

TERRAMIN AUSTRALIA LIMITED

ANGAS MINE

ENVIRONMENTAL MONITORING PORGRAM

QUATERLY REPORT #1

(JULY TO OCTOBER 2006)

for Terramin Management and the Community Consultation Committee



6 November 2006

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Surface Water Quality

Introduction

The aim of the surface water quality monitoring program is to track Terramin's performance and confirm that it is not polluting runoff to the Angas River.

The environmental monitoring program demonstrates that activities at the Terramin Angas Mine did not affect water quality of the Angas River in the quarter ending October 2006.

Surface Water Sampling Locations

Surface water was sampled at two monitoring sites, the Croser and Hogben because there was no flow in the Burnside Creek sites, Table 1 and Figure 1.

Table 1 Surface Water Quality Monitoring Sites

| Site | Site Description | Flow |
|----------------|--|---|
| Culvert | in Burnside Creek at the Swamp Road culvert immediately up stream of the wastewater lagoons | Only flows after significant storm event. |
| Weir | in Burnside Creek at the weir immediately down stream of the wastewater lagoons | Only flows after significant storm event. |
| Garwood | in Burnside Creek at the Callington Road bridge crossing (adjacent to Garwood Earthmovers depot) | Only flows after significant storm event. |
| Croser | In the Angas River immediately upstream of Burnside Creek. | Generally flows all year. |
| Hogben | In the Angas River immediately downstream of Burnside Creek. | Generally flows all year. |

Sampling Methodology

Burnside Creek did not flow during this monitoring period; the Angas River was sampled twice. A sample was collected from the watercourse by directly filling the sample bottles with water, as detailed in the Terramin sampling protocol. The pre-labelled bottles were placed in an ice cooler with ice for temporary storage and the field record sheet was completed on site.

At the Terramin Strathalbyn Office the field record sheet was placed in the surface water sampling records folder, a Chain-of-Custody (CoC) form was completed and sent with the water samples to ALSE Laboratories (NATA accredited) for analysis. The samples were kept at around 4 °C using a combination of cooler boxes with icepacks (in the field and in transport) and refrigerator (in storage).

Frequency of Sampling

Samples were collected monthly, in August, September and October.

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Results

The analytical results are presented in Table 2 below.

Table 2 Surface Water Quality -Laboratory Results

| Site | Units | LOR | HOGBEN | CROSER | HOGBEN | CROSER | HOGBEN | CROSER |
|--------------------------------|---------|--------|------------|------------|-----------|-----------|------------|------------|
| Date | | | 10/08/2006 | 10/08/2006 | 7/09/2006 | 7/09/2006 | 11/10/2006 | 11/10/2006 |
| pH Value | pH Unit | 0.01 | 7.75 | 7.79 | | | | |
| Electrical Conductivity @ 25°C | µS/cm | 1 | 2010 | 1990 | | | | |
| Total Dissolved Solids @180°C | mg/L | 1 | 1460 | 1410 | | | | |
| Turbidity | NTU | 0.1 | 4 | 3.1 | | | | |
| D-Sulphate as SO4 2- | mg/L | 1 | 50 | 49 | | | | |
| T-Iron | mg/L | 0.01 | 0.12 | 0.13 | | | | |
| T-Arsenic | mg/L | 0.001 | | | | | <0.001 | 0.001 |
| T-Cadmium | mg/L | 0.0001 | | | | | <0.0001 | 0.0003 |
| T-Chromium | mg/L | 0.001 | | | | | 0.001 | 0.001 |
| T-Copper | mg/L | 0.001 | | | | | 0.001 | 0.001 |
| T-Lead | mg/L | 0.001 | | | | | <0.001 | <0.001 |
| T-Nickel | mg/L | 0.001 | | | | | 0.001 | 0.001 |
| T-Selenium | mg/L | 0.01 | | | | | <0.010 | <0.010 |
| T-Silver | mg/L | 0.001 | | | | | <0.010 | 0.013 |
| T-Zinc | mg/L | 0.005 | | | | | 0.006 | <0.005 |
| D-Arsenic | mg/L | 0.001 | <0.001 | <0.001 | 0.001 | 0.001 | | |
| D-Cadmium | mg/L | 0.0001 | 0.0004 | <0.0001 | <0.0001 | <0.0001 | | |
| D-Chromium | mg/L | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | | |
| D-Copper | mg/L | 0.001 | 0.002 | 0.002 | 0.003 | 0.002 | | |
| D-Lead | mg/L | 0.001 | <0.001 | <0.001 | 0.009 | <0.001 | | |
| D-Nickel | mg/L | 0.001 | 0.001 | <0.001 | <0.001 | <0.001 | | |
| D-Selenium | mg/L | 0.01 | <0.010 | <0.010 | <0.010 | <0.010 | | |
| D-Silver | mg/L | 0.001 | <0.001 | <0.001 | 0.003 | <0.001 | | |
| D-Thallium | mg/L | 0.001 | <0.001 | <0.001 | | | | |
| D-Zinc | mg/L | 0.005 | 0.014 | 0.012 | 0.026 | 0.015 | | |
| Nitrite + Nitrate as N | mg/L | 0.01 | 0.106 | 0.121 | | | | |
| Total Kjeldahl Nitrogen as N | mg/L | 0.1 | 1 | 0.9 | | | | |
| Total Nitrogen as N | mg/L | 0.1 | 1.1 | 1 | | | | |
| Total Phosphorus as P | mg/L | 0.01 | 0.04 | 0.05 | | | | |

The proposed metals lead, zinc, arsenic, cadmium and iron (total) were tested but manganese (total) was replaced by relevant indicator metals including copper, chromium, silver and on one occasion thallium.

Both dissolved and total silver and total lead triggered the EPA water quality guidelines¹ for fresh water flows of 0.0001ppm and 0.005ppm respectively. These water samples came from the Angas River and are therefore deemed to be natural water concentrations for these metals before mining starts. Terramin has adopted criteria of not exceeding the average natural water quality by 2 standard deviations from the mean and to further support this position it also monitors the Angas River upstream of any mining activities.

¹ Environment Protection (Water Quality) Policy 2003 and Explanatory Report, Environment Protection Authority, May 2003; Schedule 2 Table 1.

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The proposed non-metal water quality parameters; Total dissolved solids, electrical conductivity, pH, turbidity and total suspended solids were analysed only once due to a misunderstanding between site and the laboratories. A new Terramin CoC form has been designed (instead of the standard CoC supplied by the laboratory), this should overcome this problem.

Additional non-metal parameters were also analysed including sulphate and the nutrients: oxidised nitrogen, Kjeldahl nitrogen, total nitrogen and phosphorus. Apart from elevated salinity in both upstream and downstream Angas River sites none of the parameters were at environmentally significant levels. More significantly there were no significant differences between upstream and downstream sites that would indicate potential pollution from mining activities.

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Figure 1 Surface and Ground Water Monitoring Sites



Groundwater Quality

Introduction

Ground water quality monitoring between August and October 2006 was conducted at nine bores. The target number of ground water monitoring locations suggested in the MARP was six but additional bores were installed to provide redundancy and backup monitoring sites once mining commences. Some bores were not sampled as scheduled due to technical problems with the new pumps.

The long term aim of this monitoring program is to track Terramin’s performance in preventing pollution of the regional groundwater. Before mining commences, groundwater monitoring data will be used to establish a natural background level. This is required to track Terramin’s impact on groundwater and demonstrating that groundwater quality does not exceed background by more than two standard deviations of the natural mean.

The data presented in this Quarterly Report essentially constitutes background data, because mining (other than the existing quarrying and exploration drilling) has not begun on the Angas Mine site.

Groundwater Sampling Locations

Groundwater sampling sites monitored during period are presented in Table 3 below and shown in Figure 1.

Table 3 Groundwater Monitoring Wells

| Well | Site Description | Well Depth (m) |
|-------------|---|-----------------------|
| AWE 1 | South of the sewage effluent lagoons near the Callington Rd, completed to weathered Cambrian basement. | 14.2 |
| LG1 | Immediately south of the Effluent Lagoon completed to the unweathered Cambrian basement. | 2.5 |
| LG2 | Immediately south of the Effluent Lagoon completed to the weathered Cambrian basement. | 22.5 |
| RG1 | North of the mining lease boundary near the Victor Harbour - Adelaide railway line and completed in the weathered Cambrian basement. | 21 |
| RG2 | West of the mining lease boundary near Burnside Creek and completed in the shallow weathered Cambrian basement. | 14.8 |
| RG3 | West of the mining lease boundary near Burnside Creek and completed in Quaternary sediments that overlie the unweathered Cambrian basement. | 45 |
| RG4 | South of the mining lease boundary near Summerhill Road and completed in the unweathered Cambrian basement. | 50 |

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| | | |
|-----|---|----|
| RG7 | North eastern corner of the mine near the Callington Rd and completed in Tertiary sediment. | 10 |
| RG8 | North eastern corner of the mine near the Callington Rd and completed in unweathered Cambrian basement. | 45 |

Sampling Methodology

Bores RG1, RG2, RG3, RG4, RG7, RG8, LG1, LG2 and AWE1 are fitted with dedicated Waterra HDPE or LDPE tubing and foot valves, which will remain in the bores to reduce the potential for cross contamination.

Prior to purging, depth to water was measured from a reference point (top of casing) using a calibrated dipmeter. A minimum of 3 well volumes of water (volume calculated by Terramin hydrologist) were removed by purging prior to sample collection.

Samples were collected by attaching the upper portion of the tubing to a hydrolift pump, powered by a portable generator. A Waterra pump was used for both purging and sampling. During purging, water produced by pumping was discharged to a container and the volume per unit time was recorded periodically.

Measurements of depth to water, flow rate, pH and EC were made in the field using a dip meter and Hanna pH, temperature and conductivity metres. The meters were calibrated prior to each sampling trip.

The groundwater samples were collected directly from the Waterra tubing into specially treated sampling bottles supplied by the analytical laboratories. Some samples were initially filtered through a 45 micro glass fibre filter in the field, to determine the "dissolved" (filtered) metals; this will no longer be done in the field. All sample bottles were supplied by ALS Laboratories with the appropriate preservative.

For collection of duplicate samples water is directly pumped into a large plastic container (cleaned with Decon 90, prior to sampling), this container is only used for preparing water monitoring duplicate samples.

The sample bottles were sealed with the lids provided and labelled. Separate sample bottles were used for metals, nutrients, major ions and microbiological work. At the end of the sampling round the (completed) field record sheet was placed in the surface water sampling records folder and the samples were sent to ALS Laboratories (NATA accredited) in an ice-cooler by air freight with a Chain-of-Custody form.

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Results

Frequency of Sampling

Nine bores were sampled at least once during the three month period; this frequency is inadequate for building up a pre-mining data base but is within the proposed routine sampling frequency that is quarterly sampling.

Field Testing

The results of field testing are presented in Table 4 below.

Table 4 Field Groundwater Measurements

| Site | Date sampled | SWL | Temp | pH | EC |
|---------|--------------|-------|------|------|------|
| AWE1 | 25/07/2006 | 8.9 | 19.4 | 6.22 | 18.7 |
| AWE1 | 5/10/2006 | 7.96 | 19.2 | 6.82 | 18.5 |
| LG1 | 11/10/2006 | 0.65 | 17.5 | 6.25 | 29.1 |
| LG2 | 11/10/2006 | 0.56 | 18.8 | 6.04 | 21.1 |
| RG1 | 24/07/2006 | 9.64 | 17.7 | 7.39 | 9.4 |
| RG1 | 14/09/2006 | 8.71 | 18.5 | 7.16 | 9.3 |
| RG2 | 25/07/2006 | 8.34 | 17.6 | 7.08 | 6.2 |
| RG2 dup | 25/07/2006 | 8.34 | 17.6 | 7.08 | 6.2 |
| RG2 | 5/10/2006 | 8.34 | 18.6 | 7.27 | 5.9 |
| RG3* | 20/07/2006 | 8.21 | | | 7.9 |
| RG3 | 5/10/2006 | 8.19 | 19 | 6.81 | 7.4 |
| RG4 | 24/07/2006 | 28.15 | 19.5 | 7.04 | 8.8 |
| RG4* | 22/08/2006 | 28.15 | 20.3 | 6.55 | 8.6 |
| RG4 | 5/10/2006 | 28.15 | 19.8 | 7.01 | 8.8 |
| RG7 | 24/07/2006 | 8.14 | 15.7 | 6.6 | 27.6 |
| RG7 | 28/07/2006 | | 18.5 | 6.73 | 27.5 |
| RG7 | 14/09/2006 | 8.05 | 18.6 | 6.74 | 27.1 |
| RG8* | 21/07/2006 | 7.56 | | | 25.7 |
| RG8 | 24/07/2006 | 7.55 | 18.9 | 6.57 | 26 |
| RG8 | 14/09/2006 | 7.72 | 18.7 | 6.75 | 25.5 |

* Problem with pump no water samples sent to laboratory

Laboratory Analysis

The results of laboratory testing on groundwater (bore) samples are presented in Table 5 below.

Table 5 Ground Water Quality – Laboratory Results

| Matrix: Water | X | X | AWE1 | AWE1 | LG1 | LG2 | RG1 | RG1 | RG2 | RG2 |
|--------------------------------|---------|--------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Project site: Strathalbyn | Units | LOR | 25/07/2006 | 5/10/2006 | 11/10/2006 | 11/10/2006 | 24/07/2006 | 14/09/2006 | 25/07/2006 | 5/10/2006 |
| pH Value | pH Unit | 0.01 | 7.49 | | | | 7.25 | | 7.29 | |
| Electrical Conductivity @ 25°C | µS/cm | 1 | 23.30 | | | | 11.40 | | 73.60 | |
| Total Dissolved Solids @180°C | mg/L | 1 | 13200 | | | | 6990 | | 4480 | |
| Turbidity | NTU | 0.1 | 350 | | | | 1470 | | 342 | |
| D-Sulphate as SO4 2- | mg/L | 1 | 1470 | | | | 704 | | 326 | |
| T-Iron | mg/L | 0.01 | <0.10 | | | | <0.10 | | 0.4 | |
| T-Arsenic | mg/L | 0.001 | | 0.016 | 0.005 | 0.012 | | | | 0.005 |
| T-Cadmium | mg/L | 0.0001 | | 0.0001 | 0.0002 | 0.0019 | | | | <0.0001 |
| T-Chromium | mg/L | 0.001 | | 0.039 | 0.008 | 0.045 | | | | 0.02 |
| T-Copper | mg/L | 0.001 | | 0.027 | 0.015 | 0.027 | | | | 0.012 |
| T-Lead | mg/L | 0.001 | | 0.025 | 0.01 | 0.02 | | | | 0.013 |
| T-Nickel | mg/L | 0.001 | | 0.009 | 0.012 | 0.025 | | | | 0.008 |
| T-Selenium | mg/L | 0.01 | | 0.018 | <0.010 | <0.010 | | | | <0.010 |
| T-Silver | mg/L | 0.001 | | <0.010 | 0.132 | 0.146 | | | | <0.010 |
| T-Zinc | mg/L | 0.005 | | 0.11 | 0.031 | 0.347 | | | | 0.027 |
| D-Arsenic | mg/L | 0.001 | <0.001 | | | | <0.001 | <0.001 | 0.003 | |
| D-Cadmium | mg/L | 0.0001 | <0.0001 | | | | 0.0002 | 0.0002 | <0.0001 | |
| D-Chromium | mg/L | 0.001 | 0.002 | | | | <0.001 | <0.001 | <0.001 | |
| D-Copper | mg/L | 0.001 | 0.002 | | | | 0.001 | 0.005 | 0.001 | |
| D-Lead | mg/L | 0.001 | <0.001 | | | | <0.001 | <0.001 | <0.001 | |
| D-Nickel | mg/L | 0.001 | <0.001 | | | | <0.001 | <0.001 | <0.001 | |
| D-Selenium | mg/L | 0.01 | <0.010 | | | | 0.028 | 0.034 | <0.010 | |
| D-Silver | mg/L | 0.001 | <0.005 | | | | <0.005 | <0.010 | <0.005 | |
| D-Thallium | mg/L | 0.001 | <0.001 | | | | <0.001 | | <0.001 | |
| D-Zinc | mg/L | 0.005 | <0.005 | | | | 0.008 | 0.014 | <0.005 | |
| Nitrite + Nitrate as N | mg/L | 0.01 | 3.2 | | | | 2.98 | | 0.96 | |
| Total Kjeldahl Nitrogen as N | mg/L | 0.1 | 1.1 | | | | 1.5 | | 1.2 | |
| Total Nitrogen as N | mg/L | 0.1 | 4.3 | | | | 4.5 | | 2.2 | |
| Total Phosphorus as P | mg/L | 0.01 | 0.18 | | | | 0.18 | | 0.14 | |
| Hydroxide | mg/L | 1 | <1 | | | | <1 | | <1 | |

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| Matrix: Water | X | X | AWE1 | AWE1 | LG1 | LG2 | RG1 | RG1 | RG2 | RG2 |
|---------------------------------|-----------|------|------------|-----------|------------|------------|------------|------------|------------|-----------|
| Project site: Strathalbyn | Units | LOR | 25/07/2006 | 5/10/2006 | 11/10/2006 | 11/10/2006 | 24/07/2006 | 14/09/2006 | 25/07/2006 | 5/10/2006 |
| Alkalinity as CaCO3 | | | | | | | | | | |
| Carbonate Alkalinity as CaCO3 | mg/L | 1 | <1 | | | | <1 | | <1 | |
| Bicarbonate Alkalinity as CaCO3 | mg/L | 1 | 602 | | | | 662 | | 493 | |
| Total Alkalinity as CaCO3 | mg/L | 1 | 602 | | | | 662 | | 493 | |
| Chloride | mg/L | 1 | 7370 | | | | 3140 | | 2080 | |
| D-Calcium | mg/L | 1 | 153 | | | | 70 | | 164 | |
| D-Magnesium | mg/L | 1 | 514 | | | | 152 | | 128 | |
| D-Sodium | mg/L | 1 | 4110 | | | | 2100 | | 1130 | |
| D-Potassium | mg/L | 1 | 147 | | | | 73 | | 34 | |
| Total Anions | meq/L | 0.01 | 250 | | | | 116 | | 75.4 | |
| Total Cations | meq/L | 0.01 | 232 | | | | 110 | | 68.9 | |
| Faecal Coliforms | MPN/100mL | 2 | | | <2 | <2 | | | | |
| Escherichia coli | MPN/100mL | 2 | | | <2 | <2 | | | | |
| Coliforms | MPN/100mL | 2 | | | <2 | <2 | | | | |

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| Matrix: Water | X | X | RG3 | RG4 | RG4 | RG7 | RG7 | RG8 | RG8 |
|--------------------------------|---------|--------|--------------|-------------|--------------|--------------|--------------|--------------|--------------|
| Project site: Strathalbyn | Units | LOR | 5/10/2006 | 24/07/2006 | 5/10/2006 | 24/07/2006 | 14/09/2006 | 24/07/2006 | 14/09/2006 |
| pH Value | pH Unit | 0.01 | | 7.47 | | 6.91 | | 7.07 | |
| Electrical Conductivity @ 25°C | mS/cm | 1 | | 10.6 | | 3.34 | | 3.20 | |
| Total Dissolved Solids @180°C | mg/L | 1 | | 6070 | | 20200 | | 18900 | |
| Turbidity | NTU | 0.1 | | 16.9 | | 1920 | | 35.1 | |
| D-Sulphate as SO4 2- | mg/L | 1 | | 515 | | 1990 | | 2170 | |
| T-Iron | mg/L | 0.01 | | <0.10 | | <0.10 | | 2.95 | |
| T-Arsenic | mg/L | 0.001 | 0.003 | | 0.006 | | | | |
| T-Cadmium | mg/L | 0.0001 | <0.0001 | | 0.0002 | | | | |
| T-Chromium | mg/L | 0.001 | 0.002 | | 0.02 | | | | |
| T-Copper | mg/L | 0.001 | 0.003 | | 0.012 | | | | |
| T-Lead | mg/L | 0.001 | 0.002 | | 0.013 | | | | |
| T-Nickel | mg/L | 0.001 | 0.001 | | 0.007 | | | | |
| T-Selenium | mg/L | 0.01 | <0.010 | | <0.010 | | | | |
| T-Silver | mg/L | 0.001 | <0.010 | | <0.010 | | | | |
| T-Zinc | mg/L | 0.005 | <0.005 | | 0.022 | | | | |
| D-Arsenic | mg/L | 0.001 | | <0.001 | | <0.001 | 0.003 | <0.001 | <0.001 |
| D-Cadmium | mg/L | 0.0001 | | 0.0002 | | 0.0002 | <0.0001 | 0.0004 | <0.0001 |
| D-Chromium | mg/L | 0.001 | | <0.001 | | 0.001 | <0.001 | 0.002 | <0.001 |
| D-Copper | mg/L | 0.001 | | <0.001 | | 0.004 | 0.011 | 0.002 | 0.011 |
| D-Lead | mg/L | 0.001 | | <0.001 | | 0.001 | 0.001 | <0.001 | <0.001 |
| D-Nickel | mg/L | 0.001 | | <0.001 | | 0.002 | 0.004 | <0.001 | 0.002 |
| D-Selenium | mg/L | 0.01 | | <0.010 | | <0.010 | <0.010 | <0.010 | <0.010 |
| D-Silver | mg/L | 0.001 | | <0.005 | | <0.005 | <0.010 | <0.005 | <0.010 |
| D-Thallium | mg/L | 0.001 | | <0.001 | | <0.001 | | <0.001 | |
| D-Zinc | mg/L | 0.005 | | <0.005 | | 0.011 | 0.028 | <0.005 | 0.01 |
| Nitrite + Nitrate as N | mg/L | 0.01 | | 0.154 | | 0.087 | | <0.010 | |
| Total Kjeldahl Nitrogen as N | mg/L | 0.1 | | 0.7 | | 0.6 | | 0.8 | |
| Total Nitrogen as N | mg/L | 0.1 | | 0.8 | | 0.7 | | 0.8 | |
| Total Phosphorus as P | mg/L | 0.01 | | 0.05 | | 0.22 | | 0.03 | |

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| Matrix: Water | X | X | RG3 | RG4 | RG4 | RG7 | RG7 | RG8 | RG8 |
|---|-----------|------|-----------|------------|-----------|------------|------------|------------|------------|
| Project site: Strathalbyn | Units | LOR | 5/10/2006 | 24/07/2006 | 5/10/2006 | 24/07/2006 | 14/09/2006 | 24/07/2006 | 14/09/2006 |
| Hydroxide Alkalinity as CaCO ₃ | mg/L | 1 | | <1 | | <1 | | <1 | |
| Carbonate Alkalinity as CaCO ₃ | mg/L | 1 | | <1 | | <1 | | <1 | |
| Bicarbonate Alkalinity as CaCO ₃ | mg/L | 1 | | 424 | | 433 | | 584 | |
| Total Alkalinity as CaCO ₃ | mg/L | 1 | | 424 | | 433 | | 584 | |
| Chloride | mg/L | 1 | | 3160 | | 11200 | | 11000 | |
| D-Calcium | mg/L | 1 | | 64 | | 258 | | 317 | |
| D-Magnesium | mg/L | 1 | | 126 | | 854 | | 896 | |
| D-Sodium | mg/L | 1 | | 1900 | | 5950 | | 5680 | |
| D-Potassium | mg/L | 1 | | 62 | | 158 | | 169 | |
| Total Anions | meq/L | 0.01 | | 108 | | 368 | | 367 | |
| Total Cations | meq/L | 0.01 | | 97.7 | | 346 | | 341 | |
| Faecal Coliforms | MPN/100mL | 2 | | | | | | | |
| Escherichia coli | MPN/100mL | 2 | | | | | | | |
| Coliforms | MPN/100mL | 2 | | | | | | | |

Interpretation of the Water Quality Results

Groundwater salinity falls in two groups, the relatively low salinity i.e. between 5 and 10mS/cm and the high salinity between 15 and 30 mS/cm. There seems to be no correlation between salinity and surface water level or between weathered or unweathered Cambrian aquifers. No significant variability in salinity was observed over time at the same bore.

Most of the salinity comes from sodium and chloride ions. The calculated sodium adsorption ratio (SAR) for AWE1 is 35.8 and when adjusted for the bicarbonates the value increases to 110.9. An SAR > 9 has a severe risk of increasing soil sodicity on most soils and therefore should not be used for irrigation purposes (NSW Department of Primary Industry, Agfacts 26 May 2004).

Groundwater in the vicinity of the Angas Deposit is generally neutral, reporting a pH range between 6.5 and 7.5. Total metals concentrations were found in naturally high levels the following metals were significantly higher than EPA fresh water quality guidelines²; lead, silver, zinc and copper. The highest levels were found in the bores drilled above the known Angas mineralization; AWE1, LG1 and LG2. Arsenic and selenium were also detected but were more widely dispersed and no clear trends were observed for these metalloids.

Nutrient concentrations are generally low but there are signs of potential leakage from the Sewerage effluent lagoons because of the relatively high Total Kjeldahl Nitrogen (combination of organic N and ammonia).

² Environmental Protection (Water Quality) Policy 2003 and Explanation Report. Environmental Protection Authority, May 2003

Dust Monitoring Program

Introduction

Terramin undertakes that no dust from mining activities will leave the mine. EPA criteria for threshold total suspended particulate (TSP) levels are 120 mg/m³. Terramin has been using two high volume samplers (HVS) to track TSP levels on site prior to mining.

Deposition of lead bearing dust from mining activities has the potential to impact soil downwind of the mine. While there are no criteria for lead deposited in dust deposition gauges (DDG), the criterion for soil lead content is 200 mg/kg, Terramin tracked lead the levels in dust trapped in 10 DDG gauges placed around the mine.

Sampling Locations

The dust monitoring sites are shown in Figure 2.

Table 6 Descriptions of Sampling Locations and Equipment Type

| Sampling Location No | Description of site/ motivation for selection | Type of sampling method | Type of analysis |
|-----------------------------|---|--------------------------------|--------------------------|
| 1 | High soil concentration of lead detected, Close to effluent dams | Dust deposition gauge | Complete analysis + Lead |
| 2 | Olive plantation, sensitive receptor | Dust deposition gauge | Complete analysis + Lead |
| 3 | West of the quarry site, sensitive receptor neighbours | Dust deposition gauge | Complete analysis + Lead |
| 4 | At the house in the north end of the quarry site. Correlation with HiVol sampler | Dust deposition gauge | Complete analysis + Lead |
| 4 | At the house in the north end of the quarry site. Correlation with dust deposition gauge | High Volume Air Sampler | TSP + Lead |
| 5 | East of mining site | Dust deposition gauge | Complete analysis + Lead |
| 6 | West of the quarry site, sensitive receptors neighbouring houses | Dust deposition gauge | Complete analysis + Lead |
| 7 | North east corner of tailings dam, monitoring dust particularly in dry times of year | Dust deposition gauge | Complete analysis + Lead |
| 8 | South west of quarry site, high soil content of lead detected in field just south of the location | Dust deposition gauge | Complete analysis + Lead |
| 9 | South east of quarry site and south east of tailings dam | Dust deposition gauge | Complete analysis + Lead |

Environmental Quarterly Monitoring Program #1 (July to October 2006)

Figure 2 Dust Monitoring Locations



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MAP DETAILS
 Coloured Data: 06/04
 Job Number: 2003-0436
 Filename: new_dust_locations.kur
 Drawn: Tom Davy
 Date: 28/03/06

Terramin Australia Limited
 Strathalbyn
LOCATIONS OF DUST MONITORING SITES

Environmental Quarterly Monitoring Program #1 (July to October 2006)

Methods for Monitoring Total Suspended Particulates and Particulate Lead

Total Suspended Particulates and Particulate Lead are monitored on site using two HVS. The frequency of sampling during this monitoring period was six days for each HVS but offset by three days so that a sample was collected every three days. This was intended to provide a background database for future dust monitoring.

Every six days the site was visited to collect and install a new pre-weighed filter in the HVS. The timers were set to collect dust for 24 hours. The filter papers were removed and sent for analysis to NATA certified laboratories. The laboratories measured concentrations of TSP and lead in microgram/m³.

Methods for Monitoring Ambient Dust and Lead Deposition

Ten dust deposition gauges (DDG) are used to monitor dust fallout the baseline airborne TSP and particulate lead on site. The fallout bottles were collected every 30 days +-2 days from the DDG and replaced with a new bottle. The samples were sent to a NATA certified laboratory for analysis according to AS/NZS 3580.10.1:2003 [5] for the following components:

- Total solids
- Soluble matter
- Insoluble matter
- Combustible matter
- Ash content
- Particulate Lead

Environmental Quarterly Monitoring Program #1 (July to October 2006)

Results of Dust Monitoring

The HVS results for this reporting period are presented in Table 7. A graph of the full HVS database since monitoring commenced in March 2006 is presented in Figure 3.

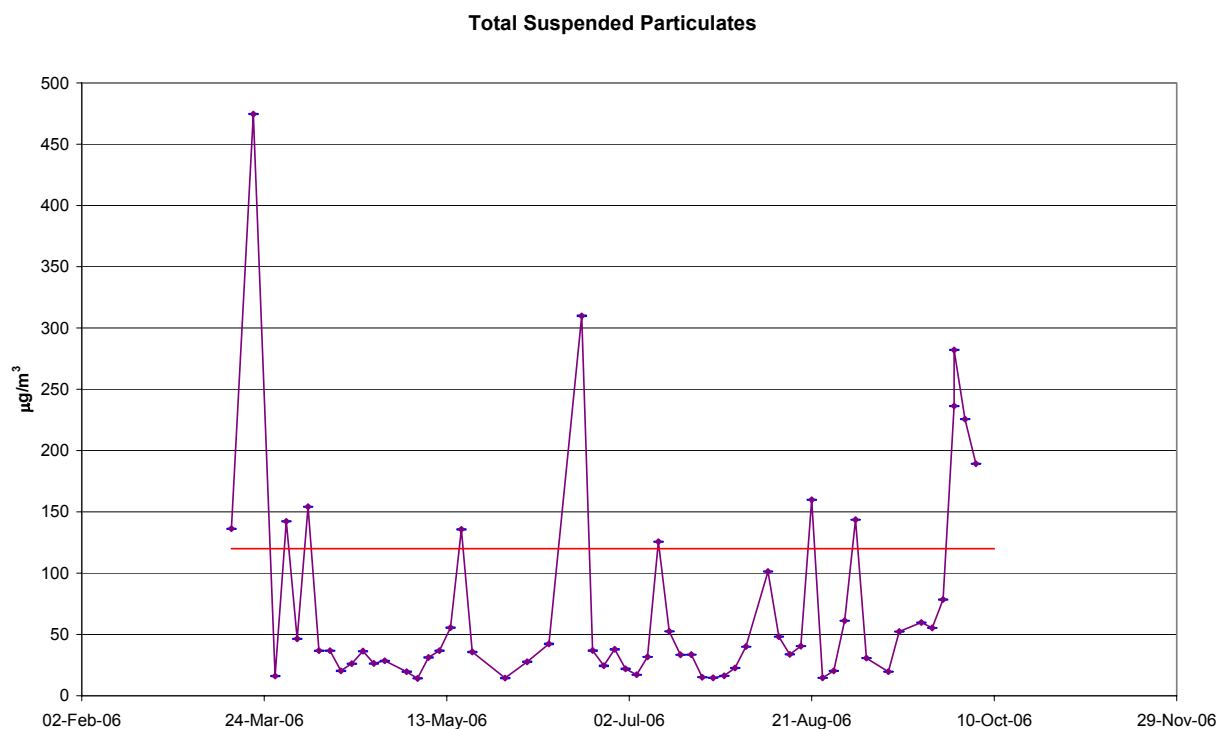
Table 7 Results of HVS Monitoring

| DATE | TSP µg/m ³ | Pb µg/m ³ | Comments |
|------------|--------------------------|-------------------------|--|
| 1/07/2006 | 21.9 | <0.01 | |
| 4/07/2006 | 17.2 | <0.01 | |
| 7/07/2006 | 31.7 | <0.01 | |
| 10/07/2006 | 125.7 | <0.01 | |
| 13/07/2006 | 52.5 | <0.01 | |
| 16/07/2006 | 33.3 | <0.01 | |
| 19/07/2006 | 33.6 | <0.01 | |
| 22/07/2006 | 15.1 | <0.01 | |
| 25/07/2006 | 14.6 | <0.01 | |
| 28/07/2006 | 16.3 | <0.01 | |
| 31/07/2006 | 22.6 | <0.01 | |
| 3/08/2006 | 40.0 | <0.01 | |
| 6/08/2006 | | | Did not run, power cord not properly plugged in to sampler |
| 9/08/2006 | 101.3 | <0.01 | |
| 12/08/2006 | 48.2 | <0.01 | |
| 15/08/2006 | 33.8 | <0.01 | |
| 18/08/2006 | 40.5 | <0.01 | |
| 21/08/2006 | 159.9 | <0.01 | |
| 24/08/2006 | 14.6 | <0.01 | |
| 27/08/2006 | 20.3 | <0.01 | |
| 30/08/2006 | 61.2 | <0.01 | |
| 2/09/2006 | 143.6 | <0.01 | |
| 5/09/2006 | 30.7 | <0.01 | |
| 11/09/2006 | 19.7 | <0.01 | |
| 14/09/2006 | 52.4 | | |
| 17/09/2006 | | | Did not run, sampler not set properly |
| 20/09/2006 | 59.7 | | |
| 23/09/2006 | 55.4 | | |
| 26/09/2006 | 78.4 | | |
| 29/09/2006 | 236.3 | | |
| 29/09/2006 | 282.1 | | |
| 2/10/2006 | 225.7 | | |
| 5/10/2006 | 189.2 | | |

Bold values represent exceedence of the World Health Organisation health guideline value of 120 µg/m³

Environmental Quarterly Monitoring Program #1 (July to October 2006)

Figure 3 Total Suspended Particulates Over Time

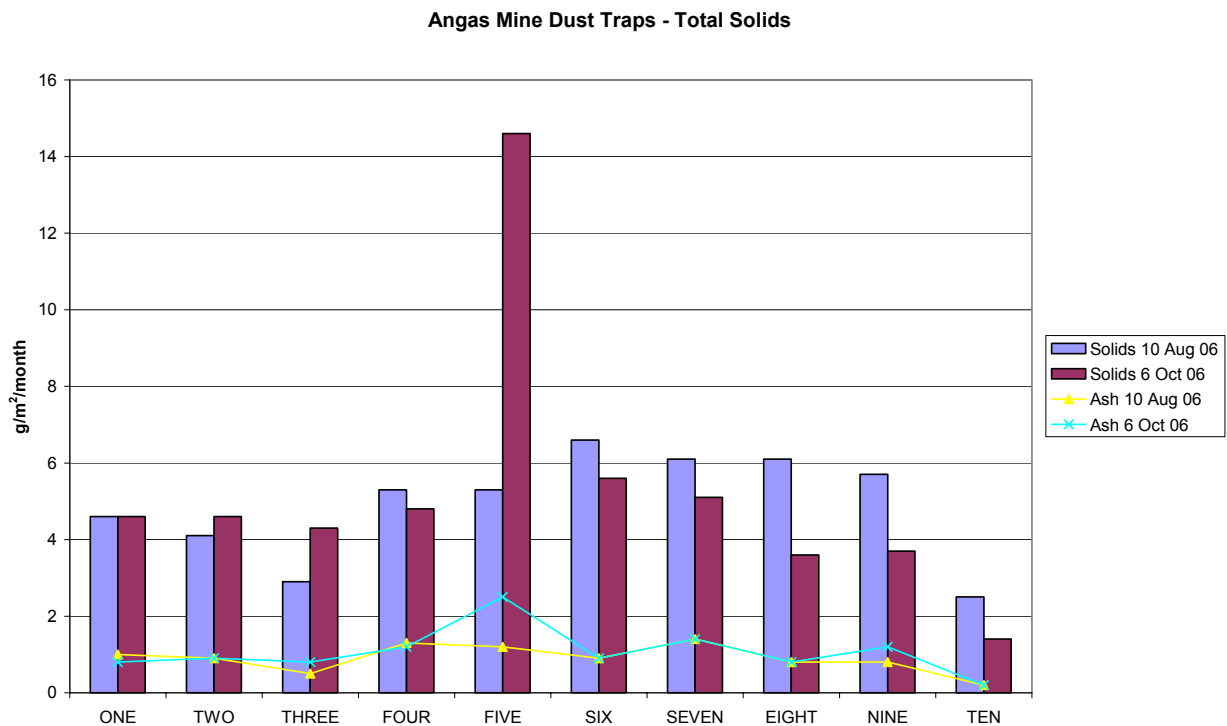


The Laboratory results from ten DDG is presented in Table 8, total solids and the ash content are shown in Figure 4.

Table 8 Results from Dust Deposition Gauges

| Analyte | | Ash Content | Combustible Matter | Total Solids | Total Soluble Matter | Total Insoluble Matter | Lead |
|---------|----------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------|
| Units | | g/(m ² month) | g/(m ² month) | g/(m ² month) | g/(m ² month) | g/m ² /month | mg/kg |
| LOR | | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 5-20 |
| SITE | Date Collected | | | | | | |
| ONE | 10/08/2006 | 1 | 1.3 | 4.6 | 2.4 | 2.2 | <20 |
| TWO | 10/08/2006 | 0.9 | 0.8 | 4.1 | 2.4 | 1.7 | <20 |
| THREE | 10/08/2006 | 0.5 | 0.4 | 2.9 | 2 | 0.9 | <20 |
| FOUR | 10/08/2006 | 1.3 | 0.8 | 5.3 | 3.1 | 2.2 | <20 |
| FIVE | 10/08/2006 | 1.2 | 1.2 | 5.3 | 3 | 2.4 | <20 |
| SIX | 10/08/2006 | 0.9 | 0.9 | 6.6 | 4.7 | 1.8 | <20 |
| SEVEN | 10/08/2006 | 1.4 | 1 | 6.1 | 3.6 | 2.5 | <20 |
| EIGHT | 10/08/2006 | 0.8 | 0.6 | 6.1 | 4.7 | 1.4 | <20 |
| NINE | 10/08/2006 | 0.8 | 0.6 | 5.7 | 4.4 | 1.4 | <20 |
| TEN | 10/08/2006 | 0.2 | <0.1 | 2.5 | 2.3 | 0.2 | <20 |
| ONE | 6/10/2006 | 0.8 | 1.3 | 4.6 | 2.5 | 2.1 | <0.5 |
| TWO | 6/10/2006 | 0.9 | 1 | 4.6 | 2.6 | 2 | <0.5 |
| THREE | 6/10/2006 | 0.8 | 0.6 | 4.3 | 2.8 | 1.5 | <0.5 |
| FOUR | 6/10/2006 | 1.2 | 0.3 | 4.8 | 3.3 | 1.6 | <0.5 |
| FIVE | 6/10/2006 | 2.5 | 5.7 | 14.6 | 6.3 | 8.2 | <0.5 |
| SIX | 6/10/2006 | 0.9 | 0.3 | 5.6 | 4.3 | 1.2 | <0.5 |
| SEVEN | 6/10/2006 | 1.4 | 1.6 | 5.1 | 2.1 | 3 | <0.5 |
| EIGHT | 6/10/2006 | 0.8 | 1.2 | 3.6 | 1.6 | 2 | <0.5 |
| NINE | 6/10/2006 | 1.2 | <0.1 | 3.7 | 2.5 | 1.2 | <0.5 |
| TEN | 6/10/2006 | 0.2 | <0.1 | 1.4 | 1.1 | 0.3 | <0.5 |

Figure 4 Total Solids Deposited Around the Proposed Angas Mine



Interpretation of the Dust Monitoring Results

The baseline dust data shows that the site can experience dusty conditions; this is not surprising since the site is currently used as a quarry and is surrounded by pastures. Out of 33 TSP readings 2 were invalid and 7 exceeded the WHO health guideline value of 120 µg/m³.

Currently this data can not be interpreted further because it is not linked to wind speed and direction information, and the second HVS is being used to accumulate data and is not used to identify the direction of source. However, it is significant to note that the dust generated around the property is occasionally higher than acceptable WHO levels.

Dust deposition was generally evenly spread during this reporting period with one exception of high deposition at Site 5 on 8 October 2006. Currently there is insufficient data to determine trends or associate this with predominant winds.

Lead levels for both the HVS and DDG were below detection limits indicating that no detectable lead bearing dust occurs around the quarry.

Terramin intends to continue building the dust monitoring database for the tracking of performance against the background levels.