



Environmental Division

CERTIFICATE OF ANALYSIS

Work Order

: EB1225794

Page

: 1 of 4

Client

: MIKE SCOTT

Laboratory

: Environmental Division Brisbane

Contact

: MR MIKE SCOTT

Contact

: Customer Services

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Project

: ----

QC Level

: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Order number

: ----

C-O-C number

: ----

Sampler

: ----

Site

: ----

Quote number

: ----

No. of samples received

: 1

No. of samples analysed

: 1

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with

ISO/IEC 17025.

Signatories

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

Signatories

Position

Stephen Hislop

Senior Inorganic Chemist

Accreditation Category

Brisbane Inorganics



WORLD RECOGNISED ACCREDITATION

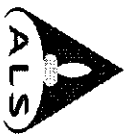


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Page : 2 of 4
Work Order : EB1225794
Client : MIKE SCOTT
Project : _____



General Comments

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

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

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

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

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

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

LOR = Limit of reporting

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



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Compound	CAS Number	LOR	Unit	Client sample ID	
				1	
EG020F: Dissolved Metals by ICP-MS					
Aluminum	7429-90-5	0.01	mg/L	0.19	
Dysprosium	7429-91-6	0.001	mg/L	<0.001	
Silver	7440-22-4	0.001	mg/L	<0.001	
Arsenic	7440-38-2	0.001	mg/L	<0.001	
Bismuth	7440-69-9	0.001	mg/L	<0.001	
Erbium	7440-52-0	0.001	mg/L	<0.001	
Boron	7440-42-8	0.05	mg/L	<0.05	
Europium	7440-53-1	0.001	mg/L	<0.001	
Strontium	7440-24-6	0.001	mg/L	0.020	
Barium	7440-39-3	0.001	mg/L	0.011	
Gadolinium	7440-54-2	0.001	mg/L	<0.001	
Titanium	7440-32-6	0.01	mg/L	<0.01	
Beryllium	7440-41-7	0.001	mg/L	<0.001	
Gallium	7440-55-3	0.001	mg/L	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	0.0392	
Hafnium	7440-58-6	0.01	mg/L	<0.01	
Tellurium	22541-49-7	0.005	mg/L	<0.005	
Cobalt	7440-48-4	0.001	mg/L	<0.001	
Holmium	7440-60-0	0.001	mg/L	<0.001	
Uranium	7440-61-1	0.001	mg/L	<0.001	
Caesium	7440-46-2	0.001	mg/L	<0.001	
Chromium	7440-47-3	0.001	mg/L	<0.001	
Indium	7440-74-6	0.001	mg/L	<0.001	
Copper	7440-50-8	0.001	mg/L	0.003	
Lanthanum	7439-91-0	0.001	mg/L	<0.001	
Rubidium	7440-17-7	0.001	mg/L	<0.001	
Lithium	7439-93-2	0.001	mg/L	<0.001	
Lutetium	7439-94-3	0.001	mg/L	<0.001	
Thorium	7440-29-1	0.001	mg/L	<0.001	
Cerium	7440-45-1	0.001	mg/L	<0.001	
Manganese	7439-96-5	0.001	mg/L	0.028	
Neodymium	7440-00-8	0.001	mg/L	<0.001	
Molybdenum	7439-98-7	0.001	mg/L	<0.001	
Praseodymium	7440-10-0	0.001	mg/L	<0.001	

Client sampling date / time

20-SEP-2012 15:00

CAS Number

EB1225794-001



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Compound	CAS Number	LOR	Unit	Client sample ID	Client sampling date / time	Result	Result	Result	Result	Result	Result
E6020F: Dissolved Metals by ICP-MS - Continued											
Nickel	7440-02-0	0.001	mg/L	1	20-SEP-2012 15:00	<0.001	---	---	---	---	---
Samarium	7440-19-9	0.001	mg/L		EB1225794-001	<0.001	---	---	---	---	---
Lead	7439-92-1	0.001	mg/L			0.001	---	---	---	---	---
Terbium	7440-27-9	0.001	mg/L			<0.001	---	---	---	---	---
Antimony	7440-36-0	0.001	mg/L			<0.001	---	---	---	---	---
Thulium	7440-30-4	0.001	mg/L			<0.001	---	---	---	---	---
Selenium	7782-49-2	0.01	mg/L			<0.01	---	---	---	---	---
Ytterbium	7440-64-4	0.001	mg/L			<0.001	---	---	---	---	---
Tin	7440-31-5	0.001	mg/L			<0.001	---	---	---	---	---
Yttrium	7440-65-5	0.001	mg/L			<0.001	---	---	---	---	---
Thallium	7440-28-0	0.001	mg/L			<0.001	---	---	---	---	---
Zirconium	7440-67-7	0.005	mg/L			<0.005	---	---	---	---	---
Vanadium	7440-62-2	0.01	mg/L			<0.01	---	---	---	---	---
Zinc	7440-66-6	0.005	mg/L			0.043	---	---	---	---	---
Iron	7439-89-6	0.05	mg/L			0.07	---	---	---	---	---

Matrix: WATER
 Workgroup: EB1225794
 Project name/number:

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Analyte grouping/Analyte	CAS Number	Units	LOR
EG020F: Dissolved Metals by ICP-MS			
Aluminium	7429-90-5	mg/L	0.01
Dysprosium	7429-91-6	mg/L	0.001
Silver	7440-22-4	mg/L	0.001
Arsenic	7440-38-2	mg/L	0.001
Bismuth	7440-69-9	mg/L	0.001
Erbium	7440-52-0	mg/L	0.001
Boron	7440-42-8	mg/L	0.05
Europium	7440-53-1	mg/L	0.001
Strontium	7440-24-6	mg/L	0.001
Barium	7440-39-3	mg/L	0.001
Gadolinium	7440-54-2	mg/L	0.001
Titanium	7440-32-6	mg/L	0.01
Beryllium	7440-41-7	mg/L	0.001
Gallium	7440-55-3	mg/L	0.001
Cadmium	7440-43-9	mg/L	0.0001
Hafnium	7440-58-6	mg/L	0.01
Tellurium	22541-49-7	mg/L	0.005
Cobalt	7440-48-4	mg/L	0.001
Holmium	7440-60-0	mg/L	0.001
Uranium	7440-61-1	mg/L	0.001
Caesium	7440-46-2	mg/L	0.001
Chromium	7440-47-3	mg/L	0.001
Indium	7440-74-6	mg/L	0.001
Copper	7440-50-8	mg/L	0.001
Lanthanum	7439-91-0	mg/L	0.001
Rubidium	7440-17-7	mg/L	0.001
Lithium	7439-93-2	mg/L	0.001
Lutetium	7439-94-3	mg/L	0.001
Thorium	7440-29-1	mg/L	0.001
Cerium	7440-45-1	mg/L	0.001
Manganese	7439-96-5	mg/L	0.001
Neodymium	7440-00-8	mg/L	0.001
Molybdenum	7439-98-7	mg/L	0.001
Praseodymium	7440-10-0	mg/L	0.001
Nickel	7440-02-0	mg/L	0.001
Samarium	7440-19-9	mg/L	0.001

Lead	7439-92-1	mg/L	0.001
Terbium	7440-27-9	mg/L	0.001
Antimony	7440-36-0	mg/L	0.001
Thulium	7440-30-4	mg/L	0.001
Selenium	7782-49-2	mg/L	0.01
Ytterbium	7440-64-4	mg/L	0.001
Tin	7440-31-5	mg/L	0.001
Yttrium	7440-65-5	mg/L	0.001
Thallium	7440-28-0	mg/L	0.001
Zirconium	7440-67-7	mg/L	0.005
Vanadium	7440-62-2	mg/L	0.01
Zinc	7440-66-6	mg/L	0.005
Iron	7439-89-6	mg/L	0.05



Environmental Division

INTERPRETIVE QUALITY CONTROL REPORT

Work Order : EB1225794

Page : 1 of 5

Client : MIKE SCOTT
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Project :
Site :

QC Level : NEPM 1999 Schedule B(3) and ALS QCCS3 requirement

C-O-C number :
Sampler :

Date Samples Received : 25-SEP-2012
Issue Date : 10-OCT-2012

Order number :
Quote number :

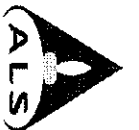
No. of samples received : 1
No. of samples analysed : 1

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers





Analysis Holding Time Compliance

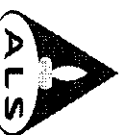
The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: WATER

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

Method	Sample Date	Extraction / Preparation		Analysis		
		Date extracted	Due for extraction	Date analysed	Due for analysis	
EG020F: Dissolved Metals by ICP-MS						
Plastic specimen jar (EG020A-F)						
1	20-SEP-2012	--	19-MAR-2013	08-OCT-2012	19-MAR-2013	✓
EG020F: Dissolved Metals by ICP-MS						
Plastic specimen jar (EG020B-F)						
1	20-SEP-2012	--	19-MAR-2013	08-OCT-2012	19-MAR-2013	✓
EG020F: Dissolved Metals by ICP-MS						
Plastic specimen jar (EG020D-F)						
1	20-SEP-2012	--	19-MAR-2013	08-OCT-2012	19-MAR-2013	✓



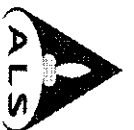
Quality Control Parameter Frequency Compliance

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: WATER

Evaluation: x = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	QC Count	Regular	Actual	Rate (%)	Expected	Evaluation	Quality Control Specification
Laboratory Duplicates (DUP)								
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement	
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement	
Dissolved Metals by ICP-MS - Suite D	EG020D-F	2	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement	
Laboratory Control Samples (LCS)								
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement	
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement	
Method Blanks (MB)								
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement	
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement	
Dissolved Metals by ICP-MS - Suite D	EG020D-F	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement	
Matrix Spikes (MS)								
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	5.6	5.0	✓	ALS QCS3 requirement	



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	Description
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWL-EN/EG020): Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWL-EN/EG020): Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals by ICP-MS - Suite D	EG020D-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWL-EN/EG020): Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QVW/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

- For all matrices, no Method Blank value outliers occur.
- For all matrices, no Duplicate outliers occur.
- For all matrices, no Laboratory Control outliers occur.
- For all matrices, no Matrix Spike outliers occur.

Regular Sample Surrogates

- For all regular sample matrices, no surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- No Quality Control Sample Frequency Outliers exist.