



Carbon Based Environmental
Pty Limited
ABN 74 102 920 285

Rocla Quarry Products
Calga Quarry

Environmental Monitoring

Dust Deposition Gauges, Surface and Ground
Waters and Meteorological Station

September 2015

A handwritten signature in black ink, appearing to read 'Colin Davies'.

Colin Davies BSc MEIA CENVP
Environmental Scientist
Date: 27 October 2015

Executive Summary

Carbon Based Environmental is contracted by Rocla Quarry Products to conduct environmental monitoring at the Calga Sand Quarry.

The monitoring includes;

- Dust Deposition Gauges;
- Surface Waters;
- Groundwaters; and
- Meteorological Station.

This report was prepared by Carbon Based Environmental and includes the following;

- Dust Deposition results for September 2015;
- Surface Water quality results for September 2015; and
- Meteorological report for September 2015.

The September 2015 dust deposition results for insoluble solids were generally low and free of major contamination. All sites, on a rolling annual average basis, are currently below the Air Quality Management Plan exceedance level of 3.7g/m².month. Results were found to be representative of dust levels as determined by the Australian Standard.

Surface water samples were collected on 2 October 2015 at sites A, D and F. Site B was dry and Site C was inaccessible and was unable to be sampled this month. The samples were collected and analysed for a monthly sampling event. Results show pH within the slightly acidic range, low Electrical Conductivity, low Total Dissolved Solids and low Total Suspended Solids. Oil and Grease was not detected at any site in August 2015.

Groundwater depth generally increased compared to July 2015, indicating water moving away from the surface. pH at all sites is in the acidic to neutral range and generally increased when compared to the previous results. EC levels slightly decreased at a majority of groundwater sites when compared to the results obtained in August 2015.

Data for September 2015 shows that rainfall recorded at the Rocla Calga Quarry was higher than the Gosford BOM and similar to the Peats Ridge long term, mean rainfall for September 2015.

The rainfall comparison is provided below:

| | |
|---|---------|
| Rocla Calga Quarry | 58.7 mm |
| BOM Peats Ridge* | NA |
| BOM Gosford* | 29.1 mm |
| BOM Peats Ridge Long term mean for September* | 69.1 mm |

*Data sourced from Bureau of Meteorology (BOM) website (www.bom.gov.au). No data was available from the BOM Peats Ridge station for September 2015

Note: Differences in the daily rainfall readings between BOM and the Rocla station may occur due to BOM stations reporting rainfall at 9am and the Rocla station recording rainfall at midnight.

Sampling Program

Rocla Calga Quarry conducts environmental monitoring in accordance to Development Consent, OEH (EPA) licence and Environmental Management Plans. Carbon Based Environmental are contracted to undertake dust deposition gauge, surface and groundwater and meteorological monitoring for the project. Carbon Based Environmental commenced monitoring from the April 2006 monitoring period.

Dust deposition gauges are operated to the Australian Standard AS3580.10.1 “Methods for Sampling and Analysis of Ambient Air Method 10.1 Determination of Particulates—Deposited Matter—Gravimetric Method”. Sampling is undertaken every 30 +/- 2 days and each gauge is analysed for insoluble solids and ash residue. The results are reported as g/m².month.

Surface waters are sampled in accordance with Australian Standards AS5667.1 “Guidance on the Design of Sample Programs, Sampling Techniques and the Preservation and Handling of Samples”, AS5667.6 “Water Quality Sampling—Guidance on sampling of rivers and streams” and AS5667.4 “Water Quality Sampling—Guidance on sampling from lakes, natural and man-made”. Surface water monitoring sites include local streams and dams. Basic analysis including pH, Electrical Conductivity, Total Suspended Solids, Total Dissolved Solids and Total Oil and Grease is conducted monthly at Sites A and F (dams) and when Sites B, C and D are flowing. Additional samples are collected when daily rainfall exceeds 50mm.

Groundwaters are sampled in accordance with Australian Standards AS5667.1 “Guidance on the Design of Sample Programs, Sampling Techniques and the Preservation and Handling of Samples” and AS5667.11 “Water Quality Sampling—Guidance on sampling of ground waters”. Groundwater monitoring sites are sampled bi-monthly for depth and water quality. Groundwater monitoring loggers continuously record water levels in a selection of bores.

Meteorological monitoring is conducted at the quarry and displayed on the site computer with a real time display. Wind parameters are measured according to Australian Standard AS 2923 “Ambient Air— Guide for Measurement of Horizontal Wind for Air Quality Applications”.

The weather stations have the following sensor configuration;

Air temperature

- Humidity
- Rainfall
- Atmospheric pressure
- Evaporation
- Solar radiation
- Wind speed
- Wind direction

Carbon Based Environmental continued to operate the monitoring equipment and utilise site collections at their existing locations.

The locations of monitoring points are provided in **Figure 1**.

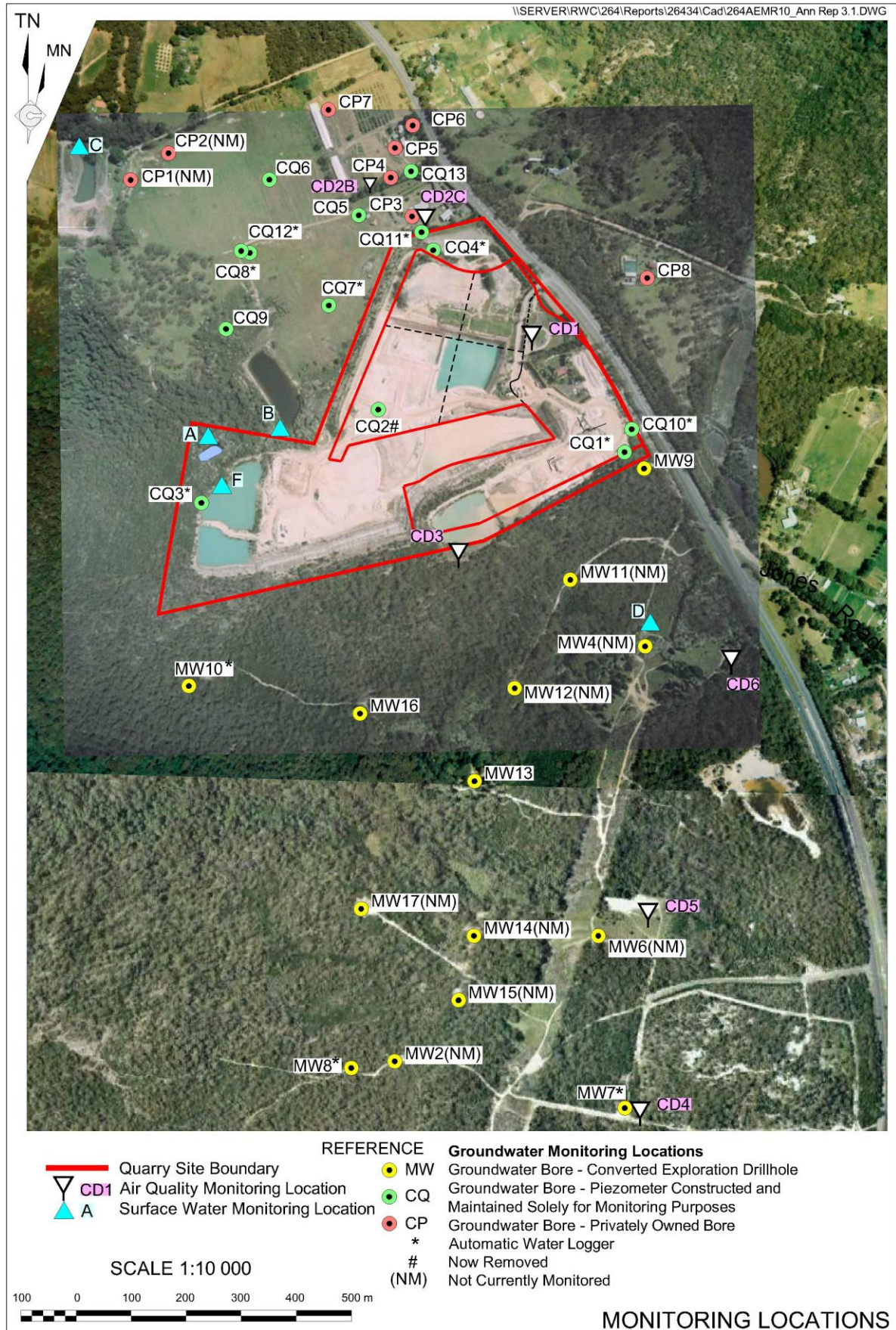


Figure 1: Rocla Calga Quarry environmental monitoring locations

2.0 Monthly Results

2.1 Dust Deposition Gauges

Table 1 displays the results for September 2015 and the project 12 month rolling average. Results are in g/m².month.

Table 1: Dust Deposition results: 2 September 2015 – 2 October 2015 (30 days)

| Site | Monthly Insoluble Solids g/m ² .month | Monthly Ash Residue g/m ² .month | Monthly Combustible Matter g/m ² .month | Monthly Ash Residue/ Insoluble Solids % | Rolling Annual Average Insoluble Solids g/m ² .month |
|-------------|---|--|---|--|--|
| CD1 | 1.0 | 1.0 | <0.1 | 100 | 1.2 |
| CD2c | 1.0 | 0.7 | 0.3 | 70 | 1.4 |
| CD3 | 0.6 | 0.3 | 0.3 | 50 | 1.1 |
| CD4 | 0.3 | 0.1 | 0.2 | 33 | 0.7 |
| CD5 | 0.2 | 0.1 | 0.1 | 50 | 0.6 |
| CD6 | 0.3 | 0.2 | 0.1 | 67 | 0.7 |

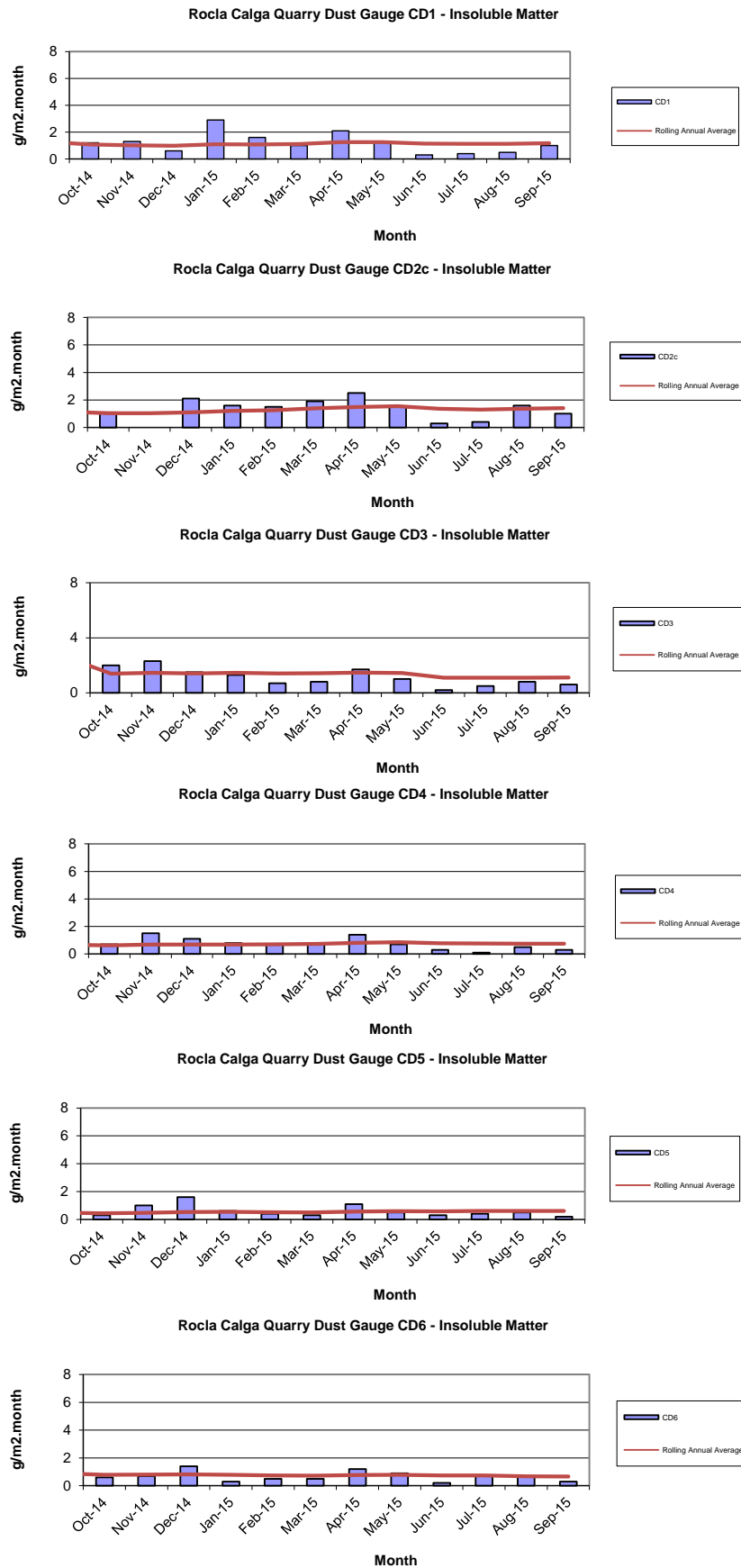
Insoluble Solids marked with an * indicate an excessively contaminated gauge. Contamination can include bird droppings, vegetation (such as plant matter, algae, pollen and seeds) and insects. Results in bold indicate insoluble solids levels above 3.7 g/m².month; the Development Consent's annual average amenity criteria at residential locations. The current rolling annual average is calculated from September 2014 to August 2015.

NA= Not Available.

CD1 was installed on the 1 May 2006. CD2a was discontinued at the start of August 2006 due to quarry operations "mining out" the site of the gauge. The replacement gauge, Site CD2b, was located in a position adjacent to the boundary between B. Kashouli and F. & J. Gazzana in conformance with the Air Quality Management Plan. CD4 was installed on 3 October 2006, to gauge air quality impacts to the south of the site operations, as were CD5 and CD6 which were installed on the 14 December 2006. CD2b was discontinued at the end of January 2010 due to contamination of the gauge by non-quarry related vehicle movements on a track adjacent to the gauge. The replacement gauge, CD2c, was located on a rehabilitated section of land between the extraction area and adjacent resident.

Dust deposition charts for all dust gauge sites appear in **Figure 2** below. The laboratory analysis is provided in **Appendix 1**.

Figure 2: Dust Deposition Charts



2.2 Surface Water Monitoring

Monthly surface water monitoring was conducted on the 2 October 2015 and results are listed in **Table 2**. The laboratory analysis sheets are provided in **Appendix 1**.

Table 2: Monthly surface water monitoring – September grab sample results

| Site | Observed Flow Rate | Water Colour | Turbidity | pH | EC (µS/cm) | TDS (mg/L) | TSS (mg/L) | Oil and Grease (mg/L) |
|------|--------------------|--------------|-----------|------|------------|------------|------------|-----------------------|
| A | Dam | Clear | Clear | 5.24 | 61 | 60 | <5 | <5 |
| B | No Flow | | | | | | | |
| C | No Access | | | | | | | |
| D | Still | Clear | Clear | 5.03 | 106 | 95 | <5 | <5 |
| F | Dam | Clear | Clear | 5.08 | 66 | 55 | <5 | <5 |

Samples were collected at sites A, D and F. Site B was dry and Site C was inaccessible and was unable to be sampled this month. The samples were collected and analysed for a monthly sampling event. Results show pH within the slightly acidic range, low Electrical Conductivity, low Total Dissolved Solids and low Total Suspended Solids. Oil and Grease was not detected at any site in September 2015.

2.2.1 Non-Routine Surface Water Sampling

No non routine sampling was undertaken during September 2015.

2.3 Groundwater Monitoring

Bi-monthly groundwaters were sampled on 2 October 2015. Water quality tests for pH and electrical conductivity were conducted by Carbon Based Environmental Pty Limited. For water quality purposes, water was purged from the bore until constant pH (+/- 0.1 pH units) and Electrical Conductivity (+/- 5%) was obtained between samples. Data is displayed in **Table 3** and **Figures 3 to 6**.

Groundwater depth generally decreased compared to July 2015, indicating water moving towards the surface.

pH at all sites is in the acidic to neutral range and generally increased when compared to the previous results. EC levels slightly decreased at a majority of groundwater sites when compared to the results obtained in August 2015.

Table 3: Groundwater Quality Data

| Reference | Bore | Type | Depth to water TOC (m) April 06 | Depth to water TOC (m) This report | pH This report | Electrical Conductivity (µS/cm) This report |
|--------------|------------|------------|---------------------------------------|--|-------------------|--|
| CQ1 | Voutos | * Monitor | 20.59 | Removed | | |
| CQ3 | Voutos | * Monitor | 10.53 | 10.84 | 6.4 | 148 |
| CQ4 | Voutos | * Monitor | 8.78 | 10.30 | 4.8 | 120 |
| CQ5 | Gazzana | DIP Only | 8.69 | 6.97 | 4.0 | 186 |
| CQ6 | Gazzana | DIP Only | 16.00 | 10.16 | 4.0 | 191 |
| CQ7 | Gazzana | * Monitor | 6.89 | 6.34 | 4.3 | 105 |
| CQ8 | Gazzana | * Monitor | 11.03 | 5.95 | 4.2 | 138 |
| CQ9 | Gazzana | DIP Only | 10.10 | 8.88 | 4.3 | 115 |
| CQ10 | Voutos | * Monitor | NI | 25.80 | 4.1 | 152 |
| CQ11S | Gazzana | * Monitor | NI | 10.40 | 4.6 | 150 |
| CQ11D | Gazzana | * Monitor | NI | 11.53 | 4.5 | 173 |
| CQ12 | Gazzana | * Monitor | NI | 4.22 | 4.1 | 134 |
| CQ13 | Kashouli | * Monitor | NI | 13.21 | 4.2 | 208 |
| CP3 | Gazzana | Domestic | 10.40 | Destroyed | | |
| CP4 | Kashouli | Domestic | 13.63 | 10.24 | NM | |
| CP5 | Kashouli | Domestic | 16.61 | 12.9 | 4.1 | 208 |
| CP6 | Kashouli | Domestic | 16.27 | 13.21 | 4.1 | 184 |
| CP7 | Kashouli | Production | 8.56 | 2.66 | 4.6 | 121 |
| CP8 | Rozmanec | Domestic | 22.17 | 21.5 | 4.2 | 162 |
| MW7 | Rocla Bore | * Monitor | 15.76 | 15.76 | 4.3 | 117 |
| MW8 | Rocla Bore | * Monitor | 9.82 | 7.49 | 4.6 | 78 |
| MW9 | Rocla Bore | * Monitor | 22.44 | 24.02 | 4.3 | 90 |
| MW10 | Rocla Bore | * Monitor | 15.41 | No Access- track eroded | | |
| MW13 | Rocla Bore | DIP Only | NI | No Access- track eroded | | |
| MW16 | Rocla Bore | DIP Only | NI | No Access- tree across track | | |
| MW17 | Rocla Bore | DIP Only | | No Access- tree across track | | |

Notes:

TOC = Water level measured from top of bore case to water.

NM = Not Monitored – unable to sample water due to non-operational pump.

NR = Not Required by resident.

* = Logger Installed.

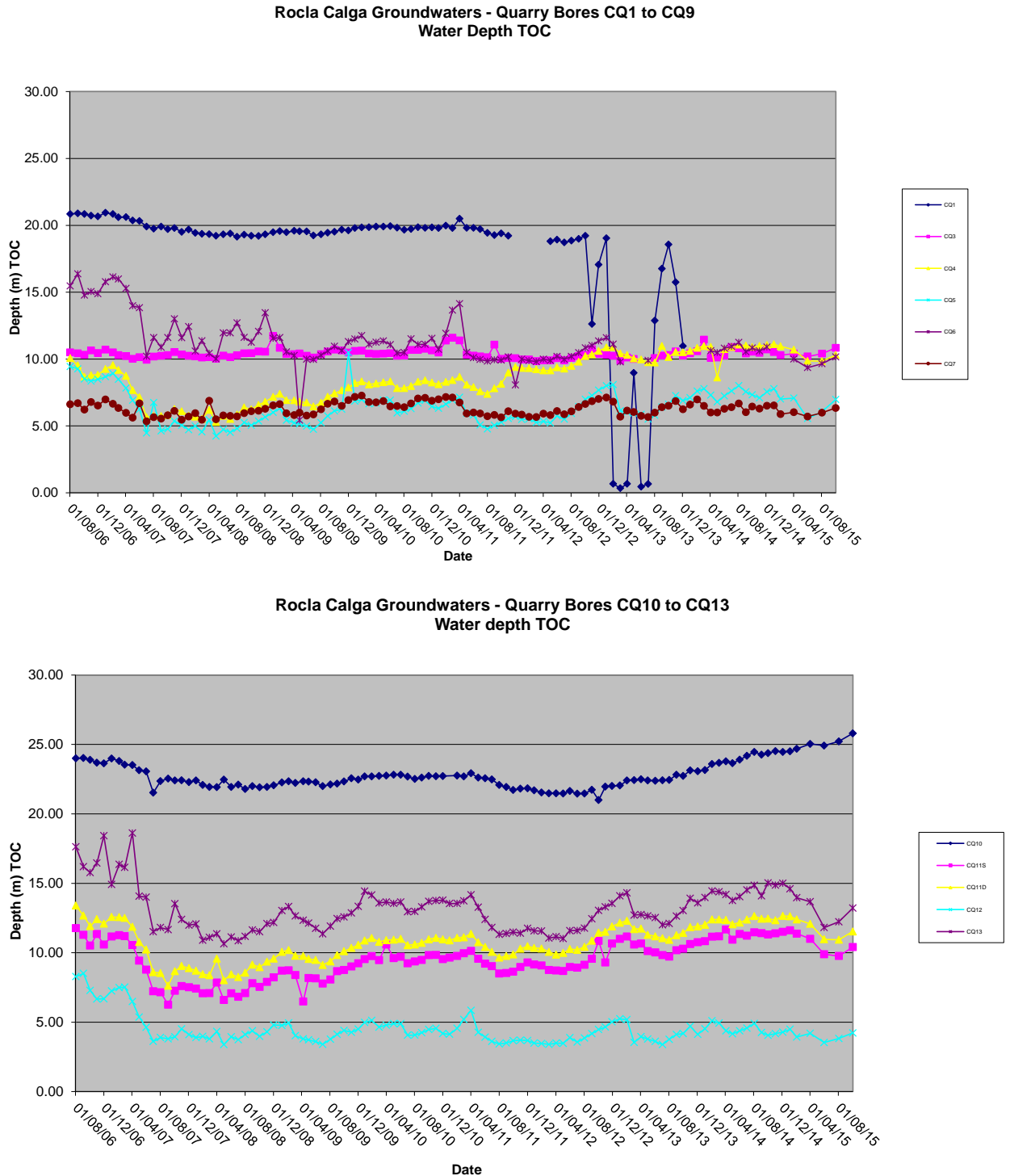
NI = These bores were not installed in April 2006 but are now operational. April 2006 was the first set of measurements taken by Carbon Based Environmental Pty Limited.

Shading is used to indicate the following trends in water depth (compared to the last reading):

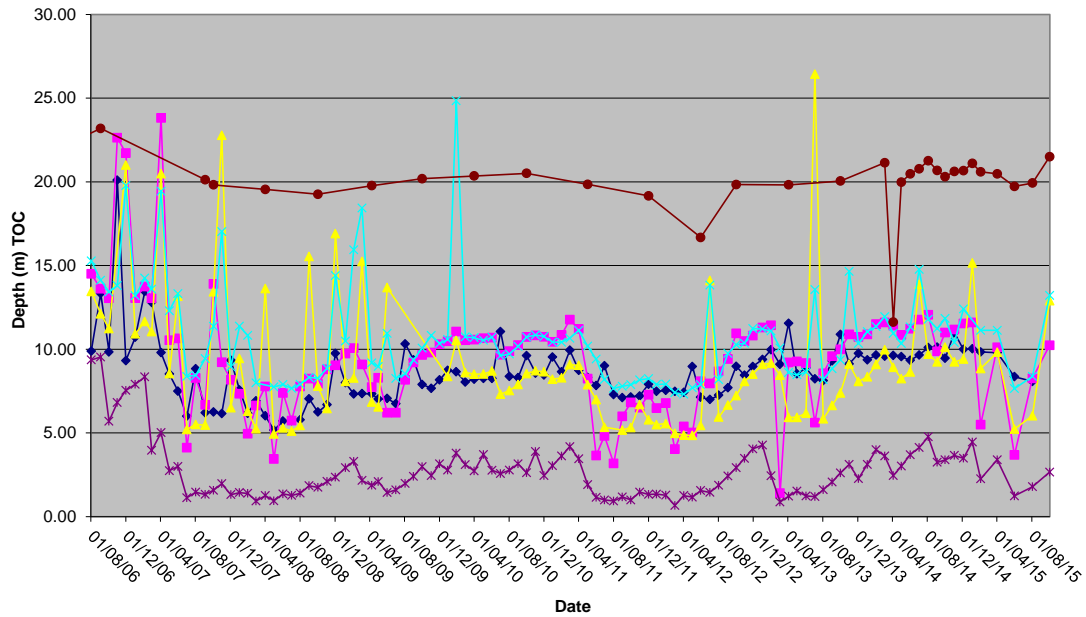
| | |
|--|--|
| | Increase to ground water depth (water moved away from surface) |
| | Decrease to ground water depth (water moved towards surface) |
| | Stable water depth (+/- 0.01m) |

Available groundwater loggers were downloaded and will be forwarded to the Rocla Calga Quarry groundwater consultant.

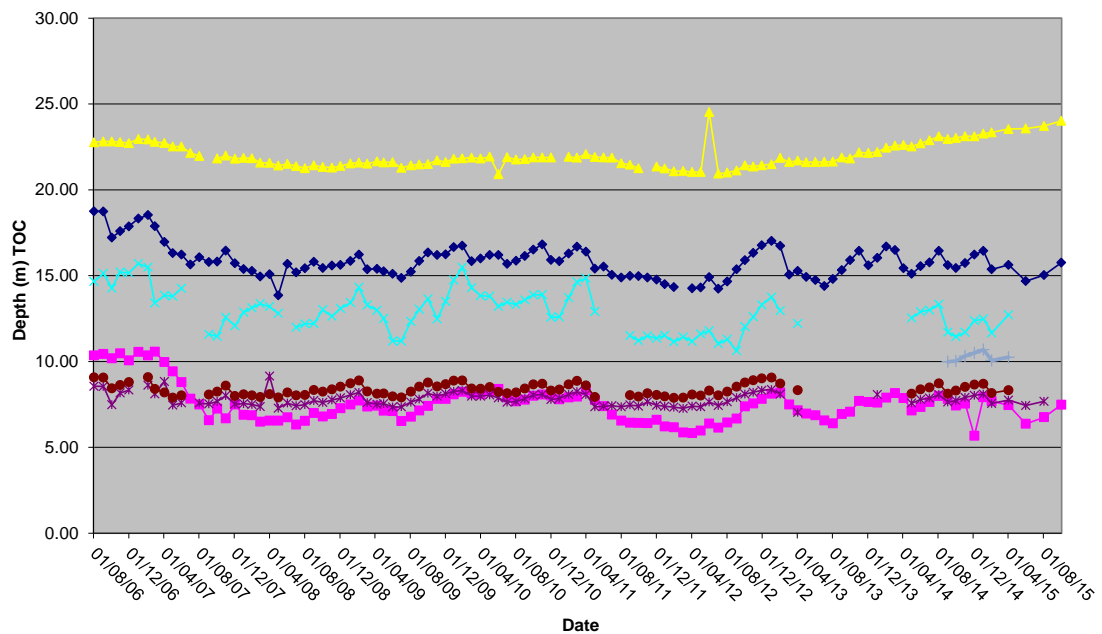
Figures 3 to 6: Groundwater Depth Charts.



Rocla Calga Groundwaters - Quarry Bores CP3 to CP8
Water Depth TOC



Rocla Calga Groundwaters - Quarry Bores MW7 to MW17
Water Depth TOC



2.4 Meteorological Monitoring

The Rocla Calga Quarry weather station data recovery in September 2015 was approximately 100%.

The weather station data follows and includes;

- Monthly data numerical summary;
- Weather charts of air temperature, humidity, heat index and wind chill, atmospheric pressure, solar radiation, evapotranspiration, rain, wind speed and data reception; and
- Wind rose (frequency distribution diagram of wind speed and direction).

Monthly weather statistics from the nearby Bureau of Meteorology (BOM) at Peats Ridge station are no longer available. However, the long term rainfall mean is available via a link on the Gosford BOM Daily Weather Observation page.

Data for September 2015 shows that rainfall recorded at the Rocla Calga Quarry was higher than the Gosford BOM and similar to the Peats Ridge long term, mean rainfall for September 2015.

The rainfall comparison is provided below:

| | |
|---|---------|
| Rocla Calga Quarry | 58.7 mm |
| BOM Peats Ridge* | NA |
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| BOM Peats Ridge Long term mean for September* | 69.1 mm |

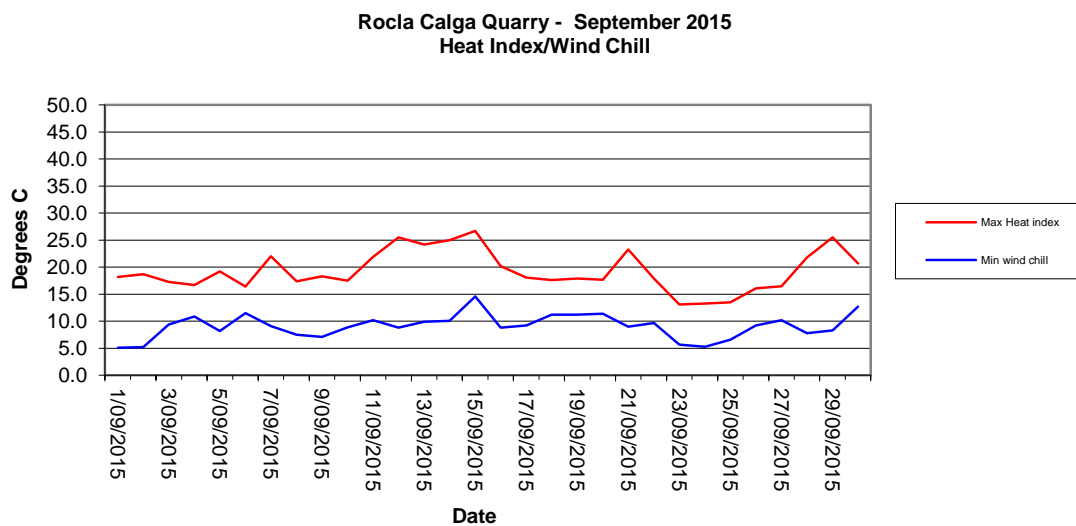
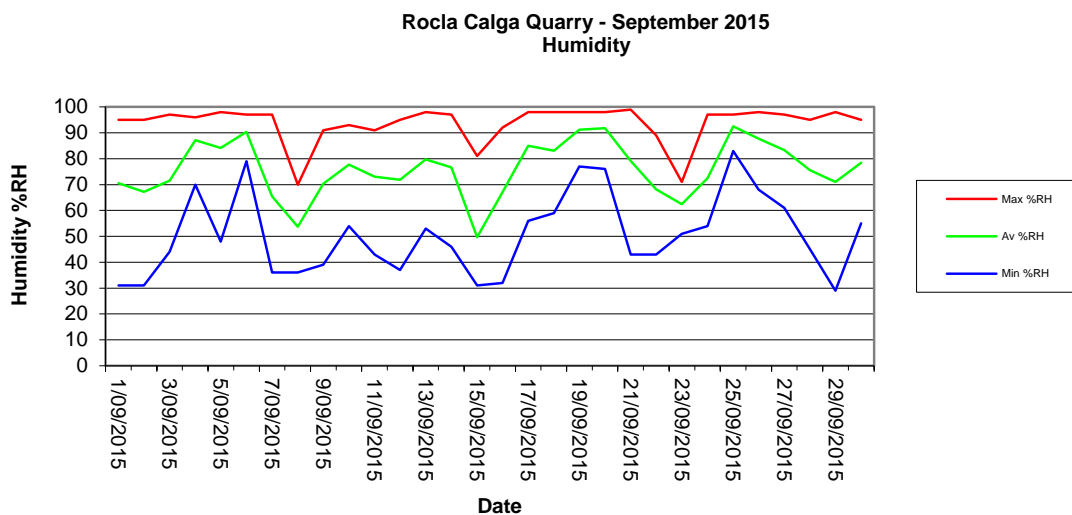
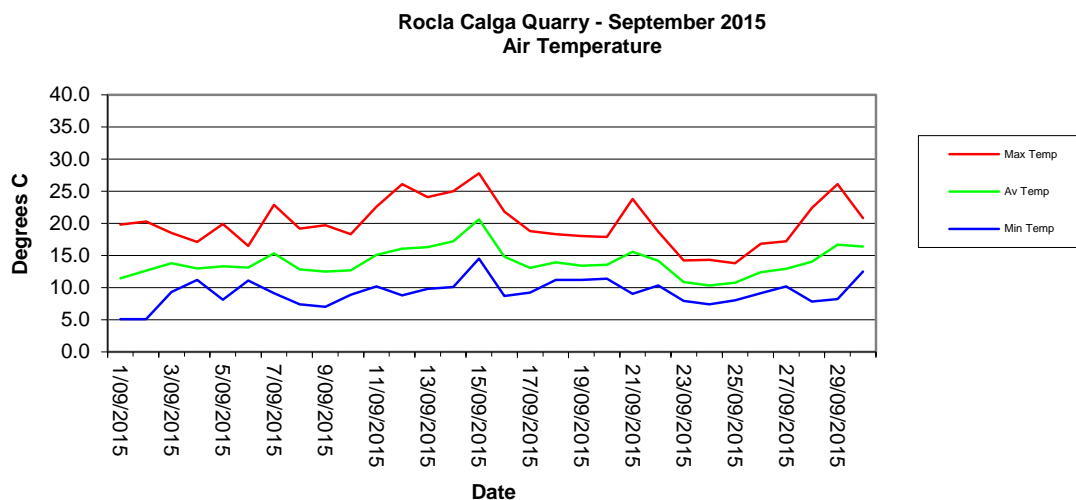
NA = Not Available

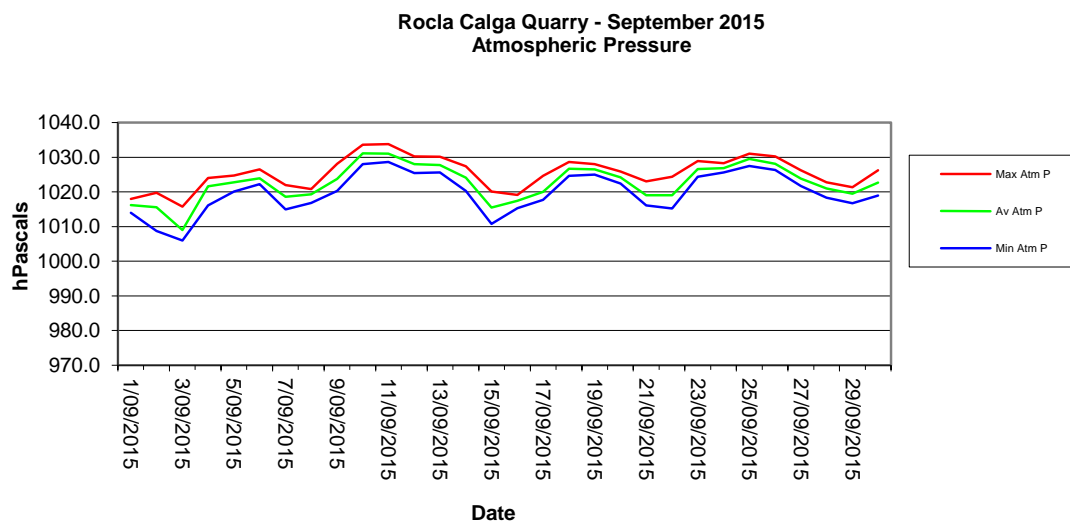
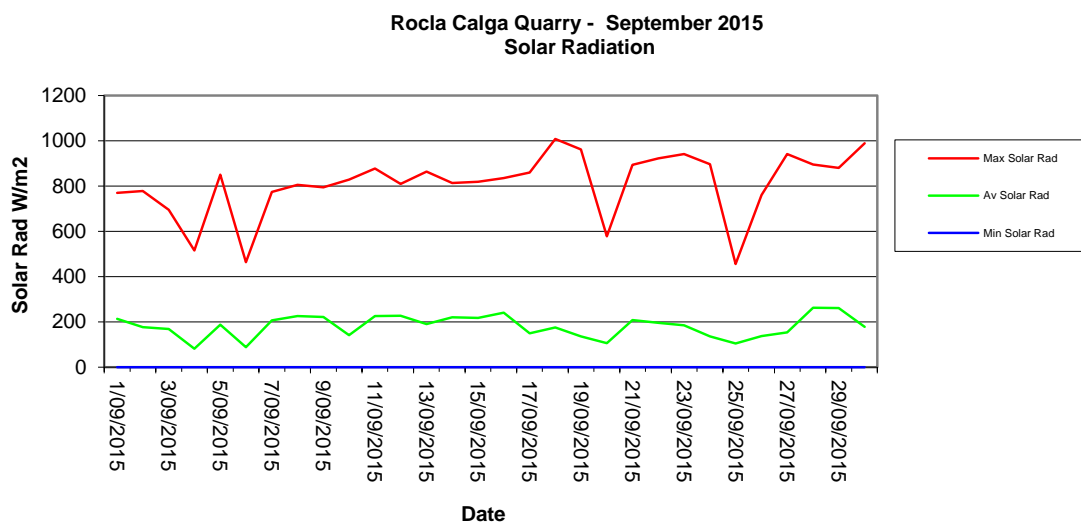
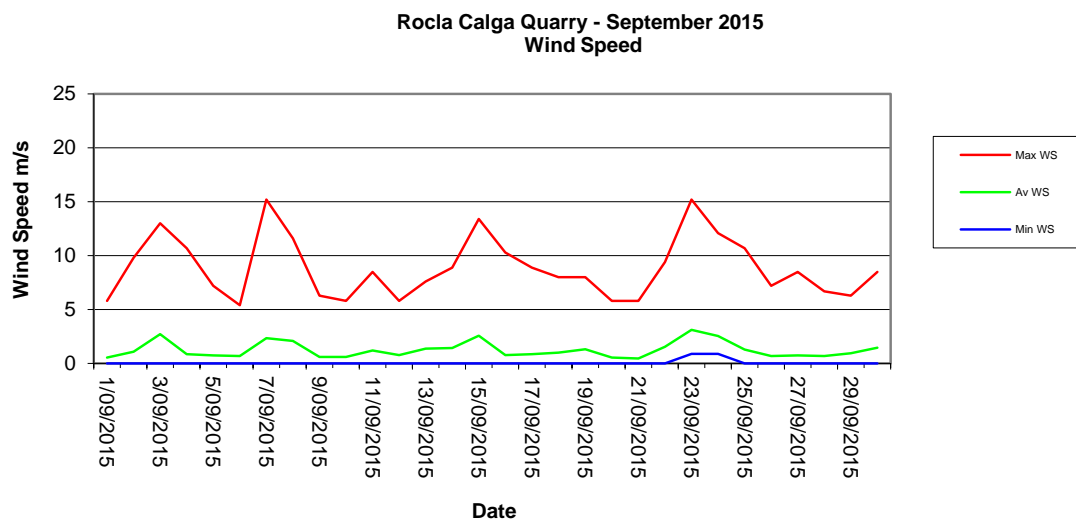
*Data sourced from Bureau of Meteorology (BOM) website (www.bom.gov.au).

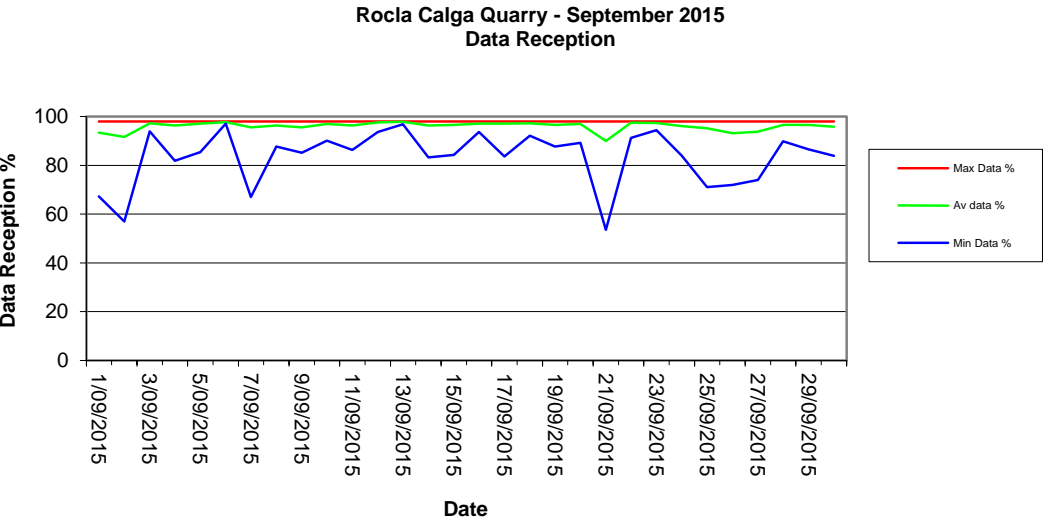
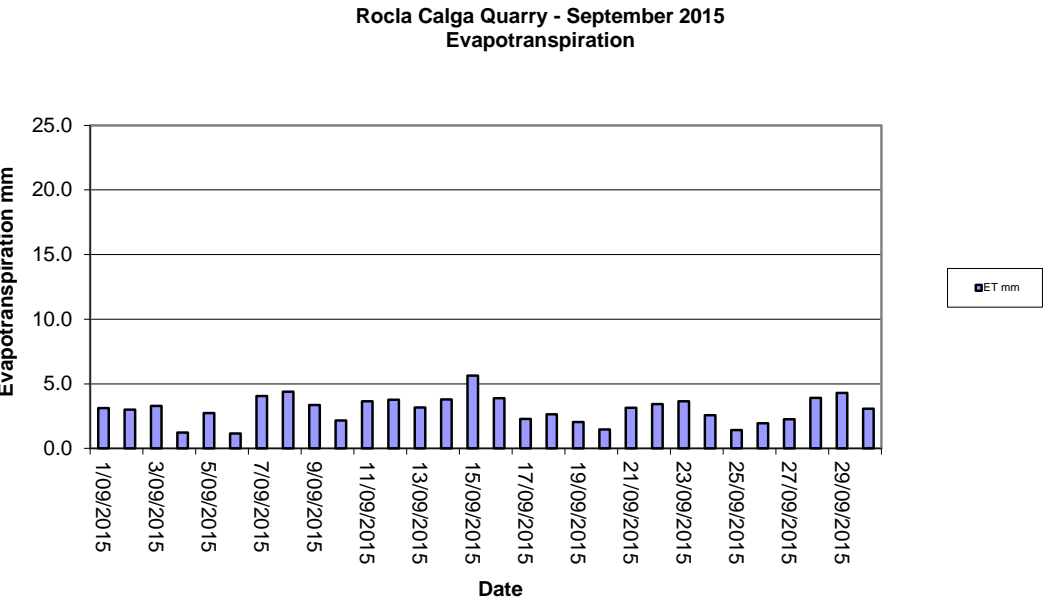
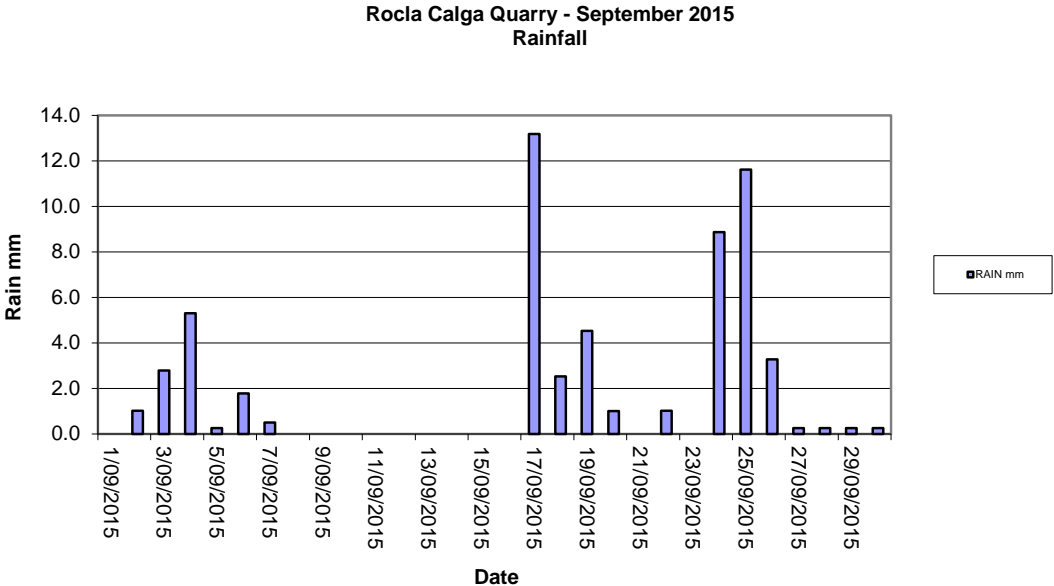
2.4.1 Monthly Meteorological Data Summary

| Date | Min Temp | Av Temp | Max Temp | Min %RH | Av %RH | Max %RH | RAIN mm | ET mm | Min WS | Av WS | Max WS | Min wind chill | Max Heat index | Min Atm P | Av Atm P | Max Atm P | Min Solar Rad | Av Solar Rad | Max Solar Rad | Min Data % | Av data % | Max Data % |
|------------|----------|---------|----------|---------|--------|---------|---------|-------|--------|-------|--------|----------------|----------------|-----------|----------|-----------|---------------|--------------|---------------|------------|-----------|------------|
| 1/09/2015 | 5.1 | 11.4 | 19.8 | 31 | 71 | 95 | 0.0 | 3.1 | 0.0 | 0.6 | 5.8 | 5.1 | 18.2 | 1014.0 | 1016.2 | 1018.0 | 0 | 212.6 | 770 | 67.3 | 93.4 | 98 |
| 2/09/2015 | 5.1 | 12.6 | 20.3 | 31.0 | 67.2 | 95.0 | 1.0 | 3.0 | 0.0 | 1.1 | 9.8 | 5.2 | 18.7 | 1008.7 | 1015.6 | 1019.7 | 0.0 | 176.5 | 778.0 | 57.0 | 91.6 | 98.0 |
| 3/09/2015 | 9.3 | 13.8 | 18.5 | 44.0 | 71.5 | 97.0 | 2.8 | 3.3 | 0.0 | 2.7 | 13.0 | 9.4 | 17.3 | 1006.0 | 1009.0 | 1015.7 | 0.0 | 167.9 | 695.0 | 93.9 | 97.2 | 98.0 |
| 4/09/2015 | 11.2 | 13.0 | 17.1 | 70.0 | 87.1 | 96.0 | 5.3 | 1.2 | 0.0 | 0.9 | 10.7 | 10.9 | 16.7 | 1016.1 | 1021.6 | 1024.0 | 0.0 | 80.9 | 516.0 | 81.9 | 96.4 | 98.0 |
| 5/09/2015 | 8.1 | 13.3 | 19.9 | 48.0 | 84.2 | 98.0 | 0.3 | 2.7 | 0.0 | 0.8 | 7.2 | 8.2 | 19.2 | 1020.1 | 1022.7 | 1024.7 | 0.0 | 187.3 | 850.0 | 85.4 | 97.0 | 98.0 |
| 6/09/2015 | 11.1 | 13.1 | 16.5 | 79.0 | 90.4 | 97.0 | 1.8 | 1.2 | 0.0 | 0.7 | 5.4 | 11.5 | 16.4 | 1022.2 | 1023.9 | 1026.5 | 0.0 | 87.5 | 463.0 | 97.1 | 97.8 | 98.0 |
| 7/09/2015 | 9.1 | 15.3 | 22.9 | 36.0 | 65.4 | 97.0 | 0.5 | 4.1 | 0.0 | 2.4 | 15.2 | 9.1 | 22.0 | 1014.9 | 1018.6 | 1022.0 | 0.0 | 206.3 | 774.0 | 67.0 | 95.5 | 98.0 |
| 8/09/2015 | 7.4 | 12.8 | 19.2 | 36.0 | 53.7 | 70.0 | 0.0 | 4.4 | 0.0 | 2.1 | 11.6 | 7.5 | 17.4 | 1016.8 | 1019.2 | 1020.8 | 0.0 | 225.4 | 806.0 | 87.7 | 96.4 | 98.0 |
| 9/09/2015 | 7.0 | 12.5 | 19.7 | 39.0 | 70.3 | 91.0 | 0.0 | 3.4 | 0.0 | 0.6 | 6.3 | 7.1 | 18.3 | 1020.3 | 1023.7 | 1028.1 | 0.0 | 221.5 | 794.0 | 85.1 | 95.5 | 98.0 |
| 10/09/2015 | 8.9 | 12.7 | 18.3 | 54.0 | 77.7 | 93.0 | 0.0 | 2.2 | 0.0 | 0.6 | 5.8 | 8.9 | 17.5 | 1028.0 | 1031.1 | 1033.6 | 0.0 | 140.5 | 828.0 | 90.1 | 96.9 | 98.0 |
| 11/09/2015 | 10.2 | 15.1 | 22.6 | 43.0 | 73.1 | 91.0 | 0.0 | 3.7 | 0.0 | 1.2 | 8.5 | 10.2 | 21.9 | 1028.6 | 1031.0 | 1033.8 | 0.0 | 225.0 | 878.0 | 86.3 | 96.3 | 98.0 |
| 12/09/2015 | 8.8 | 16.1 | 26.1 | 37.0 | 71.9 | 95.0 | 0.0 | 3.8 | 0.0 | 0.8 | 5.8 | 8.8 | 25.5 | 1025.4 | 1028.0 | 1030.2 | 0.0 | 226.1 | 810.0 | 93.6 | 97.6 | 98.0 |
| 13/09/2015 | 9.8 | 16.3 | 24.1 | 53.0 | 79.8 | 98.0 | 0.0 | 3.2 | 0.0 | 1.4 | 7.6 | 9.9 | 24.2 | 1025.6 | 1027.8 | 1030.1 | 0.0 | 189.8 | 864.0 | 96.8 | 97.9 | 98.0 |
| 14/09/2015 | 10.1 | 17.2 | 25.0 | 46.0 | 76.7 | 97.0 | 0.0 | 3.8 | 0.0 | 1.4 | 8.9 | 10.1 | 25.0 | 1020.3 | 1024.1 | 1027.4 | 0.0 | 219.5 | 814.0 | 83.3 | 96.3 | 98.0 |
| 15/09/2015 | 14.5 | 20.6 | 27.8 | 31.0 | 49.6 | 81.0 | 0.0 | 5.6 | 0.0 | 2.6 | 13.4 | 14.6 | 26.7 | 1010.8 | 1015.5 | 1020.1 | 0.0 | 216.7 | 819.0 | 84.2 | 96.6 | 98.0 |
| 16/09/2015 | 8.7 | 14.8 | 21.8 | 32.0 | 67.1 | 92.0 | 0.0 | 3.9 | 0.0 | 0.8 | 10.3 | 8.8 | 20.2 | 1015.3 | 1017.5 | 1019.1 | 0.0 | 239.9 | 836.0 | 93.6 | 97.1 | 98.0 |
| 17/09/2015 | 9.2 | 13.1 | 18.8 | 56.0 | 85.0 | 98.0 | 13.2 | 2.3 | 0.0 | 0.9 | 8.9 | 9.2 | 18.1 | 1017.7 | 1020.0 | 1024.6 | 0.0 | 148.8 | 860.0 | 83.6 | 97.0 | 98.0 |
| 18/09/2015 | 11.2 | 13.9 | 18.3 | 59.0 | 83.1 | 98.0 | 2.5 | 2.6 | 0.0 | 1.0 | 8.0 | 11.2 | 17.6 | 1024.6 | 1026.7 | 1028.6 | 0.0 | 174.8 | 1009.0 | 92.1 | 97.3 | 98.0 |
| 19/09/2015 | 11.2 | 13.4 | 18.0 | 77.0 | 91.1 | 98.0 | 4.5 | 2.0 | 0.0 | 1.3 | 8.0 | 11.2 | 17.9 | 1025.0 | 1026.5 | 1028.0 | 0.0 | 135.7 | 962.0 | 87.7 | 96.5 | 98.0 |
| 20/09/2015 | 11.4 | 13.5 | 17.9 | 76.0 | 91.8 | 98.0 | 1.0 | 1.5 | 0.0 | 0.5 | 5.8 | 11.4 | 17.7 | 1022.4 | 1024.2 | 1025.9 | 0.0 | 105.0 | 578.0 | 89.2 | 97.0 | 98.0 |
| 21/09/2015 | 9.0 | 15.6 | 23.8 | 43.0 | 79.1 | 99.0 | 0.0 | 3.2 | 0.0 | 0.5 | 5.8 | 9.0 | 23.3 | 1016.1 | 1019.0 | 1023.0 | 0.0 | 207.4 | 894.0 | 53.5 | 90.0 | 98.0 |
| 22/09/2015 | 10.3 | 14.2 | 18.7 | 43.0 | 68.2 | 89.0 | 1.0 | 3.4 | 0.0 | 1.6 | 9.4 | 9.7 | 17.9 | 1015.2 | 1019.0 | 1024.4 | 0.0 | 195.4 | 922.0 | 91.2 | 97.5 | 98.0 |
| 23/09/2015 | 7.9 | 10.8 | 14.2 | 51.0 | 62.4 | 71.0 | 0.0 | 3.7 | 0.9 | 3.1 | 15.2 | 5.7 | 13.1 | 1024.4 | 1026.5 | 1028.9 | 0.0 | 183.9 | 941.0 | 94.4 | 97.4 | 98.0 |
| 24/09/2015 | 7.4 | 10.3 | 14.3 | 54.0 | 72.4 | 97.0 | 8.9 | 2.6 | 0.9 | 2.6 | 12.1 | 5.3 | 13.3 | 1025.6 | 1026.8 | 1028.3 | 0.0 | 135.9 | 897.0 | 83.9 | 96.0 | 98.0 |
| 25/09/2015 | 8.0 | 10.7 | 13.8 | 83.0 | 92.6 | 97.0 | 11.6 | 1.4 | 0.0 | 1.3 | 10.7 | 6.6 | 13.5 | 1027.5 | 1029.6 | 1031.0 | 0.0 | 104.6 | 456.0 | 71.1 | 95.2 | 98.0 |
| 26/09/2015 | 9.1 | 12.4 | 16.8 | 68.0 | 87.7 | 98.0 | 3.3 | 1.9 | 0.0 | 0.7 | 7.2 | 9.2 | 16.1 | 1026.3 | 1028.1 | 1030.2 | 0.0 | 137.5 | 760.0 | 71.9 | 93.2 | 98.0 |
| 27/09/2015 | 10.2 | 12.9 | 17.2 | 61.0 | 83.4 | 97.0 | 0.3 | 2.3 | 0.0 | 0.7 | 8.5 | 10.2 | 16.5 | 1021.7 | 1023.9 | 1026.2 | 0.0 | 153.1 | 942.0 | 74.0 | 93.7 | 98.0 |
| 28/09/2015 | 7.8 | 14.0 | 22.4 | 45.0 | 75.6 | 95.0 | 0.3 | 3.9 | 0.0 | 0.7 | 6.7 | 7.8 | 21.8 | 1018.3 | 1021.0 | 1022.8 | 0.0 | 261.9 | 896.0 | 89.8 | 96.5 | 98.0 |
| 29/09/2015 | 8.2 | 16.7 | 26.1 | 29.0 | 71.1 | 98.0 | 0.3 | 4.3 | 0.0 | 0.9 | 6.3 | 8.3 | 25.5 | 1016.7 | 1019.5 | 1021.3 | 0.0 | 260.6 | 881.0 | 86.5 | 96.5 | 98.0 |
| 30/09/2015 | 12.5 | 16.4 | 20.8 | 55.0 | 78.4 | 95.0 | 0.3 | 3.1 | 0.0 | 1.5 | 8.5 | 12.7 | 20.7 | 1018.9 | 1022.7 | 1026.2 | 0.0 | 177.9 | 989.0 | 83.9 | 95.8 | 98.0 |
| Monthly | 5.1 | 14.0 | 27.8 | 29 | 76 | 99 | 58.7 | 90.5 | 0 | 1.3 | 15.2 | 5.1 | 26.7 | 1006 | 1022.6 | 1033.8 | 0 | 180.2 | 1009 | 53.5 | 96.0 | 98 |

2.4.2 Monthly Weather Charts



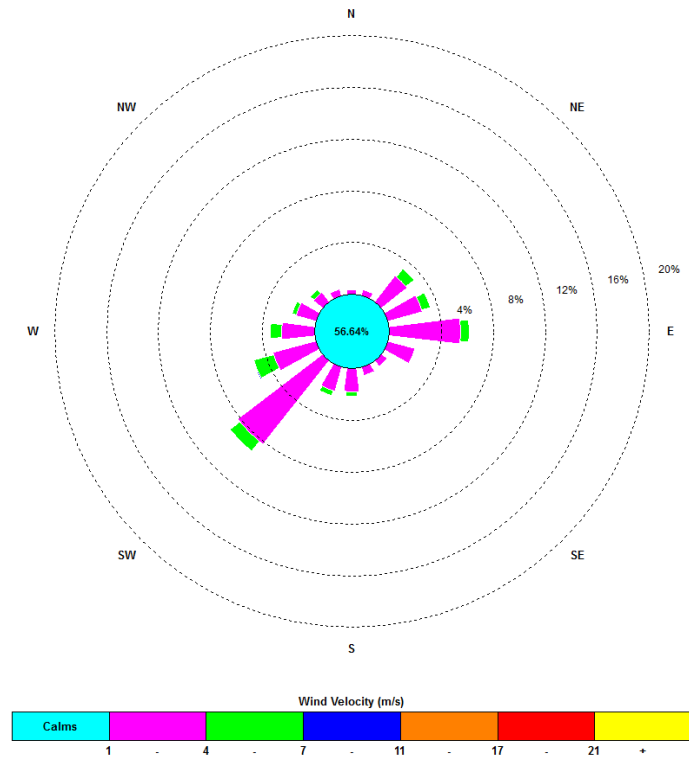




2.4.3 Monthly Windrose Plot

Frequency plot of the average wind speed and average direction over each 15 minute sampling period. Wind is considered to be calm when less than a 15 minute average of 1m/s.

00:15, 1 September 2015 – 23:45, 30 September 2015



The predominant winds were from the SW, with most frequent, strongest winds from the SW/E. The maximum wind speed was 15.2 m/s from the W and SSW.

Appendix 1

Laboratory Certificates



Environmental

CERTIFICATE OF ANALYSIS

| | | | |
|--------------|---|-------------------------|--|
| Work Order | : EN1513332 | Page | : 1 of 4 |
| Client | : CARBON BASED ENVIRONMENTAL | Laboratory | : Environmental Division Newcastle |
| Contact | : MR COLIN DAVIES (cbased) | Contact | : Peter Keyte |
| Address | : 47 BOOMERANG ST CESSNOCK NSW, AUSTRALIA 2325 | Address | : 5/585 Maitland Road Mayfield West NSW Australia 2304 |
| E-mail | : cbased@bigpond.com | E-mail | : peter.keyte@alsglobal.com |
| Telephone | : +61 49904443 | Telephone | : +61 2 4014 2500 |
| Facsimile | : +61 02 49904442 | Facsimile | : +61 2 4967 7382 |
| Project | : Roda Calga Dusts | QC Level | : NEPM 2013 Schedule B(3) and ALS QCS3 requirement |
| Order number | : --- | Date Samples Received | : 02-Oct-2015 13:08 |
| C-O-C number | : --- | Date Analysis Commenced | : 02-Oct-2015 |
| Sampler | : --- | Issue Date | : 09-Oct-2015 18:30 |
| Site | : --- | | |
| Quote number | : --- | No. of samples received | : 6 |
| | | No. of samples analysed | : 6 |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



WORLD RECOGNISED
ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories

Position

Accreditation Category

Barbara Coupland

Quality Officer

Newcastle - Inorganics



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

- Analysis as per AS3580.10.1-2003. Samples passed through a 1mm sieve prior to analysis. NATA accreditation does not apply for results reported in g/m².mth as sampling data was provided by the client.



Analytical Results

Sub-Matrix: DEPOSITIONAL DUST
 (Matrix: AIR)

Client sample ID

| Compound | CAS Number | LOR | Unit | CD1 | CD2c | CD3 | CD4 | CD5 |
|--------------------------------------|------------|-----|-------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | | | | 02/09/15 - 02/10/15 | 02/09/15 - 02/10/15 | 02/09/15 - 02/10/15 | 02/09/15 - 02/10/15 | 02/09/15 - 02/10/15 |
| | | | | [02-Oct-2015] | [02-Oct-2015] | [02-Oct-2015] | [02-Oct-2015] | [02-Oct-2015] |
| | | | | EN1513332-001 | EN1513332-002 | EN1513332-003 | EN1513332-004 | EN1513332-005 |
| | | | | Result | Result | Result | Result | Result |
| EA120: Ash Content | | | | | | | | |
| Ash Content | --- | 0.1 | g/m ² .month | 1.0 | 0.7 | 0.3 | 0.1 | 0.1 |
| Ash Content (mg) | --- | 1 | mg | 17 | 12 | 6 | 2 | 2 |
| EA125: Combustible Matter | | | | | | | | |
| Combustible Matter | --- | 0.1 | g/m ² .month | <0.1 | 0.3 | 0.3 | 0.2 | 0.1 |
| Combustible Matter (mg) | --- | 1 | mg | 1 | 5 | 5 | 3 | 2 |
| EA141: Total Insoluble Matter | | | | | | | | |
| Total Insoluble Matter | --- | 0.1 | g/m ² .month | 1.0 | 1.0 | 0.6 | 0.3 | 0.2 |
| Total Insoluble Matter (mg) | --- | 1 | mg | 18 | 17 | 11 | 5 | 4 |



Analytical Results

Sub-Matrix: **DEPOSITIONAL DUST**
 (Matrix: **AIR**)

Client sample ID

CD6

02/09/15 - 02/10/15

Client sampling date / time

[02-Oct-2015]

EN1513332-006

Result

Result

Result

Result

Result

Compound

CAS Number

LOR

Unit

EA120: Ash Content

Ash Content

0.1

g/m².month

0.2

Ash Content (mg)

1

mg

3

EA125: Combustible Matter

Combustible Matter

0.1

g/m².month

0.1

Combustible Matter (mg)

1

mg

3

EA141: Total Insoluble Matter

Total Insoluble Matter

0.1

g/m².month

0.3

Total Insoluble Matter (mg)

1

mg

6



Environmental

CERTIFICATE OF ANALYSIS

| | | | |
|--------------|---|-------------------------|---|
| Work Order | : ES1532741 | Page | : 1 of 2 |
| Client | : CARBON BASED ENVIRONMENTAL | Laboratory | : Environmental Division Sydney |
| Contact | : MR COLIN DAVIES (cbased) | Contact | : |
| Address | : 47 BOOMERANG ST CESSNOCK NSW, AUSTRALIA 2325 | Address | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| E-mail | : cbased@bigpond.com | E-mail | : |
| Telephone | : +61 49904443 | Telephone | : +61-2-8784 8555 |
| Facsimile | : +61 02 49904442 | Facsimile | : +61-2-8784 8500 |
| Project | : ROCLA QUARRY | QC Level | : NEPM 2013 Schedule B(3) and ALS QCS3 requirement |
| Order number | : — | Date Samples Received | : 02-Oct-2015 13:08 |
| C-O-C number | : — | Date Analysis Commenced | : 02-Oct-2015 |
| Sampler | : — | Issue Date | : 13-Oct-2015 14:17 |
| Site | : — | No. of samples received | : 3 |
| Quote number | : — | No. of samples analysed | : 3 |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



WORLD RECOGNISED
ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories

Alison Graham
Ankit Joshi

Position

Supervisor - Inorganic
Inorganic Chemist

Accreditation Category

Newcastle - Inorganics
Sydney Inorganics



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 ^ = This result is computed from individual analyte detections at or above the level of reporting
 z = ALS is not NATA accredited for these tests

- Sample ES1532741-1 shows poor duplicate results due to sample heterogeneity. Confirmed by re-extraction and re-analysis.
- Sampling time not provided. For operational reasons an assumed date/time (3pm on date of receipt) is used. Sample results may be affected if the analysis falls outside of actual holding time.
- EA015 TDS, results has been confirmed by re-analysis

Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Client sample ID | | A | D | F | --- | --- |
|--|------------|------|---------|-----------------------------|--|---------------|---------------|---------------|--------|--------|
| | | | | Client sampling date / time | | [02-Oct-2015] | [02-Oct-2015] | [02-Oct-2015] | --- | --- |
| Compound | CAS Number | LOR | Unit | | | ES1532741-001 | ES1532741-002 | ES1532741-003 | ----- | ----- |
| | | | | Result | | Result | Result | Result | Result | Result |
| EA005: pH | | | | | | | | | | |
| pH Value | --- | 0.01 | pH Unit | 5.24 | | 5.03 | 5.08 | --- | --- | |
| EA010P: Conductivity by PC Titrator | | | | | | | | | | |
| Electrical Conductivity @ 25°C | --- | 1 | µS/cm | 61 | | 106 | 66 | --- | --- | |
| EA015: Total Dissolved Solids | | | | | | | | | | |
| Total Dissolved Solids @180°C | --- | 10 | mg/L | --- | | --- | 55 | --- | --- | |
| ^A Total Dissolved Solids @180°C | --- | 10 | mg/L | 60 | | 95 | --- | --- | | |
| EA025: Suspended Solids | | | | | | | | | | |
| ^A Suspended Solids (SS) | --- | 5 | mg/L | <5 | | <5 | <5 | --- | --- | |
| EP020: Oil and Grease (O&G) | | | | | | | | | | |
| ^A Oil & Grease | --- | 5 | mg/L | <5 | | <5 | <5 | --- | --- | |