

Department of Jobs, Precincts and Regions

**Kangaroo Flat Mine- Dust Monitoring Report-  
January to June, 2021**

30 August 2021

## Executive Summary

***This environmental monitoring report includes available dust monitoring results for Kangaroo Flat Mine, for January to June (inclusive) 2021.***

The Kangaroo Flat Mine, Kangaroo Flat, Victoria (the site) is located in the east of Kangaroo Flat, approximately 4 Km south from the centre of Bendigo. The site includes access to the Swan Decline mine tunnel and shafts, a gold processing plant and associated mine tailings dams.

The former mining licence holder (Kralcopic Pty Ltd) at the site has gone into voluntary administration. On 23 April 2021, Earth Resource Regulation (ERR) of Department of Jobs, Precincts and Regions (DJPR) inherited the responsibility to rehabilitate the site.

DJPR commissioned dust monitoring to be carried out from the beginning of 2021, for the purpose of collecting baseline data for, if and when, ERR inherited the site to rehabilitate. The scope of the dust monitoring program included collection of dust deposition samples from four locations (KF-1, KF-2, KF-3 and KF-4), located near the boundary of the site. The adopted sampling procedures and analysis methodology were comparable to historical assessment works undertaken by Kralcopic Pty Ltd. Samples were collected and assessed by Australian Laboratory Services (ALS), under instruction by DJPR.

CDM Smith Australia Pty Ltd (CDM Smith) was engaged by DJPR to provide a summary of quarterly dust monitoring results in the vicinity of the site. At the request of DJPR quarter 1 (Q1) and quarter 2 (Q2) results are presented in this report.

Review of dust monitoring information included:

- Did the dust deposition rates reported in Q1 and Q2 of 2021, exceed the adopted dust deposition criteria of 4 g/m<sup>2</sup>.month (measured as total insoluble matter)?

No, the reported insoluble dust deposition rates from the four assessed monitoring stations during Q1 and Q2 2021 were below the adopted criteria of 4 g/m<sup>2</sup>.month. On average the dust deposition rates (1.08 g/m<sup>2</sup>.month insoluble dust) are within the accepted inferred background level (2 g/m<sup>2</sup>.month).

- Are dust deposition rates reported in Q1 and Q2 of 2021 comparable to available historic results in this area?

Dust deposition rates recorded in Q1 and Q2 2021 were within the historical range of results reported in Q4 2018, at the site.

Arsenic has been considered a key contaminant of concern for gold mine sites in the Bendigo region. To assist in the review of the monitoring results for arsenic in regards to the risk to the surrounding areas, the following questions were addressed.

- Are arsenic concentrations reported in deposited dust in Q1 and Q2 of 2021 comparable to available historic results in this area?

High variability in total arsenic concentrations was reported between sample locations and sampling periods. Total arsenic concentrations in deposited dust, during Q1 and Q2 2021, ranged from <2 to < 304 mg/kg, with an average (mean) of 48 mg/kg across the assessed monitoring stations during Q1 and Q2 2021.

The reported range of arsenic concentrations in deposited dust were within the expected range of arsenic concentrations in soils across Bendigo. Arsenic concentrations in soils (including areas impacted by mine tailings) in the Greater Bendigo Area, have reported to range from a 1-3,106 mg/kg with a median of 774 mg/kg (NSR Environmental Consultants 1991).

A human health risk assessment for dust exposure in the vicinity of the site has not been undertaken.

In the absence of screening criteria for arsenic deposited dust a comparison to the soil health investigation levels for a residential land use setting (of 100 mg/kg) is provided. It is emphasised that this is not a health assessment. The

reported total arsenic in deposited dust is not a direct measure of concentration of arsenic compounds that may be present in the atmosphere. It is for this reason that care must be taken when interpreting the monitoring data.

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## Section 1 Introduction

### 1.1 Background

The Kangaroo Flat Mine, Kangaroo Flat, Victoria (the site) is located in the east of Kangaroo Flat, approximately 4 Km south from the centre of Bendigo, Victoria. The site includes access to the Swan Decline mine tunnel and shafts (historically used for underground mining), a gold processing plant and associated mine tailings dams.

The former mining licence holder (Kralcopic Pty Ltd) at the site has gone into voluntary administration. On 23 April 2021, Earth Resource Regulation (ERR) of Department of Jobs, Precincts and Regions (DJPR) inherited the responsibility to rehabilitate the site.

DJPR commissioned dust monitoring to be carried out from the beginning of 2021, for the purpose of collecting baseline data for, if and when, ERR inherited the site to rehabilitate. The scope of the monitoring included use of dust deposition gauges in similar locations as historically assessed by Kralcopic and adoption of comparable sampling procedures and analysis methodology.

CDM Smith Australia Pty Ltd (CDM Smith) was engaged by DJPR to provide a summary of quarterly dust monitoring results in the vicinity of the site. At the request of DJPR quarter 1 and quarter 2 results are presented in this report.

### 1.2 Scope and Objective

The scope of this assessment included collation and reporting of dust sample results from four locations (KF-1, KF-2, KF-3 and KF-4), located near the boundary of the site. Samples were collected and assessed by Australian Laboratory Services (ALS), under instruction by DJPR.

The objective of this work was to provide an understanding of current dust deposition rate and composition, post mining operations and prior to mine rehabilitation. Results were compared to historical data ranges, as assessed by Kralcopic in quarter 4 (Q4) of 2018 (Kralcopic 2018). We understand that the purpose of these works is to inform air quality management practices at the site including assisting in understanding the following:

- Did the dust deposition rates, reported in quarter 1 (Q1) and quarter 2 (Q2) of 2021, exceed the adopted national dust deposition criteria of 4 g/m<sup>2</sup>.month (measured as total insoluble matter)?
- Are dust deposition rates reported in Q1 and Q2 of 2021 comparable to available historic results in this area?
- Are arsenic concentrations reported in deposited dust in Q1 and Q2 of 2021 comparable to available historic results in this area?

### 1.3 Regulatory Environment

The air environment in Victoria is protected by the Environment Protection Act 2017 (the Act). The Environmental Reference Standard (ERS) is a tool to support the Act. The ERS:

- identifies environmental values that the Victorian community want to achieve and maintain; and
- provides a way to assess those environmental values in locations across Victoria.

The environmental values of ambient air, as described in the ERS, are:

- Life, health and well-being of humans
- Life, health and well-being of other forms of life, including the protection of ecosystems and biodiversity
- Local amenity and aesthetic enjoyment

- Visibility
- The useful life and aesthetic appearance of buildings, structures, property and materials
- Climate systems that are consistent with human development, the life, health and well-being of humans, and the protection of ecosystems and biodiversity

The ERS presents indicators and objectives (or thresholds) which can be used to identify if environmental values may be impacted. The ERS generally incorporates the Ambient Air Quality National Environment Protection Measure (NEPM) standards and the associated goals and monitoring and reporting protocols.

In addition, EPA (Vic) publication 1191, Protocol for Environmental Management: Mining & Extractive Industries (the PEM), provides guidance for air quality monitoring in relation to the operation of mines and quarries.

All mining and extractive sites have a requirement to comply with the ERS. An Air Quality Assessment in accordance with the PEM, (EPA Publication 1191, 2007), is required only for proposals requiring an Environment Effects Statement or an EPA Works Approval and Licence or where specifically required by DPI (now DJPR). DJPR are likely to request an air quality assessment only when activities that are likely to generate increased emissions of the indicators specified in this PEM or will have significantly increased impact at sensitive locations. The PEM states that, for mines and quarries with less than 50,000 tonnes/year extraction, no modelling assessment of air quality is required but emissions on site must be controlled by the application of best practice site management.

No mine extraction works are underway at the site.

### 1.4 What is dust?

Dust is typically classified based on its particle size and includes the following:

- Deposited matter- any particles that fall out of suspension in the atmosphere.
- Total Suspended Particles (TSP) - particles suspended or entrained in the air. Typically, this is particles of 30µm (0.03 mm) equivalent aerodynamic diameter or less. Larger particles tend not to become suspended.
- PM<sub>10</sub> - particles 10 µm equivalent aerodynamic diameter or less.
- PM<sub>2.5</sub> - particles 2.5 µm equivalent aerodynamic diameter or less.

Dust particle size is an important factor influencing dispersion and transport in the atmosphere and potential effects on human health.

The PEM classifies indicators of dust based on its hazardous properties. PM<sub>10</sub> is identified as a Class 1 indicator under the PEM and PM<sub>2.5</sub> a Class 2 indicator. Respirable crystalline silica (PM<sub>2.5</sub> fraction) and arsenic are Class 3 indicators. TSP is an unclassified indicator. The PEM provides assessment criteria for these indicators where an Air Quality Assessment is required. The requirement for an Air Quality Assessment is determined by the size of the proposed operation and its location in relation to identified sensitive receptors (e.g. houses).

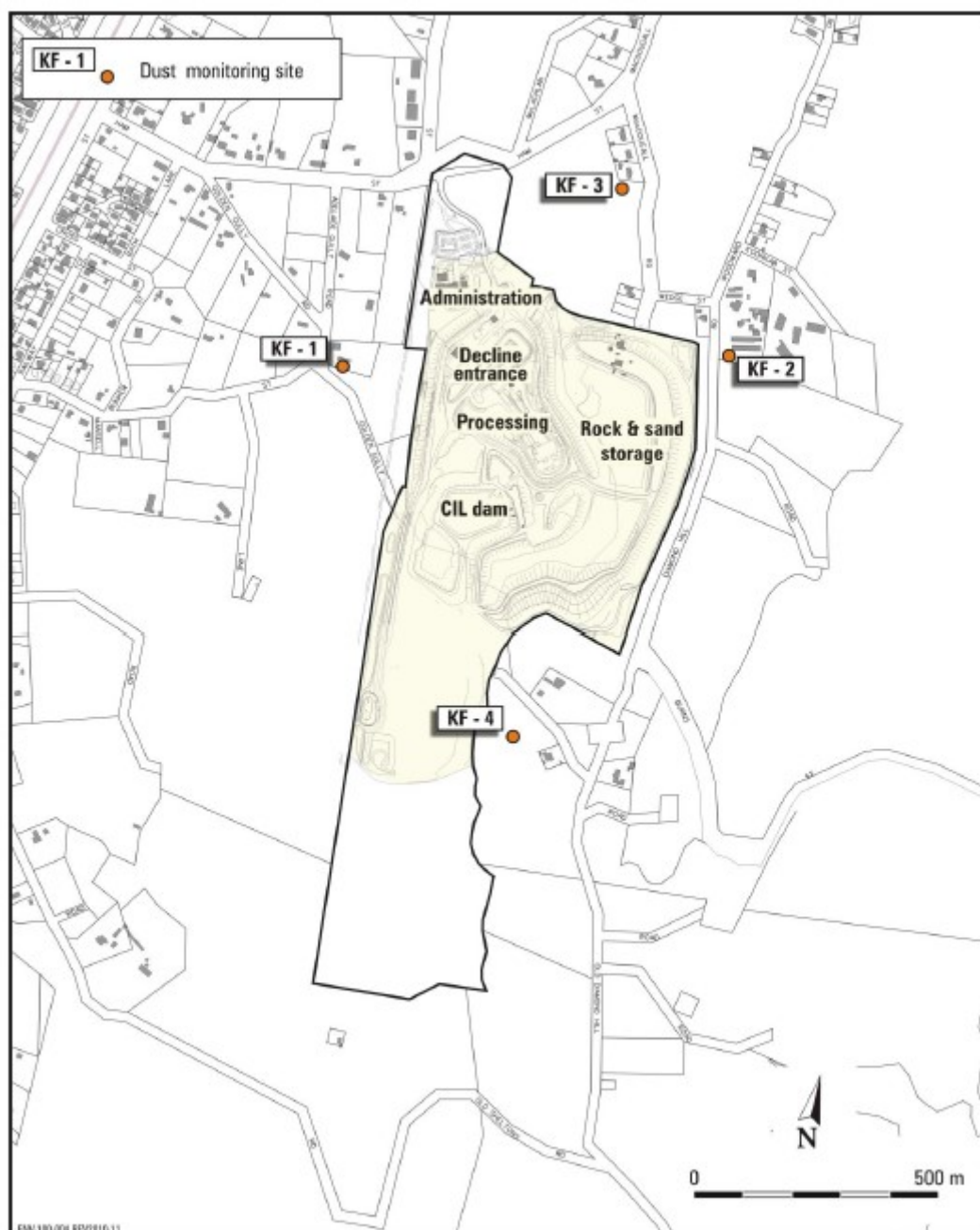
Potential sources of dust are:

- Natural sources such as dust storms, agricultural dust, bushfires, vegetation, pollen and fungi, and
- Anthropogenic sources such as mines sites, industry, roads and vehicles, construction sites, domestic and diffuse sources (Environment Australia, 1998).



## Section 2 Measurement of Dust

Australian Laboratory Services (ALS) collected deposited matter from dust deposition gauges at locations KF-1, KF-2, KF-3 and KF-4, (Figure 2-1). We understand that these locations were selected as most likely to be affected by site activities and are adjacent to the three residences closest to the Kangaroo Flat mine site (Q4 Kralcopic report, 2018).



**Figure 2-1 Kangaroo Flat - Dust Monitoring Locations (KF-1, KF-2, KF-3, KF-4), as extracted from Kralcopic 2018.**

We understand that collection of dust samples was in accordance with GBM Environmental Monitoring Procedure PRO\_25\_04\_K dust deposition sampling.

CDM Smith was not engaged to review the sample collection methodology.

Sample collection and analysis for current data (Q2 2021 data) was conducted by ALS Environmental.

Assessment included analysis of the following:

- Total Deposited matter
- Metals/metalloids, in the soluble, insoluble and ash content fraction of dust
- Ash content

### 2.1 Deposited Matter

Deposited matter was collected from standard dust deposition gauges, over monthly periods.

Dust deposition gauges measure dust deposition rate; that is the amount of material, in grams, that falls onto a known surface area over the period of one month. As such the results are expressed in g/m<sup>2</sup>/month (i.e. the calculated mass of dust deposited per square metre over the period of month). This method involves the passive deposition and capture of dust utilising a funnel and bottle arrangement.

This method enables determination of the relative 'dustiness' of sampling locations. It does not provide data on relative dust concentrations in ambient air or enable definitive determination of dust levels from a particular event or source.

As well as collecting dust deposition out of the ambient air, dust deposition gauges may also collect rainwater and other material such as insects, bird dropping and leaf litter, etc. It is acknowledged that bird droppings can significantly impact on individual monitoring results but tend not have any material impact when the data is viewed in context of long-term trends.

#### 2.1.1 Metals/Metalloids Monitoring in Dust

The concentration of arsenic, barium and manganese was reported for insoluble matter, soluble matter and ash matter and compared against historical results.

Total metal/metalloid concentrations were derived based on the sum of the insoluble metal/metalloid concentration and soluble metal concentration.

The inclusion of metals and metalloid analysis in deposited dust samples can assist in identifying possible dust sources. We understand that there are no specified threshold values for metals and metalloids in deposited dust either in the former Mining Licence conditions or within the ERS.

#### 2.1.2 Ash Content

Ash content is the matter that remains after the sample has been combusted in the laboratory. The ash component is can be used as a proxy for the mineral portion of the dust (Kralcopic, 2018).

The ashing process removes combustible organic contaminants such as bird dropping and plants material (i.e. pollen, seeds, leaf matter).

The reported total arsenic in deposited dust is not a direct measure of the concentration of arsenic compounds that may be present in the atmosphere. It is for this reason that care must be taken when interpreting the data.

### 2.2 Dust monitoring standards

Results were compared against relevant dust deposition rate criteria described by EPA Victoria (Publication 1191, dated December 2007), as shown below.

**Table 2-1 Relevant Dust Criteria**

Averaging period	Maximum increase above background (2g/m <sup>2</sup> /month ) in deposited dust level	Maximum total deposited dust level
Annual	2g/m <sup>2</sup> /month	4g/m <sup>2</sup> /month

The following points apply to the criteria:

The following points apply to the criteria:

- Results of monitoring should not exceed 4g/m<sup>2</sup> /month (no more than 2g/m<sup>2</sup> /month above background) as a monthly average.
- The 2g/m<sup>2</sup>/month criteria are used when background data on deposited dust levels exist, while the 4g/m<sup>2</sup>/month criteria is used when no background data exists.
- The criteria refer to all sources of deposited matter (including sources from mines, agriculture, unsealed roads, etc) and cumulative impacts.
- The criteria suggest that in some cases a mine may increase deposited dust levels by up to 2g/m<sup>2</sup>/month. However, the total deposited dust level (including sources from mines, agriculture, unsealed roads, etc) must not exceed 4g/m<sup>2</sup>/month.

Deposited matter (dust) can be used as an indicator of the effectiveness of site management practices and the potential for offsite nuisance (fugitive dust). Deposited dust monitoring, when conducted over a period of time, is useful for examining trends and evaluating deviation from long term trends with respect to site activities. It does not give an indication of the potential health effects of the dust because it does not measure the amount of fine and very fine particles in the atmosphere.

## 2.3 Comparison of the scope of current and historical dust monitoring

The scope of the dust monitoring program in Q1 and Q2 2021 differed from the scope of the historic assessment undertaken in Q4 2018, as described in Table 2-2 .

**Table 2-2 Overview of scope of dust monitoring data collected– Historical & Current data**

Analysis	Q4 2018	Q1 and Q2 2021	Comment
Measurement of deposited matter	Yes	Yes	Dust deposition data was collected in Kangaroo Flat at 4 monitoring stations. Samples were assessed for total solids (insoluble + soluble matter), ash content and combustible matter.
Measurement of metalloid/metals in dust	Yes	Yes	Dust deposition samples (from 4 monitoring stations) were assessed for metalloids/metals (arsenic, barium and manganese) in the soluble, insoluble and ash fraction of dust.
Measurement of particulate matter	Yes	No	PM10 and PM2.5 were measured in Q4 of 2019 at locations KF-1, KF-2 and KF-4.
Measurement of background dust data	Yes	No	In Q4 2018, a background gauge was located at Raywood. No background data was collected by DJPR for Q1 or Q2 2021 monitoring.
Meteorological data collection	Yes	No	In Q4 2018, Kralcopic included assessment of meteorological observations at Kangaroo Flat Mine Site, to support assessment of wind direction.

## Section 3 Dust Deposition Results

### 3.1 Kangaroo Flat -Q1 and Q2 2021

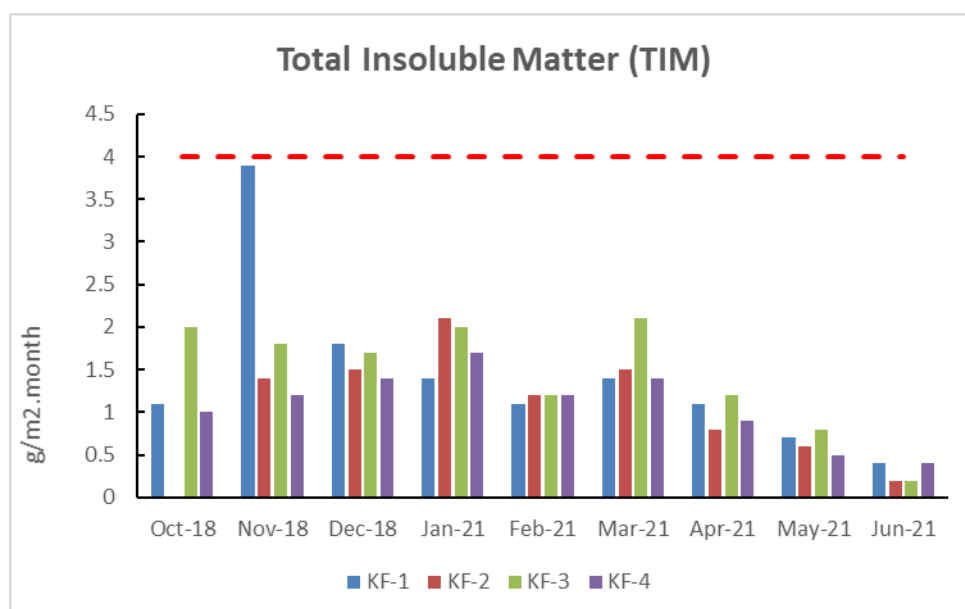
Dust deposition analytical results are presented in Table A1, Appendix A. Laboratory records of sample analysis are presented in Appendix C.

No background monitoring data was provided for this current monitoring dataset. Dust results were compared against available data from the most recent previous dust monitoring rounds (Q4 2018). We understand that no dust monitoring was undertaken between December 2018 and January 2021.

Where results were reported as “less than” (<) a specified number (the laboratory reporting limit), the number specified was adopted for graphical display of results, for example if the result was reported as “<50 g/m<sup>2</sup>.month” the result was graphically displayed as 50 g/m<sup>2</sup>.month. This is considered a conservative estimate of the result.

#### 3.1.1 Deposition of total insoluble matter

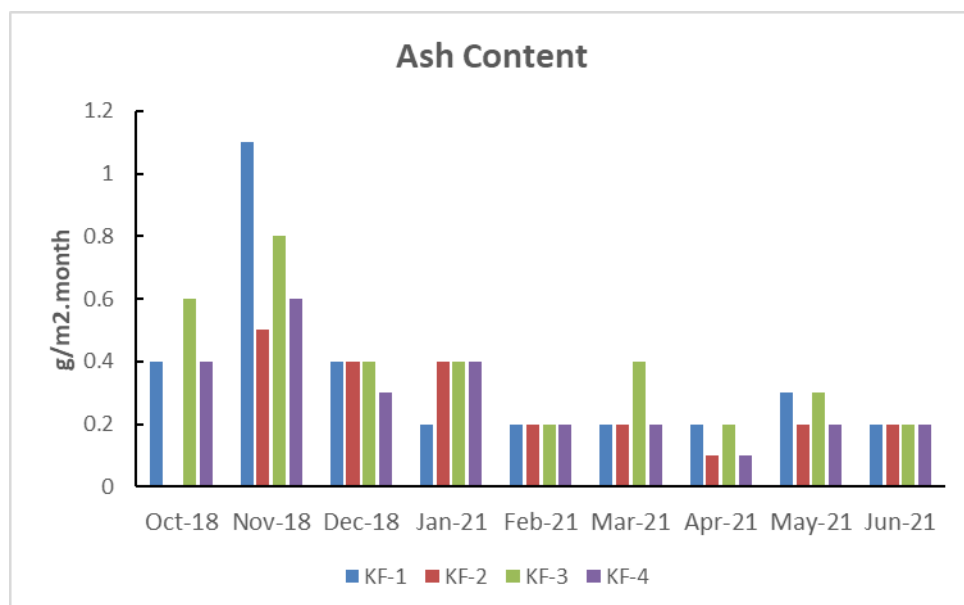
Deposition of total insoluble matter met the adopted criteria in the measured samples in Q1 and Q2, 2021, Figure 3-1.



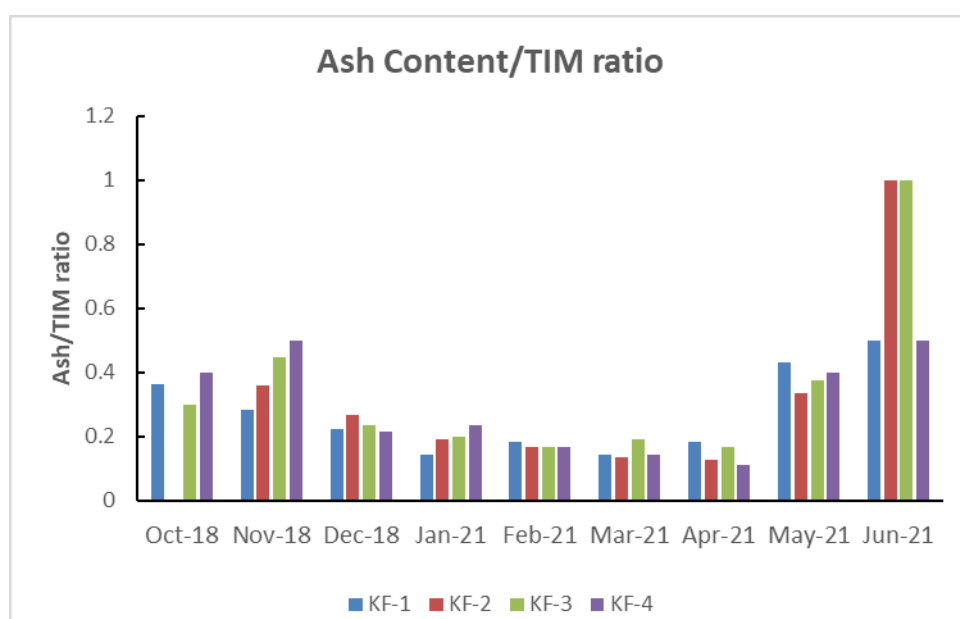
**Figure 3-1** Kangaroo Flat Dust Total Insoluble Matter (g/m<sup>2</sup>.month), comparison between 2018 (previous data) and 2021 (current data). Red Dashed line represents the adopted Total Insoluble Matter criteria.

#### 3.1.2 Mineral content in dust

The fraction of dust measured as ash content generally made up less than 50% of the total insoluble matter, with the exception of measurements at KF-2 and KF-3 in June 2021, suggesting organic matter makes up over half of the measured total insoluble solids, in the assessed samples Figure 3-3. The increased ratio of Ash content to total insoluble matter (Figure 3-3) shown during May 2021 and June 2021, appears to be due to a decrease in organics (combustible matter) during these autumn and winter months.



**Figure 3-2 Kangaroo Flat Dust Ash (g/m².month) Comparison between 2018 (previous data) and 2021 (current data)**



**Figure 3-3 Kangaroo Flat Dust Ash/Total Insoluble Matter (TIM) Ratio, comparison between 2018 (previous data) and 2021 (current data)**

### 3.1.3 Metals/metalloids in dust

Graphical presentation of soluble and insoluble arsenic, barium and manganese concentrations are presented in Appendix B.

A total of 35 soluble metal results over 9 monitoring rounds between October 2018 and Jun 2021 at four monitoring sites are available for each of arsenic, barium and manganese concentrations in dust at the site. The results are summarised in Figures B1, B3, B5 in Appendix B. There is no health or environmental benchmarks available for soluble metals in deposited dust. These are measured to consider potential sources and to further characterise dust. The results show:

- For soluble arsenic (Figure B1) most results (32 of 35) are within 30  $\mu\text{g}/\text{m}^2\cdot\text{month}$ . The maximum result (54  $\mu\text{g}/\text{m}^2\cdot\text{month}$ ) occurred at KF2 in March 21.
- For soluble barium (Figure B3) most (31 of 35) results are at or below 400  $\mu\text{g}/\text{m}^2\cdot\text{month}$ . The maximum result (1190  $\mu\text{g}/\text{m}^2\cdot\text{month}$ ) occurred at KF-2 in January 21.
- For soluble manganese (Figure B5) most (25 of 35) results are at or below 600  $\mu\text{g}/\text{m}^2\cdot\text{month}$ . The maximum result (1270  $\mu\text{g}/\text{m}^2\cdot\text{month}$ ) occurred at KF-1 in November 2018.

A total of 35 insoluble metal results over 9 monitoring rounds between October 2018 and Jun 2021 at four monitoring sites are available for each of arsenic, barium and manganese concentrations in dust at the site. The results are summarised in Figures B2, B4, B6 in Appendix B. There is no health or environmental benchmarks available for insoluble metals in deposited dust. These are measured to consider potential sources and to further characterise dust. The results show:

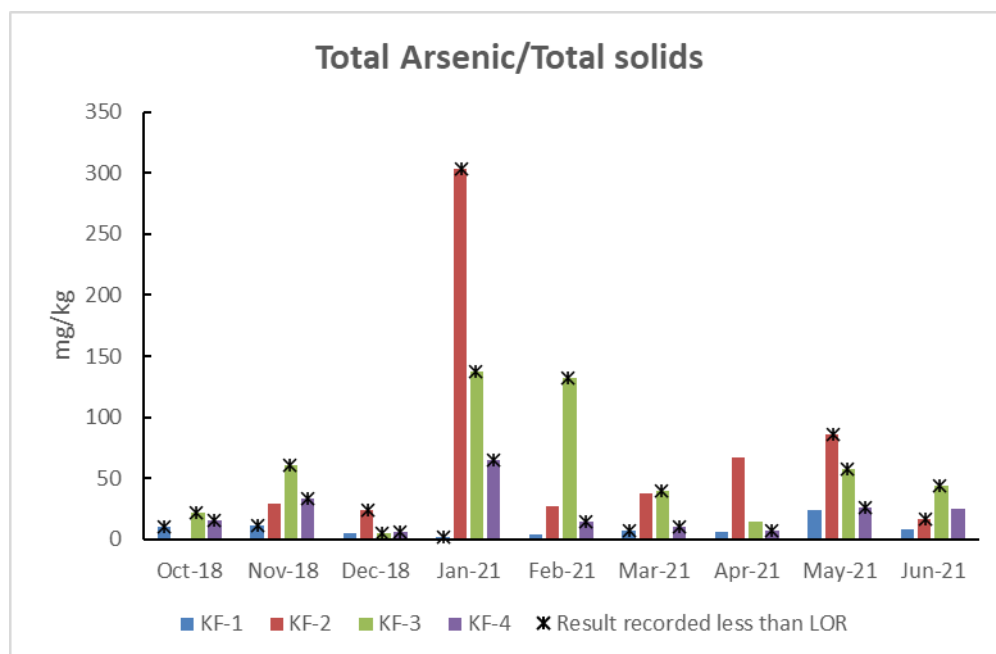
- For insoluble arsenic (Figure B2) most (24 of 35) were below the limit of reporting (LOR). Most (29 of 35) results were at or below 100  $\mu\text{g}/\text{m}^2\cdot\text{month}$ . The maximum result (<820  $\mu\text{g}/\text{m}^2\cdot\text{month}$ ) occurred in January 2021 at KF-2. Five of 6 results above 100  $\mu\text{g}/\text{m}^2\cdot\text{month}$  occurred in the current monitoring rounds (January 2021 to June 2021). Three of these results occurred in January 2021 at KF-2, KF-3, KF4, one at KF-3 in February 2021 and one in April 2021 at KF-2.
- For insoluble barium (Figure B4) most (29 of 35) were below the limit of reporting (LOR). Most (29 of 35) results were at or below 150  $\mu\text{g}/\text{m}^2\cdot\text{month}$ . The maximum result (317  $\mu\text{g}/\text{m}^2\cdot\text{month}$ ) occurred in November 2018 at KF-1. Two results in the current monitoring rounds (January 2021 to June 2021) were above 162  $\mu\text{g}/\text{m}^2\cdot\text{month}$  (one in February 2021 at KF-2 and one in May 2021 at KF-3).
- For insoluble manganese (Figure B6) most results were above the limit of reporting (27 of 35). Most results (29 of 35) were at or below 200  $\mu\text{g}/\text{m}^2\cdot\text{month}$ . The maximum result (577  $\mu\text{g}/\text{m}^2\cdot\text{month}$ ) occurred in November 2018 at KF-1. All results in the current monitoring rounds (January 2021 to June 2021) were below 200  $\mu\text{g}/\text{m}^2\cdot\text{month}$ .

There was no consistent pattern in arsenic, barium or manganese concentrations at any one monitoring station over the time period assessed. The variability in metal/metalloid deposition across the monitoring locations and monitoring events, indicates that metal/metalloid concentrations in dust are likely influenced by multiple factors and unlikely to be due to a single point source.

Interpretation of arsenic and barium concentrations in dust is limited by the high frequency of results that were reported as less than the limit of reporting. Based on discussion with ALS, there are several reasons that can lead to metal/metalloid results in dust deposition samples being reported as less than the limit of reporting. One of the key reasons for the high number of results less than the limit of reporting in this data set is due to the need to assess each single dust deposition sample for metal/metalloids in the insoluble content, as well as in the ash content. This requires the filter paper (i.e. the sample with the dust on it) to be split in half (bisected), to assess for ash as well as insoluble content. The deposition of dust on filter paper is not homogeneously (evenly) distributed. Therefore, the splitting or bisecting of the sample causes uncertainty when the result for metal concentrations in ash, for example, is higher than the metal concentration in insoluble matter.

It is also noted that the sampling period for the January 2021 data set was collected across 40 days rather than 30 days which may have contributed to the elevated results reported in January 2021 (although would not be entirely responsible for the magnitude of difference between the January 2021 results and other rounds of assessment).

Arsenic has been considered a key contaminant of concern for gold mine sites in the Bendigo region. For the purpose of providing an understanding of total arsenic concentrations measured in dust relative to arsenic concentrations measured in soils in the assessment region, total arsenic is presented as mg/kg (based on the sum of soluble and insoluble arsenic  $\mu\text{g}/\text{m}^2\cdot\text{month}$  divided by total solids g/  $\text{m}^2\cdot\text{month}$ ), Figure 3-4.



**Figure 3-4 Kangaroo Flat total arsenic/total solids (mg/kg) ratio comparison between 2018 (previous data) and 2021 (current data). Asterisk (\*) represents the results where the sample was recorded as less than x (<x). For the sake of graphical presentation <x has been taken as the value of x.**

Total arsenic concentrations in deposited dust, during Q1 and Q2 2021, ranged from <2 to < 304 mg/kg, with a mean (average) of 48 mg/kg across the assessed monitoring stations during Q1 and Q2 2021.

Arsenic concentrations in soils (including areas impacted by mine tailings) in the Greater Bendigo Area, have reported to range from a 1-3,106 mg/kg with a median of 774 mg/kg (NSR Environmental Consultants 1990).

In the absence of human health criteria for arsenic concentrations in deposited dust, a comparison of the maximum (<304 mg/kg) and mean (48 mg/kg) concentration of arsenic to the soil criteria for human health in a residential land use setting (of 100 mg/kg) and is provided. It is emphasised that this is not a health assessment and that there is uncertainty in the results, given most results for insoluble arsenic were reported as less than the limit of reporting.

The reported total arsenic in deposited dust is not a direct measure of concentration of arsenic compounds that may be present in the atmosphere. It is for this reason that care must be taken when interpreting the monitoring data.

## 3.2 Review of Quality Assurance and Quality Control

CDM Smith has not reviewed or audited the sampling or analysis methodology and/or equipment or the sampling techniques. We understand that methods and sample locations are generally consistent with those undertaken in 2018 and therefore comparison of results is considered appropriate.

ALS Environmental laboratory is NATA accredited for the analysis undertaken with the exception of analysis of metals/metalloids in dust deposition. CDM Smith has reviewed the internal laboratory quality control measures and notes the following:

- The January 2021 sampling period (from 23/12/2020-01/02/2021) was 40 days, which is outside the recommended 30 +/- 2 day window for monthly sampling and may have resulted in increased total dust deposition (i.e. increased deposition duration by 33%).
- The May 2021 sampling period (from 30/04/2021-02/06/2021) was 33 days, which is marginally outside the recommended 30 +/- 2-day window for monthly sampling, and may have resulted in increased total dust deposition (i.e. increased deposition duration by 3.3%).

- No Method Blank value outliers occurred.
- No laboratory control outliers occurred.
- No matrix Spike (MS) or Matrix Spike Duplicate (MSD) results reported.
- No laboratory duplicate results reported.
- No holding time outliers occurred.
- No quality control sample frequency outliers occurred (based on NEPM 2013 B3 quality control specification).



## Section 4 Summary of Results

The Q1 and Q2 2021 dust monitoring results for Kangaroo Flat Mine are summarised below:

**Table 4-1 Summary of Data Analysis and Interpretation**

Analysis	Interpretation
Dust Deposition rate	Dust deposition rate (as measured by total insoluble matter) in Q1 and Q2 2021 was below the dust deposition rate criteria of 4 g/m <sup>2</sup> .month, with average dust deposition across the 6 month period of 1.08 g/m <sup>2</sup> .month.
Ash Content	The ratio of ash content to total insoluble matter were higher in Q2 2021, than Q1 2021, which was inferred to be due to a decrease in the amount of organic matter in the insoluble fraction, during the autumn and winter months.
Metal/Metalloid analysis	<p>Insoluble arsenic, barium and manganese concentrations in dust at the site were generally within historical ranges (Q4 of 2018) with the exception of insoluble arsenic concentrations, which exceeded the historical maximum of 170 µg/m<sup>2</sup>.month at:</p> <ul style="list-style-type: none"> <li>▪ KF-2: January 2021 (&lt;820 µg/m<sup>2</sup>.month) and April 2021 (179 µg/m<sup>2</sup>.month)</li> <li>▪ KF-3: January 2021 (&lt;372 µg/m<sup>2</sup>.month)</li> </ul> <p>There was no consistent pattern in arsenic, barium or manganese concentrations at any one monitoring station over the time period assessed. The variability in metal/metalloid deposition across the monitoring locations and monitoring events, indicates that metal/metalloid concentrations in dust are likely influenced by multiple factors and unlikely to be due to a single point source.</p>

Monitoring results were reviewed to support addressing the following questions (questions and answers provided below):

- Did the dust deposition rates reported in Q1 and Q2 of 2021, exceed the adopted dust deposition criteria of 4 g/m<sup>2</sup>. month (measured as total insoluble matter)?  
No, the reported insoluble dust deposition rates from the four assessed monitoring stations during Q1 and Q2 2021 were below the adopted criteria of 4 g/m<sup>2</sup>.month. On average the dust deposition rates (1.08 g/m<sup>2</sup>.month insoluble dust) are within the accepted inferred background level (2 g/m<sup>2</sup>.month).
- Are dust deposition rates reported in Q1 and Q2 of 2021 comparable to available historic results in this area?  
Dust deposition rates recorded in Q1 and Q2 2021 were within the historical range of results reported in Q4 2018, at the site.

Arsenic has been considered a key contaminant of concern for gold mine sites in the Bendigo region. To assist in the review of the monitoring results for arsenic in regards to the risk to the surrounding areas, the following questions were addressed.

- Are arsenic concentrations reported in deposited dust in Q1 and Q2 of 2021 comparable to available historic results in this area?  
High variability in total arsenic concentrations was reported between sample locations and sampling periods. Total arsenic concentrations in deposited dust, during Q1 and Q2 2021, ranged from <2 to < 304 mg/kg, with an average (mean) of 48 mg/kg across the assessed monitoring stations during Q1 and Q2 2021.  
The reported range of arsenic concentrations in deposited dust were within the expected range of arsenic concentrations in soils across Bendigo. Arsenic concentrations in soils (including areas impacted by mine tailings) in the Greater Bendigo Area, have reported to range from a 1-3,106 mg/kg with a median of 774 mg/kg (NSR Environmental Consultants 1991).

A human health risk assessment for dust exposure in the vicinity of the site has not been undertaken.

In the absence of screening criteria for arsenic deposited dust a comparison to the soil health investigation levels for a residential land use setting (of 100 mg/kg) is provided. It is emphasised that this is not a health assessment. The reported total arsenic in deposited dust is not a direct measure of concentration of arsenic compounds that may be present in the atmosphere. It is for this reason that care must be taken when interpreting the monitoring data.

### Section 5 Further Considerations

CDM Smith has not reviewed or audited the sampling or analysis practices, methodology or equipment. We understand that methods and sample locations applied in Q1 and Q2 2021 are generally consistent with those undertaken in Q4 2018 and therefore comparison of results is considered appropriate.

The quality and representativeness of data collected is dependent on the sampling approach, sampling methods and the applied quality assurance and quality control (QA/QC) measures. National and Victorian guidance provides information on appropriate sampling techniques and QA/QC practices. It is a Victorian Government requirement that ambient air quality monitoring, sampling and analysis is conducted by a NATA accredited laboratory.

## Section 6 Disclaimer and Limitations

This report has been prepared by CDM Smith Australia Pty Ltd (CDM Smith) at the request of Department of Jobs, Precincts and Regions for the purpose of reporting dust monitoring results.

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- b. has not verified the accuracy or reliability of this information (other than as expressly stated in this report);
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If further information becomes available, or additional assumptions need to be made, CDM Smith reserves its right to amend this report.

### Section 7 References

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SEPP AAQ. State Environment Protection Policy (Ambient Air Quality). Available at: <https://www.epa.vic.gov.au/about-epa/publications/s19>

SEPP AQM. State Environment Protection Policy (Air Quality Management). Available at: <https://www.epa.vic.gov.au/about-epa/publications/s240>

Victorian Government (2021), Environment Protection Act 2017, Environment Reference Standard, Victorian Government Gazette, No. S 245, 26 May 2021

## Appendix A Tables



					Arsenic	Barium	Manganese	Total Solids	Ash Content	Ash Content (mg)	Combustible Matter	Combustible Matter (mg)	Total Insoluble Matter	Total Insoluble Matter (mg)	Total Solids (mg)	Total Soluble Matter	Total Soluble Matter (mg)	
					µg/m².month	µg/m².month	µg/m².month	g/m².month	g/m².month	mg	g/m².month	mg	g/m².month	mg	mg	g/m².month	mg	
EQL									0.1	1		1	0.1	1	1	0.1	1	
Description	Location	Quarter	Month	Lab Report Number														
KF1 (Insoluble)	KF1	Q4 2018	Oct-18	Kralcopic_Historic	<23	<84	<197	-	-	-	-	-	-	-	-	-	-	
			Nov-18	Kralcopic_Historic	<45	<317	<577	-	-	-	-	-	-	-	-	-	-	
			Dec-18	Kralcopic_Historic	15.5	75.7	235	-	-	-	-	-	-	-	-	-	-	
		Q1 2021	Jan-21	EM2101404	<4.95	<25.1	31.7	-	-	-	-	-	-	-	-	-	-	-
			Feb-21	EM2103691	11.6	57.2	86.5	-	-	-	-	-	-	-	-	-	-	-
			Mar-21	EM2105891	<11.7	<48.7	78.2	-	-	-	-	-	-	-	-	-	-	-
		Q2 2021	Apr-21	EM2107970	6.1	<58.3	69.5	-	-	-	-	-	-	-	-	-	-	-
			May-21	EM2110737	10	<91.3	121	-	-	-	-	-	-	-	-	-	-	-
			Jun-21	EM2112733	7.15	<67.7	91	-	-	-	-	-	-	-	-	-	-	-
KF1 (Soluble)	KF1	Q4 2018	Oct-18	Kralcopic_Historic	7.2	267	830	-	-	-	-	-	-	-	-	-	-	
			Nov-18	Kralcopic_Historic	35.6	291	1,270	-	-	-	-	-	-	-	-	-	-	
			Dec-18	Kralcopic_Historic	13.6	362	785	-	-	-	-	-	-	-	-	-	-	
		Q1 2021	Jan-21	EM2101404	0.18	70.6	90.6	-	-	-	-	-	-	-	-	-	-	-
			Feb-21	EM2103691	4.5	122	290	-	-	-	-	-	-	-	-	-	-	-
			Mar-21	EM2105891	20.6	194	309	-	-	-	-	-	-	-	-	-	-	-
		Q2 2021	Apr-21	EM2107970	6.51	80	300	-	-	-	-	-	-	-	-	-	-	-
			May-21	EM2110737	6.95	80.9	306	-	-	-	-	-	-	-	-	-	-	-
			Jun-21	EM2112733	10	114	402	-	-	-	-	-	-	-	-	-	-	-
KF1 (Ash)	KF1	Q4 2018	Oct-18	Kralcopic_Historic	-	-	-	-	-	-	-	-	-	-	-	-	-	
			Nov-18	Kralcopic_Historic	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Dec-18	Kralcopic_Historic	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Q1 2021	Jan-21	EM2101404	<4.95	<25.1	21.1	-	-	-	-	-	-	-	-	-	-	-
			Feb-21	EM2103691	8.11	56.7	54	-	-	-	-	-	-	-	-	-	-	-
			Mar-21	EM2105891	<11.7	<48.7	45.5	-	-	-	-	-	-	-	-	-	-	-
		Q2 2021	Apr-21	EM2107970	5.36	<58.3	47.1	-	-	-	-	-	-	-	-	-	-	-
			May-21	EM2110737	8.05	<91.3	74.6	-	-	-	-	-	-	-	-	-	-	-
			Jun-21	EM2112733	4.56	<67.7	64.3	-	-	-	-	-	-	-	-	-	-	-
KF1	KF1	Q4 2018	Oct-18	Kralcopic_Historic	-	-	-	2.9	0.4	-	0.7	-	1.1	-	-	-	1.8	-
			Nov-18	Kralcopic_Historic	-	-	-	7.3	1.1	-	2.8	-	3.9	-	-	-	3.4	-
			Dec-18	Kralcopic_Historic	-	-	-	5.5	0.4	-	1.4	-	1.8	-	-	-	3.7	-
		Q1 2021	Jan-21	EM2101404	-	-	-	2.7	0.2	4	1.2	29	1.4	33	63	1.3	30	
			Feb-21	EM2103691	-	-	-	4.1	0.2	4	0.9	16	1.1	20	73	3	53	
			Mar-21	EM2105891	-	-	-	4.8	0.2	3	1.2	21	1.4	24	82	3.4	58	
		Q2 2021	Apr-21	EM2107970	-	-	-	2.2	0.2	4	0.9	15	1.1	19	37	1.1	18	
			May-21	EM2110737	-	-	-	0.7	0.3	5	0.4	9	0.7	14	14	<0.1	<1	
			Jun-21	EM2112733	-	-	-	2.1	0.2	3	0.2	3	0.4	6	35	1.7	29	
KF2 (Insoluble)	KF2	Q4 2018	Nov-18	Kralcopic_Historic	59.2	<159	369	-	-	-	-	-	-	-	-	-	-	
			Dec-18	Kralcopic_Historic	<109	<83	141	-	-	-	-	-	-	-	-	-	-	-
		Q1 2021	Jan-21	EM2101404	<820	<95.7	<90.9	-	-	-	-	-	-	-	-	-	-	-
			Feb-21	EM2103691	96.7	162	100	-	-	-	-	-	-	-	-	-	-	-
			Mar-21	EM2105891	94.4	<40.2	69.1	-	-	-	-	-	-	-	-	-	-	-
		Q2 2021	Apr-21	EM2107970	179	54.9	73.7	-	-	-	-	-	-	-	-	-	-	-
			May-21	EM2110737	<46.8	<96.3	106	-	-	-	-	-	-	-	-	-	-	-
			Jun-21	EM2112733	<13.4	<67.3	97.5	-	-	-	-	-	-	-	-	-	-	-
KF2 (Soluble)	KF2	Q4 2018	Nov-18	Kralcopic_Historic	29.2	226	1,130	-	-	-	-	-	-	-	-	-	-	
			Dec-18	Kralcopic_Historic	23.5	215	724	-	-	-	-	-	-	-	-	-	-	-
		Q1 2021	Jan-21	EM2101404	<0.05	1,190	528	-	-	-	-	-	-	-	-	-	-	-
			Feb-21	EM2103691	12.6	91.6	327	-	-	-	-	-	-	-	-	-	-	-
			Mar-21	EM2105891	54	96.7	222	-	-	-	-	-	-	-	-	-	-	-
		Q2 2021	Apr-21	EM2107970	20.8	48.6	191	-	-	-	-	-	-	-	-	-	-	-
			May-21	EM2110737	22.2	68.3	258	-	-	-	-	-	-	-	-	-	-	-
			Jun-21	EM2112733	26.8	72.1	290	-	-	-	-	-	-	-	-	-	-	-
KF2 (Ash)	KF2	Q4 2018	Nov-18	Kralcopic_Historic	-	-	-	-	-	-	-	-	-	-	-	-	-	
			Dec-18	Kralcopic_Historic	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Q1 2021	Jan-21	EM2101404	<820	<95.7	<90.9	-	-	-	-	-	-	-	-	-	-	-
			Feb-21	EM2103691	64.3	53.8	59.9	-	-	-	-	-	-	-	-	-	-	-
			Mar-21	EM2105891	93.4	<40.2	29.8	-	-	-	-	-	-	-	-	-	-	-



					Arsenic	Barium	Manganese	Total Solids	Ash Content	Ash Content (mg)	Combustible Matter	Combustible Matter (mg)	Total Insoluble Matter	Total Insoluble Matter (mg)	Total Solids (mg)	Total Soluble Matter	Total Soluble Matter (mg)
					µg/m².month	µg/m².month	µg/m².month	g/m².month	g/m².month	mg	g/m².month	mg	g/m².month	mg	mg	g/m².month	mg
EQL									0.1	1		1	0.1	1	1	0.1	1
Description	Location	Quarter	Month	Lab Report Number													
KF2	KF2	Q2 2021	Apr-21	EM2107970	162	49	41.5	-	-	-	-	-	-	-	-	-	-
			May-21	EM2110737	<46.8	<96.3	71.5	-	-	-	-	-	-	-	-	-	-
			Jun-21	EM2112733	<13.4	<67.3	62.2	-	-	-	-	-	-	-	-	-	-
		Q4 2018	Nov-18	Kralcopic_Historic	-	-	-	3	0.5	-	0.9	-	1.4	-	-	1.6	-
			Dec-18	Kralcopic_Historic	-	-	-	5.6	0.4	-	1.1	-	1.5	-	-	4.1	-
		Q1 2021	Jan-21	EM2101404	-	-	-	2.7	0.4	9	1.7	40	2.1	49	62	0.6	13
			Feb-21	EM2103691	-	-	-	4	0.2	4	1	18	1.2	22	71	2.8	49
			Mar-21	EM2105891	-	-	-	3.9	0.2	3	1.3	23	1.5	26	67	2.4	41
		Q2 2021	Apr-21	EM2107970	-	-	-	3	0.1	2	0.7	11	0.8	13	50	2.2	37
			May-21	EM2110737	-	-	-	0.8	0.2	4	0.4	7	0.6	11	14	0.2	3
			Jun-21	EM2112733	-	-	-	2.5	0.2	3	<0.1	1	0.2	4	42	2.3	38
KF3 (Insoluble)	KF3	Q4 2018	Oct-18	Kralcopic_Historic	<88	<93	<282	-	-	-	-	-	-	-	-	-	-
			Nov-18	Kralcopic_Historic	<170	<217	<456	-	-	-	-	-	-	-	-	-	-
			Dec-18	Kralcopic_Historic	<21	<63	136	-	-	-	-	-	-	-	-	-	-
		Q1 2021	Jan-21	EM2101404	<372	<71.4	143	-	-	-	-	-	-	-	-	-	-
			Feb-21	EM2103691	<152	<73.6	93.9	-	-	-	-	-	-	-	-	-	-
			Mar-21	EM2105891	<74.7	<97.8	85.8	-	-	-	-	-	-	-	-	-	-
		Q2 2021	Apr-21	EM2107970	19.8	<43.7	<62.1	-	-	-	-	-	-	-	-	-	-
			May-21	EM2110737	<40.3	<157	136	-	-	-	-	-	-	-	-	-	-
			Jun-21	EM2112733	<49.5	<62.3	98.3	-	-	-	-	-	-	-	-	-	-
KF3 (Soluble)	KF3	Q4 2018	Oct-18	Kralcopic_Historic	3.01	241	607	-	-	-	-	-	-	-	-	-	-
			Nov-18	Kralcopic_Historic	17.9	277	1,060	-	-	-	-	-	-	-	-	-	-
			Dec-18	Kralcopic_Historic	13.4	188	767	-	-	-	-	-	-	-	-	-	-
		Q1 2021	Jan-21	EM2101404	<0.05	309	697	-	-	-	-	-	-	-	-	-	-
			Feb-21	EM2103691	20.1	103	341	-	-	-	-	-	-	-	-	-	-
			Mar-21	EM2105891	53.3	186	451	-	-	-	-	-	-	-	-	-	-
		Q2 2021	Apr-21	EM2107970	8.02	57.9	223	-	-	-	-	-	-	-	-	-	-
			May-21	EM2110737	17.6	54.2	315	-	-	-	-	-	-	-	-	-	-
			Jun-21	EM2112733	25.3	109	330	-	-	-	-	-	-	-	-	-	-
KF3 (Ash)	KF3	Q4 2018	Oct-18	Kralcopic_Historic	-	-	-	-	-	-	-	-	-	-	-	-	-
			Nov-18	Kralcopic_Historic	-	-	-	-	-	-	-	-	-	-	-	-	-
			Dec-18	Kralcopic_Historic	-	-	-	-	-	-	-	-	-	-	-	-	-
		Q1 2021	Jan-21	EM2101404	<372	<71.4	79.2	-	-	-	-	-	-	-	-	-	-
			Feb-21	EM2103691	<152	<73.6	74.9	-	-	-	-	-	-	-	-	-	-
			Mar-21	EM2105891	<74.7	<97.8	68.4	-	-	-	-	-	-	-	-	-	-
		Q2 2021	Apr-21	EM2107970	19.1	<43.7	<62.1	-	-	-	-	-	-	-	-	-	-
			May-21	EM2110737	<40.3	<157	133	-	-	-	-	-	-	-	-	-	-
			Jun-21	EM2112733	<49.5	<62.3	53	-	-	-	-	-	-	-	-	-	-
KF3	KF3	Q4 2018	Oct-18	Kralcopic_Historic	-	-	-	4.1	0.6	-	1.4	-	2	-	-	2.1	-
			Nov-18	Kralcopic_Historic	-	-	-	3.1	0.8	-	1	-	1.8	-	-	1.3	-
			Dec-18	Kralcopic_Historic	-	-	-	6.2	0.4	-	1.3	-	1.7	-	-	4.5	-
		Q1 2021	Jan-21	EM2101404	-	-	-	2.7	0.4	9	1.6	39	2	48	63	0.7	15
			Feb-21	EM2103691	-	-	-	1.3	0.2	4	0.9	17	1.2	22	23	0.1	1
			Mar-21	EM2105891	-	-	-	3.2	0.4	6	1.7	30	2.1	36	54	1.1	18
		Q2 2021	Apr-21	EM2107970	-	-	-	1.9	0.2	3	1	17	1.2	20	32	0.7	12
			May-21	EM2110737	-	-	-	1	0.3	6	0.5	9	0.8	15	18	0.2	3
			Jun-21	EM2112733	-	-	-	1.7	0.2	3	<0.1	1	0.2	4	29	1.5	25
KF4 (Insoluble)	KF4	Q4 2018	Oct-18	Kralcopic_Historic	<48	<85	<166	-	-	-	-	-	-	-	-	-	-
			Nov-18	Kralcopic_Historic	<85	<176	<253	-	-	-	-	-	-	-	-	-	-
			Dec-18	Kralcopic_Historic	<25	93.2	190	-	-	-	-	-	-	-	-	-	-
		Q1 2021	Jan-21	EM2101404	<170	<77.9	98	-	-	-	-	-	-	-	-	-	-
			Feb-21	EM2103691	<57.1	55.8	78.9	-	-	-	-	-	-	-	-	-	-
			Mar-21	EM2105891	<19.9	<46.2	67.1	-	-	-	-	-	-	-	-	-	-
		Q2 2021	Apr-21	EM2107970	<15.6	<41.0	48.1	-	-	-	-	-	-	-	-	-	-
			May-21	EM2110737	<12.3	<93.6	71.9	-	-	-	-	-	-	-	-	-	-
			Jun-21	EM2112733	14.7	<91.0	89.6	-	-	-	-	-	-	-	-	-	-
KF4 (Soluble)	KF4	Q4 2018	Oct-18	Kralcopic_Historic	3.01	241	607	-	-	-	-	-	-	-	-	-	-





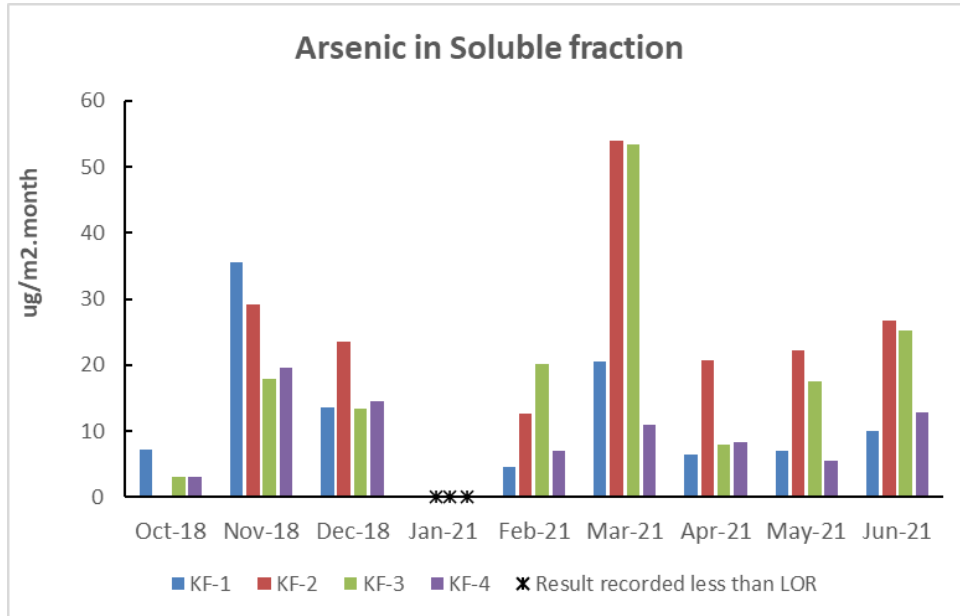
					Arsenic	Barium	Manganese	Total Solids	Ash Content	Ash Content (mg)	Combustible Matter	Combustible Matter (mg)	Total Insoluble Matter	Total Insoluble Matter (mg)	Total Solids (mg)	Total Soluble Matter	Total Soluble Matter (mg)
					µg/m².month	µg/m².month	µg/m².month	g/m².month	g/m².month	mg	g/m².month	mg	g/m².month	mg	mg	g/m².month	mg
EQL									0.1	1		1	0.1	1	1	0.1	1
Description	Location	Quarter	Month	Lab Report Number													
			Nov-18	Kralcopic_Historic	19.6	345	702	-	-	-	-	-	-	-	-	-	-
			Dec-18	Kralcopic_Historic	14.6	522	718	-	-	-	-	-	-	-	-	-	-
		Q1 2021	Jan-21	EM2101404	<0.05	696	437	-	-	-	-	-	-	-	-	-	-
			Feb-21	EM2103691	6.96	142	285	-	-	-	-	-	-	-	-	-	-
			Mar-21	EM2105891	10.9	513	178	-	-	-	-	-	-	-	-	-	-
		Q2 2021	Apr-21	EM2107970	8.38	81.3	151	-	-	-	-	-	-	-	-	-	-
			May-21	EM2110737	5.59	107	270	-	-	-	-	-	-	-	-	-	-
			Jun-21	EM2112733	12.8	241	301	-	-	-	-	-	-	-	-	-	-
	KF4 (Ash)	Q4 2018	Oct-18	Kralcopic_Historic	-	-	-	-	-	-	-	-	-	-	-	-	-
			Nov-18	Kralcopic_Historic	-	-	-	-	-	-	-	-	-	-	-	-	-
			Dec-18	Kralcopic_Historic	-	-	-	-	-	-	-	-	-	-	-	-	-
		Q1 2021	Jan-21	EM2101404	<170	<77.9	58.3	-	-	-	-	-	-	-	-	-	-
			Feb-21	EM2103691	<57.1	45.9	53.6	-	-	-	-	-	-	-	-	-	-
			Mar-21	EM2105891	<19.9	<46.2	48.4	-	-	-	-	-	-	-	-	-	-
		Q2 2021	Apr-21	EM2107970	<15.6	<41.0	41.6	-	-	-	-	-	-	-	-	-	-
			May-21	EM2110737	<12.3	<93.6	68.2	-	-	-	-	-	-	-	-	-	-
			Jun-21	EM2112733	12.9	<91.0	84.6	-	-	-	-	-	-	-	-	-	-
KF4	KF4	Q4 2018	Oct-18	Kralcopic_Historic	-	-	-	3.2	0.4	-	0.6	-	1	-	-	2.2	-
			Nov-18	Kralcopic_Historic	-	-	-	3.1	0.6	-	0.6	-	1.2	-	-	1.9	-
			Dec-18	Kralcopic_Historic	-	-	-	6.4	0.3	-	1.1	-	1.4	-	-	5	-
		Q1 2021	Jan-21	EM2101404	-	-	-	2.6	0.4	8	1.3	33	1.7	41	62	0.9	21
			Feb-21	EM2103691	-	-	-	4.3	0.2	3	1	19	1.2	22	76	3.1	54
			Mar-21	EM2105891	-	-	-	3.1	0.2	3	1.2	21	1.4	24	53	1.7	29
		Q2 2021	Apr-21	EM2107970	-	-	-	3.3	0.1	2	0.8	13	0.9	15	57	2.4	42
			May-21	EM2110737	-	-	-	0.7	0.2	4	0.3	6	0.5	10	13	0.2	3
			Jun-21	EM2112733	-	-	-	1.1	0.2	4	0.2	2	0.4	6	18	0.7	12

## Appendix B Supplementary Data

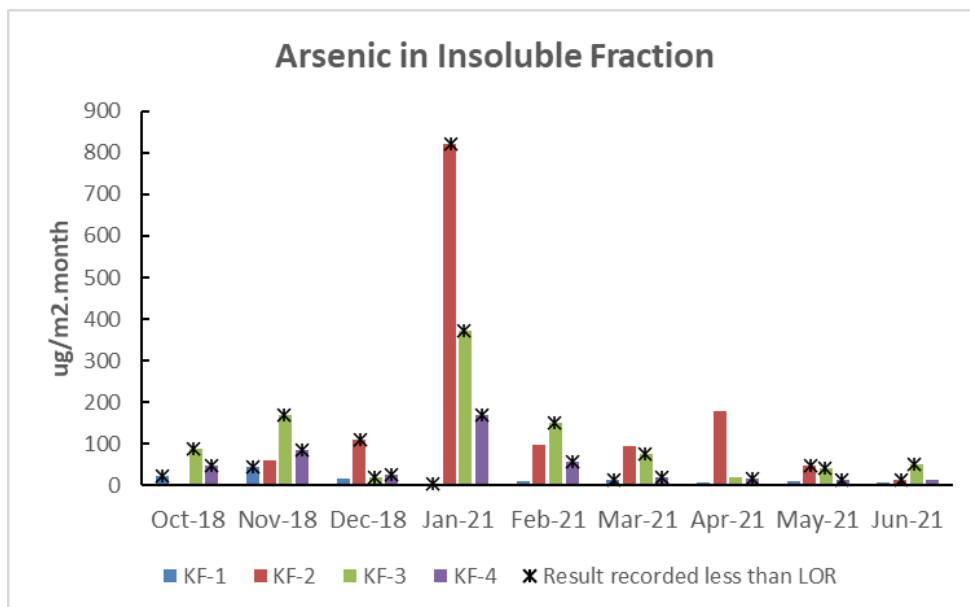
Graphs for Metals and Metalloids in Soluble and Insoluble Fractions

## B.1 Metals and Metalloids in Soluble and Insoluble Fractions

### B.1.1 Arsenic

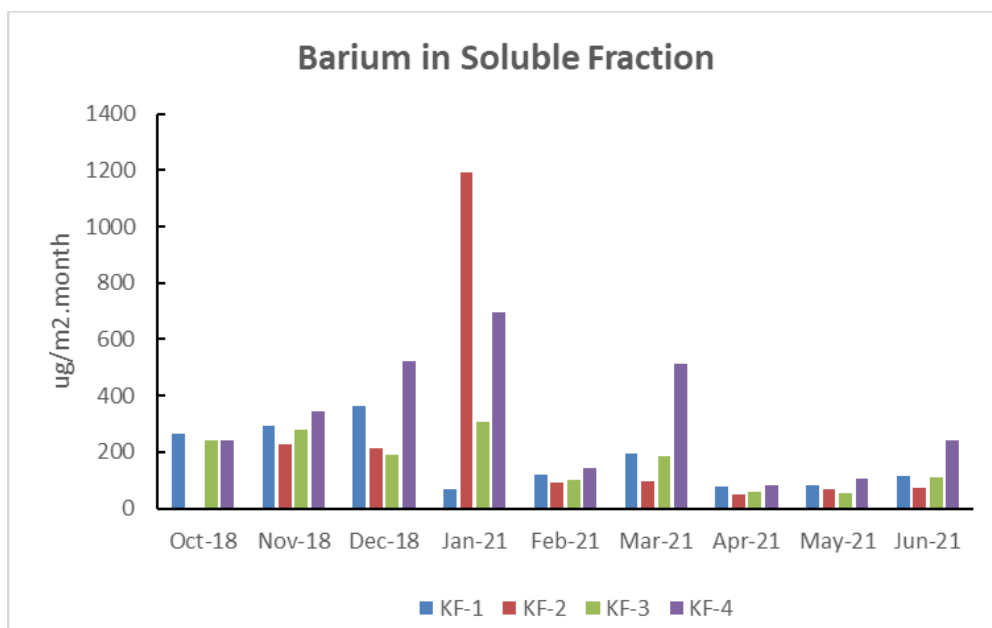


**Figure B1** Kangaroo Flat Dust Arsenic in Soluble Fraction (ug/m<sup>2</sup>.month) Comparison between 2018 (previous data) and 2021 (current data). Asterisk (\*) represents the results where the sample was recorded as less than the limit of reporting (<x). For the purpose of graphical display results less than the limit of reporting (<x) have been presented as the value of x.

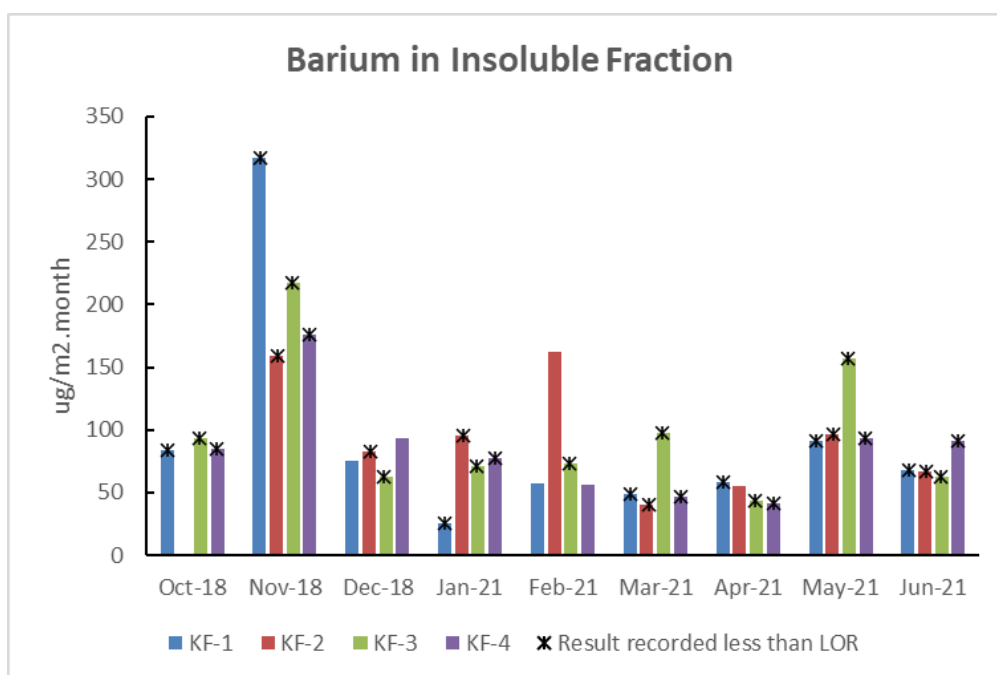


**Figure B2** Kangaroo Flat Dust Arsenic in Insoluble Fraction (ug/m<sup>2</sup>.month) Comparison between 2018 (previous data) and 2021 (current data). Asterisk (\*) represents the results where the sample was recorded as less than the limit of reporting (<x). For the purpose of graphical display results less than the limit of reporting (<x) have been presented as the value of x.

## B.1.2 Barium

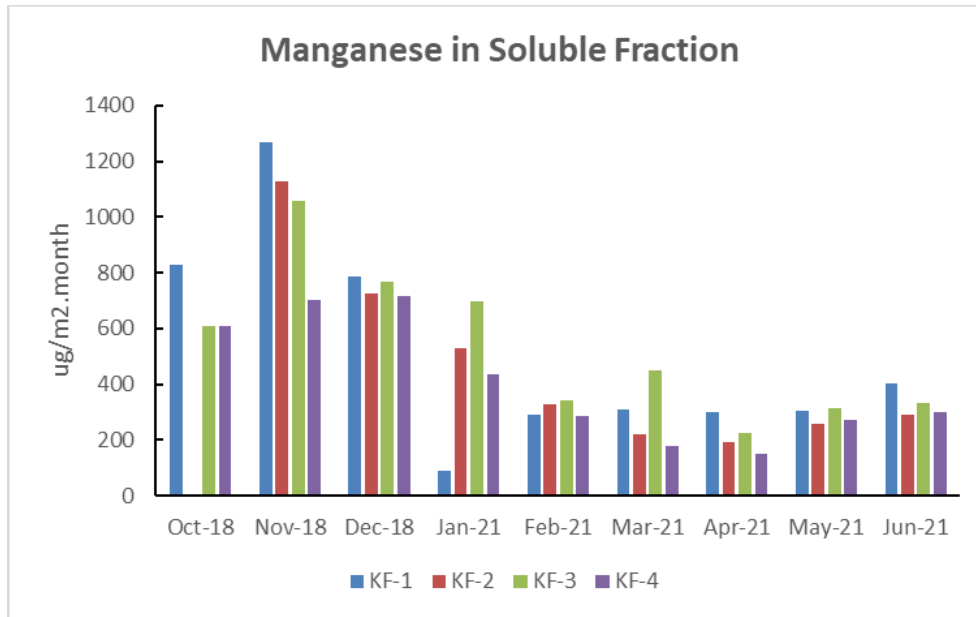


**Figure B3** Kangaroo Flat Barium in Soluble Fraction ( $\mu\text{g}/\text{m}^2\cdot\text{month}$ ) Comparison between 2018 (previous data) and 2021 (current data)

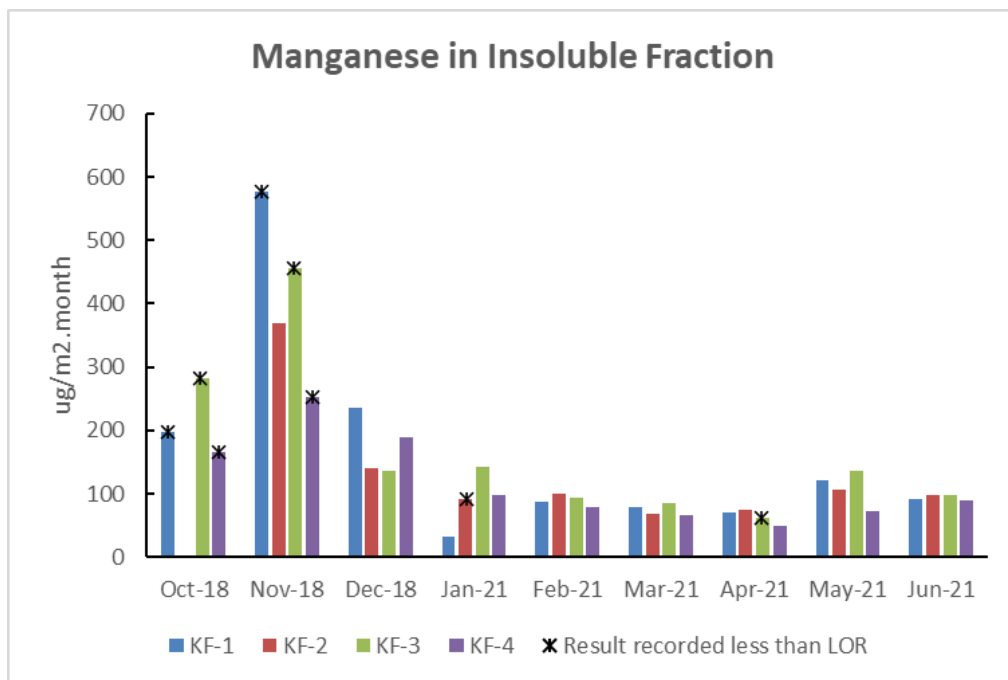


**Figure B4** Kangaroo Flat in Insoluble Fraction ( $\mu\text{g}/\text{m}^2\cdot\text{month}$ ) Comparison between 2018 (previous data) and 2021 (current data). Asterisk (\*) represents the results where the sample was recorded as less than the limit of reporting ( $<x$ ). For the purpose of graphical display results less than the limit of reporting ( $<x$ ) have been presented as the value of  $x$ .

### B.1.3 Manganese



**Figure B5** Kangaroo Flat Manganese in Soluble Fraction (ug/m².month) Comparison between 2018 (previous data) and 2021 (current data)



**Figure B6** Kangaroo Flat Manganese in Insoluble Fraction (ug/m².month) Comparison between 2018 (previous data) and 2021 (current data). Asterisk (\*) represents the results where the sample was recorded as less than the limit of reporting (<x). For the purpose of graphical display results less than the limit of reporting (<x) have been presented as the value of x..



## **Appendix C Laboratory Reports**

## CERTIFICATE OF ANALYSIS

**Work Order** : **EM2101404**  
**Client** : **ALS WATER RESOURCES GROUP**  
**Contact** : ROHAN OLIVER  
**Address** : 94 Kerang-Koondrook Road  
                   Kerang 3579  
**Telephone** : ----  
**Project** : MV214940  
**Order number** : ----  
**C-O-C number** : ----  
**Sampler** : KV  
**Site** : ----  
**Quote number** : ME/968/20  
**No. of samples received** : 30  
**No. of samples analysed** : 30

**Page** : 1 of 8  
**Laboratory** : Environmental Division Melbourne  
**Contact** : Customer Services EM  
**Address** : 4 Westall Rd Springvale VIC Australia 3171  
**Telephone** : +61-3-8549 9600  
**Date Samples Received** : 02-Feb-2021 11:35  
**Date Analysis Commenced** : 03-Feb-2021  
**Issue Date** : 09-Feb-2021 15:26



Accreditation No. 825  
 Accredited for compliance with  
 ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

### Signatories

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

Signatories	Position	Accreditation Category
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC



## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

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.

~ = Indicates an estimated value.

- ALS is not NATA accredited for the analysis of metals in dust deposition gauge.
- Insoluble and soluble metals conducted as per AS 3580.10.1:2016 Appendix A. Insoluble, soluble and ash arsenic have been reported as ug/m2.month. This is not consistent with Appendix A units of ug, ug/m2.day or mg/m2.month. Limit of reporting will vary from sample to sample based on sample volume, solid residual collected and sampling period.
- Analysis as per AS3580.10.1-2016. Samples passed through a 1mm sieve prior to analysis. NATA accreditation is not held for results reported in g/m².mth.
- Sampling period: 23/12/2020 - 01/02/2021
- Sample exposure period is 40 days which is outside the typical exposure period of 30+/-2 days as per AS3580.10.1
- Dust samples have been dosed with Copper Sulphate prior to sample collection and a copper correction factor of 0.055g has been used for calculations.





## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

				Sample ID	WVDD01	WVDD02	WVDD03	WVDD04	WVDD05
				Sampling date / time	01-Feb-2021 00:00	01-Feb-2021 00:00	01-Feb-2021 00:00	01-Feb-2021 00:00	01-Feb-2021 00:00
Compound	CAS Number	LOR	Unit		EM2101404-001	EM2101404-002	EM2101404-003	EM2101404-004	EM2101404-005
					Result	Result	Result	Result	Result
<b>EA120: Ash Content</b>									
Ash Content	----	0.1	g/m <sup>2</sup> .month		0.3	0.2	0.3	0.2	0.2
Ash Content (mg)	----	1	mg		7	6	7	4	6
<b>EA125: Combustible Matter</b>									
Combustible Matter	----	0.1	g/m <sup>2</sup> .month		1.3	1.3	1.5	0.9	0.5
Combustible Matter (mg)	----	1	mg		31	30	35	21	14
<b>EA139: Total Soluble Matter</b>									
Total Soluble Matter	----	0.1	g/m <sup>2</sup> .month		0.9	3.9	2.3	1.6	1.8
Total Soluble Matter (mg)	----	1	mg		21	92	55	37	43
<b>EA141: Total Insoluble Matter</b>									
Total Insoluble Matter	----	0.1	g/m <sup>2</sup> .month		1.6	1.5	1.8	1.1	0.8
Total Insoluble Matter (mg)	----	1	mg		38	36	42	25	20
<b>EA142: Total Solids</b>									
Total Solids	----	0.1	g/m <sup>2</sup> .month		2.5	5.4	4.1	2.7	2.6
Total Solids (mg)	----	1	mg		59	128	97	62	63
<b>EG020T: Total Metals by ICP-MS</b>									
Ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month		<1.8	5.91	<6.96	10.2	4.40
Ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month		58.3	26.2	<35.2	28.3	36.3
Ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month		28.2	19.9	51.7	32.3	28.7



## Analytical Results

Sub-Matrix: DUST (Matrix: AIR)				Sample ID	WVDD06	KF1	KF2	KF3	KF4
Sampling date / time					01-Feb-2021 00:00	01-Feb-2021 00:00	01-Feb-2021 00:00	01-Feb-2021 00:00	01-Feb-2021 00:00
Compound	CAS Number	LOR	Unit		EM2101404-006	EM2101404-007	EM2101404-008	EM2101404-009	EM2101404-010
					Result	Result	Result	Result	Result
<b>EA120: Ash Content</b>									
Ash Content	----	0.1	g/m <sup>2</sup> .month		0.5	0.2	0.4	0.4	0.4
Ash Content (mg)	----	1	mg		11	4	9	9	8
<b>EA125: Combustible Matter</b>									
Combustible Matter	----	0.1	g/m <sup>2</sup> .month		1.5	1.2	1.7	1.6	1.3
Combustible Matter (mg)	----	1	mg		37	29	40	39	33
<b>EA139: Total Soluble Matter</b>									
Total Soluble Matter	----	0.1	g/m <sup>2</sup> .month		1.2	1.3	0.6	0.7	0.9
Total Soluble Matter (mg)	----	1	mg		29	30	13	15	21
<b>EA141: Total Insoluble Matter</b>									
Total Insoluble Matter	----	0.1	g/m <sup>2</sup> .month		2.0	1.4	2.1	2.0	1.7
Total Insoluble Matter (mg)	----	1	mg		48	33	49	48	41
<b>EA142: Total Solids</b>									
Total Solids	----	0.1	g/m <sup>2</sup> .month		3.2	2.7	2.7	2.7	2.6
Total Solids (mg)	----	1	mg		77	63	62	63	62
<b>EG020T: Total Metals by ICP-MS</b>									
Ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month		<5.80	<4.95	<820	<372	<170
Ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month		<64.9	<25.1	<95.7	<71.4	<77.9
Ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month		64.9	21.1	<90.9	79.2	58.3



## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

Sample ID

				WVDD01 Soluble As, Ba, Mn	WVDD02 Soluble As, Ba, Mn	WVDD03 Soluble As, Ba, Mn	WVDD04 Soluble As, Ba, Mn	WVDD05 Soluble As, Ba, Mn
Sampling date / time				01-Feb-2021 00:00	01-Feb-2021 00:00	01-Feb-2021 00:00	01-Feb-2021 00:00	01-Feb-2021 00:00
Compound	CAS Number	LOR	Unit	EM2101404-011	EM2101404-012	EM2101404-013	EM2101404-014	EM2101404-015
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS								
ø Arsenic	7440-38-2	0.05	µg/m².month	22.8	<0.05	<0.05	2.89	<0.05
ø Barium	7440-39-3	0.05	µg/m².month	312	453	1470	727	637
ø Manganese	7439-96-5	0.05	µg/m².month	1570	1010	603	1070	393



## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

Sample ID

				WVDD06 Soluble As, Ba, Mn	KF1 Soluble As, Ba, Mn	KF2 Soluble As, Ba, Mn	KF3 Soluble As, Ba, Mn	KF4 Soluble As, Ba, Mn
Sampling date / time				01-Feb-2021 00:00	01-Feb-2021 00:00	01-Feb-2021 00:00	01-Feb-2021 00:00	01-Feb-2021 00:00
Compound	CAS Number	LOR	Unit	EM2101404-016	EM2101404-017	EM2101404-018	EM2101404-019	EM2101404-020
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS								
ø Arsenic	7440-38-2	0.05	µg/m².month	<0.05	0.18	<0.05	<0.05	<0.05
ø Barium	7440-39-3	0.05	µg/m².month	1160	70.6	1190	309	696
ø Manganese	7439-96-5	0.05	µg/m².month	751	90.6	528	697	437



## Analytical Results

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

Sample ID

				WVDD01 Insoluble As, Ba, Mn	WVDD02 Insoluble As, Ba, Mn	WVDD03 Insoluble As, Ba, Mn	WVDD04 Insoluble As, Ba, Mn	WVDD05 Insoluble As, Ba, Mn
Sampling date / time				01-Feb-2021 00:00	01-Feb-2021 00:00	01-Feb-2021 00:00	01-Feb-2021 00:00	01-Feb-2021 00:00
Compound	CAS Number	LOR	Unit	EM2101404-021	EM2101404-022	EM2101404-023	EM2101404-024	EM2101404-025
				Result	Result	Result	Result	Result
<b>EG020T: Total Metals by ICP-MS</b>								
ø Arsenic	7440-38-2	0.05	µg/m².month	<1.8	7.96	<6.96	15.7	5.14
ø Barium	7440-39-3	0.05	µg/m².month	77.7	27.3	<35.2	31.0	37.9
ø Manganese	7439-96-5	0.05	µg/m².month	48.3	44.5	67.3	59.6	66.4



## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

Sample ID

				WVDD06 Insoluble As, Ba, Mn	KF1 Insoluble As, Ba, Mn	KF2 Insoluble As, Ba, Mn	KF3 Insoluble As, Ba, Mn	KF4 Insoluble As, Ba, Mn
Sampling date / time				01-Feb-2021 00:00	01-Feb-2021 00:00	01-Feb-2021 00:00	01-Feb-2021 00:00	01-Feb-2021 00:00
Compound	CAS Number	LOR	Unit	EM2101404-026	EM2101404-027	EM2101404-028	EM2101404-029	EM2101404-030
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS								
Ø Arsenic	7440-38-2	0.05	µg/m².month	<5.80	<4.95	<820	<372	<170
Ø Barium	7440-39-3	0.05	µg/m².month	<64.9	<25.1	<95.7	<71.4	<77.9
Ø Manganese	7439-96-5	0.05	µg/m².month	86.2	31.7	<90.9	143	98.0

## QUALITY CONTROL REPORT

<b>Work Order</b>	<b>: EM2101404</b>	<b>Page</b>	<b>: 1 of 3</b>
<b>Client</b>	<b>: ALS WATER RESOURCES GROUP</b>	<b>Laboratory</b>	<b>: Environmental Division Melbourne</b>
<b>Contact</b>	<b>: ROHAN OLIVER</b>	<b>Contact</b>	<b>: Customer Services EM</b>
<b>Address</b>	<b>: 94 Kerang-Koondrook Road Kerang 3579</b>	<b>Address</b>	<b>: 4 Westall Rd Springvale VIC Australia 3171</b>
<b>Telephone</b>	<b>: ----</b>	<b>Telephone</b>	<b>: +61-3-8549 9600</b>
<b>Project</b>	<b>: MV214940</b>	<b>Date Samples Received</b>	<b>: 02-Feb-2021</b>
<b>Order number</b>	<b>: ----</b>	<b>Date Analysis Commenced</b>	<b>: 03-Feb-2021</b>
<b>C-O-C number</b>	<b>: ----</b>	<b>Issue Date</b>	<b>: 09-Feb-2021</b>
<b>Sampler</b>	<b>: KV</b>		
<b>Site</b>	<b>: ----</b>		
<b>Quote number</b>	<b>: ME/968/20</b>		
<b>No. of samples received</b>	<b>: 30</b>		
<b>No. of samples analysed</b>	<b>: 30</b>		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

### Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC



### **General Comments**

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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

Key :            Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot  
                  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  
                  RPD = Relative Percentage Difference  
                  # = Indicates failed QC

### **Laboratory Duplicate (DUP) Report**

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

- **No Laboratory Duplicate (DUP) Results are required to be reported.**





## Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: AIR				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit				Low	High
<b>EA139: Total Soluble Matter (QCLot: 3491420)</b>								
EA139: Total Soluble Matter	----	0.1	g/m <sup>2</sup> .month	<0.1	1.66 g/m <sup>2</sup> .month	102	70.0	130
EA139: Total Soluble Matter (mg)	----	1	mg	<1	29.3 mg	99.0	70.0	130
<b>EA139: Total Soluble Matter (QCLot: 3491425)</b>								
EA139: Total Soluble Matter	----	0.1	g/m <sup>2</sup> .month	<0.1	1.66 g/m <sup>2</sup> .month	102	70.0	130
EA139: Total Soluble Matter (mg)	----	1	mg	<1	29.3 mg	99.0	70.0	130
<b>EA141: Total Insoluble Matter (QCLot: 3491421)</b>								
EA141: Total Insoluble Matter	----	0.1	g/m <sup>2</sup> .month	<0.1	5.66 g/m <sup>2</sup> .month	110	66.8	134
EA141: Total Insoluble Matter (mg)	----	1	mg	<1	100 mg	110	67.5	125
<b>EA141: Total Insoluble Matter (QCLot: 3491422)</b>								
EA141: Total Insoluble Matter	----	0.1	g/m <sup>2</sup> .month	<0.1	5.66 g/m <sup>2</sup> .month	93.6	66.8	134
EA141: Total Insoluble Matter (mg)	----	1	mg	<1	100 mg	93.0	67.5	125
<b>EA142: Total Solids (QCLot: 3491419)</b>								
EA142: Total Solids	----	0.1	g/m <sup>2</sup> .month	<0.1	----	----	----	----
EA142: Total Solids (mg)	----	1	mg	<1	129.3 mg	108	68.4	126
<b>EA142: Total Solids (QCLot: 3491423)</b>								
EA142: Total Solids	----	0.1	g/m <sup>2</sup> .month	<0.1	----	----	----	----
EA142: Total Solids (mg)	----	1	mg	<1	129.3 mg	94.4	68.4	126
<b>EG020T: Total Metals by ICP-MS (QCLot: 3498630)</b>								
EG020TUG: Arsenic	7440-38-2	0.05	µg	<0.050	----	----	----	----
EG020TUG: Barium	7440-39-3	0.05	µg	<0.050	----	----	----	----
EG020TUG: Manganese	7439-96-5	0.05	µg	<0.050	----	----	----	----
<b>EG020T: Total Metals by ICP-MS (QCLot: 3498631)</b>								
EG020TUG: Arsenic	7440-38-2	0.05	µg	<0.050	----	----	----	----
EG020TUG: Barium	7440-39-3	0.05	µg	<0.050	----	----	----	----
EG020TUG: Manganese	7439-96-5	0.05	µg	<0.050	----	----	----	----

## Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.

## QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM2101404	Page	: 1 of 5
Client	: ALS WATER RESOURCES GROUP	Laboratory	: Environmental Division Melbourne
Contact	: ROHAN OLIVER	Telephone	: +61-3-8549 9600
Project	: MV214940	Date Samples Received	: 02-Feb-2021
Site	: ----	Issue Date	: 09-Feb-2021
Sampler	: KV	No. of samples received	: 30
Order number	: ----	No. of samples analysed	: 30

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

### Summary of Outliers

#### Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

#### Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

#### Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



## Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **AIR**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA120: Ash Content								
Dust Gauge (Bottle) - Copper Sulfate (EA120) WVDD01, WVDD03, WVDD05, KF1, KF3,	WVDD02, WVDD04, WVDD06, KF2, KF4	01-Feb-2021	----	----	----	03-Feb-2021	31-Jul-2021	✓
EA125: Combustible Matter								
Dust Gauge (Bottle) - Copper Sulfate (EA125) WVDD01, WVDD03, WVDD05, KF1, KF3,	WVDD02, WVDD04, WVDD06, KF2, KF4	01-Feb-2021	----	----	----	03-Feb-2021	31-Jul-2021	✓
EA139: Total Soluble Matter								
Dust Gauge (Bottle) - Copper Sulfate (EA139) WVDD01, WVDD03, WVDD05, KF1, KF3,	WVDD02, WVDD04, WVDD06, KF2, KF4	01-Feb-2021	----	----	----	03-Feb-2021	31-Jul-2021	✓
EA141: Total Insoluble Matter								
Dust Gauge (Bottle) - Copper Sulfate (EA141) WVDD01, WVDD03, WVDD05, KF1, KF3,	WVDD02, WVDD04, WVDD06, KF2, KF4	01-Feb-2021	----	----	----	03-Feb-2021	31-Jul-2021	✓

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA142: Total Solids								
Dust Gauge (Bottle) - Copper Sulfate (EA142)		01-Feb-2021	----	----	----	03-Feb-2021	31-Jul-2021	✓
WVDD01,	WVDD02,							
WVDD03,	WVDD04,							
WVDD05,	WVDD06,							
KF1,	KF2,							
KF3,	KF4							
EG020T: Total Metals by ICP-MS								
Dust Residue (EG020TUG)		01-Feb-2021	----	----	----	08-Feb-2021	31-Jul-2021	✓
WVDD01,	WVDD02,							
WVDD03,	WVDD04,							
WVDD05,	WVDD06,							
KF1,	KF2,							
KF3,	KF4,							
WVDD01 - Soluble As, Ba, Mn,	WVDD02 - Soluble As, Ba, Mn,							
WVDD03 - Soluble As, Ba, Mn,	WVDD04 - Soluble As, Ba, Mn,							
WVDD05 - Soluble As, Ba, Mn,	WVDD06 - Soluble As, Ba, Mn,							
KF1 - Soluble As, Ba, Mn,	KF2 - Soluble As, Ba, Mn,							
KF3 - Soluble As, Ba, Mn,	KF4 - Soluble As, Ba, Mn,							
WVDD01 - Insoluble As, Ba, Mn,	WVDD02 - Insoluble As, Ba, Mn,							
WVDD03 - Insoluble As, Ba, Mn,	WVDD04 - Insoluble As, Ba, Mn,							
WVDD05 - Insoluble As, Ba, Mn,	WVDD06 - Insoluble As, Ba, Mn,							
KF1 - Insoluble As, Ba, Mn,	KF2 - Insoluble As, Ba, Mn,							
KF3 - Insoluble As, Ba, Mn,	KF4 - Insoluble As, Ba, Mn,							



## Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **AIR**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS)							
Total Insoluble Matter (TIM)	EA141	2	23	8.70	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Solids (TS)	EA142	2	23	8.70	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Soluble Matter (SM)	EA139	2	23	8.70	4.76	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Insoluble Matter (TIM)	EA141	2	23	8.70	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals - ICP-MS (mass/filter)	EG020TUG	2	30	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Solids (TS)	EA142	2	23	8.70	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Soluble Matter (SM)	EA139	2	23	8.70	4.76	✓	NEPM 2013 B3 & ALS QC Standard



## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Ash Content (AC)	EA120	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Ash content in deposited dust.
Combustible Matter (CM)	EA125	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Combustible Matter in deposited dust.
Total Soluble Matter (SM)	EA139	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Soluble Solids in deposited dust.
Total Insoluble Matter (TIM)	EA141	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Total Insoluble solids in deposited dust.
Total Solids (TS)	EA142	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Total Solids in deposited dust.
Total Metals - ICP-MS (mass/filter)	* EG020TUG	AIR	In house: Referenced to APHA 3125; USEPA SW846, 6020 (ICPMS) Metals in Dust residue are quantified by ICPMS and reported as ug of the TIM.

## CERTIFICATE OF ANALYSIS

**Work Order** : **EM2103691**  
**Client** : **ALS WATER RESOURCES GROUP**  
**Contact** : ROHAN OLIVER  
**Address** : 94 Kerang-Koondrook Road  
                   Kerang 3579  
**Telephone** : ----  
**Project** : MV214940  
**Order number** : ----  
**C-O-C number** : ----  
**Sampler** : KV  
**Site** : ----  
**Quote number** : ME/968/20  
**No. of samples received** : 30  
**No. of samples analysed** : 30

**Page** : 1 of 8  
**Laboratory** : Environmental Division Melbourne  
**Contact** : Customer Services EM  
**Address** : 4 Westall Rd Springvale VIC Australia 3171  
**Telephone** : +61-3-8549 9600  
**Date Samples Received** : 04-Mar-2021 09:00  
**Date Analysis Commenced** : 10-Mar-2021  
**Issue Date** : 17-Mar-2021 12:55



Accreditation No. 825  
 Accredited for compliance with  
 ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

### Signatories

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

Signatories	Position	Accreditation Category
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC



## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

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.

~ = Indicates an estimated value.

- ALS is not NATA accredited for the analysis of metals in dust deposition gauge.
- Insoluble and soluble metals conducted as per AS 3580.10.1:2016 Appendix A. Insoluble, soluble and ash arsenic have been reported as ug/m2.month. This is not consistent with Appendix A units of ug, ug/m2.day or mg/m2.month. Limit of reporting will vary from sample to sample based on sample volume, solid residual collected and sampling period.
- Analysis as per AS3580.10.1-2016. 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.
- Sampling Period: 01/02/2021-03/03/2021.
- Sample exposure period is within the typical exposure period of 30+/-2 days as per AS3580.10.1





## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

				Sample ID	WVDD01	WVDD02	WVDD03	WVDD04	WVDD05
Sampling date / time					03-Mar-2021 13:00	03-Mar-2021 12:55	03-Mar-2021 12:00	03-Mar-2021 12:25	03-Mar-2021 12:30
Compound	CAS Number	LOR	Unit		EM2103691-001	EM2103691-002	EM2103691-003	EM2103691-004	EM2103691-005
					Result	Result	Result	Result	Result
<b>EA120: Ash Content</b>									
Ash Content	----	0.1	g/m <sup>2</sup> .month		0.1	0.3	0.2	0.6	0.2
Ash Content (mg)	----	1	mg		2	5	3	10	3
<b>EA125: Combustible Matter</b>									
Combustible Matter	----	0.1	g/m <sup>2</sup> .month		0.9	1.0	0.9	2.2	1.0
Combustible Matter (mg)	----	1	mg		16	18	16	40	18
<b>EA139: Total Soluble Matter</b>									
Total Soluble Matter	----	0.1	g/m <sup>2</sup> .month		0.6	0.3	0.2	2.3	1.5
Total Soluble Matter (mg)	----	1	mg		11	6	3	40	26
<b>EA141: Total Insoluble Matter</b>									
Total Insoluble Matter	----	0.1	g/m <sup>2</sup> .month		1.0	1.3	1.1	2.8	1.2
Total Insoluble Matter (mg)	----	1	mg		18	23	19	50	21
<b>EA142: Total Solids</b>									
Total Solids	----	0.1	g/m <sup>2</sup> .month		1.6	1.6	1.3	5.1	2.7
Total Solids (mg)	----	1	mg		29	29	22	90	47
<b>EG020T: Total Metals by ICP-MS</b>									
Ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month		3.11	5.07	<8.60	24.4	4.31
Ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month		60.0	<87.2	<71.2	<137	<61.1
Ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month		45.6	58.4	37.1	86.5	50.2



## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

				Sample ID	WVDD06	KF1	KF2	KF3	KF4
Sampling date / time					03-Mar-2021 13:10	03-Mar-2021 10:00	03-Mar-2021 10:50	03-Mar-2021 10:40	03-Mar-2021 11:00
Compound	CAS Number	LOR	Unit		EM2103691-006	EM2103691-007	EM2103691-008	EM2103691-009	EM2103691-010
					Result	Result	Result	Result	Result
<b>EA120: Ash Content</b>									
Ash Content	----	0.1	g/m <sup>2</sup> .month		0.2	0.2	0.2	0.2	0.2
Ash Content (mg)	----	1	mg		4	4	4	4	3
<b>EA125: Combustible Matter</b>									
Combustible Matter	----	0.1	g/m <sup>2</sup> .month		0.8	0.9	1.0	0.9	1.0
Combustible Matter (mg)	----	1	mg		15	16	18	17	19
<b>EA139: Total Soluble Matter</b>									
Total Soluble Matter	----	0.1	g/m <sup>2</sup> .month		3.0	3.0	2.8	0.1	3.1
Total Soluble Matter (mg)	----	1	mg		54	53	49	1	54
<b>EA141: Total Insoluble Matter</b>									
Total Insoluble Matter	----	0.1	g/m <sup>2</sup> .month		1.1	1.1	1.2	1.2	1.2
Total Insoluble Matter (mg)	----	1	mg		20	20	22	22	22
<b>EA142: Total Solids</b>									
Total Solids	----	0.1	g/m <sup>2</sup> .month		4.1	4.1	4.0	1.3	4.3
Total Solids (mg)	----	1	mg		74	73	71	23	76
<b>EG020T: Total Metals by ICP-MS</b>									
Ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month		3.05	8.11	64.3	<152	<57.1
Ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month		<60.0	56.7	53.8	<73.6	45.9
Ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month		47.9	54.0	59.9	74.9	53.6



## Analytical Results

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

Sample ID

				WVDD01 Soluble As, Ba, Mn	WVDD02 Soluble As, Ba, Mn	WVDD03 Soluble As, Ba, Mn	WVDD04 Soluble As, Ba, Mn	WVDD05 Soluble As, Ba, Mn
Sampling date / time				03-Mar-2021 00:00	03-Mar-2021 00:00	03-Mar-2021 00:00	03-Mar-2021 00:00	03-Mar-2021 00:00
Compound	CAS Number	LOR	Unit	EM2103691-011	EM2103691-012	EM2103691-013	EM2103691-014	EM2103691-015
				Result	Result	Result	Result	Result
<b>EG020T: Total Metals by ICP-MS</b>								
ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month	3.06	3.29	2.84	13.8	17.9
ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month	184	265	156	104	107
ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month	294	296	344	514	334



## Analytical Results

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

Sample ID

				WVDD06 Soluble As, Ba, Mn	KF1 Soluble As, Ba, Mn	KF2 Soluble As, Ba, Mn	KF3 Soluble As, Ba, Mn	KF4 Soluble As, Ba, Mn
Sampling date / time				03-Mar-2021 00:00	03-Mar-2021 00:00	03-Mar-2021 00:00	03-Mar-2021 00:00	03-Mar-2021 00:00
Compound	CAS Number	LOR	Unit	EM2103691-016	EM2103691-017	EM2103691-018	EM2103691-019	EM2103691-020
				Result	Result	Result	Result	Result
<b>EG020T: Total Metals by ICP-MS</b>								
ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month	4.59	4.50	12.6	20.1	6.96
ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month	209	122	91.6	103	142
ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month	369	290	327	341	285



## Analytical Results

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

Sample ID

				WVDD01 Insoluble As, Ba, Mn	WVDD02 Insoluble As, Ba, Mn	WVDD03 Insoluble As, Ba, Mn	WVDD04 Insoluble As, Ba, Mn	WVDD05 Insoluble As, Ba, Mn
Sampling date / time				03-Mar-2021 00:00	03-Mar-2021 00:00	03-Mar-2021 00:00	03-Mar-2021 00:00	03-Mar-2021 00:00
Compound	CAS Number	LOR	Unit	EM2103691-021	EM2103691-022	EM2103691-023	EM2103691-024	EM2103691-025
				Result	Result	Result	Result	Result
<b>EG020T: Total Metals by ICP-MS</b>								
Ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month	4.25	6.97	<8.6	29.6	5.89
Ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month	59.8	<87.2	<71.2	<137	<61.1
Ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month	69.3	78.6	64.2	86.6	54.3



## Analytical Results

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

Sample ID

				WVDD06 Insoluble As, Ba, Mn	KF1 Insoluble As, Ba, Mn	KF2 Insoluble As, Ba, Mn	KF3 Insoluble As, Ba, Mn	KF4 Insoluble As, Ba, Mn
Sampling date / time				03-Mar-2021 00:00	03-Mar-2021 00:00	03-Mar-2021 00:00	03-Mar-2021 00:00	03-Mar-2021 00:00
Compound	CAS Number	LOR	Unit	EM2103691-026	EM2103691-027	EM2103691-028	EM2103691-029	EM2103691-030
				Result	Result	Result	Result	Result
<b>EG020T: Total Metals by ICP-MS</b>								
ø Arsenic	7440-38-2	0.05	µg/m².month	3.70	11.6	96.7	<152	<57.1
ø Barium	7440-39-3	0.05	µg/m².month	<60.0	57.2	162	<73.6	55.8
ø Manganese	7439-96-5	0.05	µg/m².month	63.8	86.5	100	93.9	78.9

## QUALITY CONTROL REPORT

<b>Work Order</b>	<b>: EM2103691</b>	<b>Page</b>	<b>: 1 of 3</b>
<b>Client</b>	<b>: ALS WATER RESOURCES GROUP</b>	<b>Laboratory</b>	<b>: Environmental Division Melbourne</b>
<b>Contact</b>	<b>: ROHAN OLIVER</b>	<b>Contact</b>	<b>: Customer Services EM</b>
<b>Address</b>	<b>: 94 Kerang-Koondrook Road Kerang 3579</b>	<b>Address</b>	<b>: 4 Westall Rd Springvale VIC Australia 3171</b>
<b>Telephone</b>	<b>: ----</b>	<b>Telephone</b>	<b>: +61-3-8549 9600</b>
<b>Project</b>	<b>: MV214940</b>	<b>Date Samples Received</b>	<b>: 04-Mar-2021</b>
<b>Order number</b>	<b>: ----</b>	<b>Date Analysis Commenced</b>	<b>: 10-Mar-2021</b>
<b>C-O-C number</b>	<b>: ----</b>	<b>Issue Date</b>	<b>: 17-Mar-2021</b>
<b>Sampler</b>	<b>: KV</b>		
<b>Site</b>	<b>: ----</b>		
<b>Quote number</b>	<b>: ME/968/20</b>		
<b>No. of samples received</b>	<b>: 30</b>		
<b>No. of samples analysed</b>	<b>: 30</b>		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

### Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC



### **General Comments**

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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

Key :            Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot  
                  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  
                  RPD = Relative Percentage Difference  
                  # = Indicates failed QC

### **Laboratory Duplicate (DUP) Report**

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

- **No Laboratory Duplicate (DUP) Results are required to be reported.**





## Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: AIR				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit			LCS	Low	High
EA139: Total Soluble Matter (QCLot: 3555649)								
EA139: Total Soluble Matter	----	0.1	g/m².month	<0.1	1.66 g/m².month	120	70.0	130
EA139: Total Soluble Matter (mg)	----	1	mg	<1	29.3 mg	119	70.0	130
EA141: Total Insoluble Matter (QCLot: 3555647)								
EA141: Total Insoluble Matter	----	0.1	g/m².month	<0.1	5.66 g/m².month	108	66.8	134
EA141: Total Insoluble Matter (mg)	----	1	mg	<1	100 mg	107	67.5	125
EA142: Total Solids (QCLot: 3555648)								
EA142: Total Solids	----	0.1	g/m².month	<0.1	----	----	----	----
EA142: Total Solids (mg)	----	1	mg	<1	129.3 mg	110	68.4	126
EG020T: Total Metals by ICP-MS (QCLot: 3565698)								
EG020TUG: Arsenic	7440-38-2	0.05	µg	<0.050	----	----	----	----
EG020TUG: Barium	7440-39-3	0.05	µg	<0.050	----	----	----	----
EG020TUG: Manganese	7439-96-5	0.05	µg	<0.050	----	----	----	----
EG020T: Total Metals by ICP-MS (QCLot: 3565699)								
EG020TUG: Arsenic	7440-38-2	0.05	µg	<0.050	----	----	----	----
EG020TUG: Barium	7440-39-3	0.05	µg	<0.050	----	----	----	----
EG020TUG: Manganese	7439-96-5	0.05	µg	<0.050	----	----	----	----

## Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

## QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM2103691	Page	: 1 of 5
Client	: ALS WATER RESOURCES GROUP	Laboratory	: Environmental Division Melbourne
Contact	: ROHAN OLIVER	Telephone	: +61-3-8549 9600
Project	: MV214940	Date Samples Received	: 04-Mar-2021
Site	: ----	Issue Date	: 17-Mar-2021
Sampler	: KV	No. of samples received	: 30
Order number	: ----	No. of samples analysed	: 30

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

### Summary of Outliers

#### Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

#### Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

#### Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



## Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **AIR**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA120: Ash Content								
Dust Gauge (Bottle) - Copper Sulfate (EA120) WVDD01, WVDD03, WVDD05, KF1, KF3,	WVDD02, WVDD04, WVDD06, KF2, KF4	03-Mar-2021	----	----	----	10-Mar-2021	30-Aug-2021	✓
EA125: Combustible Matter								
Dust Gauge (Bottle) - Copper Sulfate (EA125) WVDD01, WVDD03, WVDD05, KF1, KF3,	WVDD02, WVDD04, WVDD06, KF2, KF4	03-Mar-2021	----	----	----	10-Mar-2021	30-Aug-2021	✓
EA139: Total Soluble Matter								
Dust Gauge (Bottle) - Copper Sulfate (EA139) WVDD01, WVDD03, WVDD05, KF1, KF3,	WVDD02, WVDD04, WVDD06, KF2, KF4	03-Mar-2021	----	----	----	10-Mar-2021	30-Aug-2021	✓
EA141: Total Insoluble Matter								
Dust Gauge (Bottle) - Copper Sulfate (EA141) WVDD01, WVDD03, WVDD05, KF1, KF3,	WVDD02, WVDD04, WVDD06, KF2, KF4	03-Mar-2021	----	----	----	10-Mar-2021	30-Aug-2021	✓

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA142: Total Solids							
Dust Gauge (Bottle) - Copper Sulfate (EA142)							
WVDD01,	WVDD02,	03-Mar-2021	----	----	----	10-Mar-2021	30-Aug-2021
WVDD03,	WVDD04,						✓
WVDD05,	WVDD06,						
KF1,	KF2,						
KF3,	KF4						
EG020T: Total Metals by ICP-MS							
Dust Residue (EG020TUG)							
WVDD01,	WVDD02,	03-Mar-2021	----	----	----	16-Mar-2021	30-Aug-2021
WVDD03,	WVDD04,						✓
WVDD05,	WVDD06,						
KF1,	KF2,						
KF3,	KF4,						
WVDD01 - Soluble As, Ba, Mn,	WVDD02 - Soluble As, Ba, Mn,						
WVDD03 - Soluble As, Ba, Mn,	WVDD04 - Soluble As, Ba, Mn,						
WVDD05 - Soluble As, Ba, Mn,	WVDD06 - Soluble As, Ba, Mn,						
KF1 - Soluble As, Ba, Mn,	KF2 - Soluble As, Ba, Mn,						
KF3 - Soluble As, Ba, Mn,	KF4 - Soluble As, Ba, Mn,						
WVDD01 - Insoluble As, Ba, Mn,	WVDD02 - Insoluble As, Ba, Mn,						
WVDD03 - Insoluble As, Ba, Mn,	WVDD04 - Insoluble As, Ba, Mn,						
WVDD05 - Insoluble As, Ba, Mn,	WVDD06 - Insoluble As, Ba, Mn,						
KF1 - Insoluble As, Ba, Mn,	KF2 - Insoluble As, Ba, Mn,						
KF3 - Insoluble As, Ba, Mn,	KF4 - Insoluble As, Ba, Mn,						



## Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **AIR**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS)							
Total Insoluble Matter (TIM)	EA141	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Solids (TS)	EA142	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Soluble Matter (SM)	EA139	1	21	4.76	4.76	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Insoluble Matter (TIM)	EA141	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals - ICP-MS (mass/filter)	EG020TUG	2	30	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Solids (TS)	EA142	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Soluble Matter (SM)	EA139	1	21	4.76	4.76	✔	NEPM 2013 B3 & ALS QC Standard



## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Ash Content (AC)	EA120	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Ash content in deposited dust.
Combustible Matter (CM)	EA125	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Combustible Matter in deposited dust.
Total Soluble Matter (SM)	EA139	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Soluble Solids in deposited dust.
Total Insoluble Matter (TIM)	EA141	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Total Insoluble solids in deposited dust.
Total Solids (TS)	EA142	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Total Solids in deposited dust.
Total Metals - ICP-MS (mass/filter)	* EG020TUG	AIR	In house: Referenced to APHA 3125; USEPA SW846, 6020 (ICPMS) Metals in Dust residue are quantified by ICPMS and reported as ug of the TIM.

## CERTIFICATE OF ANALYSIS

**Work Order** : **EM2105891**  
**Client** : **ALS WATER RESOURCES GROUP**  
**Contact** : ROHAN OLIVER  
**Address** : 94 Kerang-Koondrook Road  
                   Kerang 3579  
**Telephone** : ----  
**Project** : MV214940  
**Order number** : ----  
**C-O-C number** : ----  
**Sampler** : KV  
**Site** : ----  
**Quote number** : ME/968/20  
**No. of samples received** : 30  
**No. of samples analysed** : 30

**Page** : 1 of 8  
**Laboratory** : Environmental Division Melbourne  
**Contact** : Customer Services EM  
**Address** : 4 Westall Rd Springvale VIC Australia 3171  
**Telephone** : +61-3-8549 9600  
**Date Samples Received** : 06-Apr-2021 07:45  
**Date Analysis Commenced** : 15-Apr-2021  
**Issue Date** : 21-Apr-2021 13:12



Accreditation No. 825  
 Accredited for compliance with  
 ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

### Signatories

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

Signatories	Position	Accreditation Category
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC



## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

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.

~ = Indicates an estimated value.

- ALS is not NATA accredited for the analysis of metals in dust deposition gauge.
- Insoluble and soluble metals conducted as per AS 3580.10.1:2016 Appendix A. Insoluble, soluble and ash arsenic have been reported as ug/m2.month. This is not consistent with Appendix A units of ug, ug/m2.day or mg/m2.month. Limit of reporting will vary from sample to sample based on sample volume, solid residual collected and sampling period.
- Analysis as per AS3580.10.1-2016. 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.
- Sampling Period: 03/03/2021-01/04/2021.
- Sample exposure period is within the typical exposure period of 30+/-2 days as per AS3580.10.1





## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

				Sample ID	WVDD01	WVDD02	WVDD03	WVDD04	WVDD05
Sampling date / time					01-Apr-2021 13:05	01-Apr-2021 12:55	01-Apr-2021 11:50	01-Apr-2021 12:10	01-Apr-2021 12:15
Compound	CAS Number	LOR	Unit		EM2105891-001	EM2105891-002	EM2105891-003	EM2105891-004	EM2105891-005
					Result	Result	Result	Result	Result
<b>EA120: Ash Content</b>									
Ash Content	----	0.1	g/m <sup>2</sup> .month		0.9	0.2	0.2	<0.1	0.6
Ash Content (mg)	----	1	mg		16	3	3	1	10
<b>EA125: Combustible Matter</b>									
Combustible Matter	----	0.1	g/m <sup>2</sup> .month		4.5	1.3	1.0	1.4	2.3
Combustible Matter (mg)	----	1	mg		76	23	18	24	39
<b>EA139: Total Soluble Matter</b>									
Total Soluble Matter	----	0.1	g/m <sup>2</sup> .month		2.1	3.7	4.0	3.2	2.5
Total Soluble Matter (mg)	----	1	mg		36	63	69	55	42
<b>EA141: Total Insoluble Matter</b>									
Total Insoluble Matter	----	0.1	g/m <sup>2</sup> .month		5.4	1.5	1.2	1.5	2.9
Total Insoluble Matter (mg)	----	1	mg		92	26	21	25	49
<b>EA142: Total Solids</b>									
Total Solids	----	0.1	g/m <sup>2</sup> .month		7.5	5.2	5.2	4.7	5.4
Total Solids (mg)	----	1	mg		128	89	90	80	91
<b>EG020T: Total Metals by ICP-MS</b>									
Ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month		9.11	5.55	2.43	2.29	11.7
Ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month		819	44.4	51.8	30.9	<78.6
Ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month		204	39.3	35.6	23.5	83.2



## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

				Sample ID	WVDD06	KF1	KF2	KF3	KF4
Sampling date / time					01-Apr-2021 13:20	01-Apr-2021 10:10	01-Apr-2021 10:30	01-Apr-2021 10:25	01-Apr-2021 10:40
Compound	CAS Number	LOR	Unit		EM2105891-006	EM2105891-007	EM2105891-008	EM2105891-009	EM2105891-010
					Result	Result	Result	Result	Result
<b>EA120: Ash Content</b>									
Ash Content	----	0.1	g/m <sup>2</sup> .month		0.4	0.2	0.2	0.4	0.2
Ash Content (mg)	----	1	mg		6	3	3	6	3
<b>EA125: Combustible Matter</b>									
Combustible Matter	----	0.1	g/m <sup>2</sup> .month		1.8	1.2	1.3	1.7	1.2
Combustible Matter (mg)	----	1	mg		32	21	23	30	21
<b>EA139: Total Soluble Matter</b>									
Total Soluble Matter	----	0.1	g/m <sup>2</sup> .month		0.7	3.4	2.4	1.1	1.7
Total Soluble Matter (mg)	----	1	mg		12	58	41	18	29
<b>EA141: Total Insoluble Matter</b>									
Total Insoluble Matter	----	0.1	g/m <sup>2</sup> .month		2.2	1.4	1.5	2.1	1.4
Total Insoluble Matter (mg)	----	1	mg		38	24	26	36	24
<b>EA142: Total Solids</b>									
Total Solids	----	0.1	g/m <sup>2</sup> .month		2.9	4.8	3.9	3.2	3.1
Total Solids (mg)	----	1	mg		50	82	67	54	53
<b>EG020T: Total Metals by ICP-MS</b>									
Ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month		6.33	<11.7	93.4	<74.7	<19.9
Ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month		76.0	<48.7	<40.2	<97.8	<46.2
Ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month		78.7	45.5	29.8	68.4	48.4



## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

Sample ID

				WVDD01 Soluble As, Ba, Mn	WVDD02 Soluble As, Ba, Mn	WVDD03 Soluble As, Ba, Mn	WVDD04 Soluble As, Ba, Mn	WVDD05 Soluble As, Ba, Mn
Sampling date / time				01-Apr-2021 00:00	01-Apr-2021 00:00	01-Apr-2021 00:00	01-Apr-2021 00:00	01-Apr-2021 00:00
Compound	CAS Number	LOR	Unit	EM2105891-011	EM2105891-012	EM2105891-013	EM2105891-014	EM2105891-015
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS								
ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month	27.7	12.3	19.4	13.1	53.4
ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month	306	271	1080	96.0	167
ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month	492	435	1620	139	685



## Analytical Results

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

Sample ID

				WVDD06 Soluble As, Ba, Mn	KF1 Soluble As, Ba, Mn	KF2 Soluble As, Ba, Mn	KF3 Soluble As, Ba, Mn	KF4 Soluble As, Ba, Mn
Sampling date / time				01-Apr-2021 00:00	01-Apr-2021 00:00	01-Apr-2021 00:00	01-Apr-2021 00:00	01-Apr-2021 00:00
Compound	CAS Number	LOR	Unit	EM2105891-016	EM2105891-017	EM2105891-018	EM2105891-019	EM2105891-020
				Result	Result	Result	Result	Result
<b>EG020T: Total Metals by ICP-MS</b>								
ø Arsenic	7440-38-2	0.05	µg/m².month	11.9	20.6	54.0	53.3	10.9
ø Barium	7440-39-3	0.05	µg/m².month	1100	194	96.7	186	513
ø Manganese	7439-96-5	0.05	µg/m².month	688	309	222	451	178



## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

Sample ID

				WVDD01 Insoluble As, Ba, Mn	WVDD02 Insoluble As, Ba, Mn	WVDD03 Insoluble As, Ba, Mn	WVDD04 Insoluble As, Ba, Mn	WVDD05 Insoluble As, Ba, Mn
Sampling date / time				01-Apr-2021 00:00	01-Apr-2021 00:00	01-Apr-2021 00:00	01-Apr-2021 00:00	01-Apr-2021 00:00
Compound	CAS Number	LOR	Unit	EM2105891-021	EM2105891-022	EM2105891-023	EM2105891-024	EM2105891-025
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS								
ø Arsenic	7440-38-2	0.05	µg/m².month	11.6	7.41	2.86	3.91	18.6
ø Barium	7440-39-3	0.05	µg/m².month	1360	75.6	56.7	31.7	<78.6
ø Manganese	7439-96-5	0.05	µg/m².month	245	71.8	46.3	40.8	95.4



## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

Sample ID

				WVDD06 Insoluble As, Ba, Mn	KF1 Insoluble As, Ba, Mn	KF2 Insoluble As, Ba, Mn	KF3 Insoluble As, Ba, Mn	KF4 Insoluble As, Ba, Mn
Sampling date / time				01-Apr-2021 00:00	01-Apr-2021 00:00	01-Apr-2021 00:00	01-Apr-2021 00:00	01-Apr-2021 00:00
Compound	CAS Number	LOR	Unit	EM2105891-026	EM2105891-027	EM2105891-028	EM2105891-029	EM2105891-030
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS								
ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month	8.72	<11.7	94.4	<74.7	<19.9
ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month	132	<48.7	<40.2	<97.8	<46.2
ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month	122	78.2	69.1	85.8	67.1

## QUALITY CONTROL REPORT

<b>Work Order</b>	<b>: EM2105891</b>	<b>Page</b>	<b>: 1 of 3</b>
<b>Client</b>	<b>: ALS WATER RESOURCES GROUP</b>	<b>Laboratory</b>	<b>: Environmental Division Melbourne</b>
<b>Contact</b>	<b>: ROHAN OLIVER</b>	<b>Contact</b>	<b>: Customer Services EM</b>
<b>Address</b>	<b>: 94 Kerang-Koondrook Road Kerang 3579</b>	<b>Address</b>	<b>: 4 Westall Rd Springvale VIC Australia 3171</b>
<b>Telephone</b>	<b>: ----</b>	<b>Telephone</b>	<b>: +61-3-8549 9600</b>
<b>Project</b>	<b>: MV214940</b>	<b>Date Samples Received</b>	<b>: 06-Apr-2021</b>
<b>Order number</b>	<b>: ----</b>	<b>Date Analysis Commenced</b>	<b>: 15-Apr-2021</b>
<b>C-O-C number</b>	<b>: ----</b>	<b>Issue Date</b>	<b>: 21-Apr-2021</b>
<b>Sampler</b>	<b>: KV</b>		
<b>Site</b>	<b>: ----</b>		
<b>Quote number</b>	<b>: ME/968/20</b>		
<b>No. of samples received</b>	<b>: 30</b>		
<b>No. of samples analysed</b>	<b>: 30</b>		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

### Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC



### **General Comments**

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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

Key :            Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot  
                  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  
                  RPD = Relative Percentage Difference  
                  # = Indicates failed QC

### **Laboratory Duplicate (DUP) Report**

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

- **No Laboratory Duplicate (DUP) Results are required to be reported.**





## Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: AIR				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EA139: Total Soluble Matter (QCLot: 3622490)								
EA139: Total Soluble Matter	----	0.1	g/m².month	<0.1	1.66 g/m².month	96.4	70.0	130
EA139: Total Soluble Matter (mg)	----	1	mg	<1	29.3 mg	102	70.0	130
EA141: Total Insoluble Matter (QCLot: 3622491)								
EA141: Total Insoluble Matter	----	0.1	g/m².month	<0.1	5.66 g/m².month	86.6	66.8	134
EA141: Total Insoluble Matter (mg)	----	1	mg	<1	100 mg	90.0	67.5	125
EA142: Total Solids (QCLot: 3622489)								
EA142: Total Solids	----	0.1	g/m².month	<0.1	----	----	----	----
EA142: Total Solids (mg)	----	1	mg	<1	129.3 mg	92.8	68.4	126
EG020T: Total Metals by ICP-MS (QCLot: 3630754)								
EG020TUG: Arsenic	7440-38-2	0.05	µg	<0.050	----	----	----	----
EG020TUG: Barium	7440-39-3	0.05	µg	<0.050	----	----	----	----
EG020TUG: Manganese	7439-96-5	0.05	µg	<0.050	----	----	----	----
EG020T: Total Metals by ICP-MS (QCLot: 3630755)								
EG020TUG: Arsenic	7440-38-2	0.05	µg	<0.050	----	----	----	----
EG020TUG: Barium	7440-39-3	0.05	µg	<0.050	----	----	----	----
EG020TUG: Manganese	7439-96-5	0.05	µg	<0.050	----	----	----	----

## Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

## QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM2105891	Page	: 1 of 5
Client	: ALS WATER RESOURCES GROUP	Laboratory	: Environmental Division Melbourne
Contact	: ROHAN OLIVER	Telephone	: +61-3-8549 9600
Project	: MV214940	Date Samples Received	: 06-Apr-2021
Site	: ----	Issue Date	: 21-Apr-2021
Sampler	: KV	No. of samples received	: 30
Order number	: ----	No. of samples analysed	: 30

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

### Summary of Outliers

#### Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

#### Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

#### Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results. This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein. Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters. Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Evaluation: ✖ = Holding time breach : ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA120: Ash Content									
Dust Gauge (Bottle) - Copper Sulfate (EA120)	WVDD01, WVDD03, WVDD05, KF1, KF3,	WVDD02, WVDD04, WVDD06, KF2, KF4	01-Apr-2021	----	----	----	15-Apr-2021	28-Sep-2021	✓
EA125: Combustible Matter									
Dust Gauge (Bottle) - Copper Sulfate (EA125)	WVDD01, WVDD03, WVDD05, KF1, KF3,	WVDD02, WVDD04, WVDD06, KF2, KF4	01-Apr-2021	----	----	----	15-Apr-2021	28-Sep-2021	✓
EA139: Total Soluble Matter									
Dust Gauge (Bottle) - Copper Sulfate (EA139)	WVDD01, WVDD03, WVDD05, KF1, KF3,	WVDD02, WVDD04, WVDD06, KF2, KF4	01-Apr-2021	----	----	----	15-Apr-2021	28-Sep-2021	✓
EA141: Total Insoluble Matter									
Dust Gauge (Bottle) - Copper Sulfate (EA141)	WVDD01, WVDD03, WVDD05, KF1, KF3,	WVDD02, WVDD04, WVDD06, KF2, KF4	01-Apr-2021	----	----	----	15-Apr-2021	28-Sep-2021	✓

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA142: Total Solids								
Dust Gauge (Bottle) - Copper Sulfate (EA142)								
WVDD01,	WVDD02,	01-Apr-2021	----	----	----	15-Apr-2021	28-Sep-2021	✓
WVDD03,	WVDD04,							
WVDD05,	WVDD06,							
KF1,	KF2,							
KF3,	KF4							
EG020T: Total Metals by ICP-MS								
Dust Residue (EG020TUG)								
WVDD01,	WVDD02,	01-Apr-2021	----	----	----	20-Apr-2021	28-Sep-2021	✓
WVDD03,	WVDD04,							
WVDD05,	WVDD06,							
KF1,	KF2,							
KF3,	KF4,							
WVDD01 - Soluble As, Ba, Mn,	WVDD02 - Soluble As, Ba, Mn,							
WVDD03 - Soluble As, Ba, Mn,	WVDD04 - Soluble As, Ba, Mn,							
WVDD05 - Soluble As, Ba, Mn,	WVDD06 - Soluble As, Ba, Mn,							
KF1 - Soluble As, Ba, Mn,	KF2 - Soluble As, Ba, Mn,							
KF3 - Soluble As, Ba, Mn,	KF4 - Soluble As, Ba, Mn,							
WVDD01 - Insoluble As, Ba, Mn,	WVDD02 - Insoluble As, Ba, Mn,							
WVDD03 - Insoluble As, Ba, Mn,	WVDD04 - Insoluble As, Ba, Mn,							
WVDD05 - Insoluble As, Ba, Mn,	WVDD06 - Insoluble As, Ba, Mn,							
KF1 - Insoluble As, Ba, Mn,	KF2 - Insoluble As, Ba, Mn,							
KF3 - Insoluble As, Ba, Mn,	KF4 - Insoluble As, Ba, Mn,							



## Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **AIR**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS)							
Total Insoluble Matter (TIM)	EA141	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Solids (TS)	EA142	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Soluble Matter (SM)	EA139	1	10	10.00	4.76	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Insoluble Matter (TIM)	EA141	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals - ICP-MS (mass/filter)	EG020TUG	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Solids (TS)	EA142	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Soluble Matter (SM)	EA139	1	10	10.00	4.76	✔	NEPM 2013 B3 & ALS QC Standard



## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Ash Content (AC)	EA120	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Ash content in deposited dust.
Combustible Matter (CM)	EA125	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Combustible Matter in deposited dust.
Total Soluble Matter (SM)	EA139	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Soluble Solids in deposited dust.
Total Insoluble Matter (TIM)	EA141	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Total Insoluble solids in deposited dust.
Total Solids (TS)	EA142	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Total Solids in deposited dust.
Total Metals - ICP-MS (mass/filter)	* EG020TUG	AIR	In house: Referenced to APHA 3125; USEPA SW846, 6020 (ICPMS) Metals in Dust residue are quantified by ICPMS and reported as ug of the TIM.

## CERTIFICATE OF ANALYSIS

**Work Order** : **EM2107970**  
**Client** : **ALS WATER RESOURCES GROUP**  
**Contact** : **ROHAN OLIVER**  
**Address** : **94 KERANG-KOONDROOK ROAD**  
**KERANG 3579**  
**Telephone** : **----**  
**Project** : **MV214940**  
**Order number** : **----**  
**C-O-C number** : **----**  
**Sampler** : **KV**  
**Site** : **----**  
**Quote number** : **ME/968/20**  
**No. of samples received** : **30**  
**No. of samples analysed** : **30**

**Page** : 1 of 8  
**Laboratory** : Environmental Division Melbourne  
**Contact** : Customer Services EM  
**Address** : 4 Westall Rd Springvale VIC Australia 3171  
**Telephone** : +61-3-8549 9600  
**Date Samples Received** : 03-May-2021 13:45  
**Date Analysis Commenced** : 07-May-2021  
**Issue Date** : 13-May-2021 13:28



Accreditation No. 825  
 Accredited for compliance with  
 ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

### Signatories

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

Signatories	Position	Accreditation Category
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC



## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

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.

~ = Indicates an estimated value.

- ALS is not NATA accredited for the analysis of metals in dust deposition gauge.
- Analysis as per AS3580.10.1-2016. Samples passed through a 1mm sieve prior to analysis. NATA accreditation does not apply for results reported in g/m<sup>2</sup>.mth as sampling data was provided by the client.
- Sampling Period:01/04/2021-30/04/2021.
- Sample exposure period is within the typical exposure period of 30+/-2 days as per AS3580.10.1
- Dust samples have been dosed with Copper Sulphate prior to sample collection and a copper correction factor of 0.055g has been used for calculations.





## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

				Sample ID	WVDD01	WVDD02	WVDD03	WVDD04	WVDD05
Sampling date / time					30-Apr-2021 10:50	30-Apr-2021 10:40	30-Apr-2021 09:50	30-Apr-2021 10:10	30-Apr-2021 10:15
Compound	CAS Number	LOR	Unit		EM2107970-001	EM2107970-002	EM2107970-003	EM2107970-004	EM2107970-005
					Result	Result	Result	Result	Result
<b>EA120: Ash Content</b>									
Ash Content	----	0.1	g/m <sup>2</sup> .month		0.2	0.1	0.2	0.3	0.3
Ash Content (mg)	----	1	mg		4	2	3	4	6
<b>EA125: Combustible Matter</b>									
Combustible Matter	----	0.1	g/m <sup>2</sup> .month		0.7	0.7	1.0	0.9	0.8
Combustible Matter (mg)	----	1	mg		12	12	17	16	12
<b>EA139: Total Soluble Matter</b>									
Total Soluble Matter	----	0.1	g/m <sup>2</sup> .month		1.5	0.4	1.9	0.9	2.1
Total Soluble Matter (mg)	----	1	mg		25	6	33	16	36
<b>EA141: Total Insoluble Matter</b>									
Total Insoluble Matter	----	0.1	g/m <sup>2</sup> .month		0.9	0.8	1.2	1.2	1.1
Total Insoluble Matter (mg)	----	1	mg		16	14	20	20	18
<b>EA142: Total Solids</b>									
Total Solids	----	0.1	g/m <sup>2</sup> .month		2.4	1.2	3.1	2.1	3.2
Total Solids (mg)	----	1	mg		41	20	53	36	54
<b>EG020T: Total Metals by ICP-MS</b>									
Ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month		3.19	<8.6	4.29	10.4	13.2
Ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month		223	89.4	115	<111	115
Ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month		102	27.3	53.0	<51.5	<53.9



## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

				Sample ID	WVDD06	KF1	KF2	KF3	KF4
Sampling date / time					30-Apr-2021 11:00	30-Apr-2021 11:30	30-Apr-2021 11:50	30-Apr-2021 11:40	30-Apr-2021 12:00
Compound	CAS Number	LOR	Unit		EM2107970-006	EM2107970-007	EM2107970-008	EM2107970-009	EM2107970-010
					Result	Result	Result	Result	Result
<b>EA120: Ash Content</b>									
Ash Content	----	0.1	g/m <sup>2</sup> .month		0.2	0.2	0.1	0.2	0.1
Ash Content (mg)	----	1	mg		4	4	2	3	2
<b>EA125: Combustible Matter</b>									
Combustible Matter	----	0.1	g/m <sup>2</sup> .month		0.6	0.9	0.7	1.0	0.8
Combustible Matter (mg)	----	1	mg		9	15	11	17	13
<b>EA139: Total Soluble Matter</b>									
Total Soluble Matter	----	0.1	g/m <sup>2</sup> .month		1.1	1.1	2.2	0.7	2.4
Total Soluble Matter (mg)	----	1	mg		19	18	37	12	42
<b>EA141: Total Insoluble Matter</b>									
Total Insoluble Matter	----	0.1	g/m <sup>2</sup> .month		0.8	1.1	0.8	1.2	0.9
Total Insoluble Matter (mg)	----	1	mg		13	19	13	20	15
<b>EA142: Total Solids</b>									
Total Solids	----	0.1	g/m <sup>2</sup> .month		1.9	2.2	3.0	1.9	3.3
Total Solids (mg)	----	1	mg		32	37	50	32	57
<b>EG020T: Total Metals by ICP-MS</b>									
Ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month		5.35	5.36	162	19.1	<15.6
Ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month		71.6	<58.3	49.0	<43.7	<41.0
Ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month		64.5	47.1	41.5	<62.1	41.6



## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

Sample ID

				WVDD01 Soluble As, Ba, Mn	WVDD02 Soluble As, Ba, Mn	WVDD03 Soluble As, Ba, Mn	WVDD04 Soluble As, Ba, Mn	WVDD05 Soluble As, Ba, Mn
Sampling date / time				30-Apr-2021 00:00	30-Apr-2021 00:00	30-Apr-2021 00:00	30-Apr-2021 00:00	30-Apr-2021 00:00
Compound	CAS Number	LOR	Unit	EM2107970-011	EM2107970-012	EM2107970-013	EM2107970-014	EM2107970-015
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS								
ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month	3.48	3.59	8.87	20.75	98.7
ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month	279	186	410	94.7	131
ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month	281	266	853	355	341



## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

Sample ID

				WVDD06 Soluble As, Ba, Mn	KF1 Soluble As, Ba, Mn	KF2 Soluble As, Ba, Mn	KF3 Soluble As, Ba, Mn	KF4 Soluble As, Ba, Mn
Sampling date / time				30-Apr-2021 00:00	30-Apr-2021 00:00	30-Apr-2021 00:00	30-Apr-2021 00:00	30-Apr-2021 00:00
Compound	CAS Number	LOR	Unit	EM2107970-016	EM2107970-017	EM2107970-018	EM2107970-019	EM2107970-020
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS								
ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month	10.1	6.51	20.8	8.02	8.38
ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month	203	80.0	48.6	57.9	81.3
ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month	361	300	191	223	151



## Analytical Results

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

Sample ID

				WVDD01 Insoluble As, Ba, Mn	WVDD02 Insoluble As, Ba, Mn	WVDD03 Insoluble As, Ba, Mn	WVDD04 Insoluble As, Ba, Mn	WVDD05 Insoluble As, Ba, Mn
Sampling date / time				30-Apr-2021 00:00	30-Apr-2021 00:00	30-Apr-2021 00:00	30-Apr-2021 00:00	30-Apr-2021 00:00
Compound	CAS Number	LOR	Unit	EM2107970-021	EM2107970-022	EM2107970-023	EM2107970-024	EM2107970-025
				Result	Result	Result	Result	Result
<b>EG020T: Total Metals by ICP-MS</b>								
ø Arsenic	7440-38-2	0.05	µg/m².month	3.70	<8.6	6.23	11.1	14.5
ø Barium	7440-39-3	0.05	µg/m².month	416	159	203	<111	156
ø Manganese	7439-96-5	0.05	µg/m².month	122	50.3	75.6	<51.5	<53.9



## Analytical Results

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

Sample ID

				WVDD06 Insoluble As, Ba, Mn	KF1 Insoluble As, Ba, Mn	KF2 Insoluble As, Ba, Mn	KF3 Insoluble As, Ba, Mn	KF4 Insoluble As, Ba, Mn
Sampling date / time				30-Apr-2021 00:00	30-Apr-2021 00:00	30-Apr-2021 00:00	30-Apr-2021 00:00	30-Apr-2021 00:00
Compound	CAS Number	LOR	Unit	EM2107970-026	EM2107970-027	EM2107970-028	EM2107970-029	EM2107970-030
				Result	Result	Result	Result	Result
<b>EG020T: Total Metals by ICP-MS</b>								
Ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month	7.71	6.10	179	19.8	<15.6
Ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month	117	<58.3	54.9	<43.7	<41.0
Ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month	91.0	69.5	73.7	<62.1	48.1

## QUALITY CONTROL REPORT

<b>Work Order</b>	<b>: EM2107970</b>	<b>Page</b>	<b>: 1 of 3</b>
<b>Client</b>	<b>: ALS WATER RESOURCES GROUP</b>	<b>Laboratory</b>	<b>: Environmental Division Melbourne</b>
<b>Contact</b>	<b>: ROHAN OLIVER</b>	<b>Contact</b>	<b>: Customer Services EM</b>
<b>Address</b>	<b>: 94 KERANG-KOONDROOK ROAD KERANG 3579</b>	<b>Address</b>	<b>: 4 Westall Rd Springvale VIC Australia 3171</b>
<b>Telephone</b>	<b>: ----</b>	<b>Telephone</b>	<b>: +61-3-8549 9600</b>
<b>Project</b>	<b>: MV214940</b>	<b>Date Samples Received</b>	<b>: 03-May-2021</b>
<b>Order number</b>	<b>: ----</b>	<b>Date Analysis Commenced</b>	<b>: 07-May-2021</b>
<b>C-O-C number</b>	<b>: ----</b>	<b>Issue Date</b>	<b>: 13-May-2021</b>
<b>Sampler</b>	<b>: KV</b>		
<b>Site</b>	<b>: ----</b>		
<b>Quote number</b>	<b>: ME/968/20</b>		
<b>No. of samples received</b>	<b>: 30</b>		
<b>No. of samples analysed</b>	<b>: 30</b>		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

### Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC



### **General Comments**

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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

Key :            Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot  
                  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  
                  RPD = Relative Percentage Difference  
                  # = Indicates failed QC

### **Laboratory Duplicate (DUP) Report**

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

- **No Laboratory Duplicate (DUP) Results are required to be reported.**





## Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: AIR				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EA139: Total Soluble Matter (QCLot: 3665410)								
EA139: Total Soluble Matter	----	0.1	g/m².month	<0.1	1.66 g/m².month	102	70.0	130
EA139: Total Soluble Matter (mg)	----	1	mg	<1	29.3 mg	102	70.0	130
EA141: Total Insoluble Matter (QCLot: 3665411)								
EA141: Total Insoluble Matter	----	0.1	g/m².month	<0.1	5.66 g/m².month	90.1	66.8	134
EA141: Total Insoluble Matter (mg)	----	1	mg	<1	100 mg	91.0	67.5	125
EA142: Total Solids (QCLot: 3665409)								
EA142: Total Solids	----	0.1	g/m².month	<0.1	----	----	----	----
EA142: Total Solids (mg)	----	1	mg	<1	129.3 mg	93.6	68.4	126
EG020T: Total Metals by ICP-MS (QCLot: 3670894)								
EG020TUG: Arsenic	7440-38-2	0.05	µg	<0.050	----	----	----	----
EG020TUG: Barium	7440-39-3	0.05	µg	<0.050	----	----	----	----
EG020TUG: Manganese	7439-96-5	0.05	µg	<0.050	----	----	----	----
EG020T: Total Metals by ICP-MS (QCLot: 3670895)								
EG020TUG: Arsenic	7440-38-2	0.05	µg	<0.050	----	----	----	----
EG020TUG: Barium	7440-39-3	0.05	µg	<0.050	----	----	----	----
EG020TUG: Manganese	7439-96-5	0.05	µg	<0.050	----	----	----	----

## Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

## QA/QC Compliance Assessment to assist with Quality Review

Work Order : **EM2107970**

Page : 1 of 5

Client : **ALS WATER RESOURCES GROUP**  
Contact : **ROHAN OLIVER**  
Project : **MV214940**  
Site : ----  
Sampler : **KV**  
Order number : ----

Laboratory : Environmental Division Melbourne  
Telephone : +61-3-8549 9600  
Date Samples Received : 03-May-2021  
Issue Date : 13-May-2021  
No. of samples received : 30  
No. of samples analysed : 30

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

### Summary of Outliers

#### Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

#### Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

#### Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results. This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein. Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters. Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Evaluation: ✖ = Holding time breach : ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA120: Ash Content								
Dust Gauge (Bottle) - Copper Sulfate (EA120) WVDD01, WVDD03, WVDD05, KF1, KF3,	WVDD02, WVDD04, WVDD06, KF2, KF4	30-Apr-2021	----	----	----	07-May-2021	27-Oct-2021	✓
EA125: Combustible Matter								
Dust Gauge (Bottle) - Copper Sulfate (EA125) WVDD01, WVDD03, WVDD05, KF1, KF3,	WVDD02, WVDD04, WVDD06, KF2, KF4	30-Apr-2021	----	----	----	07-May-2021	27-Oct-2021	✓
EA139: Total Soluble Matter								
Dust Gauge (Bottle) - Copper Sulfate (EA139) WVDD01, WVDD03, WVDD05, KF1, KF3,	WVDD02, WVDD04, WVDD06, KF2, KF4	30-Apr-2021	----	----	----	07-May-2021	27-Oct-2021	✓
EA141: Total Insoluble Matter								
Dust Gauge (Bottle) - Copper Sulfate (EA141) WVDD01, WVDD03, WVDD05, KF1, KF3,	WVDD02, WVDD04, WVDD06, KF2, KF4	30-Apr-2021	----	----	----	07-May-2021	27-Oct-2021	✓

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA142: Total Solids								
Dust Gauge (Bottle) - Copper Sulfate (EA142)								
WVDD01,	WVDD02,	30-Apr-2021	----	----	----	07-May-2021	27-Oct-2021	✓
WVDD03,	WVDD04,							
WVDD05,	WVDD06,							
KF1,	KF2,							
KF3,	KF4							
EG020T: Total Metals by ICP-MS								
Dust Residue (EG020TUG)								
WVDD01,	WVDD02,	30-Apr-2021	----	----	----	11-May-2021	27-Oct-2021	✓
WVDD03,	WVDD04,							
WVDD05,	WVDD06,							
KF1,	KF2,							
KF3,	KF4,							
WVDD01 - Soluble As, Ba, Mn,	WVDD02 - Soluble As, Ba, Mn,							
WVDD03 - Soluble As, Ba, Mn,	WVDD04 - Soluble As, Ba, Mn,							
WVDD05 - Soluble As, Ba, Mn,	WVDD06 - Soluble As, Ba, Mn,							
KF1 - Soluble As, Ba, Mn,	KF2 - Soluble As, Ba, Mn,							
KF3 - Soluble As, Ba, Mn,	KF4 - Soluble As, Ba, Mn,							
WVDD01 - Insoluble As, Ba, Mn,	WVDD02 - Insoluble As, Ba, Mn,							
WVDD03 - Insoluble As, Ba, Mn,	WVDD04 - Insoluble As, Ba, Mn,							
WVDD05 - Insoluble As, Ba, Mn,	WVDD06 - Insoluble As, Ba, Mn,							
KF1 - Insoluble As, Ba, Mn,	KF2 - Insoluble As, Ba, Mn,							
KF3 - Insoluble As, Ba, Mn,	KF4 - Insoluble As, Ba, Mn,							



## Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **AIR**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS)							
Total Insoluble Matter (TIM)	EA141	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Solids (TS)	EA142	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Soluble Matter (SM)	EA139	1	17	5.88	4.76	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Insoluble Matter (TIM)	EA141	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals - ICP-MS (mass/filter)	EG020TUG	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Solids (TS)	EA142	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Soluble Matter (SM)	EA139	1	17	5.88	4.76	✔	NEPM 2013 B3 & ALS QC Standard



## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Ash Content (AC)	EA120	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Ash content in deposited dust.
Combustible Matter (CM)	EA125	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Combustible Matter in deposited dust.
Total Soluble Matter (SM)	EA139	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Soluble Solids in deposited dust.
Total Insoluble Matter (TIM)	EA141	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Total Insoluble solids in deposited dust.
Total Solids (TS)	EA142	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Total Solids in deposited dust.
Total Metals - ICP-MS (mass/filter)	* EG020TUG	AIR	In house: Referenced to APHA 3125; USEPA SW846, 6020 (ICPMS) Metals in Dust residue are quantified by ICPMS and reported as ug of the TIM.

## QUALITY CONTROL REPORT

<b>Work Order</b>	<b>: EM2110733</b>	<b>Page</b>	<b>: 1 of 3</b>
<b>Client</b>	<b>: ALS WATER RESOURCES GROUP</b>	<b>Laboratory</b>	<b>: Environmental Division Melbourne</b>
<b>Contact</b>	<b>: ROHAN OLIVER</b>	<b>Contact</b>	<b>: Customer Services EM</b>
<b>Address</b>	<b>: 94 KERANG-KOONDROOK ROAD KERANG 3579</b>	<b>Address</b>	<b>: 4 Westall Rd Springvale VIC Australia 3171</b>
<b>Telephone</b>	<b>: ----</b>	<b>Telephone</b>	<b>: +61-3-8549 9600</b>
<b>Project</b>	<b>: MV214940</b>	<b>Date Samples Received</b>	<b>: 07-Jun-2021</b>
<b>Order number</b>	<b>: ----</b>	<b>Date Analysis Commenced</b>	<b>: 08-Jun-2021</b>
<b>C-O-C number</b>	<b>: ----</b>	<b>Issue Date</b>	<b>: 15-Jun-2021</b>
<b>Sampler</b>	<b>: RO</b>		
<b>Site</b>	<b>: ----</b>		
<b>Quote number</b>	<b>: ME/968/20</b>		
<b>No. of samples received</b>	<b>: 24</b>		
<b>No. of samples analysed</b>	<b>: 24</b>		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

### Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC



### **General Comments**

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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

Key :            Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot  
                  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  
                  RPD = Relative Percentage Difference  
                  # = Indicates failed QC

### **Laboratory Duplicate (DUP) Report**

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

- **No Laboratory Duplicate (DUP) Results are required to be reported.**





## Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: AIR				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit			Result	LCS	Low
EA139I: Total Soluble Matter (QCLot: 3723910)								
EA139I: Total Soluble Matter	----	0.1	g/m².month	<0.1	1.66 g/m².month	114	70.0	130
EA139I: Total Soluble Matter (mg)	----	1	mg	<1	29.3 mg	102	70.0	130
EA141I: Total Insoluble Matter (QCLot: 3723900)								
EA141I: Total Insoluble Matter	----	0.1	g/m².month	<0.1	5.66 g/m².month	117	70.0	130
EA141I: Total Insoluble Matter (mg)	----	1	mg	<1	100 mg	104	70.0	130
EA142I: Total Solids (QCLot: 3723909)								
EA142I: Total Solids	----	0.1	g/m².month	<0.1	7.32 g/m².month	116	70.0	130
EA142I: Total Solids (mg)	----	1	mg	<1	129.3 mg	104	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 3730295)								
EG020TUG: Arsenic	7440-38-2	0.05	µg	<0.050	----	----	----	----
EG020TUG: Barium	7440-39-3	0.05	µg	<0.050	----	----	----	----
EG020TUG: Manganese	7439-96-5	0.05	µg	<0.050	----	----	----	----
EG020T: Total Metals by ICP-MS (QCLot: 3730296)								
EG020TUG: Arsenic	7440-38-2	0.05	µg	<0.050	----	----	----	----
EG020TUG: Barium	7440-39-3	0.05	µg	<0.050	----	----	----	----
EG020TUG: Manganese	7439-96-5	0.05	µg	<0.050	----	----	----	----

## Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.

## QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM2110733	Page	: 1 of 5
Client	: ALS WATER RESOURCES GROUP	Laboratory	: Environmental Division Melbourne
Contact	: ROHAN OLIVER	Telephone	: +61-3-8549 9600
Project	: MV214940	Date Samples Received	: 07-Jun-2021
Site	: ----	Issue Date	: 15-Jun-2021
Sampler	: RO	No. of samples received	: 24
Order number	: ----	No. of samples analysed	: 24

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

### Summary of Outliers

#### Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

#### Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

#### Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Evaluation: ✖ = Holding time breach : ✔ = Within holding time

Method	Sample Date	Extraction / Preparation			Evaluation	Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation		Date analysed	Due for analysis	Evaluation
EA120I: Ash Content								
Directional Dust Gauge - Plastic - Algitrol Algaecide (EA120I) WVDG03N, WVDG03S, WVDG05N, WVDG05S,	WVDG03E, WVDG03W, WVDG05E, WVDG05W	02-Jun-2021	----	----	----	08-Jun-2021	29-Nov-2021	✓
EA125I: Combustible Matter								
Directional Dust Gauge - Plastic - Algitrol Algaecide (EA125I) WVDG03N, WVDG03S, WVDG05N, WVDG05S,	WVDG03E, WVDG03W, WVDG05E, WVDG05W	02-Jun-2021	----	----	----	08-Jun-2021	29-Nov-2021	✓
EA139: Total Soluble Matter								
Directional Dust Gauge - Plastic - Algitrol Algaecide (EA139I) WVDG03N, WVDG03S, WVDG05N, WVDG05S,	WVDG03E, WVDG03W, WVDG05E, WVDG05W	02-Jun-2021	----	----	----	08-Jun-2021	29-Nov-2021	✓
EA139I: Total Soluble Matter								
Directional Dust Gauge - Plastic - Algitrol Algaecide (EA139I) WVDG03N, WVDG03S, WVDG05N, WVDG05S,	WVDG03E, WVDG03W, WVDG05E, WVDG05W	02-Jun-2021	----	----	----	08-Jun-2021	29-Nov-2021	✓
EA141: Total Insoluble Matter								
Directional Dust Gauge - Plastic - Algitrol Algaecide (EA141I) WVDG03N, WVDG03S, WVDG05N, WVDG05S,	WVDG03E, WVDG03W, WVDG05E, WVDG05W	02-Jun-2021	----	----	----	08-Jun-2021	29-Nov-2021	✓



Matrix: **AIR**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA141I: Total Insoluble Matter								
Directional Dust Gauge - Plastic - Algitrol Algaecide (EA141I)		02-Jun-2021	----	----	----	08-Jun-2021	29-Nov-2021	✓
WVDG03N,	WVDG03E,							
WVDG03S,	WVDG03W,							
WVDG05N,	WVDG05E,							
WVDG05S,	WVDG05W							
EA142: Total Solids								
Directional Dust Gauge - Plastic - Algitrol Algaecide (EA142I)		02-Jun-2021	----	----	----	08-Jun-2021	29-Nov-2021	✓
WVDG03N,	WVDG03E,							
WVDG03S,	WVDG03W,							
WVDG05N,	WVDG05E,							
WVDG05S,	WVDG05W							
EA142I: Total Solids								
Directional Dust Gauge - Plastic - Algitrol Algaecide (EA142I)		02-Jun-2021	----	----	----	08-Jun-2021	29-Nov-2021	✓
WVDG03N,	WVDG03E,							
WVDG03S,	WVDG03W,							
WVDG05N,	WVDG05E,							
WVDG05S,	WVDG05W							
EG020T: Total Metals by ICP-MS								
Dust Residue (EG020TUG)		02-Jun-2021	----	----	----	11-Jun-2021	29-Nov-2021	✓
WVDG03N,	WVDG03E,							
WVDG03S,	WVDG03W,							
WVDG05N,	WVDG05E,							
WVDG05S,	WVDG05W,							
WVDG03N - soluble metals,	WVDG03E - soluble metals,							
WVDG03S - soluble metals,	WVDG03W - soluble metals,							
WVDG05N - soluble metals,	WVDG05E - soluble metals,							
WVDG05S - soluble metals,	WVDG05W - soluble metals,							
WVDG03N - insoluble metals,	WVDG03E - insoluble metals,							
WVDG03S - insoluble metals,	WVDG03W - insoluble metals,							
WVDG05N - insoluble metals,	WVDG05E - insoluble metals,							
WVDG05S - insoluble metals,	WVDG05W - insoluble metals							



## Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **AIR**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS)							
Total Insoluble Matter (TIM)	EA141I	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Solids (TS)	EA142I	1	8	12.50	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Soluble Matter (SM)	EA139I	1	8	12.50	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Insoluble Matter (TIM)	EA141I	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals - ICP-MS (mass/filter)	EG020TUG	2	25	8.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Solids (TS)	EA142I	1	8	12.50	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Soluble Matter (SM)	EA139I	1	8	12.50	5.00	✔	NEPM 2013 B3 & ALS QC Standard



## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Ash Content (AC)	EA120I	AIR	In house: Referenced to AS 3580.10.2. A gravimetric procedure reporting Ash content in deposited dust.
Combustible Matter (CM)	EA125I	AIR	In house: Referenced to AS 3580.10.2. A gravimetric procedure reporting Combustible Matter in deposited dust.
Total Soluble Matter (SM)	EA139I	AIR	In house: Referenced to AS 3580.10.2. A gravimetric procedure reporting Soluble Solids in deposited dust.
Total Insoluble Matter (TIM)	EA141I	AIR	In house: Referenced to AS 3580.10.2. A gravimetric procedure reporting Total Insoluble solids in deposited dust.
Total Solids (TS)	EA142I	AIR	In house: Referenced to AS 3580.10.2. A gravimetric procedure reporting Total Solids in deposited dust.
Total Metals - ICP-MS (mass/filter)	* EG020TUG	AIR	In house: Referenced to APHA 3125; USEPA SW846, 6020 (ICPMS) Metals in Dust residue are quantified by ICPMS and reported as ug of the TIM.

## CERTIFICATE OF ANALYSIS

**Work Order** : **EM2110737**  
**Client** : **ALS WATER RESOURCES GROUP**  
**Contact** : **ROHAN OLIVER**  
**Address** : **94 KERANG-KOONDROOK ROAD**  
**KERANG 3579**  
**Telephone** : **----**  
**Project** : **MV214940**  
**Order number** : **----**  
**C-O-C number** : **----**  
**Sampler** : **ROHAN OLIVER, ROHAN OLIVER**  
**Site** : **----**  
**Quote number** : **ME/968/20**  
**No. of samples received** : **30**  
**No. of samples analysed** : **30**

**Page** : 1 of 8  
**Laboratory** : Environmental Division Melbourne  
**Contact** : Customer Services EM  
**Address** : 4 Westall Rd Springvale VIC Australia 3171  
**Telephone** : +61-3-8549 9600  
**Date Samples Received** : 07-Jun-2021 14:45  
**Date Analysis Commenced** : 10-Jun-2021  
**Issue Date** : 17-Jun-2021 16:14



Accreditation No. 825  
 Accredited for compliance with  
 ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

### Signatories

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

Signatories	Position	Accreditation Category
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC



## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

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.

~ = Indicates an estimated value.

- EA139, EA141, EA142: EM2110737#3: Sample is discoloured –Brown, and is higher in suspended solids than rest of work order.
- ALS is not NATA accredited for the analysis of metals in dust deposition gauge.
- Analysis as per AS3580.10.1-2016. Samples passed through a 1mm sieve prior to analysis. NATA accreditation does not apply for results reported in g/m<sup>2</sup>.mth as sampling data was provided by the client.
- Sampling Period: 30/04/2021-02/06/2021.
- Sample exposure period is 33 days which is outside the typical exposure period of 30+/-2 days as per AS3580.10.1





## Analytical Results

Sub-Matrix: DUST (Matrix: AIR)				Sample ID	WVDD01	WVDD02	WVDD03	WVDD04	WVDD05
Sampling date / time					02-Jun-2021 16:05	02-Jun-2021 14:00	02-Jun-2021 14:05	02-Jun-2021 14:30	02-Jun-2021 14:35
Compound	CAS Number	LOR	Unit		EM2110737-001	EM2110737-002	EM2110737-003	EM2110737-004	EM2110737-005
					Result	Result	Result	Result	Result
<b>EA120: Ash Content</b>									
Ash Content	----	0.1	g/m <sup>2</sup> .month		0.2	0.1	1.4	0.2	0.2
Ash Content (mg)	----	1	mg		3	2	26	4	3
<b>EA125: Combustible Matter</b>									
Combustible Matter	----	0.1	g/m <sup>2</sup> .month		0.3	0.2	4.5	0.4	0.2
Combustible Matter (mg)	----	1	mg		6	2	88	8	5
<b>EA139: Total Soluble Matter</b>									
Total Soluble Matter	----	0.1	g/m <sup>2</sup> .month		0.1	0.1	0.5	<0.1	0.2
Total Soluble Matter (mg)	----	1	mg		1	3	10	1	4
<b>EA141: Total Insoluble Matter</b>									
Total Insoluble Matter	----	0.1	g/m <sup>2</sup> .month		0.5	0.3	5.9	0.6	0.4
Total Insoluble Matter (mg)	----	1	mg		9	5	114	12	8
<b>EA142: Total Solids</b>									
Total Solids	----	0.1	g/m <sup>2</sup> .month		0.6	0.4	6.4	0.6	0.6
Total Solids (mg)	----	1	mg		10	8	124	13	12
<b>EG020T: Total Metals by ICP-MS</b>									
Ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month		2.64	1.93	17.9	<5.10	3.16
Ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month		<64.6	<56.6	<691	<117	<66.4
Ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month		45.1	46.5	622	70.3	38.8



## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

				Sample ID	WVDD06	KF1	KF2	KF3	KF4
Sampling date / time					02-Jun-2021 16:15	02-Jun-2021 13:00	02-Jun-2021 13:15	02-Jun-2021 13:10	02-Jun-2021 13:30
Compound	CAS Number	LOR	Unit		EM2110737-006	EM2110737-007	EM2110737-008	EM2110737-009	EM2110737-010
					Result	Result	Result	Result	Result
<b>EA120: Ash Content</b>									
Ash Content	----	0.1	g/m <sup>2</sup> .month		0.4	0.3	0.2	0.3	0.2
Ash Content (mg)	----	1	mg		7	5	4	6	4
<b>EA125: Combustible Matter</b>									
Combustible Matter	----	0.1	g/m <sup>2</sup> .month		0.5	0.4	0.4	0.5	0.3
Combustible Matter (mg)	----	1	mg		10	9	7	9	6
<b>EA139: Total Soluble Matter</b>									
Total Soluble Matter	----	0.1	g/m <sup>2</sup> .month		0.6	<0.1	0.2	0.2	0.2
Total Soluble Matter (mg)	----	1	mg		13	<1	3	3	3
<b>EA141: Total Insoluble Matter</b>									
Total Insoluble Matter	----	0.1	g/m <sup>2</sup> .month		0.9	0.7	0.6	0.8	0.5
Total Insoluble Matter (mg)	----	1	mg		17	14	11	15	10
<b>EA142: Total Solids</b>									
Total Solids	----	0.1	g/m <sup>2</sup> .month		1.5	0.7	0.8	1.0	0.7
Total Solids (mg)	----	1	mg		30	14	14	18	13
<b>EG020T: Total Metals by ICP-MS</b>									
Ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month		6.14	8.05	<46.8	<40.3	<12.3
Ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month		158	<91.3	<96.3	<157	<93.6
Ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month		75.5	74.6	71.5	133	68.2



## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

Sample ID

				WVDD01 Soluble As, Ba, Mn	WVDD02 Soluble As, Ba, Mn	WVDD03 Soluble As, Ba, Mn	WVDD04 Soluble As, Ba, Mn	WVDD05 Soluble As, Ba, Mn
Sampling date / time				02-Jun-2021 00:00	02-Jun-2021 00:00	02-Jun-2021 00:00	02-Jun-2021 00:00	02-Jun-2021 00:00
Compound	CAS Number	LOR	Unit	EM2110737-011	EM2110737-012	EM2110737-013	EM2110737-014	EM2110737-015
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS								
ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month	3.42	2.10	18.9	18.5	4.14
ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month	110	68.0	658	192	114
ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month	273	237	1700	519	291



## Analytical Results

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

Sample ID

				WVDD06 Soluble As, Ba, Mn	KF1 Soluble As, Ba, Mn	KF2 Soluble As, Ba, Mn	KF3 Soluble As, Ba, Mn	KF4 Soluble As, Ba, Mn
Sampling date / time				02-Jun-2021 00:00	02-Jun-2021 00:00	02-Jun-2021 00:00	02-Jun-2021 00:00	02-Jun-2021 00:00
Compound	CAS Number	LOR	Unit	EM2110737-016	EM2110737-017	EM2110737-018	EM2110737-019	EM2110737-020
				Result	Result	Result	Result	Result
<b>EG020T: Total Metals by ICP-MS</b>								
ø Arsenic	7440-38-2	0.05	µg/m².month	7.77	6.95	22.2	17.6	5.59
ø Barium	7440-39-3	0.05	µg/m².month	351	80.9	68.3	54.2	107
ø Manganese	7439-96-5	0.05	µg/m².month	387	306	258	315	270



## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

Sample ID

				WVDD01 Insoluble As, Ba, Mn	WVDD02 Insoluble As, Ba, Mn	WVDD03 Insoluble As, Ba, Mn	WVDD04 Insoluble As, Ba, Mn	WVDD05 Insoluble As, Ba, Mn
Sampling date / time				02-Jun-2021 00:00	02-Jun-2021 00:00	02-Jun-2021 00:00	02-Jun-2021 00:00	02-Jun-2021 00:00
Compound	CAS Number	LOR	Unit	EM2110737-021	EM2110737-022	EM2110737-023	EM2110737-024	EM2110737-025
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS								
Ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month	3.56	3.11	21.3	<5.10	3.41
Ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month	<64.6	<56.6	<691	<118	<66.4
Ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month	93.9	86.3	753	90.9	54.3



## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

Sample ID

				WVDD06 Insoluble As, Ba, Mn	KF1 Insoluble As, Ba, Mn	KF2 Insoluble As, Ba, Mn	KF3 Insoluble As, Ba, Mn	KF4 Insoluble As, Ba, Mn
Sampling date / time				02-Jun-2021 00:00	02-Jun-2021 00:00	02-Jun-2021 00:00	02-Jun-2021 00:00	02-Jun-2021 00:00
Compound	CAS Number	LOR	Unit	EM2110737-026	EM2110737-027	EM2110737-028	EM2110737-029	EM2110737-030
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS								
ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month	8.08	10.0	<46.8	<40.3	<12.3
ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month	173	<91.3	<96.3	<157	<93.6
ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month	130	121	106	136	71.9

## QUALITY CONTROL REPORT

<b>Work Order</b>	<b>: EM2110737</b>	<b>Page</b>	<b>: 1 of 3</b>
<b>Client</b>	<b>: ALS WATER RESOURCES GROUP</b>	<b>Laboratory</b>	<b>: Environmental Division Melbourne</b>
<b>Contact</b>	<b>: ROHAN OLIVER</b>	<b>Contact</b>	<b>: Customer Services EM</b>
<b>Address</b>	<b>: 94 KERANG-KOONDROOK ROAD KERANG 3579</b>	<b>Address</b>	<b>: 4 Westall Rd Springvale VIC Australia 3171</b>
<b>Telephone</b>	<b>: ----</b>	<b>Telephone</b>	<b>: +61-3-8549 9600</b>
<b>Project</b>	<b>: MV214940</b>	<b>Date Samples Received</b>	<b>: 07-Jun-2021</b>
<b>Order number</b>	<b>: ----</b>	<b>Date Analysis Commenced</b>	<b>: 10-Jun-2021</b>
<b>C-O-C number</b>	<b>: ----</b>	<b>Issue Date</b>	<b>: 17-Jun-2021</b>
<b>Sampler</b>	<b>: ROHAN OLIVER, ROHAN OLIVER</b>		
<b>Site</b>	<b>: ----</b>		
<b>Quote number</b>	<b>: ME/968/20</b>		
<b>No. of samples received</b>	<b>: 30</b>		
<b>No. of samples analysed</b>	<b>: 30</b>		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

### Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC



## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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

Key :  
Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot  
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  
RPD = Relative Percentage Difference  
# = Indicates failed QC

## Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

- **No Laboratory Duplicate (DUP) Results are required to be reported.**





## Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: AIR				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit			Result	LCS	Low
EA139: Total Soluble Matter (QCLot: 3729174)								
EA139: Total Soluble Matter	----	0.1	g/m².month	<0.1	1.66 g/m².month	102	70.0	130
EA139: Total Soluble Matter (mg)	----	1	mg	<1	29.3 mg	106	70.0	130
EA141: Total Insoluble Matter (QCLot: 3729175)								
EA141: Total Insoluble Matter	----	0.1	g/m².month	<0.1	5.66 g/m².month	76.0	66.8	134
EA141: Total Insoluble Matter (mg)	----	1	mg	<1	100 mg	78.0	67.5	125
EA142: Total Solids (QCLot: 3729173)								
EA142: Total Solids	----	0.1	g/m².month	<0.1	----	----	----	----
EA142: Total Solids (mg)	----	1	mg	<1	129.3 mg	84.3	68.4	126
EG020T: Total Metals by ICP-MS (QCLot: 3738143)								
EG020TUG: Arsenic	7440-38-2	0.05	µg	<0.050	----	----	----	----
EG020TUG: Barium	7440-39-3	0.05	µg	<0.050	----	----	----	----
EG020TUG: Manganese	7439-96-5	0.05	µg	<0.050	----	----	----	----
EG020T: Total Metals by ICP-MS (QCLot: 3738144)								
EG020TUG: Arsenic	7440-38-2	0.05	µg	<0.050	----	----	----	----
EG020TUG: Barium	7440-39-3	0.05	µg	<0.050	----	----	----	----
EG020TUG: Manganese	7439-96-5	0.05	µg	<0.050	----	----	----	----
EG020T: Total Metals by ICP-MS (QCLot: 3738145)								
EG020TUG: Arsenic	7440-38-2	0.05	µg	<0.050	----	----	----	----
EG020TUG: Barium	7440-39-3	0.05	µg	<0.050	----	----	----	----
EG020TUG: Manganese	7439-96-5	0.05	µg	<0.050	----	----	----	----

## Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

## QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM2110737	Page	: 1 of 5
Client	: ALS WATER RESOURCES GROUP	Laboratory	: Environmental Division Melbourne
Contact	: ROHAN OLIVER	Telephone	: +61-3-8549 9600
Project	: MV214940	Date Samples Received	: 07-Jun-2021
Site	: ----	Issue Date	: 17-Jun-2021
Sampler	: ROHAN OLIVER, ROHAN OLIVER	No. of samples received	: 30
Order number	: ----	No. of samples analysed	: 30

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

### Summary of Outliers

#### Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

#### Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

#### Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



## Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **AIR**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA120: Ash Content								
Dust Gauge (Bottle) - Copper Sulfate (EA120)		02-Jun-2021	----	----	----	10-Jun-2021	29-Nov-2021	✔
WVDD01,	WVDD02,							
WVDD03,	WVDD04,							
WVDD05,	WVDD06,							
KF1,	KF2,							
KF3,	KF4							
EA125: Combustible Matter								
Dust Gauge (Bottle) - Copper Sulfate (EA125)		02-Jun-2021	----	----	----	10-Jun-2021	29-Nov-2021	✔
WVDD01,	WVDD02,							
WVDD03,	WVDD04,							
WVDD05,	WVDD06,							
KF1,	KF2,							
KF3,	KF4							
EA139: Total Soluble Matter								
Dust Gauge (Bottle) - Copper Sulfate (EA139)		02-Jun-2021	----	----	----	10-Jun-2021	29-Nov-2021	✔
WVDD01,	WVDD02,							
WVDD03,	WVDD04,							
WVDD05,	WVDD06,							
KF1,	KF2,							
KF3,	KF4							
EA141: Total Insoluble Matter								
Dust Gauge (Bottle) - Copper Sulfate (EA141)		02-Jun-2021	----	----	----	10-Jun-2021	29-Nov-2021	✔
WVDD01,	WVDD02,							
WVDD03,	WVDD04,							
WVDD05,	WVDD06,							
KF1,	KF2,							
KF3,	KF4							

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA142: Total Solids								
Dust Gauge (Bottle) - Copper Sulfate (EA142)		02-Jun-2021	----	----	----	10-Jun-2021	29-Nov-2021	✓
WVDD01,	WVDD02,							
WVDD03,	WVDD04,							
WVDD05,	WVDD06,							
KF1,	KF2,							
KF3,	KF4							
EG020T: Total Metals by ICP-MS								
Dust Residue (EG020TUG)		02-Jun-2021	----	----	----	16-Jun-2021	29-Nov-2021	✓
WVDD01,	WVDD02,							
WVDD03,	WVDD04,							
WVDD05,	WVDD06,							
KF1,	KF2,							
KF3,	KF4,							
WVDD01 - Soluble As, Ba, Mn,	WVDD02 - Soluble As, Ba, Mn,							
WVDD03 - Soluble As, Ba, Mn,	WVDD04 - Soluble As, Ba, Mn,							
WVDD05 - Soluble As, Ba, Mn,	WVDD06 - Soluble As, Ba, Mn,							
KF1 - Soluble As, Ba, Mn,	KF2 - Soluble As, Ba, Mn,							
KF3 - Soluble As, Ba, Mn,	KF4 - Soluble As, Ba, Mn,							
WVDD01 - Insoluble As, Ba, Mn,	WVDD02 - Insoluble As, Ba, Mn,							
WVDD03 - Insoluble As, Ba, Mn,	WVDD04 - Insoluble As, Ba, Mn,							
WVDD05 - Insoluble As, Ba, Mn,	WVDD06 - Insoluble As, Ba, Mn,							
KF1 - Insoluble As, Ba, Mn,	KF2 - Insoluble As, Ba, Mn,							
KF3 - Insoluble As, Ba, Mn,	KF4 - Insoluble As, Ba, Mn,							



## Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **AIR**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS)							
Total Insoluble Matter (TIM)	EA141	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Solids (TS)	EA142	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Soluble Matter (SM)	EA139	1	10	10.00	4.76	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Insoluble Matter (TIM)	EA141	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals - ICP-MS (mass/filter)	EG020TUG	3	30	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Solids (TS)	EA142	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Soluble Matter (SM)	EA139	1	10	10.00	4.76	✔	NEPM 2013 B3 & ALS QC Standard



## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Ash Content (AC)	EA120	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Ash content in deposited dust.
Combustible Matter (CM)	EA125	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Combustible Matter in deposited dust.
Total Soluble Matter (SM)	EA139	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Soluble Solids in deposited dust.
Total Insoluble Matter (TIM)	EA141	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Total Insoluble solids in deposited dust.
Total Solids (TS)	EA142	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Total Solids in deposited dust.
Total Metals - ICP-MS (mass/filter)	* EG020TUG	AIR	In house: Referenced to APHA 3125; USEPA SW846, 6020 (ICPMS) Metals in Dust residue are quantified by ICPMS and reported as ug of the TIM.

## CERTIFICATE OF ANALYSIS

**Work Order** : **EM2112733**  
**Client** : **ALS WATER RESOURCES GROUP**  
**Contact** : **ROHAN OLIVER**  
**Address** : **94 KERANG-KOONDROOK ROAD**  
**KERANG 3579**  
**Telephone** : **----**  
**Project** : **MV214940**  
**Order number** : **----**  
**C-O-C number** : **----**  
**Sampler** : **KV**  
**Site** : **----**  
**Quote number** : **ME/968/20**  
**No. of samples received** : **30**  
**No. of samples analysed** : **30**

**Page** : 1 of 8  
**Laboratory** : Environmental Division Melbourne  
**Contact** : Customer Services EM  
**Address** : 4 Westall Rd Springvale VIC Australia 3171  
**Telephone** : +61-3-8549 9600  
**Date Samples Received** : 02-Jul-2021 11:20  
**Date Analysis Commenced** : 06-Jul-2021  
**Issue Date** : 13-Jul-2021 15:12



Accreditation No. 825  
 Accredited for compliance with  
 ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

### Signatories

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

Signatories	Position	Accreditation Category
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC



## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

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.

~ = Indicates an estimated value.

- Sampling period: 02/06/2021 - 30/06/21
- ALS is not NATA accredited for the analysis of metals in dust deposition gauge.
- Analysis as per AS3580.10.1-2016. Samples passed through a 1mm sieve prior to analysis. NATA accreditation does not apply for results reported in g/m<sup>2</sup>.mth as sampling data was provided by the client.
- EM2112733 #1: Sample has been visually observed to be turbid.
- Sample exposure period is within the typical exposure period of 30+/-2 days as per AS3580.10.1





## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

				Sample ID	WVDD01	WVDD02	WVDD03	WVDD04	WVDD05
Sampling date / time					30-Jun-2021 11:17	30-Jun-2021 11:25	30-Jun-2021 11:35	30-Jun-2021 12:00	30-Jun-2021 12:10
Compound	CAS Number	LOR	Unit		EM2112733-001	EM2112733-002	EM2112733-003	EM2112733-004	EM2112733-005
					Result	Result	Result	Result	Result
<b>EA120: Ash Content</b>									
Ash Content	----	0.1	g/m <sup>2</sup> .month		5.4	0.1	0.7	0.1	0.1
Ash Content (mg)	----	1	mg		90	2	11	2	2
<b>EA125: Combustible Matter</b>									
Combustible Matter	----	0.1	g/m <sup>2</sup> .month		13.9	0.1	1.6	0.6	0.1
Combustible Matter (mg)	----	1	mg		228	2	27	9	2
<b>EA139: Total Soluble Matter</b>									
Total Soluble Matter	----	0.1	g/m <sup>2</sup> .month		13.2	3.3	3.0	4.8	4.9
Total Soluble Matter (mg)	----	1	mg		217	54	49	79	81
<b>EA141: Total Insoluble Matter</b>									
Total Insoluble Matter	----	0.1	g/m <sup>2</sup> .month		19.3	0.2	2.3	0.7	0.2
Total Insoluble Matter (mg)	----	1	mg		318	4	38	11	4
<b>EA142: Total Solids</b>									
Total Solids	----	0.1	g/m <sup>2</sup> .month		32.5	3.5	5.3	5.5	5.1
Total Solids (mg)	----	1	mg		535	58	87	90	85
<b>EG020T: Total Metals by ICP-MS</b>									
Ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month		65.8	2.67	8.99	4.90	2.28
Ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month		<2340	<65.1	<343	<81.9	<65.6
Ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month		1690	50.0	276	84.2	44.5



## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

				Sample ID	WVDD06	KF1	KF2	KF3	KF4
				Sampling date / time	30-Jun-2021 11:00	30-Jun-2021 13:00	30-Jun-2021 13:10	30-Jun-2021 13:15	30-Jun-2021 13:25
Compound	CAS Number	LOR	Unit		EM2112733-006	EM2112733-007	EM2112733-008	EM2112733-009	EM2112733-010
					Result	Result	Result	Result	Result
<b>EA120: Ash Content</b>									
Ash Content	----	0.1	g/m <sup>2</sup> .month		1.2	0.2	0.2	0.2	0.2
Ash Content (mg)	----	1	mg		20	3	3	3	4
<b>EA125: Combustible Matter</b>									
Combustible Matter	----	0.1	g/m <sup>2</sup> .month		3.0	0.2	<0.1	<0.1	0.2
Combustible Matter (mg)	----	1	mg		50	3	1	1	2
<b>EA139: Total Soluble Matter</b>									
Total Soluble Matter	----	0.1	g/m <sup>2</sup> .month		6.0	1.7	2.3	1.5	0.7
Total Soluble Matter (mg)	----	1	mg		98	29	38	25	12
<b>EA141: Total Insoluble Matter</b>									
Total Insoluble Matter	----	0.1	g/m <sup>2</sup> .month		4.2	0.4	0.2	0.2	0.4
Total Insoluble Matter (mg)	----	1	mg		70	6	4	4	6
<b>EA142: Total Solids</b>									
Total Solids	----	0.1	g/m <sup>2</sup> .month		10.2	2.1	2.5	1.7	1.1
Total Solids (mg)	----	1	mg		168	35	42	29	18
<b>EG020T: Total Metals by ICP-MS</b>									
Ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month		<16.6	4.56	<13.4	<49.5	12.9
Ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month		<551	<67.7	<67.3	<62.3	<91.0
Ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month		226	64.3	62.2	53.0	84.6



## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

Sample ID

				WVDD01 Soluble As, Ba, Mn	WVDD02 Soluble As, Ba, Mn	WVDD03 Soluble As, Ba, Mn	WVDD04 Soluble As, Ba, Mn	WVDD05 Soluble As, Ba, Mn
Sampling date / time				30-Jun-2021 00:00	30-Jun-2021 00:00	30-Jun-2021 00:00	30-Jun-2021 00:00	30-Jun-2021 00:00
Compound	CAS Number	LOR	Unit	EM2112733-011	EM2112733-012	EM2112733-013	EM2112733-014	EM2112733-015
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS								
ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month	108	43.7	49.8	126	47.8
ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month	1750	87.1	412	241	104
ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month	2580	222	924	992	433



## Analytical Results

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

Sample ID

				WVDD06 Soluble As, Ba, Mn	KF1 Soluble As, Ba, Mn	KF2 Soluble As, Ba, Mn	KF3 Soluble As, Ba, Mn	KF4 Soluble As, Ba, Mn
Sampling date / time				30-Jun-2021 00:00	30-Jun-2021 00:00	30-Jun-2021 00:00	30-Jun-2021 00:00	30-Jun-2021 00:00
Compound	CAS Number	LOR	Unit	EM2112733-016	EM2112733-017	EM2112733-018	EM2112733-019	EM2112733-020
				Result	Result	Result	Result	Result
<b>EG020T: Total Metals by ICP-MS</b>								
ø Arsenic	7440-38-2	0.05	µg/m <sup>2</sup> .month	131	10.0	26.8	25.3	12.8
ø Barium	7440-39-3	0.05	µg/m <sup>2</sup> .month	714	114	72.1	109	241
ø Manganese	7439-96-5	0.05	µg/m <sup>2</sup> .month	1430	402	290	330	301



## Analytical Results

Sub-Matrix: DUST  
 (Matrix: AIR)

Sample ID

				WVDD01 Insoluble As, Ba, Mn	WVDD02 Insoluble As, Ba, Mn	WVDD03 Insoluble As, Ba, Mn	WVDD04 Insoluble As, Ba, Mn	WVDD05 Insoluble As, Ba, Mn
Sampling date / time				30-Jun-2021 00:00	30-Jun-2021 00:00	30-Jun-2021 00:00	30-Jun-2021 00:00	30-Jun-2021 00:00
Compound	CAS Number	LOR	Unit	EM2112733-021	EM2112733-022	EM2112733-023	EM2112733-024	EM2112733-025
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS								
ø Arsenic	7440-38-2	0.05	µg/m².month	85.6	2.67	12.4	13.1	2.60
ø Barium	7440-39-3	0.05	µg/m².month	<2340	<65.1	<343	<81.9	<65.6
ø Manganese	7439-96-5	0.05	µg/m².month	2240	50.2	358	110	45.9



## Analytical Results

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

Sample ID

				WVDD06 Insoluble As, Ba, Mn	KF1 Insoluble As, Ba, Mn	KF2 Insoluble As, Ba, Mn	KF3 Insoluble As, Ba, Mn	KF4 Insoluble As, Ba, Mn
Sampling date / time				30-Jun-2021 00:00	30-Jun-2021 00:00	30-Jun-2021 00:00	30-Jun-2021 00:00	30-Jun-2021 00:00
Compound	CAS Number	LOR	Unit	EM2112733-026	EM2112733-027	EM2112733-028	EM2112733-029	EM2112733-030
				Result	Result	Result	Result	Result
<b>EG020T: Total Metals by ICP-MS</b>								
Ø Arsenic	7440-38-2	0.05	µg/m².month	<16.6	7.15	<13.4	<49.5	14.7
Ø Barium	7440-39-3	0.05	µg/m².month	<551	<67.7	<67.3	<62.3	<91.0
Ø Manganese	7439-96-5	0.05	µg/m².month	225	91.0	97.5	98.3	89.6

## QUALITY CONTROL REPORT

<b>Work Order</b>	<b>: EM2112733</b>	<b>Page</b>	<b>: 1 of 3</b>
<b>Client</b>	<b>: ALS WATER RESOURCES GROUP</b>	<b>Laboratory</b>	<b>: Environmental Division Melbourne</b>
<b>Contact</b>	<b>: ROHAN OLIVER</b>	<b>Contact</b>	<b>: Customer Services EM</b>
<b>Address</b>	<b>: 94 KERANG-KOONDROOK ROAD KERANG 3579</b>	<b>Address</b>	<b>: 4 Westall Rd Springvale VIC Australia 3171</b>
<b>Telephone</b>	<b>: ----</b>	<b>Telephone</b>	<b>: +61-3-8549 9600</b>
<b>Project</b>	<b>: MV214940</b>	<b>Date Samples Received</b>	<b>: 02-Jul-2021</b>
<b>Order number</b>	<b>: ----</b>	<b>Date Analysis Commenced</b>	<b>: 06-Jul-2021</b>
<b>C-O-C number</b>	<b>: ----</b>	<b>Issue Date</b>	<b>: 13-Jul-2021</b>
<b>Sampler</b>	<b>: KV</b>		
<b>Site</b>	<b>: ----</b>		
<b>Quote number</b>	<b>: ME/968/20</b>		
<b>No. of samples received</b>	<b>: 30</b>		
<b>No. of samples analysed</b>	<b>: 30</b>		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

### Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC



## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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

Key :            Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot  
                  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  
                  RPD = Relative Percentage Difference  
                  # = Indicates failed QC

## Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

- **No Laboratory Duplicate (DUP) Results are required to be reported.**





## Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: AIR				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
			Spike Concentration		Spike Recovery (%)	Acceptable Limits (%)		
Method: Compound	CAS Number	LOR			Unit	Result	LCS	Low
EA139: Total Soluble Matter (QCLot: 3775249)								
EA139: Total Soluble Matter	----	0.1	g/m².month	<0.1	1.66 g/m².month	114	70.0	130
EA139: Total Soluble Matter (mg)	----	1	mg	<1	29.3 mg	113	70.0	130
EA141: Total Insoluble Matter (QCLot: 3775246)								
EA141: Total Insoluble Matter	----	0.1	g/m².month	<0.1	5.66 g/m².month	90.1	66.8	134
EA141: Total Insoluble Matter (mg)	----	1	mg	<1	100 mg	90.0	67.5	125
EA142: Total Solids (QCLot: 3775248)								
EA142: Total Solids	----	0.1	g/m².month	<0.1	----	----	----	----
EA142: Total Solids (mg)	----	1	mg	<1	129.3 mg	95.1	68.4	126
EG020T: Total Metals by ICP-MS (QCLot: 3786259)								
EG020TUG: Arsenic	7440-38-2	0.05	µg	<0.050	----	----	----	----
EG020TUG: Barium	7440-39-3	0.05	µg	<0.050	----	----	----	----
EG020TUG: Manganese	7439-96-5	0.05	µg	<0.050	----	----	----	----
EG020T: Total Metals by ICP-MS (QCLot: 3786260)								
EG020TUG: Arsenic	7440-38-2	0.05	µg	<0.050	----	----	----	----
EG020TUG: Barium	7440-39-3	0.05	µg	<0.050	----	----	----	----
EG020TUG: Manganese	7439-96-5	0.05	µg	<0.050	----	----	----	----

## Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

## QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM2112733	Page	: 1 of 5
Client	: ALS WATER RESOURCES GROUP	Laboratory	: Environmental Division Melbourne
Contact	: ROHAN OLIVER	Telephone	: +61-3-8549 9600
Project	: MV214940	Date Samples Received	: 02-Jul-2021
Site	: ----	Issue Date	: 13-Jul-2021
Sampler	: KV	No. of samples received	: 30
Order number	: ----	No. of samples analysed	: 30

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

### Summary of Outliers

#### Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

#### Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

#### Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results. This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein. Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters. Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Evaluation: ✖ = Holding time breach : ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA120: Ash Content							
Dust Gauge (Bottle) - Copper Sulfate (EA120) WVDD01, WVDD02, WVDD03, WVDD04, WVDD05, WVDD06, KF1, KF2, KF3, KF4	30-Jun-2021	----	----	----	06-Jul-2021	27-Dec-2021	✓
EA125: Combustible Matter							
Dust Gauge (Bottle) - Copper Sulfate (EA125) WVDD01, WVDD02, WVDD03, WVDD04, WVDD05, WVDD06, KF1, KF2, KF3, KF4	30-Jun-2021	----	----	----	06-Jul-2021	27-Dec-2021	✓
EA139: Total Soluble Matter							
Dust Gauge (Bottle) - Copper Sulfate (EA139) WVDD01, WVDD02, WVDD03, WVDD04, WVDD05, WVDD06, KF1, KF2, KF3, KF4	30-Jun-2021	----	----	----	06-Jul-2021	27-Dec-2021	✓
EA141: Total Insoluble Matter							
Dust Gauge (Bottle) - Copper Sulfate (EA141) WVDD01, WVDD02, WVDD03, WVDD04, WVDD05, WVDD06, KF1, KF2, KF3, KF4	30-Jun-2021	----	----	----	06-Jul-2021	27-Dec-2021	✓

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA142: Total Solids								
Dust Gauge (Bottle) - Copper Sulfate (EA142)								
WVDD01,	WVDD02,	30-Jun-2021	----	----	----	06-Jul-2021	27-Dec-2021	✓
WVDD03,	WVDD04,							
WVDD05,	WVDD06,							
KF1,	KF2,							
KF3,	KF4							
EG020T: Total Metals by ICP-MS								
Dust Residue (EG020TUG)								
WVDD01,	WVDD02,	30-Jun-2021	----	----	----	12-Jul-2021	27-Dec-2021	✓
WVDD03,	WVDD04,							
WVDD05,	WVDD06,							
KF1,	KF2,							
KF3,	KF4,							
WVDD01 - Soluble As, Ba, Mn,	WVDD02 - Soluble As, Ba, Mn,							
WVDD03 - Soluble As, Ba, Mn,	WVDD04 - Soluble As, Ba, Mn,							
WVDD05 - Soluble As, Ba, Mn,	WVDD06 - Soluble As, Ba, Mn,							
KF1 - Soluble As, Ba, Mn,	KF2 - Soluble As, Ba, Mn,							
KF3 - Soluble As, Ba, Mn,	KF4 - Soluble As, Ba, Mn,							
WVDD01 - Insoluble As, Ba, Mn,	WVDD02 - Insoluble As, Ba, Mn,							
WVDD03 - Insoluble As, Ba, Mn,	WVDD04 - Insoluble As, Ba, Mn,							
WVDD05 - Insoluble As, Ba, Mn,	WVDD06 - Insoluble As, Ba, Mn,							
KF1 - Insoluble As, Ba, Mn,	KF2 - Insoluble As, Ba, Mn,							
KF3 - Insoluble As, Ba, Mn,	KF4 - Insoluble As, Ba, Mn,							



## Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **AIR**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS)							
Total Insoluble Matter (TIM)	EA141	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Solids (TS)	EA142	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Soluble Matter (SM)	EA139	1	12	8.33	4.76	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Insoluble Matter (TIM)	EA141	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals - ICP-MS (mass/filter)	EG020TUG	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Solids (TS)	EA142	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Soluble Matter (SM)	EA139	1	12	8.33	4.76	✔	NEPM 2013 B3 & ALS QC Standard



## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Ash Content (AC)	EA120	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Ash content in deposited dust.
Combustible Matter (CM)	EA125	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Combustible Matter in deposited dust.
Total Soluble Matter (SM)	EA139	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Soluble Solids in deposited dust.
Total Insoluble Matter (TIM)	EA141	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Total Insoluble solids in deposited dust.
Total Solids (TS)	EA142	AIR	In house: Referenced to AS 3580.10.1. A gravimetric procedure reporting Total Solids in deposited dust.
Total Metals - ICP-MS (mass/filter)	* EG020TUG	AIR	In house: Referenced to APHA 3125; USEPA SW846, 6020 (ICPMS) Metals in Dust residue are quantified by ICPMS and reported as ug of the TIM.