depth of the hole, collar azimuth, dip and dates commenced and finished.

**4.2 DRILL HOLE SURVEY** – A multishot down hole survey camera was used to record the azimuth and dip of the hole – the survey results are recorded at nominal 30m separations in the Drill Contractors daily Plod sheet.

**4.3 DRILL RECOVERY** – each coring run records the interval drilled, the core recovered and the total drill hole depth (each core block records this information), these details are recorded in the drillers records. The recovery is again measured from the core blocks and the recovery recorded as a percentage.

**4.4 DRILL LITHOLOGY** – The lithology of each interval is recorded in a From - To table with provision for description of the rock type, lithology code and phenocryst and groundmass size.

**4.5 DRILL PRIMARY ALTERATION** – The interval of each style of Primary Alteration is recorded in a From - To table with an alteration code.

**4.6 DRILL SECONDARY ALTERATION** – The interval of each style of Secondary (overprinted) Alteration is recorded in a From - To table with an alteration code.

**4.7 DRILL MINERALISATION** – The interval of each style of mineralisation is given a code and recorded in a From - To table.

**4.8 DRILL ASSAY** – Each assay interval (nominal 2m) is recorded and a sample number assigned, the recovery within the interval is also calculated per interval to record where a sample interval is missing material.

**4.9 DRILL STRUCTURE** – The down hole depth to a structure of interest is recorded and a structure code applied – the angle from the structures lower ellipse to the core axis is measured (alpha angle) by a protractor and the associated strike of the structure measured from the lower ellipse, clockwise to the orientation line (a line representing the bottom of the drill hole) marked during the core mark up stage (for oriented core). Drill holes DUNDD001, 2, 3, 4, 5 & 6 were oriented using a Bowen spear (this tool had a low success rate) and holes DUNDD007,8 & 9 used the Easy-Ori – ACE tool. This tool proved highly successful with concurrent orientation marks generally coincident.

The drilling assay data used in the Minerals Resource estimate has been derived from 2068 individual assay samples from 4164.7m of total drilling.

- Approximately 184 composite samples (5m each) from 918m of RAB drilling over 15 separate drill holes of up to 82m length. Only assay data from RAB holes DUNRAB07, 08, 09, 10, 11, 12, 13 and 14 contributed to the reported Minerals Resource.
- Approximately 1884 individual samples from some 3246.7m of diamond core drilling spread over 10 drill holes of up to 574m down hole depth.

Drilling database validation is carried out by an independent database specialist (Maxwell's Geoservices) subsequent to Dart Mining NL's internal spot checks of keyed transcribed data. Assay data is not keyed, being imported directly from digital Laboratory files removing transcription errors.

## **5. SAMPLING AND ASSAY METHODS**

Assay data for the development of the resource model and Grade Zone components consists of assays from both Rotary Air Blast drilling (RAB) and Diamond Core Drilling (DD) with sample collection, preparation and analysis defined below.

### **5.1 RAB Drilling Sampling Methods**

A variation on open hole RAB drilling was used at Unicorn where a "stuffing box" was added to hole collars above a 3m PVC collar pipe. The collar pipe was secured into the ground with A & B Foam and the weight of the mast. A 1m length of steel pipe with a drill through rubber seal was then placed over the PVC. This "Stuffing Box" has an outlet below the seal to receive the outside air and sample from the drill hole and is directed into a sample collection hose and then into the cyclone. This system mimics conventional RC sample collection in that all fines and chips arrive at the cyclone for collection. However, the sample still travels the length of the drill hole in an open hole and as such there is still potential for contamination from wall rock material. Rapid assay changes from high grade to low grade in the 1m sampled holes highlight the minimal cross contamination that appears to have occurred.

A 75:25% Riffle Splitter was used to reduce the 1m interval (15Kg) bulk sample to a 3 – 4kg analysis sub-sample (Callico Bag) ready for shipment to the Laboratory. All samples from the RAB program were collected at 1m intervals.

The majority of the samples submitted to ALS Chemex Laboratories consisted of 5m composites derived from the 1m samples collected at the drill rig. The methodology of composite preparation is as follows:

1. Each 1m sample was riffle split from approx. 3.5 kg to 0.85kg via a 50:50 LAB riffle splitter. Each 5m interval was split in this manner and the split fraction combined into a composite for submission. The original 1m analysis sample was retained and selected holes submitted for detailed 1m sample intervals. Comparisons of the 1m and 5m show that although the 5m composite method smooths the data at the higher and lower grade range in comparison to the one metre sampling, it remains a good representation over the 5m average grade interval over the length of the hole.

## 5.2 Diamond Drilling Sampling Methods

The drill core is processed at the Dart Mining Core facility where a recovery log and Geological Log is completed by a qualified Geologist, to note any pertinent Geological and Geotechnical information. The sample numbers and intervals are also assigned and recorded at this point.

The core is then photographed to preserve a visual representation of the core's appearance as it came out of the ground and is halved by a diamond bladed core saw, half of the core from each sample interval is placed into a Calico bag marked with the sample number, which in turn are placed into a woven polypropylene bag for submission to the laboratory.

## 5.3 Laboratory Assay Methodology (ALS CHEMEX)

Samples submitted to laboratories undergo internal laboratory quality control checks (duplicates, standards and blanks) and in addition, Dart Mining NL carry out cross laboratory checks (duplicate assay data from two laboratories for the same sample) and a series of assay standards and blanks of known Mo, Cu and Ag content. These checks for quality control monitor laboratory accuracy. All internal and company standards and blanks produced data within recommended tolerances and can be relied upon to be representative of the samples submitted.

Upon receipt of the samples at the ALS Chemex laboratory in Orange, NSW ALS Chemex used the following procedure to prepare both the RAB chip samples and the Drill core samples:

1. The 1m or 5m RAB composite samples and diamond drill core were dried and weighed.
2. Samples that are too coarse to be put directly into a large pulverizing mill, or where the particle size needs to be reduced before we are able to take a representative split for further pulverization, are crushed using jaw and/or rolls crushers.
3. Some samples require the division of one or more size fractions into representative splits, achieved by the use of a riffle or rotary splitter.
4. All pulverizing procedures make use of 'flying disk' or 'ring and puck' style grinding mills. Unless otherwise indicated, all pulverizing procedures guarantee that for most sample types at least 85% of the material will be pulverized to 75 micron (200 Mesh) or better.
5. The coarse reject was retained for 90 days.

The samples are then ready to undergo the suitable analytical techniques to assay for not only Mo, Cu and Ag content, but also a range of elements. The list of testing codes below relate to ALS Chemex's testing procedures, followed by a description of a process involved.

1. ME-ICP41 – Involves a process of aqua regia digestion (a combination of nitric and hydrochloric acid) followed by analysis by Inductively Coupled Plasma Atomic Emission Spectroscopy (ICPAES), to test for up to 34 elements (including Mo coverage range from 0.05-10,000ppm) using a minimum sample size of 1g
2. ME-MS42 – follows a similar procedure as above, with aqua regia digestion, but utilises Inductively Coupled Plasma Mass Spectrometry (ICPMS) to test for fewer elements to a lower detection limit (Mo 0.05-250ppm).
3. ME-XRF05 – Involves the production of a pressed pellet disc, followed by analysis through X-Ray fluorescence (with a Mo range from 4-10,000ppm)
4. ME-MS61r - Involves a process of four acid "near-total" digestion (combining HF-HNO<sub>3</sub>-HClO<sub>4</sub> acid digestion and HCl leach), followed by a combination of ICPMS and ICPAES analysis to test for up to 47 elements (with a Mo range of 0.05-10,000ppm).

5. The remains of the bulk pulp produced in the preparation process, not used during analysis, are then retained by ALS for up to 90 days, or until notified by Dart Mining.

The results of the assays are then reported to Dart Mining electronically, along with the sampling certificates and laboratory QA/QC report. Mo content is reported in ppm, and the bulk pulps also returned for storage.

## **6. LABORATORY ACCREDITATION**

### **6.1 ALS Chemex**

ALS Minerals has developed and implemented at each of its locations a Quality Management System (QMS) designed to ensure the production of consistently reliable data. The system covers all laboratory activities and takes into consideration the requirements of ISO standards.

ALS Chemex is individually certified to standards within ISO 9001:2008 at their Orange branch laboratory. Perhaps the most important aspect of the QMS is the process of external auditing by recognized organizations and the maintaining of ISO registrations and accreditations. ISO registration and accreditation provides independent verification for our clients that a QMS is in operation at the location in question.

### **6.2 Bureau Veritas – AMDEL**

All tests and services performed by AMDEL comply with stringent quality assurance and accreditation requirements. Where appropriate, AMDEL and New Zealand Laboratory Services Limited laboratories are ISO 17025 accredited and/or certified to ISO 9001 Quality Management Systems, with the AMDEL's Adelaide Laboratory being certified to ISO 9001 standard.

## **7. GEOLOGICAL AND GRADE ZONE ASSIGNMENT**

The geology of the Unicorn porphyry deposit has been established through broad geological mapping, detailed soil and rock chip geochemical sampling, two phases of ground based geophysics and four phases of drilling over the system. In order to estimate the current Minerals Resource it has been necessary to generate a series of 3D geological models to represent the lithology domains and grade zones interpreted for the system.

The Unicorn deposit features mineralisation of Mo, Cu and Ag that show different distribution and only partly overlap. Individual Grade Zones (M1, M2 and M3) define areas that contain significant molybdenum (the primary economic metal within the deposit) as well as copper and silver. These zones cross lithology type boundaries and form draped sub-horizontal layers or shells within the host porphyry. The Grade Zone is assigned from drill assay data, guided by surface geochemistry data and constrained by the modelled lithology. The total tonnage of the Grade Zone is estimated by considering the volume within each lithology (applying the respective specific gravity) and within either resource category to sum the total tonnage. Grade Zone M1 occurs both within the Indicated

and Inferred Mineral Resource while M2 is only defined within the Indicated Mineral Resource. Grade Zone M3 is open with depth and only occurs within the Inferred Mineral Resource.

The lithology domains that constrain the resource (Quartz Feldspar Porphyry – **QFP**, Silica Cap – **SLC** and Polymict Breccia – **PBX**) have been interpreted in cross section and plan based on surface mapping, drilling and Controlled Source Magnetotellurics (CSAMT) geophysics (CSAMT was carried out on five 100m spaced cross sections - 5,977,900mN, 5,978,000mN, 5,978,100mN, 5,978,200mN and 5,978,300mN across the majority of the resource area). The modelled volume of the enclosing QFP relied heavily upon the CSAMT geophysics interpretation and the response of the interpreted pyrite shell halo to the mineralisation which appears to be highly diagnostic of the contact zone with the host sedimentary hostfels. The lithology domains and Grade Zones modelled appear below:

## 8. LITHOLOGY

**Quartz Feldspar Porphyry (QFP)** – constrained by surface mapping, geochemistry, CSAMT geophysics and drilling

**Silica Cap (SLC)** – constrained by surface mapping, geochemistry, CSAMT geophysics and drilling.

**Polymict Breccia (PBX)** – constrained by surface mapping, geochemistry and drilling.

## 9. GRADE ZONES

**M1** (occurs within the Indicated and Inferred Mineral Resource – constrained by Molybdenum grade)

**M2** (only occurs within the Indicated Mineral Resource – constrained by Molybdenum grade)

**M3** (only occurs within the Inferred Mineral Resource – constrained by Molybdenum grade)

**INT** (occurs within the Indicated and Inferred Mineral Resource – represents all material within the QFP that are not assigned grade zone M1, M2 or M3).

## 10. SPECIFIC GRAVITY ESTIMATION

The specific gravity estimation for the resource is based on 14 drill core samples from 3 different holes throughout the resource area. The diamond drill core samples were collected from representative sections of typical mineralisation style hosted by the three main lithology types considered. Table 1 shows the distribution of samples within the drilling and the results from the different lithology groups.

Table 1. Specific Gravity Results – Unicorn Drill Core.

HOLE_ID	SAMPLE NAME	FROM (m)	TO (m)	LITHOLOGY	SG (g/cm <sup>3</sup> )
<b>QFP STOCKWORK STYLE MINERALISATION</b>					
DUNDD004	194.9 stockwork	194.9	195.1	QFP	2.65
DUNDD004	222.4 stockwork	222.4	222.7	QFP	2.64
DUNDD004	249.2 stockwork	249.2	249.3	QFP	2.62
DUNDD007	361 stockwork	361.0	361.3	QFP	2.70
DUNDD007	370.2 stockwork	370.2	370.5	QFP	2.69
DUNDD007	400.2 stockwork	400.2	400.5	QFP	2.69
DUNDD007	420.8 stockwork	420.8	421.1	QFP	2.72
<b>AVERAGE</b>					<b>2.67</b>
<b>SILICA CAP STYLE MINERALISATION</b>					
DUNDD004	316.7 silica cap	316.7	316.9	SLC	2.71
DUNDD004	320.6 silica cap	320.6	320.7	SLC	2.72
DUNDD006	108.7 silica cap	108.7	109.0	SLC	2.70
DUNDD007	379.2 silica cap	379.2	379.5	SLC	2.73
<b>AVERAGE</b>					<b>2.72</b>
<b>BRECCIA STYLE MINERALISATION</b>					
DUNDD006	136.5 BX_SLC	136.5	136.8	PBX	2.75
DUNDD006	142.4 BX	142.4	142.7	PBX	2.73
DUNDD006	165.8 BX_P	165.8	166.1	PBX	2.70
<b>AVERAGE</b>					<b>2.73</b>

## 11. RESOURCE ESTIMATION – AMC PTY LTD

Australian Mining Consultants Pty Ltd (Melbourne) were contracted to assist with the completion of a Mineral Resource estimate for the Unicorn Project. This involved working with Dart Mining NL to design and place up to three diamond drill holes, assist with the geological modelling of the interpretation and to carry out the resource estimate based on the geological and Grade Zone

models supplied by Dean Turnbull, Manager – Exploration (Dart Mining NL). AMC carried out the Resource Estimation and has prepared a report detailing the estimation process. A summary of this report is attached as Appendix 1. The Mineral Resource Estimate has been presented based on a 200ppm Mo cutoff grade. A 200ppm Mo cutoff was utilised as it represents a level at which the combined value of recoverable metals clearly shows reasonable prospects for eventual economic extraction.