# MINERAL HOLDINGS AUSTRALIA PTY LTD

## RETENTION LICENCE 1/2001
## MEUNNA

## REPORT ON EXPLORATION
## MARCH 2015 to MARCH 2016

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## ABSTRACT

RL1/2001 was granted to Mineral Holdings Australia Pty Ltd (MHA) on 1 March 2002 for a period of 3 years, over an area of 2km$^2$ in north-west Tasmania. The Licence was renewed on the 1 March 2005, for a period of 3 years, to 1 March 2008 and subsequently for another 5 years to 1 March 2013. The Licence is a flow on title from EL11/1992 and covers exploration for Category 3 construction materials and Category 5 industrial minerals and semi-precious stones.

The Licence was applied to cover the silica resources of the 1,130m thick Proterozoic Jacob Quartzite, a quartz arenite formation within the Rocky Cape Group. The resources lie along a NE-SW trending 2km length of the Meunna Hills. The targets are high-grade quartzite and sand to supply local and overseas markets with fracturing (frac) sand, silicon or ferrosilicon products and materials for the glass making industry.

Exploration carried out by MHA under EL11/1992, over the period 1992 to 2002, has outlined an indicated resource of 90,000m$^3$ and an inferred resource of 270,000m$^3$ of silica sand and gravel. In addition, there is an inferred in situ quartzite resource of 700,000m$^3$ or 1.7 million tonnes (assuming an SG factor of 2.5).

The Meunna retention licence is an essential part of the Thomas Mountain quartzite and frac sand resource area that is currently being developed by MHA.

There is greatly increased interest in the availability of frac sands for use in the coal seam gas industry in Queensland and New South Wales and in the availability of high-grade silica sand and quartzite for the production of liquid crystal screens and solar panels. Interest in the production of fused silica, silicon carbide, silicon metal and glass manufacture is also increasing.

Information meetings and/or field visits have been arranged with numerous companies and groups. Discussions with these companies will continue with a view to potential joint ventures and future development of the resource.

## 1.0 INTRODUCTION

RL1/2001 was granted to Mineral Holdings Australia Pty Ltd (MHA) on 1 March 2002 for a period of 3 years over an area of 2km$^2$ in north-west Tasmania. The Licence was renewed on 1 March 2005, for a period of 3 years, to 1 March 2008 and subsequently for a further 5 years to 1 March 2013. The Licence is a flow on title from EL11/1992 and covers exploration for Category 3 construction materials and Category 5 industrial minerals and semi-precious stones.

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The Meunna area is considered an important backup for the nearby Thomas Mountain quartzite and frac sand reserves.

## 2.0 PREVIOUS EXPLORATION

Over the past 20 years, MHA has carried out an extensive program of exploration for silica resources in north-west Tasmania. It has identified quartzite and sand at Thomas Mountain/Dip Range (Hogarth Creek) RL1/2005, silica flour at Champion Road RL2/1996 and quartzite and sand at Meunna, originally EL11/1992, now RL1/2001. The exploration effort on EL11/1992 has been described in the series of annual reports by V. M. Threader (listed in the references) and was summarised by David Duncan as follows:

“In the year to 1993, exploration consisted of preliminary traverses along existing tracks and three surface samples were taken from an area just west of the Newhaven Track/Myalla Road junction. The samples were found to be of high purity sand derived from quartz arenite with $SiO_2$ greater than 99.6%. The conclusion was that the area was prospective for quartz arenite and derived sand as local accumulations in depressions and hill cap remnants.

In the following year, some 26 samples of rock chips and sand derived from the Jacob Quartzite were taken along roads and logging tracks. Most of these were discounted due to high levels of the natural contaminants $Al_2O_3$, $Fe_2O_3$ and $TiO_2$. Three samples of sand from the Meunna Hills, NE of Myalla road showed high chemical purity, with average contaminant level of about 0.07%. The area of the Licence was reduced to 30 square kilometres.

The year to 1995 saw eleven excavator pits completed along disused logging tracks in the Meunna Hills following up on the surface sampling. An in situ resource of 90,000$m^3$ of sand and gravel was identified over an area of 25,000$m^2$ to an average depth of 3.6m above a hard sandstone bedrock. Sizing studies showed that 50% of this was sand at minus 425 microns grain size. Chemical analyses revealed that the iron content was variable with the average content being 113 ppm. However, three of the samples indicated that they could meet the highest purity classification (less than 20 ppm $Fe_2O_3$) for the silica sand market.

In 1996, thirteen percussion holes were drilled along the crest of the ridge on the Meunna Hills. Because of drilling difficulties and problems with sample return, only one hole reached its target depth (18m). Geochemistry carried out on the successful hole indicated a general increase in the level of the contaminants $TiO_2$, $Al_2O_3$ and $Fe_2O_3$ at about 10-12m depth, above that the $SiO_2$ content being 99.4% or better. This is the pattern repeated throughout the NW and suggests enrichment by silica by either leaching of impurities or silicification.

Five airtrack holes were drilled successfully in 1997 with downhole hammer in the area of the high quality silica sand defined during the excavator program with all holes reaching target depth. Preliminary iron contents carried, out by Index Minerals, range from 217 to 1040 ppm $Fe_2O_3$ with the lower values being found in the top 10m. This is probably too high for premium quality silica which should be less than 200 ppm $Fe_2O_3$ but is considered to be acceptable for secondary metallurgical grade silicon or ferrosilicon production."

In December 2004, five pits were dug by excavator for an aggregate depth of 11.9m, in the area previously reported as less than 20ppm $Fe_2O_3$. The pits all terminated in hard sandstone basically when the hole refused to advance with ripping in any reasonable time. When dug out and brought to the surface, the material presented as up to 30% blocks of sandstone/quartzite in a matrix of mainly fine grained, light brown sand.

Channel samples of the sand profile were washed to remove organic material, dried and passed over a magnet to remove any magnetic material and then assayed. The $Fe_2O_3$ content of these test pit samples at 187 to 455 ppm does not repeat the minus 20ppm values of the first excavator program. In general, although the silica content is in the range of 99.5 to 99.8%, the contaminants are at least an order of magnitude too high for most silica flour specifications particularly in $Fe_2O_3$, $TiO_2$, $K_2O$ and the metals Mn, Cu, Cr and Ni.

## 3.0 INVENTORY OF SILICA RESOURCES

The resources identified in RL1/2001 by MHA are based on the 1130m thick Jacob Quartzite, a quartz arenite formation within the Rocky Cape Group. They lie along a NE-SW trending 2km length of the Meunna Hills (Plan 2).

The resources are:

| | | |
|---|---|---|
| Sand and gravel | 90,000$m^3$ | Indicated |
| | 270,000$m^3$ | Inferred |
| Quartzite/sandstone | 700,000$m^3$ | Inferred |

The in situ resource of 90,000$m^3$ of sand and gravel has been identified in the NE of the area, based on 11 excavator pits, over an area of 25,000$m^2$, with an average depth to hard sandstone bedrock of 3.6m. Sizing and purity studies are given in the annual exploration accounts. Duncan (2002) judged that this deposit meets the criteria for the Indicated Resource Category (JORC 1999).

This sand and gravel resource occurs on the SE flank of the northern part of the NE-SW trending ridge. There is a distinct possibility that, following the pattern elsewhere in Tasmania, the deposit extends along the entire SE flank of the ridge to correlate with the sand and gravel resources of the Pokes Road Quarry located at the SW end. The ridge topography may have protected the resource on the sheltered SE flank from the eroding effects of the wind and sun prevailing from the north and west. If this is the case an additional Inferred resource of 270,000$m^3$ of sand and gravel could lie along the SE flank of the ridge.

Also, eighteen percussion drill holes have quantified the bedrock quartzite/sandstone resource on the crest of the ridge (11 holes) and also under the sand resource already defined (5 holes). In the program, three holes encountered schist interbeds.

Based on the drilling, the in situ hardrock quartzite resource along the ridge is conservatively inferred to be 700,000$m^3$ (2,000m x 50m x 7m) or 1.7 million tonnes assuming an SG of 2.5. The limited analyses available may rule out this material for best quality silicon but it is expected to be acceptable for secondary metallurgical grade silicon or ferrosilicon. On extraction, some of the deposit may be waste either as schist interbeds or substandard quartzite/sandstone.

Only limited work has been carried out at Meunna while effort has been concentrated on developing the Thomas Mountain area for initial production. The reserves at Meunna however are an important backup for that development and will be mined as production increases.

## 4.0 WORK PROGRAM

MHA has been very active in trying to interest companies and groups in the development of a quartzite and frac sand mining operation at Thomas Mountain and Meunna and also in trying to interest potential customers in the products. The companies involved in discussions and mine visits are:

- Simcoa (interested in quartzite to blend with their WA-sourced chert)
- Australian Centre for Advanced Photovoltaics – Prof. Martin Green

- Russian Quartz – Leonid Kuzmin
- Nevada CMI – Ed Lee
- Kassem Holdings Pty Ltd – Talal Hassan
- CMS Group – Jason Sentinella
- Dorfner Anzaplan (for specialty evaluation of the quartzite)
- Rum Jungle Resources – Chris Tziolis
- Hazell Bros – Peter Bennett (mining and environmental effects statement)
- Project Monitor Pty Ltd – Brian Wawn
- Tooperang Quarry – Steve Bainger
- Earth Commodities – Darren Wardle
- Tasmanian Advanced Minerals
- Sibelco – Geoff Tonkin & Rodney Hunt
- Halliburton Australia – Greg Ward (Procurement Manager)
- Schlumberger Well Services Aust. – Richard Grattan (Supply Chain Manager)
- Iluka Resources – Richard Hine (Exploration Manager)
- Australian Consolidated Industries (ACI)

Many of these groups have visited the Meunna site but only ACI and Sibelco have provided assay results to MHA (included in Appendices 1 & 2).

## 5.0 PROPOSED PROGRAM

Enough outcrop is visible along the tracks to prove that this is an in situ weathered sandstone deposit in Jacob Quartzite. The weathering and/or other alteration has produced irregular zones of hard and soft sandstone and even quartzite (silicified sandstone) like the Detention Formation in the Dip Range at Thomas Mountain.

Sizing tests from samples from excavator pits in the area show that on average about 30% of the resource would be in the plus 420 micron range considered optimum for frac sand (see Table 2, from Threader, 1995). Plotting on a conventional size grading diagram shows that Meunna, Dip Range and Hebe river sand are closely related in grain size distribution (Threader, 1995).

The presence of some very fine grained, pure material with 50% less than 75 microns suggests a possibility of a silica flour tail that would be available during mining.

Marketing studies have continued and industrial companies with suitable expertise have been approached for potential joint venture with down stream processing as part of any future development. Discussions with these companies will continue with a view to potential joint ventures and future development of this resource, along with the nearby Thomas Mountain.

## 6.0 ENVIRONMENT

All pits and drill sites have been backfilled immediately following logging and sampling. The surface was recontoured and slash and litter distributed around as appropriate.

## 7.0 REFERENCES


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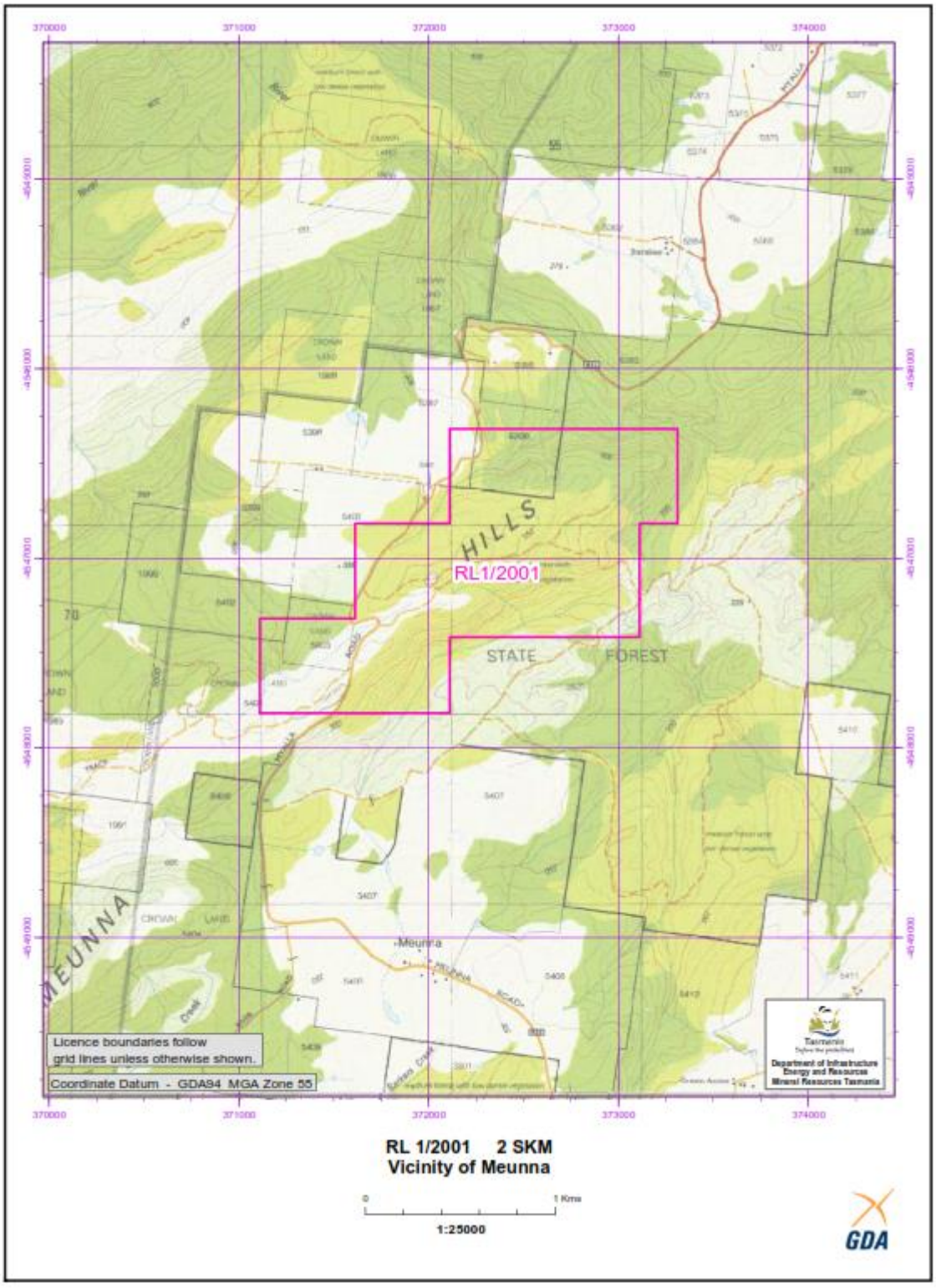
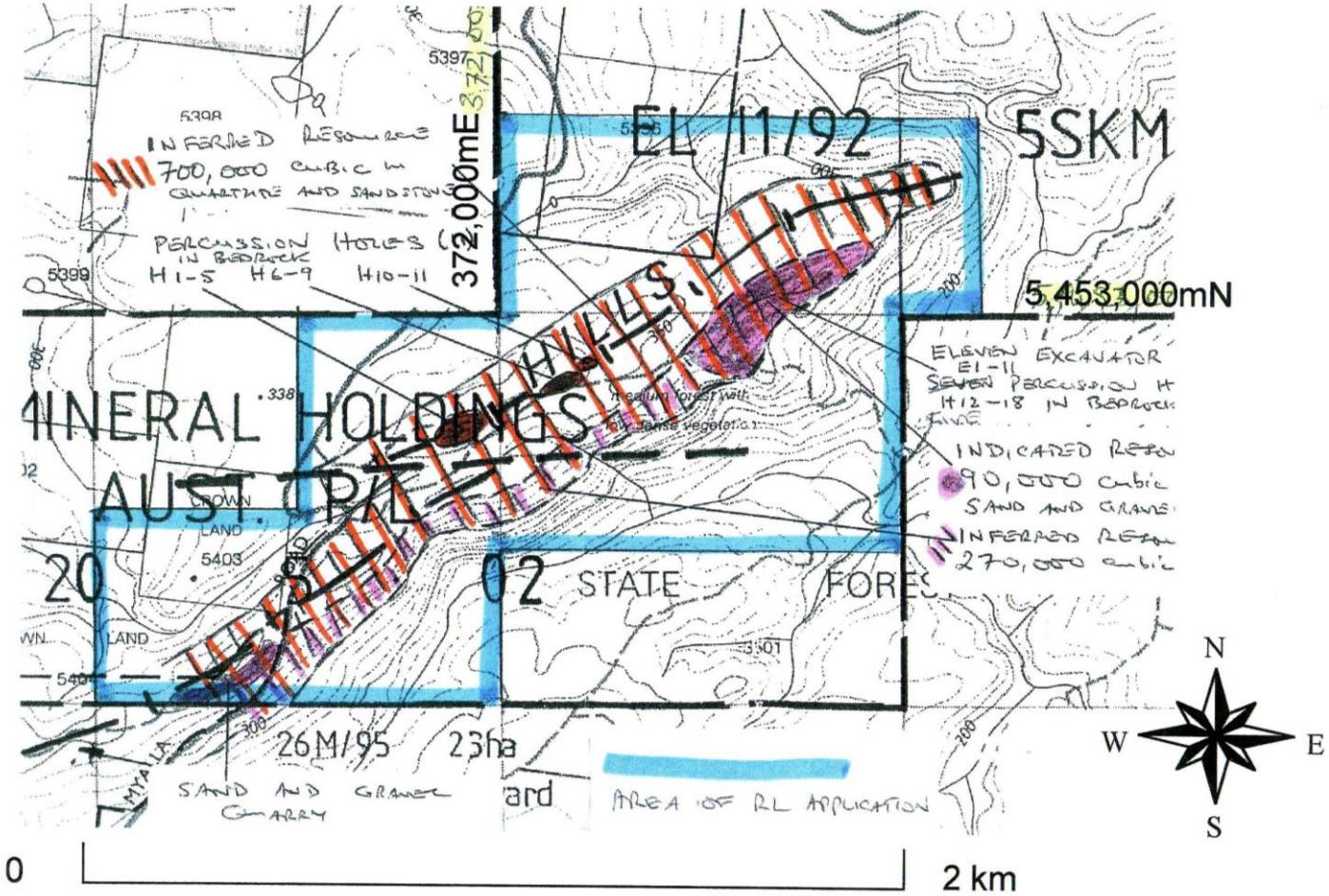
## 8.0 KEYWORDS

Meunna Hills, Jacob Quartzite, Rocky Cape Group, Sand, Sandstone, Quartzite, Silica resources.




**Plan 1: Location Diagram - RL1/2001 Meunna**




**Plan 2: Geology and Resource Plan - RL1/2001 Meunna**

## APPENDIX 1: Sand Assay – Meunna & Thomas Mountain (ACI)

(grid coordinates not provided)

| Analysis carried out on samples dried at 110 °C | | | | | | |
|---|---|---|---|---|---|---|
| | Sand | Sand | Sand | Sand | Sand | Sand |
| | O-I Asia Pacific Sand Specification | Meunna Myalla Rd | Meunna Newhaven Track | Thomas Mountain Bottom Pit LHS | Thomas Mountain Bottom Pit RHS | Thomas Mountain Top Pit |
| O-I Ref. | | 601264 | 601263 | 601260 | 601261 | 601262 |
| $SiO_2$ | 99.0 min | 99.45 | 99.62 | 99.79 | 99.80 | 99.77 |
| $Na_2O$ | | 0.03 | 0.02 | 0.01 | 0.01 | 0.02 |
| $K_2O$ | | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 |
| CaO | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| MgO | | 0.01 | 0.01 | 0.01 | <0.01 | 0.01 |
| CaO+MgO | | | | | | |
| SrO | | ND | ND | ND | ND | ND |
| $Al_2O_3$ | ± 0.05 | 0.05 | 0.02 | 0.02 | 0.02 | 0.02 |
| $TiO_2$ | 0.10 max | 0.25 | 0.14 | 0.07 | 0.07 | 0.09 |
| $Fe_2O_3$ | 0.030 max | 0.031 | 0.035 | 0.012 | 0.010 | 0.013 |
| $Cr_2O_3$ | 0.0006 max | 0.0003 | 0.0005 | 0.0001 | 0.0002 | 0.0001 |
| MnO | | ND | ND | ND | ND | ND |
| $SO_3$ | | ND | ND | ND | ND | ND |
| | | | | | | |
| LOI | | 0.16 | 0.13 | 0.08 | 0.08 | 0.07 |
| COD | | 381 | 334 | 115 | 125 | 122 |
| | | | | | | |
| +1000µm | NIL | 2.2 | 1.1 | <0.1 | <0.1 | <0.1 |
| +600µm | 2.0 max | 8.6 | 6.1 | 7.1 | 5.4 | 9.6 |
| +425µm | 10.0 max | 21.2 | 18.4 | 32.6 | 32.7 | 41.1 |
| +250µm | | 57.3 | 57.9 | 66.5 | 69.4 | 70.2 |
| +150µm | | 87.6 | 85.2 | 91.1 | 92.7 | 88.8 |
| +106µm | | 92.8 | 92.5 | 96.3 | 97.6 | 94.7 |
| +75µm | | 94.9 | 96.5 | 97.9 | 98.7 | 98.0 |
| -75µm | 1.0 max | 5.1 | 3.5 | 2.1 | 1.3 | 2.0 |

## APPENDIX 2: Quartzite Assay – Meunna & Thomas Mountain (Sibelco)

| SampleID | East | North | RL | Projection | Date | Prospect | Colour | Lithology | Comments | Logged_By | TSD_No | SiO2 | Fe2O3 | TiO2 | Al2O3 | CaO | MgO | Na2O | K2O | Cr2O3 | SO3 | LOI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7401 | 372,516.41 | 5,462,718.89 | 187.643372 | MGA55 | 10/10/2012 | Thomas Mountain | White | QUATZITE | TEMCO Bulk Sample | rhunt | 136,656 | 99.58 | 0.026 | 0.052 | 0.064 | 0.04 | 0.02 | 0.02 | -0.01 | 0.0001 | 0 | 0.2 |
| 7402 | 372,491.19 | 5,462,654.37 | 191.293854 | MGA55 | 10/10/2012 | Thomas Mountain | White | QUATZITE | TEMCO Bulk Sample | rhunt | 136,657 | 99.53 | 0.029 | 0.048 | 0.079 | 0.01 | 0.02 | 0.02 | 0.01 | 0.0005 | 0 | 0.26 |
| 7403 | 371,954.10 | 5,452,888.47 | 357.876221 | MGA55 | 10/10/2012 | Meunna | White | QUATZITE | Quarry | rhunt | 136,658 | 99.66 | 0.025 | 0.055 | 0.036 | -0.01 | 0.01 | 0.02 | -0.01 | -0.0001 | 0 | 0.19 |
| 7404 | 371,962.89 | 5,452,881.19 | 357.876221 | MGA55 | 10/10/2012 | Meunna | White | QUATZITE | Quarry | rhunt | 136,659 | 99.62 | 0.021 | 0.069 | 0.047 | -0.01 | 0.02 | 0.02 | -0.01 | 0.0002 | 0 | 0.2 |
| 7405 | 371,954.79 | 5,452,887.93 | 357.876221 | MGA55 | 10/10/2012 | Meunna | White | QUATZITE | Quarry | rhunt | 136,660 | 99.71 | 0.015 | 0.04 | 0.014 | -0.01 | 0.02 | 0.02 | -0.01 | -0.0001 | 0 | 0.18 |