

Appendix 4 Laboratory analysis reports

Appendix 4 contains the laboratory analysis reports for High Volume Air Sampler PM₁₀ and metals, and dust deposition.

High Volume Air Sampler PM₁₀ and metals

- Certificate of analysis PEE1153 (15 pages)
- Certificate of analysis PED1298 (15 pages)
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Dust deposition

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Certificate of Analysis PED1153

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	20/04/2023
Date Instructions Received	20/04/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	01/05/2023
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Authorisation Details

Airborne Dust Approved By	Heram Halim Thomas Edwards
Results Approved By	Heram Halim, Operations Manager Thomas Edwards, OHL Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PED1153

Report Amendment History

Revision	Reason for Amendment
R-02	Results now include /filter and /m3 unit reporting.
R-04	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.
R-01	Updated Results: Now blank corrected using supplied blank filter
R-03	QC reporting updated to include PQL and updated RPD flag qualifiers.

Certificate of Analysis PED1153

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PED1153-01	TENV1	HiVol Filter	17/04/2023	20/04/2023
PED1153-02	TENV2	HiVol Filter	17/04/2023	20/04/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
TENV1	TENV1	[NA]	[NA]	1500
TENV2	TENV2	[NA]	[NA]	[NA]

Certificate of Analysis PED1153

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PED1153-01 TENV1 17/04/2023	PED1153-02 TENV2 17/04/2023
Aluminium	µg/sample	5.0	730 [1]	8400
Aluminium	µg/m3		0.49 [1]	[NA]
Boron	µg/sample	20	49 [1]	16000
Boron	µg/m3		0.033 [1]	[NA]
Barium	µg/sample	2.0	170 [1]	4100
Barium	µg/m3		0.11 [1]	[NA]
Calcium	µg/sample	50	1600 [1]	35000
Calcium	µg/m3		1.1 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	<2.0 [1]	15
Chromium	µg/m3		<0.0013 [1]	[NA]
Copper	µg/sample	2.0	<2.0 [1]	7.8
Copper	µg/m3		<0.0013 [1]	[NA]
Iron	µg/sample	5.0	230 [1]	280
Iron	µg/m3		0.15 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	210 [1]	6600
Potassium	µg/m3		0.14 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	5.5
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	580 [1]	12000
Magnesium	µg/m3		0.39 [1]	[NA]
Manganese	µg/sample	2.0	2.6 [1]	9.7
Manganese	µg/m3		0.0017 [1]	[NA]
Molybdenum	µg/sample	5.0	7.2 [1]	<5.0
Molybdenum	µg/m3		0.0048 [1]	[NA]
Sodium	µg/sample	100	2600 [1]	130000
Sodium	µg/m3		1.7 [1]	[NA]
Nickel	µg/sample	2.0	14 [1]	3.9
Nickel	µg/m3		0.0096 [1]	[NA]
Phosphorus	µg/sample	20	21 [1]	<20
Phosphorus	µg/m3		0.014 [1]	[NA]
Lead	µg/sample	5.0	<5.0 [1]	<5.0
Lead	µg/m3		<0.0033 [1]	[NA]
Sulfur	µg/sample	50	480 [1]	2000
Sulfur	µg/m3		0.32 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	5.2 [1]	12
Titanium	µg/m3		0.0035 [1]	[NA]
Vanadium	µg/sample	2.0	2.2 [1]	<2.0
Vanadium	µg/m3		0.0015 [1]	[NA]

Certificate of Analysis PED1153

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PED1153-01 TENV1 17/04/2023	PED1153-02 TENV2 17/04/2023
Zinc	µg/sample	5.0	56 [1]	2800
Zinc	µg/m3		0.037 [1]	[NA]
Arsenic	µg/sample	2.0	<2.0 [1]	2.7
Arsenic	µg/m3		<0.0013 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	<4.0 [1]	<4.0
Thorium	µg/m3		<0.0027 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PED1153

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PED1153-01	PED1153-02
Your Reference			TENV1	TENV2
Date Sampled			17/04/2023	17/04/2023
Dust	mg	0.10	5.6	<0.10
Dust	µg/m3	0.10	3.7	[NA]

Certificate of Analysis PED1153

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

Certificate of Analysis PED1153

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

Certificate of Analysis PED1153

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PED1153

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PED1153

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	No	Duplicate Outliers Exist - See detailed list below
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	No	QC Frequency Outliers Exist - See detailed list below

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PED1153

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	1	17/04/2023	28/04/2023	10/08/2023	Yes
	2	17/04/2023	28/04/2023	28/04/2023	Yes
Metals OHS (LL) HiVol Filter	1	17/04/2023	28/04/2023	10/08/2023	Yes
	2	17/04/2023	28/04/2023	29/04/2023	Yes
Metals OHS-Hg HiVol Filter	1	17/04/2023	28/04/2023	10/08/2023	Yes
	2	17/04/2023	28/04/2023	28/04/2023	Yes
Gravimetric Dust HiVol Filter	1	17/04/2023	28/04/2023	10/08/2023	Yes
	2	17/04/2023	28/04/2023	28/04/2023	Yes

Outliers: Duplicates

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BED2805

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PED1153-01	DUP1	Sodium	40.00	95.7[2]
BED2805-DUP2#	DUP2	Calcium	40.00	79.4[2]
BED2805-DUP2#	DUP2	Magnesium	40.00	86.0[2]
BED2805-DUP2#	DUP2	Potassium	40.00	46.6[2]
BED2805-DUP2#	DUP2	Sodium	40.00	66.9[2]

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BED2805

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PED1153-01	DUP1	Boron	40.00	166[3]
PED1153-01	DUP1	Zinc	40.00	67.3[2]
BED2805-DUP2#	DUP2	Barium	40.00	46.5[2]
BED2805-DUP2#	DUP2	Boron	40.00	92.2[3]
BED2805-DUP2#	DUP2	Zinc	40.00	83.8[2]

Data Quality Assessment Summary PED1153

Outliers: QC Frequency

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BED2806

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BED2806

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BED2810

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BED2807

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BED2808

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

Quality Control PED1153

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BED2805

Analyte	Units	PQL	Blank	DUP1	DUP2	LCS %
				PED1153-01 Samp QC RPD %	BED2805-DUP2# Samp QC RPD %	
Aluminium	µg/sample	5.0	<5.0	734 830 12.3	1500 2200 37.6	106
Barium	µg/sample	2.0	<2.0	171 253 38.5	312 500 46.5 [2]	113
Boron	µg/sample	20	<20	49.4 533 166 [3]	684 1850 92.2 [3]	108
Cadmium	µg/sample	0.50	<0.50	<0.50 <0.50 [NA]	<0.50 <0.50 [NA]	105
Calcium	µg/sample	50	<50	1610 2220 31.6	2290 5300 79.4 [2]	98.9
Chromium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	<2.0 2.40 [NA] [3]	110
Cobalt	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	<2.0 <2.0 [NA]	107
Copper	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	8.20 5.80 [NA]	114
Iron	µg/sample	5.0	<5.0	229 226 1.06	835 860 3.02	109
Lead	µg/sample	5.0	<5.0	<5.0 <5.0 [NA]	6.28 5.99 [NA]	107
Lithium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	<2.0 <2.0 [NA]	115
Magnesium	µg/sample	50	<50	582 758 26.3	750 1880 86.0 [2]	101
Manganese	µg/sample	2.0	<2.0	2.60 2.60 [NA]	6.40 7.00 [NA]	109
Molybdenum	µg/sample	5.0	<5.0	7.20 5.05 [NA]	<5.0 <5.0 [NA]	110
Nickel	µg/sample	2.0	<2.0	14.4 4.40 [NA] [3]	<2.0 <2.0 [NA]	108
Phosphorus	µg/sample	20	<20	21.2 <20 [NA]	27.0 30.2 [NA]	102
Potassium	µg/sample	50	<50	207 292 [NA]	717 1150 46.6 [2]	99.5
Sodium	µg/sample	100	<100	2570 7300 95.7 [2]	7350 14800 66.9 [2]	101
Sulfur	µg/sample	50	<50	480 494 2.96	665 682 2.49	98.9
Tin	µg/sample	10	<10	<10 <10 [NA]	<10 <10 [NA]	105
Titanium	µg/sample	2.0	<2.0	5.20 4.60 [NA]	16.2 17.4 7.14	104
Vanadium	µg/sample	2.0	<2.0	2.21 2.25 [NA]	3.68 3.68 [NA]	109
Zinc	µg/sample	5.0	<5.0	56.2 113 67.3 [2]	119 291 83.8 [2]	107

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BED2806

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	106
Barium	µg/sample	2.0	<2.0	114
Boron	µg/sample	20	<20	119
Cadmium	µg/sample	0.50	<0.50	105
Calcium	µg/sample	50	<50	100
Chromium	µg/sample	2.0	<2.0	110
Cobalt	µg/sample	2.0	<2.0	108
Copper	µg/sample	2.0	<2.0	115
Iron	µg/sample	5.0	<5.0	108
Lead	µg/sample	5.0	<5.0	107
Lithium	µg/sample	2.0	<2.0	115
Magnesium	µg/sample	50	<50	101
Manganese	µg/sample	2.0	<2.0	109
Molybdenum	µg/sample	5.0	<5.0	109
Nickel	µg/sample	2.0	<2.0	108
Phosphorus	µg/sample	20	<20	102
Potassium	µg/sample	50	<50	99.7
Sodium	µg/sample	100	<100	102
Sulfur	µg/sample	50	<50	101
Tin	µg/sample	10	<10	105
Titanium	µg/sample	2.0	<2.0	105
Vanadium	µg/sample	2.0	<2.0	109
Zinc	µg/sample	5.0	<5.0	107

Quality Control PED1153

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BED2807

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	113
Arsenic	µg/sample	2.0	<2.0	103
Beryllium	µg/sample	2.0	<2.0	112
Gallium	µg/sample	4.0	<4.0	98.0
Selenium	µg/sample	4.0	<4.0	103
Thallium	µg/sample	4.0	<4.0	95.3
Thorium	µg/sample	4.0	<4.0	96.1
Uranium	µg/sample	4.0	<4.0	99.2

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BED2808

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	115
Arsenic	µg/sample	2.0	<2.0	102
Beryllium	µg/sample	2.0	<2.0	115
Gallium	µg/sample	4.0	<4.0	98.1
Selenium	µg/sample	4.0	<4.0	105
Thallium	µg/sample	4.0	<4.0	98.8
Thorium	µg/sample	4.0	<4.0	102
Uranium	µg/sample	4.0	<4.0	104

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BED2809

Analyte	Units	PQL	Blank	DUP1	DUP2	LCS %
				PED1153-01 Samp QC RPD %	BED2809-DUP2# Samp QC RPD %	
Mercury	µg/sample	0.20	<0.20	<0.20 <0.20 [NA]	<0.20 <0.20 [NA]	96.8

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BED2810

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.20	<0.20	99.2

QC Comments

Identifier	Description
[2]	Duplicate analysis precision is/are outside acceptable %RPD, re-analysis indicates possible sample heterogeneity.
[3]	Duplicate %RPD may be flagged as an outlier to routine laboratory acceptance, however, where one or both results are <10*PQL, the RPD acceptance criteria increases exponentially.

Certificate of Analysis PED1298

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	24/04/2023
Date Instructions Received	24/04/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	02/05/2023
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Authorisation Details

Airborne Dust Approved By	Heram Halim Thomas Edwards
Results Approved By	Heram Halim, Operations Manager Thomas Edwards, OHL Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PED1298

Report Amendment History

Revision	Reason for Amendment
R-03	QC reporting updated to include PQL and updated RPD flag qualifiers.
R-02	Results now include /filter and /m3 unit reporting.
R-01	Updated Results: Now blank corrected using supplied blank filter
R-04	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.

Certificate of Analysis PED1298

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PED1298-01	Sample 2	HiVol Filter	23/04/2023	24/04/2023
PED1298-02	Blank 2	HiVol Filter	23/04/2023	24/04/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
Sample 2	TENV3	[NA]	[NA]	1500
Blank 2	TENV4	[NA]	[NA]	[NA]

Certificate of Analysis PED1298

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PED1298-01 Sample 2 23/04/2023	PED1298-02 Blank 2 23/04/2023
Aluminium	µg/sample	5.0	1500 [1]	7600
Aluminium	µg/m3		1.0 [1]	[NA]
Boron	µg/sample	20	680 [1]	15000
Boron	µg/m3		0.46 [1]	[NA]
Barium	µg/sample	2.0	310 [1]	3800
Barium	µg/m3		0.21 [1]	[NA]
Calcium	µg/sample	50	2300 [1]	32000
Calcium	µg/m3		1.5 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	<2.0 [1]	15
Chromium	µg/m3		<0.0013 [1]	[NA]
Copper	µg/sample	2.0	8.2 [1]	7.5
Copper	µg/m3		0.0055 [1]	[NA]
Iron	µg/sample	5.0	830 [1]	270
Iron	µg/m3		0.56 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	720 [1]	6200
Potassium	µg/m3		0.48 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	5.1
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	750 [1]	11000
Magnesium	µg/m3		0.50 [1]	[NA]
Manganese	µg/sample	2.0	6.4 [1]	9.1
Manganese	µg/m3		0.0043 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	<5.0
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	7400 [1]	120000
Sodium	µg/m3		4.9 [1]	[NA]
Nickel	µg/sample	2.0	<2.0 [1]	3.1
Nickel	µg/m3		<0.0013 [1]	[NA]
Phosphorus	µg/sample	20	27 [1]	<20
Phosphorus	µg/m3		0.018 [1]	[NA]
Lead	µg/sample	5.0	6.3 [1]	<5.0
Lead	µg/m3		0.0042 [1]	[NA]
Sulfur	µg/sample	50	660 [1]	1900
Sulfur	µg/m3		0.44 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	16 [1]	11
Titanium	µg/m3		0.011 [1]	[NA]
Vanadium	µg/sample	2.0	3.7 [1]	<2.0
Vanadium	µg/m3		0.0025 [1]	[NA]

Certificate of Analysis PED1298

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PED1298-01 Sample 2 23/04/2023	PED1298-02 Blank 2 23/04/2023
Zinc	µg/sample	5.0	120 [1]	2700
Zinc	µg/m3		0.079 [1]	[NA]
Arsenic	µg/sample	2.0	<2.0 [1]	2.4
Arsenic	µg/m3		<0.0013 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	<4.0 [1]	<4.0
Thorium	µg/m3		<0.0027 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PED1298

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PED1298-01	PED1298-02
Your Reference			Sample 2	Blank 2
Date Sampled			23/04/2023	23/04/2023
Dust	mg	0.10	66	<0.10
Dust	µg/m3	0.10	44	[NA]

Certificate of Analysis PED1298

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

Certificate of Analysis PED1298

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

Certificate of Analysis PED1298

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PED1298

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PED1298

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	No	Duplicate Outliers Exist - See detailed list below
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	No	QC Frequency Outliers Exist - See detailed list below

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PED1298

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	1	23/04/2023	28/04/2023	10/08/2023	Yes
	2	23/04/2023	28/04/2023	28/04/2023	Yes
Metals OHS (LL) HiVol Filter	1	23/04/2023	28/04/2023	10/08/2023	Yes
	2	23/04/2023	28/04/2023	29/04/2023	Yes
Metals OHS-Hg HiVol Filter	1	23/04/2023	28/04/2023	10/08/2023	Yes
	2	23/04/2023	28/04/2023	28/04/2023	Yes
Gravimetric Dust HiVol Filter	1	23/04/2023	28/04/2023	10/08/2023	Yes
	2	23/04/2023	28/04/2023	28/04/2023	Yes

Outliers: Duplicates

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BED2805

Sample ID	Duplicate ID	Analyte	% Limits	RPD
BED2805-DUP1#	DUP1	Sodium	40.00	95.7[2]
PED1298-01	DUP2	Calcium	40.00	79.4[2]
PED1298-01	DUP2	Magnesium	40.00	86.0[2]
PED1298-01	DUP2	Potassium	40.00	46.6[2]
PED1298-01	DUP2	Sodium	40.00	66.9[2]

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BED2805

Sample ID	Duplicate ID	Analyte	% Limits	RPD
BED2805-DUP1#	DUP1	Boron	40.00	166[3]
BED2805-DUP1#	DUP1	Zinc	40.00	67.3[2]
PED1298-01	DUP2	Barium	40.00	46.5[2]
PED1298-01	DUP2	Boron	40.00	92.2[3]
PED1298-01	DUP2	Zinc	40.00	83.8[2]

Data Quality Assessment Summary PED1298

Outliers: QC Frequency

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BED2806

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BED2806

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BED2810

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BED2807

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BED2808

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

Quality Control PED1298

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BED2805

Analyte	Units	PQL	Blank	DUP1	DUP2	LCS %
				BED2805-DUP1# Samp QC RPD %	PED1298-01 Samp QC RPD %	
Aluminium	µg/sample	5.0	<5.0	734 830 12.3	1500 2200 37.6	106
Barium	µg/sample	2.0	<2.0	171 253 38.5	312 500 46.5 [2]	113
Boron	µg/sample	20	<20	49.4 533 166 [3]	684 1850 92.2 [3]	108
Cadmium	µg/sample	0.50	<0.50	<0.50 <0.50 [NA]	<0.50 <0.50 [NA]	105
Calcium	µg/sample	50	<50	1610 2220 31.6	2290 5300 79.4 [2]	98.9
Chromium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	<2.0 2.40 [NA] [3]	110
Cobalt	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	<2.0 <2.0 [NA]	107
Copper	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	8.20 5.80 [NA]	114
Iron	µg/sample	5.0	<5.0	229 226 1.06	835 860 3.02	109
Lead	µg/sample	5.0	<5.0	<5.0 <5.0 [NA]	6.28 5.99 [NA]	107
Lithium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	<2.0 <2.0 [NA]	115
Magnesium	µg/sample	50	<50	582 758 26.3	750 1880 86.0 [2]	101
Manganese	µg/sample	2.0	<2.0	2.60 2.60 [NA]	6.40 7.00 [NA]	109
Molybdenum	µg/sample	5.0	<5.0	7.20 5.05 [NA]	<5.0 <5.0 [NA]	110
Nickel	µg/sample	2.0	<2.0	14.4 4.40 [NA] [3]	<2.0 <2.0 [NA]	108
Phosphorus	µg/sample	20	<20	21.2 <20 [NA]	27.0 30.2 [NA]	102
Potassium	µg/sample	50	<50	207 292 [NA]	717 1150 46.6 [2]	99.5
Sodium	µg/sample	100	<100	2570 7300 95.7 [2]	7350 14800 66.9 [2]	101
Sulfur	µg/sample	50	<50	480 494 2.96	665 682 2.49	98.9
Tin	µg/sample	10	<10	<10 <10 [NA]	<10 <10 [NA]	105
Titanium	µg/sample	2.0	<2.0	5.20 4.60 [NA]	16.2 17.4 7.14	104
Vanadium	µg/sample	2.0	<2.0	2.21 2.25 [NA]	3.68 3.68 [NA]	109
Zinc	µg/sample	5.0	<5.0	56.2 113 67.3 [2]	119 291 83.8 [2]	107

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BED2806

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	106
Barium	µg/sample	2.0	<2.0	114
Boron	µg/sample	20	<20	119
Cadmium	µg/sample	0.50	<0.50	105
Calcium	µg/sample	50	<50	100
Chromium	µg/sample	2.0	<2.0	110
Cobalt	µg/sample	2.0	<2.0	108
Copper	µg/sample	2.0	<2.0	115
Iron	µg/sample	5.0	<5.0	108
Lead	µg/sample	5.0	<5.0	107
Lithium	µg/sample	2.0	<2.0	115
Magnesium	µg/sample	50	<50	101
Manganese	µg/sample	2.0	<2.0	109
Molybdenum	µg/sample	5.0	<5.0	109
Nickel	µg/sample	2.0	<2.0	108
Phosphorus	µg/sample	20	<20	102
Potassium	µg/sample	50	<50	99.7
Sodium	µg/sample	100	<100	102
Sulfur	µg/sample	50	<50	101
Tin	µg/sample	10	<10	105
Titanium	µg/sample	2.0	<2.0	105
Vanadium	µg/sample	2.0	<2.0	109
Zinc	µg/sample	5.0	<5.0	107

Quality Control PED1298

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BED2807

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	113
Arsenic	µg/sample	2.0	<2.0	103
Beryllium	µg/sample	2.0	<2.0	112
Gallium	µg/sample	4.0	<4.0	98.0
Selenium	µg/sample	4.0	<4.0	103
Thallium	µg/sample	4.0	<4.0	95.3
Thorium	µg/sample	4.0	<4.0	96.1
Uranium	µg/sample	4.0	<4.0	99.2

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BED2808

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	115
Arsenic	µg/sample	2.0	<2.0	102
Beryllium	µg/sample	2.0	<2.0	115
Gallium	µg/sample	4.0	<4.0	98.1
Selenium	µg/sample	4.0	<4.0	105
Thallium	µg/sample	4.0	<4.0	98.8
Thorium	µg/sample	4.0	<4.0	102
Uranium	µg/sample	4.0	<4.0	104

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BED2809

Analyte	Units	PQL	Blank	DUP1	DUP2	LCS %
				BED2809-DUP1# Samp QC RPD %	PED1298-01 Samp QC RPD %	
Mercury	µg/sample	0.20	<0.20	<0.20 <0.20 [NA]	<0.20 <0.20 [NA]	96.8

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BED2810

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.20	<0.20	99.2

QC Comments

Identifier	Description
[2]	Duplicate analysis precision is/are outside acceptable %RPD, re-analysis indicates possible sample heterogeneity.
[3]	Duplicate %RPD may be flagged as an outlier to routine laboratory acceptance, however, where one or both results are <10*PQL, the RPD acceptance criteria increases exponentially.

Certificate of Analysis PEE0058

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	01/05/2023
Date Instructions Received	01/05/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	08/05/2023
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Authorisation Details

Airborne Dust Approved By	Heram Halim
Results Approved By	Heram Halim, Operations Manager
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEE0058

Report Amendment History

Revision	Reason for Amendment
R-01	Updated Results: Now blank corrected using supplied blank filter
R-05	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.
R-04	QC reporting updated to include PQL.
R-02	Calcium result corrected for sample #1
R-03	Results now include /filter and /m3 unit reporting.

Certificate of Analysis PEE0058

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEE0058-01	Sample 3	HiVol Filter	29/04/2023	01/05/2023
PEE0058-02	Blank 3	HiVol Filter	29/04/2023	01/05/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
Sample 3	TENV5	[NA]	[NA]	1500
Blank 3	TENV6	[NA]	[NA]	[NA]

Certificate of Analysis PEE0058

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEE0058-01 Sample 3 29/04/2023	PEE0058-02 Blank 3 29/04/2023
Aluminium	µg/sample	5.0	<5.0 [1]	6900
Aluminium	µg/m3		<0.0033 [1]	[NA]
Boron	µg/sample	20	<20 [1]	13000
Boron	µg/m3		<0.013 [1]	[NA]
Barium	µg/sample	2.0	<2.0 [1]	3400
Barium	µg/m3		<0.0013 [1]	[NA]
Calcium	µg/sample	50	<50 [1]	33000
Calcium	µg/m3		<0.033 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	<2.0 [1]	11
Chromium	µg/m3		<0.0013 [1]	[NA]
Copper	µg/sample	2.0	2.2 [1]	5.6
Copper	µg/m3		0.0015 [1]	[NA]
Iron	µg/sample	5.0	74 [1]	240
Iron	µg/m3		0.049 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	<50 [1]	6300
Potassium	µg/m3		<0.033 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	4.8
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	<50 [1]	11000
Magnesium	µg/m3		<0.033 [1]	[NA]
Manganese	µg/sample	2.0	<2.0 [1]	7.9
Manganese	µg/m3		<0.0013 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	5.1
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	<100 [1]	100000
Sodium	µg/m3		<0.067 [1]	[NA]
Nickel	µg/sample	2.0	<2.0 [1]	3.3
Nickel	µg/m3		<0.0013 [1]	[NA]
Phosphorus	µg/sample	20	<20 [1]	<20
Phosphorus	µg/m3		<0.00033 [1]	[NA]
Lead	µg/sample	5.0	<5.0 [1]	5.8
Lead	µg/m3		<0.0033 [1]	[NA]
Sulfur	µg/sample	50	240 [1]	1500
Sulfur	µg/m3		0.16 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	<2.0 [1]	8.9
Titanium	µg/m3		<0.0013 [1]	[NA]
Vanadium	µg/sample	2.0	<2.0 [1]	<2.0
Vanadium	µg/m3		<0.0013 [1]	[NA]

Certificate of Analysis PEE0058

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEE0058-01 Sample 3 29/04/2023	PEE0058-02 Blank 3 29/04/2023
Zinc	µg/sample	5.0	<5.0 [1]	2400
Zinc	µg/m3		<0.0033 [1]	[NA]
Arsenic	µg/sample	2.0	<2.0 [1]	3.0
Arsenic	µg/m3		<0.0013 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	<4.0 [1]	<4.0
Thorium	µg/m3		<0.0027 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PEE0058

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PEE0058-01	PEE0058-02
Your Reference			Sample 3	Blank 3
Date Sampled			29/04/2023	29/04/2023
Dust	mg	0.10	11	<0.10
Dust	µg/m3	0.10	7.6	[NA]

Certificate of Analysis PEE0058

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

Certificate of Analysis PEE0058

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

Certificate of Analysis PEE0058

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PEE0058

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PEE0058

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	No	QC Frequency Outliers Exist - See detailed list below

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PEE0058

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	2	29/04/2023	08/05/2023	08/05/2023	Yes
	1	29/04/2023	08/05/2023	11/08/2023	Yes
Metals OHS (LL) HiVol Filter	2	29/04/2023	08/05/2023	09/05/2023	Yes
	1	29/04/2023	08/05/2023	11/08/2023	Yes
Metals OHS-Hg HiVol Filter	2	29/04/2023	08/05/2023	09/05/2023	Yes
	1	29/04/2023	08/05/2023	11/08/2023	Yes
Gravimetric Dust HiVol Filter	2	29/04/2023	08/05/2023	08/05/2023	Yes
	1	29/04/2023	08/05/2023	11/08/2023	Yes

Data Quality Assessment Summary PEE0058

Outliers: QC Frequency

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BEE0851

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BEE0852

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEE0851

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEE0852

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEE0853

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEE0854

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEE0855

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEE0856

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

Quality Control PEE0058

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEE0851

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	83.7
Barium	µg/sample	2.0	<2.0	96.1
Boron	µg/sample	20	<20	78.2
Cadmium	µg/sample	0.50	<0.50	84.7
Calcium	µg/sample	50	<50	82.5
Chromium	µg/sample	2.0	<2.0	84.3
Cobalt	µg/sample	2.0	<2.0	87.1
Copper	µg/sample	2.0	<2.0	84.8
Iron	µg/sample	5.0	<5.0	86.2
Lead	µg/sample	5.0	<5.0	81.5
Lithium	µg/sample	2.0	<2.0	91.5
Magnesium	µg/sample	50	<50	81.6
Manganese	µg/sample	2.0	<2.0	82.6
Molybdenum	µg/sample	5.0	<5.0	84.6
Nickel	µg/sample	2.0	<2.0	83.2
Phosphorus	µg/sample	20	<20	85.4
Potassium	µg/sample	50	<50	93.5
Sodium	µg/sample	100	<100	83.0
Sulfur	µg/sample	50	<50	80.9
Tin	µg/sample	10	<10	84.4
Titanium	µg/sample	2.0	<2.0	80.6
Vanadium	µg/sample	2.0	<2.0	86.5
Zinc	µg/sample	5.0	<5.0	84.0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEE0852

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	83.4
Barium	µg/sample	2.0	<2.0	96.2
Boron	µg/sample	20	<20	78.7
Cadmium	µg/sample	0.50	<0.50	84.6
Calcium	µg/sample	50	<50	81.7
Chromium	µg/sample	2.0	<2.0	83.8
Cobalt	µg/sample	2.0	<2.0	86.6
Copper	µg/sample	2.0	<2.0	84.6
Iron	µg/sample	5.0	<5.0	85.5
Lead	µg/sample	5.0	<5.0	81.7
Lithium	µg/sample	2.0	<2.0	92.6
Magnesium	µg/sample	50	<50	81.4
Manganese	µg/sample	2.0	<2.0	82.2
Molybdenum	µg/sample	5.0	<5.0	83.8
Nickel	µg/sample	2.0	<2.0	82.5
Phosphorus	µg/sample	20	<20	85.0
Potassium	µg/sample	50	<50	93.5
Sodium	µg/sample	100	<100	83.1
Sulfur	µg/sample	50	<50	81.1
Tin	µg/sample	10	<10	85.4
Titanium	µg/sample	2.0	<2.0	80.4
Vanadium	µg/sample	2.0	<2.0	86.2
Zinc	µg/sample	5.0	<5.0	83.5

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEE0853

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.20	<0.20	104

Quality Control PEE0058

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEE0854

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.20	<0.20	72.0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEE0855

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	94.5
Arsenic	µg/sample	2.0	<2.0	107
Beryllium	µg/sample	2.0	<2.0	104
Gallium	µg/sample	4.0	<4.0	96.6
Selenium	µg/sample	4.0	<4.0	123
Thallium	µg/sample	4.0	<4.0	104
Thorium	µg/sample	4.0	<4.0	114
Uranium	µg/sample	4.0	<4.0	115

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEE0856

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	94.5
Arsenic	µg/sample	2.0	<2.0	107
Beryllium	µg/sample	2.0	<2.0	104
Gallium	µg/sample	4.0	<4.0	96.6
Selenium	µg/sample	4.0	<4.0	123
Thallium	µg/sample	4.0	<4.0	104
Thorium	µg/sample	4.0	<4.0	114
Uranium	µg/sample	4.0	<4.0	115

Certificate of Analysis PEE0557

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	08/05/2023
Date Instructions Received	08/05/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	15/05/2023
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Accredited for compliance with ISO/IEC 17025. Tests not covered by NATA are denoted with *.

Authorisation Details

Airborne Dust Approved By	Heram Halim Thomas Edwards
Results Approved By	Heram Halim, Operations Manager Thomas Edwards, OHL Supervisor Todd Lee, Group Operations Manager
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEE0557

Report Amendment History

Revision	Reason for Amendment
R-01	Results now include /filter and /m3 unit reporting.
R-03	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.
R-02	QC reporting updated to include PQL.

Certificate of Analysis PEE0557

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEE0557-01	Sample 4	HiVol Filter	05/05/2023	08/05/2023
PEE0557-02	Blank 4	HiVol Filter	05/05/2023	08/05/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
Sample 4	TENV7	[NA]	[NA]	1500
Blank 4	TENV8	[NA]	[NA]	[NA]

Certificate of Analysis PEE0557

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEE0557-01 Sample 4 05/05/2023	PEE0557-02 Blank 4 05/05/2023
Aluminium	µg/sample	5.0	1700 [1]	5900
Aluminium	µg/m3		1.1 [1]	[NA]
Boron	µg/sample	20	1200 [1]	12000
Boron	µg/m3		0.81 [1]	[NA]
Barium	µg/sample	2.0	320 [1]	3000
Barium	µg/m3		0.21 [1]	[NA]
Calcium	µg/sample	50	4200 [1]	26000
Calcium	µg/m3		2.8 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	3.2 [1]	10
Chromium	µg/m3		0.0021 [1]	[NA]
Copper	µg/sample	2.0	13 [1]	5.9
Copper	µg/m3		0.0085 [1]	[NA]
Iron	µg/sample	5.0	1400 [1]	210
Iron	µg/m3		0.91 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	760 [1]	5300
Potassium	µg/m3		0.51 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	4.1
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	1200 [1]	9100
Magnesium	µg/m3		0.83 [1]	[NA]
Manganese	µg/sample	2.0	3.2 [1]	7.2
Manganese	µg/m3		0.0021 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	<5.0
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	12000 [1]	98000
Sodium	µg/m3		8.3 [1]	[NA]
Nickel	µg/sample	2.0	<2.0 [1]	2.6
Nickel	µg/m3		<0.0013 [1]	[NA]
Phosphorus	µg/sample	20	<20 [1]	<20
Phosphorus	µg/m3		<0.00033 [1]	[NA]
Lead	µg/sample	5.0	<5.0 [1]	<5.0
Lead	µg/m3		<0.0033 [1]	[NA]
Sulfur	µg/sample	50	280 [1]	1400
Sulfur	µg/m3		0.18 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	45 [1]	9.3
Titanium	µg/m3		0.030 [1]	[NA]
Vanadium	µg/sample	2.0	5.6 [1]	<2.0
Vanadium	µg/m3		0.0037 [1]	[NA]

Certificate of Analysis PEE0557

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEE0557-01 Sample 4 05/05/2023	PEE0557-02 Blank 4 05/05/2023
Zinc	µg/sample	5.0	180 [1]	2200
Zinc	µg/m3		0.12 [1]	[NA]
Arsenic	µg/sample	2.0	<2.0 [1]	3.1
Arsenic	µg/m3		<0.0013 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	<4.0 [1]	<4.0
Thorium	µg/m3		<0.0027 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PEE0557

HVAS Dust (HiVol Filter)

EnviroLab ID	Units	PQL	PEE0557-01	PEE0557-02
Your Reference			Sample 4	Blank 4
Date Sampled			05/05/2023	05/05/2023
Dust	mg	0.10	25	<0.10
Dust	µg/m3	0.10	17	[NA]

Certificate of Analysis PEE0557

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

Certificate of Analysis PEE0557

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

Certificate of Analysis PEE0557

Result Definitions

Identifier	Description
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NEPM	National Environment Protection Measure
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LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
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Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PEE0557

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PEE0557

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	No	Duplicate Outliers Exist - See detailed list below
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	Yes	No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PEE0557

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	1	05/05/2023	11/05/2023	11/08/2023	Yes
	2	05/05/2023	11/05/2023	12/05/2023	Yes
Metals OHS (LL) HiVol Filter	1	05/05/2023	11/05/2023	11/08/2023	Yes
	2	05/05/2023	11/05/2023	17/05/2023	Yes
Metals OHS-Hg HiVol Filter	1	05/05/2023	11/05/2023	11/08/2023	Yes
	2	05/05/2023	11/05/2023	12/05/2023	Yes
Gravimetric Dust HiVol Filter	2	05/05/2023	11/05/2023	11/05/2023	Yes
	1	05/05/2023	11/05/2023	11/08/2023	Yes

Outliers: Duplicates

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BEE1298

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PEE0557-01	DUP1	Magnesium	40.00	74.3[2]
PEE0557-01	DUP1	Sodium	40.00	84.4[2]

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEE1298

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PEE0557-01	DUP1	Barium	40.00	102[2]
PEE0557-01	DUP1	Boron	40.00	89.0[2]
PEE0557-01	DUP1	Zinc	40.00	94.0[2]

Quality Control PEE0557

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEE1298

Analyte	Units	PQL	Blank	DUP1	LCS %
				PEE0557-01 Samp QC RPD %	
Aluminium	µg/sample	5.0	<5.0	1660 1190 33.2	97.0
Antimony	µg/sample	10	<10	<10 <10 [NA]	103
Arsenic	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	108
Barium	µg/sample	2.0	<2.0	317 103 102 [2]	110
Beryllium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	120
Boron	µg/sample	20	<20	1220 467 89.0 [2]	111
Cadmium	µg/sample	0.50	<0.50	<0.50 <0.50 [NA]	98.5
Calcium	µg/sample	50	<50	4210 2950 35.3	97.7
Chromium	µg/sample	2.0	<2.0	3.20 2.40 [NA]	103
Cobalt	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	98.9
Copper	µg/sample	2.0	<2.0	12.8 11.4 11.6	109
Gallium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	98.1
Iron	µg/sample	5.0	<5.0	1360 1310 4.01	99.5
Lead	µg/sample	5.0	<5.0	<5.0 <5.0 [NA]	101
Lithium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	108
Magnesium	µg/sample	50	<50	1240 568 74.3 [2]	96.5
Manganese	µg/sample	2.0	<2.0	3.20 2.20 [NA]	102
Mercury	µg/sample	0.20	<0.20	<0.20 <0.20 [NA]	100
Molybdenum	µg/sample	5.0	<5.0	<5.0 <5.0 [NA]	116
Nickel	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	102
Phosphorus	µg/sample	20	<20	<20 <20 [NA]	93.3
Potassium	µg/sample	50	<50	765 532 35.8	103
Selenium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	129
Sodium	µg/sample	100	<100	12500 5080 84.4 [2]	96.3
Sulfur	µg/sample	50	<50	276 212 [NA]	91.9
Thallium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	105
Thorium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	110
Tin	µg/sample	10	<10	<10 <10 [NA]	117
Titanium	µg/sample	2.0	<2.0	44.8 41.2 8.37	113
Uranium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	111
Vanadium	µg/sample	2.0	<2.0	5.57 5.18 [NA]	100
Zinc	µg/sample	5.0	<5.0	182 65.6 94.0 [2]	100

Quality Control PEE0557

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEE1299

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	97.0
Antimony	µg/sample	10	<10	109
Arsenic	µg/sample	2.0	<2.0	123
Barium	µg/sample	2.0	<2.0	111
Beryllium	µg/sample	2.0	<2.0	120
Boron	µg/sample	20	<20	95.1
Cadmium	µg/sample	0.50	<0.50	98.1
Calcium	µg/sample	50	<50	98.0
Chromium	µg/sample	2.0	<2.0	103
Cobalt	µg/sample	2.0	<2.0	98.8
Copper	µg/sample	2.0	<2.0	110
Gallium	µg/sample	4.0	<4.0	111
Iron	µg/sample	5.0	<5.0	103
Lead	µg/sample	5.0	<5.0	101
Lithium	µg/sample	2.0	<2.0	109
Magnesium	µg/sample	50	<50	96.8
Manganese	µg/sample	2.0	<2.0	103
Mercury	µg/sample	0.20	<0.20	104
Molybdenum	µg/sample	5.0	<5.0	117
Nickel	µg/sample	2.0	<2.0	102
Phosphorus	µg/sample	20	<20	93.3
Potassium	µg/sample	50	<50	103
Selenium	µg/sample	4.0	<4.0	129
Sodium	µg/sample	100	<100	96.8
Sulfur	µg/sample	50	<50	92.6
Thallium	µg/sample	4.0	<4.0	110
Thorium	µg/sample	4.0	<4.0	118
Tin	µg/sample	10	<10	118
Titanium	µg/sample	2.0	<2.0	113
Uranium	µg/sample	4.0	<4.0	118
Vanadium	µg/sample	2.0	<2.0	100
Zinc	µg/sample	5.0	<5.0	100

QC Comments

Identifier	Description
[2]	Duplicate analysis precision is/are outside acceptable %RPD, re-analysis indicates possible sample heterogeneity.

Certificate of Analysis PEE0984

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	12/05/2023
Date Instructions Received	12/05/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	19/05/2023
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Authorisation Details

Airborne Dust Approved By	Heram Halim
Results Approved By	Heram Halim, Operations Manager Michael Hall, Inorganics & Metals Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEE0984

Report Amendment History

Revision	Reason for Amendment
R-03	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.
R-01	Results now include /filter and /m3 unit reporting.
R-02	QC reporting updated to include PQL and updated RPD flag qualifiers.

Certificate of Analysis PEE0984

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEE0984-01	Sample 3	HiVol Filter	11/05/2023	12/05/2023
PEE0984-02	Blank 3	HiVol Filter	11/05/2023	12/05/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
Sample 3	TENV9	[NA]	[NA]	1500
Blank 3	TENV10	[NA]	[NA]	[NA]

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Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEE0984-01 Sample 3 11/05/2023	PEE0984-02 Blank 3 11/05/2023
Aluminium	µg/sample	5.0	29 [1]	6700
Aluminium	µg/m3		0.020 [1]	[NA]
Boron	µg/sample	20	<20 [1]	13000
Boron	µg/m3		<0.013 [1]	[NA]
Barium	µg/sample	2.0	<2.0 [1]	3400
Barium	µg/m3		<0.0013 [1]	[NA]
Calcium	µg/sample	50	190 [1]	27000
Calcium	µg/m3		0.13 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	<2.0 [1]	13
Chromium	µg/m3		<0.0013 [1]	[NA]
Copper	µg/sample	2.0	5.0 [1]	7.6
Copper	µg/m3		0.0033 [1]	[NA]
Iron	µg/sample	5.0	170 [1]	280
Iron	µg/m3		0.11 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	<50 [1]	5400
Potassium	µg/m3		<0.033 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	4.6
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	52 [1]	10000
Magnesium	µg/m3		0.035 [1]	[NA]
Manganese	µg/sample	2.0	<2.0 [1]	8.3
Manganese	µg/m3		<0.0013 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	5.0
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	<100 [1]	110000
Sodium	µg/m3		<0.067 [1]	[NA]
Nickel	µg/sample	2.0	<2.0 [1]	3.6
Nickel	µg/m3		<0.0013 [1]	[NA]
Phosphorus	µg/sample	20	20 [1]	<20
Phosphorus	µg/m3		0.014 [1]	[NA]
Lead	µg/sample	5.0	5.4 [1]	<5.0
Lead	µg/m3		0.0036 [1]	[NA]
Sulfur	µg/sample	50	490 [1]	1600
Sulfur	µg/m3		0.32 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	4.0 [1]	11
Titanium	µg/m3		0.0027 [1]	[NA]
Vanadium	µg/sample	2.0	2.1 [1]	<2.0
Vanadium	µg/m3		0.0014 [1]	[NA]

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Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEE0984-01 Sample 3 11/05/2023	PEE0984-02 Blank 3 11/05/2023
Zinc	µg/sample	5.0	11 [1]	2400
Zinc	µg/m3		0.0073 [1]	[NA]
Arsenic	µg/sample	2.0	<2.0 [1]	2.7
Arsenic	µg/m3		<0.0013 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	<4.0 [1]	<4.0
Thorium	µg/m3		<0.0027 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

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HVAS Dust (HiVol Filter)

EnviroLab ID	Units	PQL	PEE0984-01	PEE0984-02
Your Reference			Sample 3	Blank 3
Date Sampled			11/05/2023	11/05/2023
Dust	mg	0.10	12	<0.10
Dust	µg/m3	0.10	7.7	[NA]

Certificate of Analysis PEE0984

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

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Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

Certificate of Analysis PEE0984

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PEE0984

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PEE0984

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	No	Duplicate Outliers Exist - See detailed list below
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	Yes	No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PEE0984

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	1	11/05/2023	19/05/2023	14/08/2023	Yes
	2	11/05/2023	19/05/2023	19/05/2023	Yes
Metals OHS (LL) HiVol Filter	1	11/05/2023	19/05/2023	14/08/2023	Yes
	2	11/05/2023	19/05/2023	20/05/2023	Yes
Metals OHS-Hg HiVol Filter	1	11/05/2023	19/05/2023	14/08/2023	Yes
	2	11/05/2023	19/05/2023	19/05/2023	Yes
Gravimetric Dust HiVol Filter	1	11/05/2023	19/05/2023	14/08/2023	Yes
	2	11/05/2023	19/05/2023	19/05/2023	Yes

Outliers: Duplicates

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BEE2276

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PEE0984-01	DUP1	Calcium	40.00	160[2]
PEE0984-01	DUP1	Magnesium	40.00	171[2]
PEE0984-01	DUP1	Potassium	40.00	200[3]
PEE0984-01	DUP1	Sodium	40.00	200[2]

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEE2276

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PEE0984-01	DUP1	Aluminium	40.00	176[2]
PEE0984-01	DUP1	Barium	40.00	200[2]
PEE0984-01	DUP1	Boron	40.00	200[2]
PEE0984-01	DUP1	Zinc	40.00	170[2]

Quality Control PEE0984

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEE2276

Analyte	Units	PQL	Blank	DUP1		LCS %
				PEE0984-01 Samp QC RPD %		
Aluminium	µg/sample	5.0	<5.0	29.4	453 176 [2]	107
Antimony	µg/sample	10	<10	<10	<10 [NA] [1]	106
Arsenic	µg/sample	2.0	<2.0	<2.0	<2.0 [NA] [1]	121
Barium	µg/sample	2.0	<2.0	<2.0	134 200 [2]	117
Beryllium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA] [1]	102
Boron	µg/sample	20	<20	<20	546 200 [2]	117
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50 [NA]	109
Calcium	µg/sample	50	<50	192	1730 160 [2]	104
Chromium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	111
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	110
Copper	µg/sample	2.0	<2.0	5.00	4.20 [NA]	115
Gallium	µg/sample	4.0	<4.0	<4.0	<4.0 [NA] [1]	103
Iron	µg/sample	5.0	<5.0	166	180 7.98	111
Lead	µg/sample	5.0	<5.0	5.35	<5.0 [NA] [3]	108
Lithium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	115
Magnesium	µg/sample	50	<50	51.8	673 171 [2]	104
Manganese	µg/sample	2.0	<2.0	<2.0	2.00 [NA] [3]	110
Mercury	µg/sample	0.20	<0.20	<0.20	<0.20 [NA]	123
Molybdenum	µg/sample	5.0	<5.0	<5.0	<5.0 [NA]	112
Nickel	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	108
Phosphorus	µg/sample	20	<20	20.4	22.8 [NA]	102
Potassium	µg/sample	50	<50	<50	288 200 [3]	102
Selenium	µg/sample	4.0	<4.0	<4.0	<4.0 [NA] [1]	129
Sodium	µg/sample	100	<100	<100	5560 200 [2]	103
Sulfur	µg/sample	50	<50	486	460 5.54	98.4
Thallium	µg/sample	4.0	<4.0	<4.0	<4.0 [NA] [1]	102
Thorium	µg/sample	4.0	<4.0	<4.0	<4.0 [NA] [1]	106
Tin	µg/sample	10	<10	<10	<10 [NA]	112
Titanium	µg/sample	2.0	<2.0	4.00	4.20 [NA]	112
Uranium	µg/sample	4.0	<4.0	<4.0	<4.0 [NA] [1]	108
Vanadium	µg/sample	2.0	<2.0	2.08	2.26 [NA]	111
Zinc	µg/sample	5.0	<5.0	11.0	134 170 [2]	109

Quality Control PEE0984

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEE2277

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	107
Antimony	µg/sample	10	<10	114
Arsenic	µg/sample	2.0	<2.0	121
Barium	µg/sample	2.0	<2.0	117
Beryllium	µg/sample	2.0	<2.0	112
Boron	µg/sample	20	<20	117
Cadmium	µg/sample	0.50	<0.50	109
Calcium	µg/sample	50	<50	104
Chromium	µg/sample	2.0	<2.0	111
Cobalt	µg/sample	2.0	<2.0	110
Copper	µg/sample	2.0	<2.0	115
Gallium	µg/sample	4.0	<4.0	116
Iron	µg/sample	5.0	<5.0	111
Lead	µg/sample	5.0	<5.0	108
Lithium	µg/sample	2.0	<2.0	115
Magnesium	µg/sample	50	<50	104
Manganese	µg/sample	2.0	<2.0	110
Mercury	µg/sample	0.20	<0.20	107
Molybdenum	µg/sample	5.0	<5.0	112
Nickel	µg/sample	2.0	<2.0	108
Phosphorus	µg/sample	20	<20	102
Potassium	µg/sample	50	<50	102
Selenium	µg/sample	4.0	<4.0	129
Sodium	µg/sample	100	<100	103
Sulfur	µg/sample	50	<50	98.4
Thallium	µg/sample	4.0	<4.0	105
Thorium	µg/sample	4.0	<4.0	117
Tin	µg/sample	10	<10	112
Titanium	µg/sample	2.0	<2.0	112
Uranium	µg/sample	4.0	<4.0	117
Vanadium	µg/sample	2.0	<2.0	111
Zinc	µg/sample	5.0	<5.0	109

QC Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.
[2]	Duplicate analysis precision is/are outside acceptable %RPD, re-analysis indicates possible sample heterogeneity.
[3]	Duplicate %RPD may be flagged as an outlier to routine laboratory acceptance, however, where one or both results are <10*PQL, the RPD acceptance criteria increases exponentially.

Certificate of Analysis PEE1468

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	19/05/2023
Date Instructions Received	19/05/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	26/05/2023
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Authorisation Details

Airborne Dust Approved By	Heram Halim Thomas Edwards
Results Approved By	Ben Carpenter, Metals Technician Heram Halim, Operations Manager Michael Hall, Inorganics & Metals Supervisor Thomas Edwards, OHL Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEE1468

Report Amendment History

Revision	Reason for Amendment
R-02	Results now include /filter and /m3 unit reporting.
R-04	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.
R-01	Calcium result corrected for sample #1
R-03	QC reporting updated to include PQL.

Certificate of Analysis PEE1468

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEE1468-01	TENV11	HiVol Filter	17/05/2023	19/05/2023
PEE1468-02	TENV12	HiVol Filter	17/05/2023	19/05/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
TENV11	TENV11	[NA]	[NA]	1500
TENV12	TENV12	[NA]	[NA]	[NA]

Certificate of Analysis PEE1468

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEE1468-01 TENV11 17/05/2023	PEE1468-02 TENV12 17/05/2023
Aluminium	µg/sample	5.0	360 [1]	8300
Aluminium	µg/m3		0.24 [1]	[NA]
Boron	µg/sample	20	<20 [1]	16000
Boron	µg/m3		<0.013 [1]	[NA]
Barium	µg/sample	2.0	<2.0 [1]	3900
Barium	µg/m3		<0.0013 [1]	[NA]
Calcium	µg/sample	50	<50 [1]	35000
Calcium	µg/m3		<0.033 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	<2.0 [1]	14
Chromium	µg/m3		<0.0013 [1]	[NA]
Copper	µg/sample	2.0	<2.0 [1]	6.1
Copper	µg/m3		<0.0013 [1]	[NA]
Iron	µg/sample	5.0	620 [1]	270
Iron	µg/m3		0.41 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	<50 [1]	6900
Potassium	µg/m3		<0.033 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	5.5
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	<50 [1]	12000
Magnesium	µg/m3		<0.033 [1]	[NA]
Manganese	µg/sample	2.0	<2.0 [1]	9.3
Manganese	µg/m3		<0.0013 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	<5.0
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	<100 [1]	120000
Sodium	µg/m3		<0.067 [1]	[NA]
Nickel	µg/sample	2.0	<2.0 [1]	3.5
Nickel	µg/m3		<0.0013 [1]	[NA]
Phosphorus	µg/sample	20	<20 [1]	<20
Phosphorus	µg/m3		<0.00033 [1]	[NA]
Lead	µg/sample	5.0	<5.0 [1]	<5.0
Lead	µg/m3		<0.0033 [1]	[NA]
Sulfur	µg/sample	50	280 [1]	1700
Sulfur	µg/m3		0.18 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	12 [1]	11
Titanium	µg/m3		0.0081 [1]	[NA]
Vanadium	µg/sample	2.0	<2.0 [1]	<2.0
Vanadium	µg/m3		<0.0013 [1]	[NA]

Certificate of Analysis PEE1468

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEE1468-01 TENV11 17/05/2023	PEE1468-02 TENV12 17/05/2023
Zinc	µg/sample	5.0	<5.0 [1]	2700
Zinc	µg/m3		<0.0033 [1]	[NA]
Arsenic	µg/sample	2.0	<2.0 [1] [1]	3.6
Arsenic	µg/m3		<0.0013 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	<4.0 [1]	<4.0
Thorium	µg/m3		<0.0027 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PEE1468

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PEE1468-01	PEE1468-02
Your Reference			TENV11	TENV12
Date Sampled			17/05/2023	17/05/2023
Dust	mg	0.10	13	<0.10
Dust	µg/m3	0.10	8.7	[NA]

Certificate of Analysis PEE1468

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

Certificate of Analysis PEE1468

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

Certificate of Analysis PEE1468

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PEE1468

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PEE1468

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	No	QC Frequency Outliers Exist - See detailed list below

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PEE1468

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	1	17/05/2023	25/05/2023	14/08/2023	Yes
	2	17/05/2023	25/05/2023	25/05/2023	Yes
Metals OHS (LL) HiVol Filter	1	17/05/2023	25/05/2023	14/08/2023	Yes
	2	17/05/2023	25/05/2023	25/05/2023	Yes
Metals OHS-Hg HiVol Filter	1	17/05/2023	25/05/2023	14/08/2023	Yes
	2	17/05/2023	25/05/2023	26/05/2023	Yes
Gravimetric Dust HiVol Filter	1	17/05/2023	24/05/2023	14/08/2023	Yes
	2	17/05/2023	24/05/2023	24/05/2023	Yes

Data Quality Assessment Summary PEE1468

Outliers: QC Frequency

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BEE3000

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BEE3001

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEE3000

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEE3001

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEE3002

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEE3003

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEE3004

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEE3005

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

Quality Control PEE1468

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEE3000

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	106
Barium	µg/sample	2.0	<2.0	117
Boron	µg/sample	20	<20	105
Cadmium	µg/sample	0.50	<0.50	105
Calcium	µg/sample	50	<50	100
Chromium	µg/sample	2.0	<2.0	108
Cobalt	µg/sample	2.0	<2.0	104
Copper	µg/sample	2.0	<2.0	113
Iron	µg/sample	5.0	<5.0	105
Lead	µg/sample	5.0	<5.0	106
Lithium	µg/sample	2.0	<2.0	114
Magnesium	µg/sample	50	<50	105
Manganese	µg/sample	2.0	<2.0	108
Molybdenum	µg/sample	5.0	<5.0	112
Nickel	µg/sample	2.0	<2.0	106
Phosphorus	µg/sample	20	<20	104
Potassium	µg/sample	50	<50	104
Sodium	µg/sample	100	<100	103
Sulfur	µg/sample	50	<50	100
Tin	µg/sample	10	<10	112
Titanium	µg/sample	2.0	<2.0	110
Vanadium	µg/sample	2.0	<2.0	105
Zinc	µg/sample	5.0	<5.0	105

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEE3001

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	106
Barium	µg/sample	2.0	<2.0	118
Boron	µg/sample	20	<20	113
Cadmium	µg/sample	0.50	<0.50	104
Calcium	µg/sample	50	<50	101
Chromium	µg/sample	2.0	<2.0	108
Cobalt	µg/sample	2.0	<2.0	104
Copper	µg/sample	2.0	<2.0	113
Iron	µg/sample	5.0	<5.0	105
Lead	µg/sample	5.0	<5.0	105
Lithium	µg/sample	2.0	<2.0	115
Magnesium	µg/sample	50	<50	105
Manganese	µg/sample	2.0	<2.0	108
Molybdenum	µg/sample	5.0	<5.0	112
Nickel	µg/sample	2.0	<2.0	107
Phosphorus	µg/sample	20	<20	105
Potassium	µg/sample	50	<50	104
Sodium	µg/sample	100	<100	103
Sulfur	µg/sample	50	<50	100
Tin	µg/sample	10	<10	111
Titanium	µg/sample	2.0	<2.0	111
Vanadium	µg/sample	2.0	<2.0	105
Zinc	µg/sample	5.0	<5.0	104

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEE3002

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.20	<0.20	104

Quality Control PEE1468

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEE3003

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.20	<0.20	92.0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEE3004

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	114
Arsenic	µg/sample	2.0	<2.0	125
Beryllium	µg/sample	2.0	<2.0	130
Gallium	µg/sample	4.0	<4.0	122
Selenium	µg/sample	4.0	<4.0	127
Thallium	µg/sample	4.0	<4.0	116
Thorium	µg/sample	4.0	<4.0	120
Uranium	µg/sample	4.0	<4.0	124

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEE3005

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	112
Arsenic	µg/sample	2.0	<2.0	125
Beryllium	µg/sample	2.0	<2.0	130
Gallium	µg/sample	4.0	<4.0	122
Selenium	µg/sample	4.0	<4.0	127
Thallium	µg/sample	4.0	<4.0	115
Thorium	µg/sample	4.0	<4.0	120
Uranium	µg/sample	4.0	<4.0	124

Certificate of Analysis PEE1859

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	25/05/2023
Date Instructions Received	25/05/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	01/06/2023
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Authorisation Details

Airborne Dust Approved By	Heram Halim Thomas Edwards
Results Approved By	Heram Halim, Operations Manager Thomas Edwards, OHL Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEE1859

Report Amendment History

Revision	Reason for Amendment
R-02	QC reporting updated to include PQL.
R-03	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.
R-01	Results now include /filter and /m3 unit reporting.

Certificate of Analysis PEE1859

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEE1859-01	Sample 7	HiVol Filter	23/05/2023	25/05/2023
PEE1859-02	Blank 7	HiVol Filter	23/05/2023	25/05/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
Sample 7	TENV13	[NA]	[NA]	1500
Blank 7	TENV14	[NA]	[NA]	[NA]

Certificate of Analysis PEE1859

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEE1859-01 Sample 7 23/05/2023	PEE1859-02 Blank 7 23/05/2023
Aluminium	µg/sample	5.0	<5.0 [1]	6200
Aluminium	µg/m3		<0.0033 [1]	[NA]
Boron	µg/sample	20	<20 [1]	11000
Boron	µg/m3		<0.013 [1]	[NA]
Barium	µg/sample	2.0	<2.0 [1]	3900
Barium	µg/m3		<0.0013 [1]	[NA]
Calcium	µg/sample	50	<50 [1]	26000
Calcium	µg/m3		<0.033 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	<2.0 [1]	13
Chromium	µg/m3		<0.0013 [1]	[NA]
Copper	µg/sample	2.0	5.0 [1]	5.5
Copper	µg/m3		0.0033 [1]	[NA]
Iron	µg/sample	5.0	820 [1]	220
Iron	µg/m3		0.55 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	<50 [1]	4900
Potassium	µg/m3		<0.033 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	4.4
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	<50 [1]	9100
Magnesium	µg/m3		<0.033 [1]	[NA]
Manganese	µg/sample	2.0	6.0 [1]	7.2
Manganese	µg/m3		0.0040 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	<5.0
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	<100 [1]	97000
Sodium	µg/m3		<0.067 [1]	[NA]
Nickel	µg/sample	2.0	2.2 [1]	<2.0
Nickel	µg/m3		0.0015 [1]	[NA]
Phosphorus	µg/sample	20	<20 [1]	<20
Phosphorus	µg/m3		<0.00033 [1]	[NA]
Lead	µg/sample	5.0	<5.0 [1]	<5.0
Lead	µg/m3		<0.0033 [1]	[NA]
Sulfur	µg/sample	50	160 [1]	1600
Sulfur	µg/m3		0.11 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	17 [1]	11
Titanium	µg/m3		0.011 [1]	[NA]
Vanadium	µg/sample	2.0	<2.0 [1]	<2.0
Vanadium	µg/m3		<0.0013 [1]	[NA]

Certificate of Analysis PEE1859

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEE1859-01 Sample 7 23/05/2023	PEE1859-02 Blank 7 23/05/2023
Zinc	µg/sample	5.0	<5.0 [1]	2400
Zinc	µg/m3		<0.0033 [1]	[NA]
Arsenic	µg/sample	2.0	<2.0 [1]	2.4
Arsenic	µg/m3		<0.0013 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	<4.0 [1]	<4.0
Thorium	µg/m3		<0.0027 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PEE1859

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PEE1859-01	PEE1859-02
Your Reference			Sample 7	Blank 7
Date Sampled			23/05/2023	23/05/2023
Dust	mg	0.10	32	1.3
Dust	µg/m3	0.10	21	[NA]

Certificate of Analysis PEE1859

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

Certificate of Analysis PEE1859

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

Certificate of Analysis PEE1859

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PEE1859

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PEE1859

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	No	QC Frequency Outliers Exist - See detailed list below

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PEE1859

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	2	23/05/2023	31/05/2023	01/06/2023	Yes
	1	23/05/2023	31/05/2023	14/08/2023	Yes
Metals OHS (LL) HiVol Filter	2	23/05/2023	31/05/2023	01/06/2023	Yes
	1	23/05/2023	31/05/2023	14/08/2023	Yes
Metals OHS-Hg HiVol Filter	2	23/05/2023	31/05/2023	01/06/2023	Yes
	1	23/05/2023	31/05/2023	14/08/2023	Yes
Gravimetric Dust HiVol Filter	1	23/05/2023	31/05/2023	14/08/2023	Yes
	2	23/05/2023	31/05/2023	31/05/2023	Yes

Outliers: QC Frequency

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BEE3823

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEE3823

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEE3828

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEE3826

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

Quality Control PEE1859

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEE3822

Analyte	Units	PQL	Blank	DUP1	LCS %
				PEE1859-01 Samp QC RPD %	
Aluminium	µg/sample	5.0	<5.0	<5.0 <5.0 [NA]	96.3
Barium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	125
Boron	µg/sample	20	<20	<20 <20 [NA]	96.3
Cadmium	µg/sample	0.50	<0.50	<0.50 <0.50 [NA]	99.4
Calcium	µg/sample	50	<50	<50 <50 [NA]	93.6
Chromium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	101
Cobalt	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	99.7
Copper	µg/sample	2.0	<2.0	5.00 4.00 [NA]	102
Iron	µg/sample	5.0	<5.0	823 835 1.40	99.9
Lead	µg/sample	5.0	<5.0	<5.0 <5.0 [NA]	99.8
Lithium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	110
Magnesium	µg/sample	50	<50	<50 <50 [NA]	99.5
Manganese	µg/sample	2.0	<2.0	6.00 6.00 [NA]	99.8
Molybdenum	µg/sample	5.0	<5.0	<5.0 <5.0 [NA]	108
Nickel	µg/sample	2.0	<2.0	2.20 <2.0 [NA] [2]	99.8
Phosphorus	µg/sample	20	<20	<20 <20 [NA]	95.1
Potassium	µg/sample	50	<50	<50 <50 [NA]	93.7
Sodium	µg/sample	100	<100	<100 <100 [NA]	98.9
Sulfur	µg/sample	50	<50	162 77.8 [NA] [2]	94.4
Tin	µg/sample	10	<10	<10 <10 [NA]	106
Titanium	µg/sample	2.0	<2.0	16.6 16.4 1.21	104
Vanadium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	100
Zinc	µg/sample	5.0	<5.0	<5.0 <5.0 [NA]	101

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEE3823

Analyte	Units	PQL	Blank	LCS %
Barium	µg/sample	2.0	<2.0	123
Boron	µg/sample	20	<20	94.4
Cadmium	µg/sample	0.50	<0.50	98.0
Calcium	µg/sample	50	<50	92.4
Chromium	µg/sample	2.0	<2.0	99.8
Cobalt	µg/sample	2.0	<2.0	98.0
Copper	µg/sample	2.0	<2.0	99.9
Iron	µg/sample	5.0	<5.0	98.1
Lead	µg/sample	5.0	<5.0	98.2
Lithium	µg/sample	2.0	<2.0	106
Magnesium	µg/sample	50	<50	97.6
Manganese	µg/sample	2.0	<2.0	98.4
Molybdenum	µg/sample	5.0	<5.0	106
Nickel	µg/sample	2.0	<2.0	98.4
Phosphorus	µg/sample	20	<20	93.2
Potassium	µg/sample	50	<50	93.4
Sodium	µg/sample	100	<100	96.8
Sulfur	µg/sample	50	<50	92.5
Tin	µg/sample	10	<10	105
Titanium	µg/sample	2.0	<2.0	103
Vanadium	µg/sample	2.0	<2.0	98.4
Zinc	µg/sample	5.0	<5.0	99.2

Quality Control PEE1859

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEE3825

Analyte	Units	PQL	Blank	DUP1	LCS %
				PEE1859-01 Samp QC RPD %	
Antimony	µg/sample	10	<10	<10 <10 [NA]	114
Arsenic	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	104
Beryllium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	98.3
Gallium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	99.0
Selenium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	126
Thallium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	95.5
Thorium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	99.2
Uranium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	101

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEE3826

Analyte	Units	PQL	Blank		LCS %
Antimony	µg/sample	10	<10		114
Arsenic	µg/sample	2.0	<2.0		104
Beryllium	µg/sample	2.0	<2.0		99.2
Gallium	µg/sample	4.0	<4.0		98.0
Selenium	µg/sample	4.0	<4.0		127
Thallium	µg/sample	4.0	<4.0		86.9
Thorium	µg/sample	4.0	<4.0		95.9
Uranium	µg/sample	4.0	<4.0		98.5

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEE3827

Analyte	Units	PQL	Blank	DUP1	LCS %
				PEE1859-01 Samp QC RPD %	
Mercury	µg/sample	0.20	<0.20	<0.20 <0.20 [NA]	97.2

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEE3828

Analyte	Units	PQL	Blank		LCS %
Mercury	µg/sample	0.20	<0.20		96.0

QC Comments

Identifier	Description
[2]	Duplicate %RPD may be flagged as an outlier to routine laboratory acceptance, however, where one or both results are <10*PQL, the RPD acceptance criteria increases exponentially.

Certificate of Analysis PEE2078

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	30/05/2023
Date Instructions Received	30/05/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	07/06/2023
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Accredited for compliance with ISO/IEC 17025. Tests not covered by NATA are denoted with *.

Authorisation Details

Airborne Dust Approved By	Heram Halim Thomas Edwards
Results Approved By	Heram Halim, Operations Manager Michael Hall, Inorganics & Metals Supervisor Thomas Edwards, OHL Supervisor Todd Lee, Group Operations Manager
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEE2078

Report Amendment History

Revision	Reason for Amendment
R-01	Results now include /filter and /m3 unit reporting.
R-02	QC reporting updated to include PQL.
R-03	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.

Certificate of Analysis PEE2078

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEE2078-01	Sample 8	HiVol Filter	29/05/2023	30/05/2023
PEE2078-02	Blank 8	HiVol Filter	29/05/2023	30/05/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
Sample 8	TENV15	[NA]	[NA]	1500
Blank 8	TENV16	[NA]	[NA]	[NA]

Certificate of Analysis PEE2078

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEE2078-01 Sample 8 29/05/2023	PEE2078-02 Blank 8 29/05/2023
Aluminium	µg/sample	5.0	740 [1]	6500
Aluminium	µg/m3		0.50 [1]	[NA]
Boron	µg/sample	20	420 [1]	12000
Boron	µg/m3		0.28 [1]	[NA]
Barium	µg/sample	2.0	120 [1]	3400
Barium	µg/m3		0.077 [1]	[NA]
Calcium	µg/sample	50	780 [1]	27000
Calcium	µg/m3		0.52 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	2.6 [1]	13
Chromium	µg/m3		0.0017 [1]	[NA]
Copper	µg/sample	2.0	7.4 [1]	6.8
Copper	µg/m3		0.0049 [1]	[NA]
Iron	µg/sample	5.0	690 [1]	220
Iron	µg/m3		0.46 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	500 [1]	5800
Potassium	µg/m3		0.33 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	4.4
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	300 [1]	9300
Magnesium	µg/m3		0.20 [1]	[NA]
Manganese	µg/sample	2.0	8.2 [1]	7.8
Manganese	µg/m3		0.0055 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	<5.0
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	5700 [1]	100000
Sodium	µg/m3		3.8 [1]	[NA]
Nickel	µg/sample	2.0	<2.0 [1]	2.2
Nickel	µg/m3		<0.0013 [1]	[NA]
Phosphorus	µg/sample	20	36 [1]	<20
Phosphorus	µg/m3		0.024 [1]	[NA]
Lead	µg/sample	5.0	6.7 [1]	<5.0
Lead	µg/m3		0.0044 [1]	[NA]
Sulfur	µg/sample	50	570 [1]	1800
Sulfur	µg/m3		0.38 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	11 [1]	11
Titanium	µg/m3		0.0073 [1]	[NA]
Vanadium	µg/sample	2.0	2.4 [1]	<2.0
Vanadium	µg/m3		0.0016 [1]	[NA]

Certificate of Analysis PEE2078

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEE2078-01 Sample 8 29/05/2023	PEE2078-02 Blank 8 29/05/2023
Zinc	µg/sample	5.0	65 [1]	2400
Zinc	µg/m3		0.043 [1]	[NA]
Arsenic	µg/sample	2.0	2.3 [1]	2.4
Arsenic	µg/m3		0.0015 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	<4.0 [1]	<4.0
Thorium	µg/m3		<0.0027 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PEE2078

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PEE2078-01	PEE2078-02
Your Reference			Sample 8	Blank 8
Date Sampled			29/05/2023	29/05/2023
Dust	mg	0.10	27	0.30
Dust	µg/m3	0.10	18	[NA]

Certificate of Analysis PEE2078

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

Certificate of Analysis PEE2078

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
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Certificate of Analysis PEE2078

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This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PEE2078

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

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Data Quality Assessment Summary PEE2078

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	No	QC Frequency Outliers Exist - See detailed list below

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PEE2078

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	2	29/05/2023	07/06/2023	07/06/2023	Yes
	1	29/05/2023	07/06/2023	14/08/2023	Yes
Metals OHS (LL) HiVol Filter	2	29/05/2023	07/06/2023	07/06/2023	Yes
	1	29/05/2023	07/06/2023	14/08/2023	Yes
Metals OHS-Hg HiVol Filter	2	29/05/2023	07/06/2023	08/06/2023	Yes
	1	29/05/2023	07/06/2023	14/08/2023	Yes
Gravimetric Dust HiVol Filter	2	29/05/2023	07/06/2023	07/06/2023	Yes
	1	29/05/2023	07/06/2023	14/08/2023	Yes

Outliers: QC Frequency

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BEF0582

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BEF0583

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEF0582

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEF0583

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEF0588

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEF0589

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

Quality Control PEE2078

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEF0582

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	93.4
Barium	µg/sample	2.0	<2.0	110
Boron	µg/sample	20	<20	103
Cadmium	µg/sample	0.50	<0.50	95.4
Calcium	µg/sample	50	<50	96.9
Chromium	µg/sample	2.0	<2.0	96.6
Cobalt	µg/sample	2.0	<2.0	95.8
Copper	µg/sample	2.0	<2.0	106
Iron	µg/sample	5.0	<5.0	94.5
Lead	µg/sample	5.0	<5.0	99.7
Lithium	µg/sample	2.0	<2.0	102
Magnesium	µg/sample	50	<50	103
Manganese	µg/sample	2.0	<2.0	98.9
Molybdenum	µg/sample	5.0	<5.0	102
Nickel	µg/sample	2.0	<2.0	101
Phosphorus	µg/sample	20	<20	103
Potassium	µg/sample	50	<50	103
Sodium	µg/sample	100	<100	102
Sulfur	µg/sample	50	<50	95.2
Tin	µg/sample	10	<10	102
Titanium	µg/sample	2.0	<2.0	93.4
Vanadium	µg/sample	2.0	<2.0	97.9
Zinc	µg/sample	5.0	<5.0	96.7

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEF0583

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	93.4
Barium	µg/sample	2.0	<2.0	107
Boron	µg/sample	20	<20	103
Cadmium	µg/sample	0.50	<0.50	93.1
Calcium	µg/sample	50	<50	93.7
Chromium	µg/sample	2.0	<2.0	101
Cobalt	µg/sample	2.0	<2.0	93.5
Copper	µg/sample	2.0	<2.0	106
Iron	µg/sample	5.0	<5.0	94.5
Lead	µg/sample	5.0	<5.0	97.4
Lithium	µg/sample	2.0	<2.0	102
Magnesium	µg/sample	50	<50	98.9
Manganese	µg/sample	2.0	<2.0	100
Molybdenum	µg/sample	5.0	<5.0	98.7
Nickel	µg/sample	2.0	<2.0	99.2
Phosphorus	µg/sample	20	<20	99.8
Potassium	µg/sample	50	<50	103
Sodium	µg/sample	100	<100	99.2
Sulfur	µg/sample	50	<50	95.2
Tin	µg/sample	10	<10	98.3
Titanium	µg/sample	2.0	<2.0	96.2
Vanadium	µg/sample	2.0	<2.0	95.3
Zinc	µg/sample	5.0	<5.0	96.7

Quality Control PEE2078

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEF0586

Analyte	Units	PQL	Blank	DUP1	LCS %
				PEE2078-01 Samp QC RPD %	
Antimony	µg/sample	10	<10	<10 <10 [NA]	102
Arsenic	µg/sample	2.0	<2.0	2.30 <2.0 [NA] [2]	100
Beryllium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	109
Gallium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	97.6
Selenium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	105
Thallium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	92.2
Thorium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	93.8
Uranium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	97.7

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEF0587

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	84.8
Arsenic	µg/sample	2.0	<2.0	106
Beryllium	µg/sample	2.0	<2.0	99.8
Gallium	µg/sample	4.0	<4.0	102
Selenium	µg/sample	4.0	<4.0	108
Thallium	µg/sample	4.0	<4.0	75.4
Thorium	µg/sample	4.0	<4.0	79.7
Uranium	µg/sample	4.0	<4.0	82.1

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEF0588

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.20	<0.20	87.2

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEF0589

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.20	<0.20	89.6

QC Comments

Identifier	Description
[2]	Duplicate %RPD may be flagged as an outlier to routine laboratory acceptance, however, where one or both results are <10*PQL, the RPD acceptance criteria increases exponentially.

Certificate of Analysis PEF0294

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	06/06/2023
Date Instructions Received	06/06/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	14/06/2023
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Authorisation Details

Airborne Dust Approved By	Heram Halim Thomas Edwards
Results Approved By	Heram Halim, Operations Manager Thomas Edwards, OHL Supervisor Todd Lee, Group Operations Manager
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEF0294

Report Amendment History

Revision	Reason for Amendment
R-01	Results now include /filter and /m3 unit reporting.
R-02	QC reporting updated to include PQL and updated RPD flag qualifiers.
R-03	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.

Certificate of Analysis PEF0294

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEF0294-01	Sample 9	HiVol Filter	04/06/2023	06/06/2023
PEF0294-02	Blank 9	HiVol Filter	04/06/2023	06/06/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
Sample 9	TENV17	[NA]	[NA]	1500
Blank 9	TENV18	[NA]	[NA]	[NA]

Certificate of Analysis PEF0294

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEF0294-01 Sample 9 04/06/2023	PEF0294-02 Blank 9 04/06/2023
Aluminium	µg/sample	5.0	630 [1]	6100
Aluminium	µg/m3		0.42 [1]	[NA]
Boron	µg/sample	20	780 [1]	12000
Boron	µg/m3		0.52 [1]	[NA]
Barium	µg/sample	2.0	160 [1]	3300
Barium	µg/m3		0.11 [1]	[NA]
Calcium	µg/sample	50	1300 [1]	27000
Calcium	µg/m3		0.84 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	<2.0 [1]	12
Chromium	µg/m3		<0.0013 [1]	[NA]
Copper	µg/sample	2.0	2.6 [1]	6.3
Copper	µg/m3		0.0017 [1]	[NA]
Iron	µg/sample	5.0	260 [1]	210
Iron	µg/m3		0.17 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	370 [1]	5400
Potassium	µg/m3		0.24 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	4.5
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	590 [1]	9500
Magnesium	µg/m3		0.40 [1]	[NA]
Manganese	µg/sample	2.0	2.4 [1]	7.5
Manganese	µg/m3		0.0016 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	<5.0
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	4700 [1]	100000
Sodium	µg/m3		3.1 [1]	[NA]
Nickel	µg/sample	2.0	<2.0 [1]	3.1
Phosphorus	µg/sample	20	24 [1]	<20
Phosphorus	µg/m3		0.016 [1]	[NA]
Lead	µg/sample	5.0	5.4 [1]	<5.0
Lead	µg/m3		0.0036 [1]	[NA]
Sulfur	µg/sample	50	280 [1]	1700
Sulfur	µg/m3		0.19 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	4.4 [1]	11
Titanium	µg/m3		0.0029 [1]	[NA]
Vanadium	µg/sample	2.0	2.1 [1]	<2.0
Vanadium	µg/m3		0.0014 [1]	[NA]
Zinc	µg/sample	5.0	100 [1]	2400

Certificate of Analysis PEF0294

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEF0294-01 Sample 9 04/06/2023	PEF0294-02 Blank 9 04/06/2023
Zinc	µg/m3		0.067 [1]	[NA]
Arsenic	µg/sample	2.0	<2.0 [1]	2.4
Arsenic	µg/m3		<0.0013 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	<4.0 [1]	<4.0
Thorium	µg/m3		<0.0027 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PEF0294

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PEF0294-01	PEF0294-02
Your Reference			Sample 9	Blank 9
Date Sampled			04/06/2023	04/06/2023
Dust	mg	0.10	12	0.50
Dust	µg/m3	0.10	8.1	[NA]

Certificate of Analysis PEF0294

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

Certificate of Analysis PEF0294

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

Certificate of Analysis PEF0294

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PEF0294

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PEF0294

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	No	Duplicate Outliers Exist - See detailed list below
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	No	QC Frequency Outliers Exist - See detailed list below

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PEF0294

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	2	04/06/2023	13/06/2023	13/06/2023	Yes
	1	04/06/2023	13/06/2023	14/08/2023	Yes
Metals OHS (LL) HiVol Filter	2	04/06/2023	13/06/2023	14/06/2023	Yes
	1	04/06/2023	13/06/2023	14/08/2023	Yes
Metals OHS-Hg HiVol Filter	2	04/06/2023	13/06/2023	13/06/2023	Yes
	1	04/06/2023	13/06/2023	14/08/2023	Yes
Gravimetric Dust HiVol Filter	2	04/06/2023	12/06/2023	12/06/2023	Yes
	1	04/06/2023	12/06/2023	14/08/2023	Yes

Outliers: Duplicates

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BEF1333

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PEF0294-01	DUP1	Calcium	40.00	178[2][3]
PEF0294-01	DUP1	Magnesium	40.00	83.7[2]
PEF0294-01	DUP1	Potassium	40.00	63.5[3]
PEF0294-01	DUP1	Sodium	40.00	136[2]

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEF1333

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PEF0294-01	DUP1	Aluminium	40.00	70.2[2]
PEF0294-01	DUP1	Barium	40.00	117[2]
PEF0294-01	DUP1	Boron	40.00	57.3[2]
PEF0294-01	DUP1	Zinc	40.00	94.6[2]

Data Quality Assessment Summary PEF0294

Outliers: QC Frequency

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BEF1334

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEF1334

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEF1334

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEF1334

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

Quality Control PEF0294

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEF1333

Analyte	Units	PQL	Blank	DUP1	LCS %
				PEF0294-01 Samp QC RPD %	
Aluminium	µg/sample	5.0	<5.0	626 301 70.2 [2]	97.6
Antimony	µg/sample	10	<10	<10 <10 [NA]	99.7
Arsenic	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	108
Barium	µg/sample	2.0	<2.0	165 42.8 117 [2]	109
Beryllium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	98.9
Boron	µg/sample	20	<20	780 432 57.3 [2]	103
Cadmium	µg/sample	0.50	<0.50	<0.50 <0.50 [NA]	97.3
Calcium	µg/sample	50	<50	1250 74.0 178 [2][3]	96.1
Chromium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	96.0
Cobalt	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	97.4
Copper	µg/sample	2.0	<2.0	2.60 4.20 [NA] [3]	101
Gallium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	101
Iron	µg/sample	5.0	<5.0	259 241 7.12	98.8
Lead	µg/sample	5.0	<5.0	5.40 <5.0 [NA] [3]	99.1
Lithium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	105
Magnesium	µg/sample	50	<50	593 243 83.7 [2]	102
Manganese	µg/sample	2.0	<2.0	2.40 2.00 [NA]	97.8
Mercury	µg/sample	0.20	<0.20	<0.20 <0.20 [NA]	96.4
Molybdenum	µg/sample	5.0	<5.0	<5.0 <5.0 [NA]	94.3
Nickel	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	97.9
Phosphorus	µg/sample	20	<20	24.0 21.8 [NA]	96.1
Potassium	µg/sample	50	<50	367 190 63.5 [3]	101
Selenium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	114
Sodium	µg/sample	100	<100	4720 906 136 [2]	100
Sulfur	µg/sample	50	<50	282 172 [NA] [3]	97.7
Thallium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	103
Thorium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	104
Tin	µg/sample	10	<10	<10 <10 [NA]	94.4
Titanium	µg/sample	2.0	<2.0	4.40 3.80 [NA]	86.6
Uranium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	106
Vanadium	µg/sample	2.0	<2.0	2.10 <2.0 [NA] [3]	98.0
Zinc	µg/sample	5.0	<5.0	100 35.8 94.6 [2]	101

Quality Control PEF0294

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEF1334

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	97.6
Antimony	µg/sample	10	<10	[NA]
Arsenic	µg/sample	2.0	<2.0	[NA]
Barium	µg/sample	2.0	<2.0	110
Beryllium	µg/sample	2.0	<2.0	[NA]
Boron	µg/sample	20	<20	103
Cadmium	µg/sample	0.50	<0.50	98.6
Calcium	µg/sample	50	<50	96.3
Chromium	µg/sample	2.0	<2.0	103
Cobalt	µg/sample	2.0	<2.0	98.6
Copper	µg/sample	2.0	<2.0	105
Gallium	µg/sample	4.0	<4.0	[NA]
Iron	µg/sample	5.0	<5.0	98.9
Lead	µg/sample	5.0	<5.0	101
Lithium	µg/sample	2.0	<2.0	108
Magnesium	µg/sample	50	<50	102
Manganese	µg/sample	2.0	<2.0	103
Mercury	µg/sample	0.20	<0.20	[NA]
Molybdenum	µg/sample	5.0	<5.0	95.4
Nickel	µg/sample	2.0	<2.0	100
Phosphorus	µg/sample	20	<20	97.6
Potassium	µg/sample	50	<50	101
Selenium	µg/sample	4.0	<4.0	[NA]
Sodium	µg/sample	100	<100	102
Sulfur	µg/sample	50	<50	97.7
Thallium	µg/sample	4.0	<4.0	[NA]
Thorium	µg/sample	4.0	<4.0	[NA]
Tin	µg/sample	10	<10	96.3
Titanium	µg/sample	2.0	<2.0	93.0
Uranium	µg/sample	4.0	<4.0	[NA]
Vanadium	µg/sample	2.0	<2.0	98.9
Zinc	µg/sample	5.0	<5.0	101

QC Comments

Identifier	Description
[2]	Duplicate analysis precision is/are outside acceptable %RPD, re-analysis indicates possible sample heterogeneity.
[3]	Duplicate %RPD may be flagged as an outlier to routine laboratory acceptance, however, where one or both results are <10*PQL, the RPD acceptance criteria increases exponentially.

Certificate of Analysis PEF0824

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	13/06/2023
Date Instructions Received	13/06/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	20/06/2023
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Authorisation Details

Airborne Dust Approved By	Heram Halim Thomas Edwards
Results Approved By	Heram Halim, Operations Manager Michael Hall, Inorganics & Metals Supervisor Thomas Edwards, OHL Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEF0824

Report Amendment History

Revision	Reason for Amendment
R-01	Results now include /filter and /m3 unit reporting.
R-02	QC reporting updated to include PQL.
R-03	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.

Certificate of Analysis PEF0824

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEF0824-01	TENV19	HiVol Filter	10/06/2023	13/06/2023
PEF0824-02	TENV20	HiVol Filter	10/06/2023	13/06/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
TENV19	TENV19	[NA]	[NA]	1500
TENV20	TENV20	[NA]	[NA]	[NA]

Certificate of Analysis PEF0824

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEF0824-01 TENV19 10/06/2023	PEF0824-02 TENV20 10/06/2023
Aluminium	µg/sample	5.0	<5.0 [1]	6600
Aluminium	µg/m3		<0.0033 [1]	[NA]
Boron	µg/sample	20	38 [1]	13000
Boron	µg/m3		0.025 [1]	[NA]
Barium	µg/sample	2.0	<2.0 [1]	3400
Barium	µg/m3		<0.0013 [1]	[NA]
Calcium	µg/sample	50	<50 [1]	27000
Calcium	µg/m3		<0.033 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	<2.0 [1]	12
Chromium	µg/m3		<0.0013 [1]	[NA]
Copper	µg/sample	2.0	5.0 [1]	5.2
Copper	µg/m3		0.0033 [1]	[NA]
Iron	µg/sample	5.0	18 [1]	240
Iron	µg/m3		0.012 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	<50 [1]	5500
Potassium	µg/m3		<0.033 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	4.7
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	81 [1]	9900
Magnesium	µg/m3		0.054 [1]	[NA]
Manganese	µg/sample	2.0	<2.0 [1]	7.4
Manganese	µg/m3		<0.0013 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	<5.0
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	440 [1]	100000
Sodium	µg/m3		0.30 [1]	[NA]
Nickel	µg/sample	2.0	<2.0 [1]	3.0
Nickel	µg/m3		<0.0013 [1]	[NA]
Phosphorus	µg/sample	20	24 [1]	<20
Phosphorus	µg/m3		0.016 [1]	[NA]
Lead	µg/sample	5.0	<5.0 [1]	<5.0
Lead	µg/m3		<0.0033 [1]	[NA]
Sulfur	µg/sample	50	150 [1]	1700
Sulfur	µg/m3		0.099 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	<2.0 [1]	11
Titanium	µg/m3		<0.0013 [1]	[NA]
Vanadium	µg/sample	2.0	<2.0 [1]	<2.0
Vanadium	µg/m3		<0.0013 [1]	[NA]

Certificate of Analysis PEF0824

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEF0824-01 TENV19 10/06/2023	PEF0824-02 TENV20 10/06/2023
Zinc	µg/sample	5.0	<5.0 [1]	2300
Zinc	µg/m3		<0.0033 [1]	[NA]
Arsenic	µg/sample	2.0	<2.0 [1]	2.6
Arsenic	µg/m3		<0.0013 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	<4.0 [1]	<4.0
Thorium	µg/m3		<0.0027 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PEF0824

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PEF0824-01	PEF0824-02
Your Reference			TENV19	TENV20
Date Sampled			10/06/2023	10/06/2023
Dust	mg	0.10	9.3	1.2
Dust	µg/m3	0.10	6.2	[NA]

Certificate of Analysis PEF0824

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

Certificate of Analysis PEF0824

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

Certificate of Analysis PEF0824

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PEF0824

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PEF0824

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	No	QC Frequency Outliers Exist - See detailed list below

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PEF0824

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	1	10/06/2023	19/06/2023	14/08/2023	Yes
	2	10/06/2023	19/06/2023	19/06/2023	Yes
Metals OHS (LL) HiVol Filter	1	10/06/2023	19/06/2023	14/08/2023	Yes
	2	10/06/2023	19/06/2023	20/06/2023	Yes
Metals OHS-Hg HiVol Filter	1	10/06/2023	19/06/2023	14/08/2023	Yes
	2	10/06/2023	19/06/2023	20/06/2023	Yes
Gravimetric Dust HiVol Filter	1	10/06/2023	16/06/2023	14/08/2023	Yes
	2	10/06/2023	16/06/2023	16/06/2023	Yes

Data Quality Assessment Summary PEF0824

Outliers: QC Frequency

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BEF2069

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BEF2070

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEF2069

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEF2070

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEF2069

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEF2070

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEF2069

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEF2070

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

Quality Control PEF0824

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEF2069

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	87.3
Antimony	µg/sample	10	<10	103
Arsenic	µg/sample	2.0	<2.0	107
Barium	µg/sample	2.0	<2.0	102
Beryllium	µg/sample	2.0	<2.0	103
Boron	µg/sample	20	<20	83.3
Cadmium	µg/sample	0.50	<0.50	90.3
Calcium	µg/sample	50	<50	86.2
Chromium	µg/sample	2.0	<2.0	81.3
Cobalt	µg/sample	2.0	<2.0	90.9
Copper	µg/sample	2.0	<2.0	86.2
Gallium	µg/sample	4.0	<4.0	93.4
Iron	µg/sample	5.0	<5.0	87.9
Lead	µg/sample	5.0	<5.0	84.1
Lithium	µg/sample	2.0	<2.0	94.8
Magnesium	µg/sample	50	<50	87.1
Manganese	µg/sample	2.0	<2.0	83.8
Mercury	µg/sample	0.20	<0.20	96.8
Molybdenum	µg/sample	5.0	<5.0	87.9
Nickel	µg/sample	2.0	<2.0	83.6
Phosphorus	µg/sample	20	<20	88.6
Potassium	µg/sample	50	<50	90.4
Selenium	µg/sample	4.0	<4.0	120
Sodium	µg/sample	100	<100	90.9
Sulfur	µg/sample	50	<50	86.0
Thallium	µg/sample	4.0	<4.0	101
Thorium	µg/sample	4.0	<4.0	103
Tin	µg/sample	10	<10	87.4
Titanium	µg/sample	2.0	<2.0	80.0
Uranium	µg/sample	4.0	<4.0	105
Vanadium	µg/sample	2.0	<2.0	91.4
Zinc	µg/sample	5.0	<5.0	81.9

Quality Control PEF0824

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEF2070

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	87.3
Antimony	µg/sample	10	<10	103
Arsenic	µg/sample	2.0	<2.0	102
Barium	µg/sample	2.0	<2.0	97.4
Beryllium	µg/sample	2.0	<2.0	101
Boron	µg/sample	20	<20	83.4
Cadmium	µg/sample	0.50	<0.50	86.7
Calcium	µg/sample	50	<50	82.8
Chromium	µg/sample	2.0	<2.0	84.0
Cobalt	µg/sample	2.0	<2.0	87.4
Copper	µg/sample	2.0	<2.0	85.5
Gallium	µg/sample	4.0	<4.0	89.1
Iron	µg/sample	5.0	<5.0	87.9
Lead	µg/sample	5.0	<5.0	80.3
Lithium	µg/sample	2.0	<2.0	93.5
Magnesium	µg/sample	50	<50	87.1
Manganese	µg/sample	2.0	<2.0	84.4
Mercury	µg/sample	0.20	<0.20	96.4
Molybdenum	µg/sample	5.0	<5.0	84.4
Nickel	µg/sample	2.0	<2.0	81.9
Phosphorus	µg/sample	20	<20	86.3
Potassium	µg/sample	50	<50	90.4
Selenium	µg/sample	4.0	<4.0	120
Sodium	µg/sample	100	<100	87.9
Sulfur	µg/sample	50	<50	86.0
Thallium	µg/sample	4.0	<4.0	98.0
Thorium	µg/sample	4.0	<4.0	104
Tin	µg/sample	10	<10	84.3
Titanium	µg/sample	2.0	<2.0	82.9
Uranium	µg/sample	4.0	<4.0	106
Vanadium	µg/sample	2.0	<2.0	87.8
Zinc	µg/sample	5.0	<5.0	81.9

Certificate of Analysis PEF1154

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	19/06/2023
Date Instructions Received	19/06/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	26/06/2023
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Authorisation Details

Airborne Dust Approved By	Heram Halim Thomas Edwards
Results Approved By	Heram Halim, Operations Manager Michael Hall, Inorganics & Metals Supervisor Thomas Edwards, OHL Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEF1154

Report Amendment History

Revision	Reason for Amendment
R-03	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.
R-01	Results now include /filter and /m3 unit reporting.
R-02	QC reporting updated to include PQL and updated RPD flag qualifiers.

Certificate of Analysis PEF1154

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEF1154-01	Sample 11	HiVol Filter	16/06/2023	19/06/2023
PEF1154-02	Blank 11	HiVol Filter	16/06/2023	19/06/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
Sample 11	TENV21	[NA]	[NA]	1500
Blank 11	TENV22	[NA]	[NA]	[NA]

Certificate of Analysis PEF1154

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEF1154-01 Sample 11 16/06/2023	PEF1154-02 Blank 11 16/06/2023
Aluminium	µg/sample	5.0	490 [1]	6800
Aluminium	µg/m3		0.33 [1]	[NA]
Boron	µg/sample	20	960 [1]	17000
Boron	µg/m3		0.64 [1]	[NA]
Barium	µg/sample	2.0	2.8 [1]	200
Barium	µg/m3		0.0019 [1]	[NA]
Calcium	µg/sample	50	1900 [1]	41000
Calcium	µg/m3		1.2 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	<2.0 [1]	4.6
Chromium	µg/m3		<0.0013 [1]	[NA]
Copper	µg/sample	2.0	<2.0 [1]	15
Copper	µg/m3		<0.0013 [1]	[NA]
Iron	µg/sample	5.0	57 [1]	220
Iron	µg/m3		0.038 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	450 [1]	5300
Potassium	µg/m3		0.30 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	11
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	1000 [1]	18000
Magnesium	µg/m3		0.69 [1]	[NA]
Manganese	µg/sample	2.0	<2.0 [1]	16
Manganese	µg/m3		<0.0013 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	<5.0
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	10000 [1]	120000
Sodium	µg/m3		6.7 [1]	[NA]
Nickel	µg/sample	2.0	<2.0 [1]	4.4
Nickel	µg/m3		<0.0013 [1]	[NA]
Phosphorus	µg/sample	20	<20 [1]	47
Phosphorus	µg/m3		<0.00033 [1]	[NA]
Lead	µg/sample	5.0	<5.0 [1]	6.7
Lead	µg/m3		<0.0033 [1]	[NA]
Sulfur	µg/sample	50	240 [1]	2800
Sulfur	µg/m3		0.16 [1]	[NA]
Tin	µg/sample	10	10 [1]	<10
Tin	µg/m3		0.0069 [1]	[NA]
Titanium	µg/sample	2.0	5.2 [1]	40
Titanium	µg/m3		0.0035 [1]	[NA]
Vanadium	µg/sample	2.0	<2.0 [1]	<2.0
Vanadium	µg/m3		<0.0013 [1]	[NA]

Certificate of Analysis PEF1154

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEF1154-01 Sample 11 16/06/2023	PEF1154-02 Blank 11 16/06/2023
Zinc	µg/sample	5.0	5.2 [1]	110
Zinc	µg/m3		0.0035 [1]	[NA]
Arsenic	µg/sample	2.0	<2.0 [1]	<2.0
Arsenic	µg/m3		<0.0013 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	<4.0 [1]	<4.0
Thorium	µg/m3		<0.0027 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PEF1154

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PEF1154-01	PEF1154-02
Your Reference			Sample 11	Blank 11
Date Sampled			16/06/2023	16/06/2023
Dust	mg	0.10	13	<0.10
Dust	µg/m3	0.10	8.4	[NA]

Certificate of Analysis PEF1154

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

Certificate of Analysis PEF1154

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

Certificate of Analysis PEF1154

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PEF1154

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PEF1154

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	No	Duplicate Outliers Exist - See detailed list below
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	No	QC Frequency Outliers Exist - See detailed list below

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PEF1154

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	1	16/06/2023	26/06/2023	17/08/2023	Yes
	2	16/06/2023	26/06/2023	26/06/2023	Yes
Metals OHS (LL) HiVol Filter	1	16/06/2023	26/06/2023	17/08/2023	Yes
	2	16/06/2023	26/06/2023	26/06/2023	Yes
Metals OHS-Hg HiVol Filter	1	16/06/2023	26/06/2023	17/08/2023	Yes
	2	16/06/2023	26/06/2023	26/06/2023	Yes
Gravimetric Dust HiVol Filter	1	16/06/2023	23/06/2023	17/08/2023	Yes
	2	16/06/2023	23/06/2023	23/06/2023	Yes

Data Quality Assessment Summary PEF1154

Outliers: Duplicates

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BEF3017

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PEF1154-01	DUP1	Calcium	40.00	101[2]
PEF1154-01	DUP1	Magnesium	40.00	89.5[2]
PEF1154-01	DUP1	Potassium	40.00	56.2[2]
PEF1154-01	DUP1	Sodium	40.00	65.4[2]
PEF1154-01	DUP1	Sulfur	40.00	69.4[3]

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BEF3018

Sample ID	Duplicate ID	Analyte	% Limits	RPD
BEF3018-DUP1#	DUP1	Calcium	40.00	200[3]
BEF3018-DUP1#	DUP1	Magnesium	40.00	200[2]
BEF3018-DUP1#	DUP1	Potassium	40.00	200[2]
BEF3018-DUP1#	DUP1	Sodium	40.00	200[2]

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEF3017

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PEF1154-01	DUP1	Aluminium	40.00	66.1[2]
PEF1154-01	DUP1	Boron	40.00	83.5[2]
PEF1154-01	DUP1	Iron	40.00	54.2[2]

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEF3018

Sample ID	Duplicate ID	Analyte	% Limits	RPD
BEF3018-DUP1#	DUP1	Aluminium	40.00	200[2]
BEF3018-DUP1#	DUP1	Barium	40.00	200[3]
BEF3018-DUP1#	DUP1	Zinc	40.00	87.3[3]

Outliers: QC Frequency

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEF3022

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

Quality Control PEF1154

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEF3017

Analyte	Units	PQL	Blank	DUP1		LCS %
				PEF1154-01 Samp QC RPD %		
Aluminium	µg/sample	5.0	<5.0	493	979 66.1 [2]	99.5
Barium	µg/sample	2.0	<2.0	2.80	14.0 [NA] [3]	119
Boron	µg/sample	20	<20	963	2340 83.5 [2]	109
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50 [NA]	107
Calcium	µg/sample	50	<50	1860	5610 101 [2]	96.0
Chromium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	105
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	106
Copper	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	100
Iron	µg/sample	5.0	<5.0	56.8	99.0 54.2 [2]	107
Lead	µg/sample	5.0	<5.0	<5.0	<5.0 [NA]	104
Lithium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	101
Magnesium	µg/sample	50	<50	1040	2730 89.5 [2]	102
Manganese	µg/sample	2.0	<2.0	<2.0	2.20 [NA] [3]	96.7
Molybdenum	µg/sample	5.0	<5.0	<5.0	<5.0 [NA]	106
Nickel	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	105
Phosphorus	µg/sample	20	<20	<20	<20 [NA]	77.1
Potassium	µg/sample	50	<50	454	809 56.2 [2]	101
Sodium	µg/sample	100	<100	10100	20000 65.4 [2]	102
Sulfur	µg/sample	50	<50	240	494 69.4 [3]	99.1
Tin	µg/sample	10	<10	10.4	10.1 [NA]	104
Titanium	µg/sample	2.0	<2.0	5.20	5.60 [NA]	82.0
Vanadium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	106
Zinc	µg/sample	5.0	<5.0	5.20	9.60 [NA] [3]	107

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEF3018

Analyte	Units	PQL	Blank	DUP1		LCS %
				BEF3018-DUP1# Samp QC RPD %		
Aluminium	µg/sample	5.0	<5.0	610	<5.0 200 [2]	99.5
Barium	µg/sample	2.0	<2.0	17.4	<2.0 200 [3]	119
Boron	µg/sample	20	<20	<20	<20 [NA]	109
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50 [NA]	107
Calcium	µg/sample	50	<50	354	<50 200 [3]	96.0
Chromium	µg/sample	2.0	<2.0	2.40	2.00 [NA]	108
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	106
Copper	µg/sample	2.0	<2.0	8.20	7.40 [NA]	109
Iron	µg/sample	5.0	<5.0	987	843 15.7	107
Lead	µg/sample	5.0	<5.0	6.83	7.74 [NA]	109
Lithium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	107
Magnesium	µg/sample	50	<50	976	<50 200 [2]	102
Manganese	µg/sample	2.0	<2.0	16.8	14.8 12.7	106
Molybdenum	µg/sample	5.0	<5.0	<5.0	<5.0 [NA]	106
Nickel	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	106
Phosphorus	µg/sample	20	<20	132	129 2.91	101
Potassium	µg/sample	50	<50	599	<50 200 [2]	102
Sodium	µg/sample	100	<100	12000	<100 200 [2]	102
Sulfur	µg/sample	50	<50	1090	804 30.2	99.1
Tin	µg/sample	10	<10	<10	<10 [NA]	105
Titanium	µg/sample	2.0	<2.0	7.00	4.00 [NA] [3]	102
Vanadium	µg/sample	2.0	<2.0	2.40	2.19 [NA]	106
Zinc	µg/sample	5.0	<5.0	41.8	16.4 87.3 [3]	107

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

Quality Control PEF1154

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEF3019

Analyte	Units	PQL	Blank	DUP1	LCS %
				PEF1154-01 Samp QC RPD %	
Antimony	µg/sample	10	<10	<10 <10 [NA]	118
Arsenic	µg/sample	2.0	<2.0	<2.0 <2.0 [NA] [1]	103
Beryllium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	107
Gallium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	99.0
Selenium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	104
Thallium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	97.8
Thorium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	102
Uranium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	106

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEF3020

Analyte	Units	PQL	Blank		LCS %
Antimony	µg/sample	10	<10		118
Arsenic	µg/sample	2.0	<2.0		103
Beryllium	µg/sample	2.0	<2.0		107
Gallium	µg/sample	4.0	<4.0		99.0
Selenium	µg/sample	4.0	<4.0		104
Thallium	µg/sample	4.0	<4.0		97.8
Thorium	µg/sample	4.0	<4.0		102
Uranium	µg/sample	4.0	<4.0		106

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEF3021

Analyte	Units	PQL	Blank	DUP1	LCS %
				PEF1154-01 Samp QC RPD %	
Mercury	µg/sample	0.20	<0.20	<0.20 <0.20 [NA]	90.0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEF3022

Analyte	Units	PQL	Blank		LCS %
Mercury	µg/sample	0.20	<0.20		96.4

QC Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.
[2]	Duplicate analysis precision is/are outside acceptable %RPD, re-analysis indicates possible sample heterogeneity.
[3]	Duplicate %RPD may be flagged as an outlier to routine laboratory acceptance, however, where one or both results are <10*PQL, the RPD acceptance criteria increases exponentially.

Certificate of Analysis PEI0502

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	07/09/2023
Date Instructions Received	07/09/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	14/09/2023
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Authorisation Details

Airborne Dust Approved By	Heram Halim Thomas Edwards
Results Approved By	Heram Halim, Operations Manager Thomas Edwards, OHL Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEI0502

Report Amendment History

Revision	Reason for Amendment
R-01	Updated reporting: per filter and per m3 for sample 1
R-02	QC reporting updated to include PQL and updated RPD flag qualifiers.
R-03	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.

Certificate of Analysis PEI0502

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEI0502-01	TENV27	HiVol Filter	06/09/2023	07/09/2023
PEI0502-02	TENV28	HiVol Filter	06/09/2023	07/09/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
TENV27	TENV27	[NA]	[NA]	1500
TENV28	TENV28	[NA]	[NA]	[NA]

Certificate of Analysis PEI0502

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEI0502-01 TENV27 06/09/2023	PEI0502-02 TENV28 06/09/2023
Aluminium	µg/sample	5.0	<5.0 [1]	12000
Aluminium	µg/m3		<0.0033 [1]	[NA]
Boron	µg/sample	20	<20 [1]	25000
Boron	µg/m3		<0.013 [1]	[NA]
Barium	µg/sample	2.0	<2.0 [1]	2700
Barium	µg/m3		<0.0013 [1]	[NA]
Calcium	µg/sample	50	<50 [1]	58000
Calcium	µg/m3		<0.033 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	<2.0 [1]	6.1
Chromium	µg/m3		<0.0013 [1]	[NA]
Copper	µg/sample	2.0	7.0 [1]	14
Copper	µg/m3		0.0047 [1]	[NA]
Iron	µg/sample	5.0	35 [1]	320
Iron	µg/m3		0.023 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	<50 [1]	8300
Potassium	µg/m3		<0.033 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	15
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	<50 [1]	26000
Magnesium	µg/m3		<0.033 [1]	[NA]
Manganese	µg/sample	2.0	<2.0 [1]	22
Manganese	µg/m3		<0.0013 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	<5.0
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	4400 [1]	170000
Sodium	µg/m3		3.0 [1]	[NA]
Nickel	µg/sample	2.0	<2.0 [1]	5.4
Nickel	µg/m3		<0.0013 [1]	[NA]
Phosphorus	µg/sample	20	<20 [1]	72
Phosphorus	µg/m3		0.0028 [1]	[NA]
Lead	µg/sample	5.0	<5.0 [1]	8.9
Lead	µg/m3		<0.0033 [1]	[NA]
Sulfur	µg/sample	50	260 [1]	3100
Sulfur	µg/m3		0.17 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	<2.0 [1]	56
Titanium	µg/m3		<0.0013 [1]	[NA]
Vanadium	µg/sample	2.0	<2.0 [1]	2.0
Vanadium	µg/m3		<0.0013 [1]	[NA]

Certificate of Analysis PEI0502

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEI0502-01 TENV27 06/09/2023	PEI0502-02 TENV28 06/09/2023
Zinc	µg/sample	5.0	6.0 [1]	1900
Zinc	µg/m3		0.0040 [1]	[NA]
Arsenic	µg/sample	2.0	<2.0 [1]	<2.0
Arsenic	µg/m3		<0.0013 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	<4.0 [1]	<4.0
Thorium	µg/m3		<0.0027 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PEI0502

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PEI0502-01	PEI0502-02
Your Reference			TENV27	TENV28
Date Sampled			06/09/2023	06/09/2023
Dust	mg	0.10	7.5	0.65
Dust	µg/m3	0.10	5.0	[NA]

Certificate of Analysis PEI0502

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

Certificate of Analysis PEI0502

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

Certificate of Analysis PEI0502

Result Definitions

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LCS	Laboratory Control Sample
RPD	Relative Percent Difference
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Quality Control Definitions

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This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PEI0502

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PEI0502

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	No	Duplicate Outliers Exist - See detailed list below
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	No	QC Frequency Outliers Exist - See detailed list below

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PEI0502

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	2	06/09/2023	14/09/2023	14/09/2023	Yes
	1	06/09/2023	14/09/2023	15/09/2023	Yes
Metals OHS (LL) HiVol Filter	2	06/09/2023	14/09/2023	14/09/2023	Yes
	1	06/09/2023	14/09/2023	15/09/2023	Yes
Metals OHS-Hg HiVol Filter	2	06/09/2023	14/09/2023	14/09/2023	Yes
	1	06/09/2023	14/09/2023	15/09/2023	Yes
Gravimetric Dust HiVol Filter	2	06/09/2023	12/09/2023	12/09/2023	Yes
	1	06/09/2023	12/09/2023	15/09/2023	Yes

Outliers: Duplicates

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BEI1389

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PEI0502-01	DUP1	Sodium	40.00	61.3[2]

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BEI1390

Sample ID	Duplicate ID	Analyte	% Limits	RPD
BEI1390-DUP1#	DUP1	Calcium	40.00	168[2]
BEI1390-DUP1#	DUP1	Magnesium	40.00	128[2]
BEI1390-DUP1#	DUP1	Potassium	40.00	51.6[2]
BEI1390-DUP1#	DUP1	Sodium	40.00	89.0[2]

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEI1389

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PEI0502-01	DUP1	Aluminium	40.00	200[2]
PEI0502-01	DUP1	Barium	40.00	200[2]
PEI0502-01	DUP1	Boron	40.00	200[2]
PEI0502-01	DUP1	Zinc	40.00	162[2]

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEI1390

Sample ID	Duplicate ID	Analyte	% Limits	RPD
BEI1390-DUP1#	DUP1	Aluminium	40.00	84.7[2]
BEI1390-DUP1#	DUP1	Barium	40.00	200[3]
BEI1390-DUP1#	DUP1	Boron	40.00	144[2]

Data Quality Assessment Summary PEI0502

Outliers: QC Frequency

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEI1390

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	2	1

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEI1394

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEI1392

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

Quality Control PEI0502

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEI1389

Analyte	Units	PQL	Blank	DUP1		LCS %
				PEI0502-01	Samp QC RPD %	
Aluminium	µg/sample	5.0	<5.0	<5.0 474 200 [2]		98.2
Barium	µg/sample	2.0	<2.0	<2.0 91.0 200 [2]		104
Boron	µg/sample	20	<20	<20 448 200 [2]		104
Cadmium	µg/sample	0.50	<0.50	<0.50 <0.50 [NA]		102
Calcium	µg/sample	50	<50	<50 <50 [NA]		94.5
Chromium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]		118
Cobalt	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]		104
Copper	µg/sample	2.0	<2.0	7.00 4.20 [NA] [3]		107
Iron	µg/sample	5.0	<5.0	34.6 36.2 4.52		102
Lead	µg/sample	5.0	<5.0	<5.0 <5.0 [NA]		102
Lithium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]		91.8
Magnesium	µg/sample	50	<50	<50 <50 [NA]		97.0
Manganese	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]		97.1
Molybdenum	µg/sample	5.0	<5.0	<5.0 <5.0 [NA]		105
Nickel	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]		112
Phosphorus	µg/sample	20	<20	<20 <20 [NA] [3]		95.8
Potassium	µg/sample	50	<50	<50 70.0 [NA] [3]		97.0
Sodium	µg/sample	100	<100	4430 8350 61.3 [2]		97.3
Sulfur	µg/sample	50	<50	257 324 22.8		92.7
Tin	µg/sample	10	<10	<10 11.5 [NA] [3]		101
Titanium	µg/sample	2.0	<2.0	<2.0 3.20 [NA] [3]		72.7
Vanadium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]		104
Zinc	µg/sample	5.0	<5.0	6.00 58.0 162 [2]		107

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEI1390

Analyte	Units	PQL	Blank	DUP1		LCS %
				BEI1390-DUP1#	Samp QC RPD %	
Aluminium	µg/sample	5.0	<5.0	433 1070 84.7 [2]		98.1
Barium	µg/sample	2.0	<2.0	<2.0 15.6 200 [3]		104
Boron	µg/sample	20	<20	166 1030 144 [2]		107
Cadmium	µg/sample	0.50	<0.50	<0.50 <0.50 [NA]		102
Calcium	µg/sample	50	<50	204 2390 168 [2]		94.4
Chromium	µg/sample	2.0	<2.0	102 109 6.82		121
Cobalt	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]		104
Copper	µg/sample	2.0	<2.0	6.60 8.80 [NA]		113
Iron	µg/sample	5.0	<5.0	1420 1570 10.0		102
Lead	µg/sample	5.0	<5.0	6.55 6.47 [NA]		106
Lithium	µg/sample	2.0	<2.0	<2.0 2.20 [NA] [3]		99.0
Magnesium	µg/sample	50	<50	322 1470 128 [2]		96.3
Manganese	µg/sample	2.0	<2.0	16.2 19.6 19.0		108
Molybdenum	µg/sample	5.0	<5.0	<5.0 7.15 [NA] [3]		105
Nickel	µg/sample	2.0	<2.0	9.40 12.8 30.6		115
Phosphorus	µg/sample	20	<20	50.8 58.8 [NA]		96.0
Potassium	µg/sample	50	<50	311 528 51.6 [2]		95.2
Sodium	µg/sample	100	<100	4950 12900 89.0 [2]		96.8
Sulfur	µg/sample	50	<50	1670 2040 19.7		92.5
Tin	µg/sample	10	<10	<10 <10 [NA]		101
Titanium	µg/sample	2.0	<2.0	3.60 6.20 [NA] [3]		100
Vanadium	µg/sample	2.0	<2.0	5.28 5.65 [NA]		105
Zinc	µg/sample	5.0	<5.0	9.20 19.6 [NA] [3]		107

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

Quality Control PEI0502

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEI1391

Analyte	Units	PQL	Blank	DUP1	LCS %
				PEI0502-01 Samp QC RPD %	
Antimony	µg/sample	10	<10	<10 <10 [NA]	108
Arsenic	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	104
Beryllium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	92.4
Gallium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	93.8
Selenium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	110
Thallium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	94.5
Thorium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	91.7
Uranium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	96.6

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEI1392

Analyte	Units	PQL	Blank		LCS %
Antimony	µg/sample	10	<10		105
Arsenic	µg/sample	2.0	<2.0		97.3
Beryllium	µg/sample	2.0	<2.0		88.4
Gallium	µg/sample	4.0	<4.0		88.7
Selenium	µg/sample	4.0	<4.0		105
Thallium	µg/sample	4.0	<4.0		89.5
Thorium	µg/sample	4.0	<4.0		90.3
Uranium	µg/sample	4.0	<4.0		93.8

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEI1393

Analyte	Units	PQL	Blank	DUP1	LCS %
				PEI0502-01 Samp QC RPD %	
Mercury	µg/sample	0.20	<0.20	<0.20 <0.20 [NA]	104

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEI1394

Analyte	Units	PQL	Blank		LCS %
Mercury	µg/sample	0.20	<0.20		108

QC Comments

Identifier	Description
[2]	Duplicate analysis precision is/are outside acceptable %RPD, re-analysis indicates possible sample heterogeneity.
[3]	Duplicate %RPD may be flagged as an outlier to routine laboratory acceptance, however, where one or both results are <10*PQL, the RPD acceptance criteria increases exponentially.

Certificate of Analysis PEI0924

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	14/09/2023
Date Instructions Received	14/09/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	21/09/2023
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Accredited for compliance with ISO/IEC 17025. Tests not covered by NATA are denoted with *.

Authorisation Details

Airborne Dust Approved By	Heram Halim Thomas Edwards
Results Approved By	Heram Halim, Operations Manager Michael Hall, Inorganics & Metals Supervisor Thomas Edwards, OHL Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEI0924

Report Amendment History

Revision	Reason for Amendment
R-01	QC reporting updated to include PQL.
R-02	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.

Certificate of Analysis PEI0924

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEI0924-01	TENV29	HiVol Filter	12/09/2023	14/09/2023
PEI0924-02	TENV30	HiVol Filter	12/09/2023	14/09/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
TENV29	TENV29	[NA]	[NA]	1500
TENV30	TENV30	[NA]	[NA]	[NA]

Certificate of Analysis PEI0924

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEI0924-01 TENV29 12/09/2023	PEI0924-02 TENV30 12/09/2023
Aluminium	µg/sample	5.0	1800 [1]	6500
Aluminium	µg/m3		1.2 [1]	[NA]
Boron	µg/sample	20	2900 [1]	15000
Boron	µg/m3		1.9 [1]	[NA]
Barium	µg/sample	2.0	2200 [1]	160
Barium	µg/m3		1.4 [1]	[NA]
Calcium	µg/sample	50	4700 [1]	36000
Calcium	µg/m3		3.1 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	<2.0 [1]	3.9
Chromium	µg/m3		<0.0013 [1]	[NA]
Copper	µg/sample	2.0	<2.0 [1]	13
Copper	µg/m3		<0.0013 [1]	[NA]
Iron	µg/sample	5.0	180 [1]	170
Iron	µg/m3		0.12 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	1800 [1]	5000
Potassium	µg/m3		1.2 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	11
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	2100 [1]	16000
Magnesium	µg/m3		1.4 [1]	[NA]
Manganese	µg/sample	2.0	4.1 [1]	13
Manganese	µg/m3		0.0027 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	<5.0
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	15000 [1]	110000
Sodium	µg/m3		9.7 [1]	[NA]
Nickel	µg/sample	2.0	<2.0 [1]	3.9
Nickel	µg/m3		<0.0013 [1]	[NA]
Phosphorus	µg/sample	20	<20 [1]	43
Phosphorus	µg/m3		<0.00033 [1]	[NA]
Lead	µg/sample	5.0	7.1 [1]	<5.0
Lead	µg/m3		0.0048 [1]	[NA]
Sulfur	µg/sample	50	420 [1]	3000
Sulfur	µg/m3		0.28 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	14 [1]	36
Titanium	µg/m3		0.0092 [1]	[NA]
Vanadium	µg/sample	2.0	<2.0 [1]	<2.0
Vanadium	µg/m3		<0.0013 [1]	[NA]

Certificate of Analysis PEI0924

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEI0924-01 TENV29 12/09/2023	PEI0924-02 TENV30 12/09/2023
Zinc	µg/sample	5.0	1500 [1]	100
Zinc	µg/m3		1.0 [1]	[NA]
Arsenic	µg/sample	2.0	<2.0 [1]	<2.0 [1]
Arsenic	µg/m3		<0.0013 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	<4.0 [1]	<4.0
Thorium	µg/m3		<0.0027 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PEI0924

HVAS Dust (HiVol Filter)

EnviroLab ID	Units	PQL	PEI0924-01	PEI0924-02
Your Reference			TENV29	TENV30
Date Sampled			12/09/2023	12/09/2023
Dust	mg	0.10	6.2	0.20
Dust	µg/m3	0.10	4.1	[NA]

Certificate of Analysis PEI0924

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

Certificate of Analysis PEI0924

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

Certificate of Analysis PEI0924

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PEI0924

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PEI0924

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	No	Duplicate Outliers Exist - See detailed list below
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	No	QC Frequency Outliers Exist - See detailed list below

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PEI0924

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	1	12/09/2023	19/09/2023	13/10/2023	Yes
	2	12/09/2023	19/09/2023	21/09/2023	Yes
Metals OHS (LL) HiVol Filter	1	12/09/2023	19/09/2023	13/10/2023	Yes
	2	12/09/2023	19/09/2023	21/09/2023	Yes
Metals OHS-Hg HiVol Filter	1	12/09/2023	19/09/2023	13/10/2023	Yes
	2	12/09/2023	19/09/2023	21/09/2023	Yes
Gravimetric Dust HiVol Filter	1	12/09/2023	18/09/2023	13/10/2023	Yes
	2	12/09/2023	18/09/2023	18/09/2023	Yes

Outliers: Duplicates

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BEI2024

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PEI0924-01	DUP1	Sodium	40.00	48.9[2]

Outliers: QC Frequency

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEI2029

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

Quality Control PEI0924

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEI2024

Analyte	Units	PQL	Blank	DUP1		LCS %
				PEI0924-01 Samp QC RPD %		
Aluminium	µg/sample	5.0	<5.0	1770	2430 31.3	106
Barium	µg/sample	2.0	<2.0	2150	2260 4.93	108
Boron	µg/sample	20	<20	2900	4170 35.8	97.9
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50 [NA]	105
Calcium	µg/sample	50	<50	4690	6910 38.2	105
Chromium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	106
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	104
Copper	µg/sample	2.0	<2.0	<2.0	2.01 [NA] [3]	105
Iron	µg/sample	5.0	<5.0	182	204 11.7	107
Lead	µg/sample	5.0	<5.0	7.13	5.29 [NA]	105
Lithium	µg/sample	2.0	<2.0	<2.0	2.77 [NA] [3]	118
Magnesium	µg/sample	50	<50	2150	3110 36.8	106
Manganese	µg/sample	2.0	<2.0	4.07	5.21 [NA]	104
Molybdenum	µg/sample	5.0	<5.0	<5.0	<5.0 [NA]	109
Nickel	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	104
Phosphorus	µg/sample	20	<20	<20	38.1 [NA] [2]	103
Potassium	µg/sample	50	<50	1780	2060 14.6	109
Sodium	µg/sample	100	<100	14600	24000 48.9 [2]	107
Sulfur	µg/sample	50	<50	425	615 36.5	108
Tin	µg/sample	10	<10	<10	<10 [NA]	108
Titanium	µg/sample	2.0	<2.0	13.8	16.0 15.0	104
Vanadium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	104
Zinc	µg/sample	5.0	<5.0	1520	1590 4.40	106

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEI2025

Analyte	Units	PQL	Blank	DUP1		LCS %
				BEI2025-DUP1# Samp QC RPD %		
Aluminium	µg/sample	5.0	<5.0	34.2	32.3 5.64	103
Barium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	106
Boron	µg/sample	20	<20	<20	<20 [NA]	101
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50 [NA]	103
Calcium	µg/sample	50	<50	116	119 [NA]	103
Chromium	µg/sample	2.0	<2.0	17.8	17.6 1.27	104
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	102
Copper	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	103
Iron	µg/sample	5.0	<5.0	58.1	63.2 8.33	104
Lead	µg/sample	5.0	<5.0	<5.0	<5.0 [NA]	103
Lithium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	118
Magnesium	µg/sample	50	<50	<50	<50 [NA]	106
Manganese	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	102
Molybdenum	µg/sample	5.0	<5.0	<5.0	<5.0 [NA]	108
Nickel	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	103
Phosphorus	µg/sample	20	<20	<20	<20 [NA] [3]	101
Potassium	µg/sample	50	<50	72.0	78.2 [NA]	109
Sodium	µg/sample	100	<100	177	182 [NA]	108
Sulfur	µg/sample	50	<50	321	371 14.7	105
Tin	µg/sample	10	<10	<10	<10 [NA]	106
Titanium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	102
Vanadium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	103
Zinc	µg/sample	5.0	<5.0	5.60	5.97 [NA]	104

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

Quality Control PEI0924

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEI2026

Analyte	Units	PQL	Blank	DUP1	LCS %
				PEI0924-01 Samp QC RPD %	
Antimony	µg/sample	10	<10	<10 <10 [NA]	124
Arsenic	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	103
Beryllium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	121
Gallium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	101
Selenium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	103
Thallium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	97.2
Thorium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	101
Uranium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	106

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEI2027

Analyte	Units	PQL	Blank	DUP1	LCS %
				BEI2027-DUP1# Samp QC RPD %	
Antimony	µg/sample	10	<10	<10 <10 [NA]	129
Arsenic	µg/sample	2.0	<2.0	4.52 5.34 [NA]	109
Beryllium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	122
Gallium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	106
Selenium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	108
Thallium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	96.1
Thorium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	107
Uranium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	109

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEI2028

Analyte	Units	PQL	Blank	DUP1	LCS %
				PEI0924-01 Samp QC RPD %	
Mercury	µg/sample	0.20	<0.20	<0.20 <0.20 [NA]	106

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEI2029

Analyte	Units	PQL	Blank	LCS %

QC Comments

Identifier	Description
[2]	Duplicate analysis precision is/are outside acceptable %RPD, re-analysis indicates possible sample heterogeneity.
[3]	Duplicate %RPD may be flagged as an outlier to routine laboratory acceptance, however, where one or both results are <10*PQL, the RPD acceptance criteria increases exponentially.

Certificate of Analysis PEL0868

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	13/12/2023
Date Instructions Received	13/12/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	20/12/2023
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Authorisation Details

Airborne Dust Approved By	Heram Halim
Results Approved By	Heram Halim, Operations Manager
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEL0868

Report Amendment History

Revision	Reason for Amendment
R-01	Report re-issued to correct air volume units
R-02	Report now includes results in /filter and /m3 units.
R-03	Sample ID updated.
R-05	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.
R-04	QC reporting updated to include PQL.

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Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEL0868-01	Sample 15	HiVol Filter	07/12/2023	13/12/2023
PEL0868-02	Blank15	HiVol Filter	13/12/2023	13/12/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
Sample 15	TENV36	[NA]	[NA]	1500
Blank15	TENV37	[NA]	[NA]	[NA]

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Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEL0868-01 Sample 15 07/12/2023	PEL0868-02 Blank15 13/12/2023
Aluminium	µg/sample	5.0	<5.0 [1]	5700
Aluminium	µg/m3		<0.0033 [1]	[NA]
Boron	µg/sample	20	<20 [1]	14000
Boron	µg/m3		<0.013 [1]	[NA]
Barium	µg/sample	2.0	<2.0 [1]	380
Barium	µg/m3		<0.0013 [1]	[NA]
Calcium	µg/sample	50	34000 [1]	37000
Calcium	µg/m3		23 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	<2.0 [1]	2.9
Chromium	µg/m3		<0.0013 [1]	[NA]
Copper	µg/sample	2.0	15 [1]	12
Copper	µg/m3		0.0099 [1]	[NA]
Iron	µg/sample	5.0	520 [1]	180
Iron	µg/m3		0.35 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	4700 [1]	4900
Potassium	µg/m3		3.1 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	8.5
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	14000 [1]	16000
Magnesium	µg/m3		9.6 [1]	[NA]
Manganese	µg/sample	2.0	4.8 [1]	11
Manganese	µg/m3		0.0032 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	<5.0
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	<100 [1]	100000
Sodium	µg/m3		<0.067 [1]	[NA]
Nickel	µg/sample	2.0	<2.0 [1]	3.7
Nickel	µg/m3		<0.0013 [1]	[NA]
Phosphorus	µg/sample	20	29 [1]	48
Phosphorus	µg/m3		0.019 [1]	[NA]
Lead	µg/sample	5.0	5.2 [1]	<5.0
Lead	µg/m3		0.0034 [1]	[NA]
Sulfur	µg/sample	50	920 [1]	3000
Sulfur	µg/m3		0.62 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	5.6 [1]	26
Titanium	µg/m3		0.0037 [1]	[NA]
Vanadium	µg/sample	2.0	2.2 [1]	<2.0
Vanadium	µg/m3		0.0015 [1]	[NA]

Certificate of Analysis PEL0868

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEL0868-01 Sample 15 07/12/2023	PEL0868-02 Blank15 13/12/2023
Zinc	µg/sample	5.0	<5.0 [1]	220
Zinc	µg/m3		<0.0033 [1]	[NA]
Arsenic	µg/sample	2.0	<2.0 [1]	<2.0
Arsenic	µg/m3		<0.0013 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	<4.0 [1]	<4.0
Thorium	µg/m3		<0.0027 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PEL0868

HVAS Dust (HiVol Filter)

EnviroLab ID	Units	PQL	PEL0868-01	PEL0868-02
Your Reference			Sample 15	Blank15
Date Sampled			07/12/2023	13/12/2023
Dust	mg	0.10	27	<0.10
Dust	µg/m3	0.10	18	[NA]

Certificate of Analysis PEL0868

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

Certificate of Analysis PEL0868

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

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Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PEL0868

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PEL0868

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	No	QC Frequency Outliers Exist - See detailed list below

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PEL0868

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	1	07/12/2023	19/12/2023	21/12/2023	Yes
	2	13/12/2023	19/12/2023	19/12/2023	Yes
Metals OHS (LL) HiVol Filter	1	07/12/2023	19/12/2023	21/12/2023	Yes
	2	13/12/2023	19/12/2023	19/12/2023	Yes
Metals OHS-Hg HiVol Filter	1	07/12/2023	19/12/2023	21/12/2023	Yes
	2	13/12/2023	19/12/2023	20/12/2023	Yes
Gravimetric Dust HiVol Filter	1	07/12/2023	18/12/2023	21/12/2023	Yes
	2	13/12/2023	18/12/2023	18/12/2023	Yes

Outliers: QC Frequency

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BEL2336

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEL2336

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEL2336

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEL2336

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

Quality Control PEL0868

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEL2336

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	99.4
Antimony	µg/sample	10	<10	115
Arsenic	µg/sample	2.0	<2.0	125
Barium	µg/sample	2.0	<2.0	118
Beryllium	µg/sample	2.0	<2.0	102
Boron	µg/sample	20	<20	96.2
Cadmium	µg/sample	0.50	<0.50	102
Calcium	µg/sample	50	<50	94.1
Chromium	µg/sample	2.0	<2.0	99.1
Cobalt	µg/sample	2.0	<2.0	105
Copper	µg/sample	2.0	<2.0	99.8
Gallium	µg/sample	4.0	<4.0	110
Iron	µg/sample	5.0	<5.0	116
Lead	µg/sample	5.0	<5.0	100
Lithium	µg/sample	2.0	<2.0	104
Magnesium	µg/sample	50	<50	97.5
Manganese	µg/sample	2.0	<2.0	100
Mercury	µg/sample	0.20	<0.20	[NA]
Molybdenum	µg/sample	5.0	<5.0	119
Nickel	µg/sample	2.0	<2.0	98.8
Phosphorus	µg/sample	20	<20	101
Potassium	µg/sample	50	<50	102
Selenium	µg/sample	4.0	<4.0	117
Sodium	µg/sample	100	<100	96.0
Sulfur	µg/sample	50	<50	102
Thallium	µg/sample	4.0	<4.0	113
Thorium	µg/sample	4.0	<4.0	120
Tin	µg/sample	10	<10	103
Titanium	µg/sample	2.0	<2.0	99.9
Uranium	µg/sample	4.0	<4.0	122
Vanadium	µg/sample	2.0	<2.0	104
Zinc	µg/sample	5.0	<5.0	97.1

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.2		101

Certificate of Analysis PEL0869

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	13/12/2023
Date Instructions Received	13/12/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	20/12/2023
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Authorisation Details

Airborne Dust Approved By	Heram Halim
Results Approved By	Heram Halim, Operations Manager
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEL0869

Report Amendment History

Revision	Reason for Amendment
R-01	QC reporting updated to include PQL.
R-04	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.
R-03	QC reporting updated to include PQL.
R-02	Sample ID updated.

Certificate of Analysis PEL0869

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEL0869-01	Sample 14	HiVol Filter	01/12/2023	13/12/2023
PEL0869-02	Blank 14	HiVol Filter	01/12/2023	13/12/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
Sample 14	TENV34	[NA]	[NA]	1500
Blank 14	TENV34	[NA]	[NA]	[NA]

Certificate of Analysis PEL0869

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEL0869-01 Sample 14 01/12/2023	PEL0869-02 Blank 14 01/12/2023
Aluminium	µg/sample	5.0	61 [1]	6200
Aluminium	µg/m3		0.041 [1]	[NA]
Boron	µg/sample	20	<20 [1]	15000
Boron	µg/m3		<0.013 [1]	[NA]
Barium	µg/sample	2.0	<2.0 [1]	420
Barium	µg/m3		<0.0013 [1]	[NA]
Calcium	µg/sample	50	33000 [1]	39000
Calcium	µg/m3		22 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	<2.0 [1]	3.0
Chromium	µg/m3		<0.0013 [1]	[NA]
Copper	µg/sample	2.0	4.6 [1]	14
Copper	µg/m3		0.0031 [1]	[NA]
Iron	µg/sample	5.0	700 [1]	180
Iron	µg/m3		0.46 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	4500 [1]	5100
Potassium	µg/m3		3.0 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	9.2
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	14000 [1]	17000
Magnesium	µg/m3		9.2 [1]	[NA]
Manganese	µg/sample	2.0	3.2 [1]	12
Manganese	µg/m3		0.0021 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	<5.0
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	<100 [1]	110000
Sodium	µg/m3		<0.067 [1]	[NA]
Nickel	µg/sample	2.0	2.2 [1]	4.5
Nickel	µg/m3		0.0015 [1]	[NA]
Phosphorus	µg/sample	20	22 [1]	55
Phosphorus	µg/m3		0.015 [1]	[NA]
Lead	µg/sample	5.0	<5.0 [1]	<5.0
Lead	µg/m3		<0.0033 [1]	[NA]
Sulfur	µg/sample	50	600 [1]	3100
Sulfur	µg/m3		0.40 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	11 [1]	29
Titanium	µg/m3		0.0076 [1]	[NA]
Vanadium	µg/sample	2.0	2.9 [1]	<2.0
Vanadium	µg/m3		0.0019 [1]	[NA]

Certificate of Analysis PEL0869

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEL0869-01 Sample 14 01/12/2023	PEL0869-02 Blank 14 01/12/2023
Zinc	µg/sample	5.0	<5.0 [1]	240
Zinc	µg/m3		<0.0033 [1]	[NA]
Arsenic	µg/sample	2.0	<2.0 [1]	<2.0
Arsenic	µg/m3		<0.0013 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	<4.0 [1]	<4.0
Thorium	µg/m3		<0.0027 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PEL0869

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PEL0869-01	PEL0869-02
Your Reference			Sample 14	Blank 14
Date Sampled			01/12/2023	01/12/2023
Dust	mg	0.10	30	1.0
Dust	µg/m3	0.10	20	[NA]

Certificate of Analysis PEL0869

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

Certificate of Analysis PEL0869

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

Certificate of Analysis PEL0869

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PEL0869

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PEL0869

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	No	QC Frequency Outliers Exist - See detailed list below

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PEL0869

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	2	01/12/2023	19/12/2023	19/12/2023	Yes
	1	01/12/2023	19/12/2023	21/12/2023	Yes
Metals OHS (LL) HiVol Filter	2	01/12/2023	19/12/2023	19/12/2023	Yes
	1	01/12/2023	19/12/2023	21/12/2023	Yes
Metals OHS-Hg HiVol Filter	2	01/12/2023	19/12/2023	20/12/2023	Yes
	1	01/12/2023	19/12/2023	21/12/2023	Yes
Gravimetric Dust HiVol Filter	1-2	01/12/2023	14/12/2023	14/12/2023	Yes
	1	01/12/2023	18/12/2023	21/12/2023	Yes

Outliers: QC Frequency

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BEL2336

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEL2336

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEL2336

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEL2336

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

Quality Control PEL0869

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEL2336

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	99.4
Antimony	µg/sample	10	<10	115
Arsenic	µg/sample	2.0	<2.0	125
Barium	µg/sample	2.0	<2.0	118
Beryllium	µg/sample	2.0	<2.0	102
Boron	µg/sample	20	<20	96.2
Cadmium	µg/sample	0.50	<0.50	102
Calcium	µg/sample	50	<50	94.1
Chromium	µg/sample	2.0	<2.0	99.1
Cobalt	µg/sample	2.0	<2.0	105
Copper	µg/sample	2.0	<2.0	99.8
Gallium	µg/sample	4.0	<4.0	110
Iron	µg/sample	5.0	<5.0	116
Lead	µg/sample	5.0	<5.0	100
Lithium	µg/sample	2.0	<2.0	104
Magnesium	µg/sample	50	<50	97.5
Manganese	µg/sample	2.0	<2.0	100
Mercury	µg/sample	0.20	<0.20	[NA]
Molybdenum	µg/sample	5.0	<5.0	119
Nickel	µg/sample	2.0	<2.0	98.8
Phosphorus	µg/sample	20	<20	101
Potassium	µg/sample	50	<50	102
Selenium	µg/sample	4.0	<4.0	117
Sodium	µg/sample	100	<100	96.0
Sulfur	µg/sample	50	<50	102
Thallium	µg/sample	4.0	<4.0	113
Thorium	µg/sample	4.0	<4.0	120
Tin	µg/sample	10	<10	103
Titanium	µg/sample	2.0	<2.0	99.9
Uranium	µg/sample	4.0	<4.0	122
Vanadium	µg/sample	2.0	<2.0	104
Zinc	µg/sample	5.0	<5.0	97.1

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.2		101

Certificate of Analysis PEL1153

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	15/12/2023
Date Instructions Received	15/12/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	28/12/2023
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Authorisation Details

Airborne Dust Approved By	Heram Halim Thomas Edwards
Results Approved By	Heram Halim, Operations Manager Thomas Edwards, OHL Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEL1153

Report Amendment History

Revision	Reason for Amendment
R-02	QC reporting updated to include PQL and updated RPD flag qualifiers.
R-03	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.
R-01	Sample ID updated.

Certificate of Analysis PEL1153

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEL1153-01	Sample 16	HiVol Filter	15/12/2023	15/12/2023
PEL1153-02	Blank 16	HiVol Filter	15/12/2023	15/12/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
Sample 16	TENV38	[NA]	[NA]	1500
Blank 16	TENV39	[NA]	[NA]	[NA]

Certificate of Analysis PEL1153

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEL1153-01 Sample 16 15/12/2023	PEL1153-02 Blank 16 15/12/2023
Aluminium	µg/sample	5.0	<5.0 [1]	5400
Aluminium	µg/m3		<0.0033 [1]	[NA]
Boron	µg/sample	20	<20 [1]	13000
Boron	µg/m3		<0.013 [1]	[NA]
Barium	µg/sample	2.0	<2.0 [1]	330
Barium	µg/m3		<0.0013 [1]	[NA]
Calcium	µg/sample	50	<50 [1]	34000
Calcium	µg/m3		<0.033 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	<2.0 [1]	2.9
Chromium	µg/m3		<0.0013 [1]	[NA]
Copper	µg/sample	2.0	9.8 [1]	12
Copper	µg/m3		0.0065 [1]	[NA]
Iron	µg/sample	5.0	710 [1]	160
Iron	µg/m3		0.47 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	<50 [1]	4600
Potassium	µg/m3		<0.033 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	8.1
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	<50 [1]	14000
Magnesium	µg/m3		<0.033 [1]	[NA]
Manganese	µg/sample	2.0	7.4 [1]	11
Manganese	µg/m3		0.0049 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	<5.0
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	<100 [1]	100000
Sodium	µg/m3		<0.067 [1]	[NA]
Nickel	µg/sample	2.0	<2.0 [1]	3.3
Nickel	µg/m3		<0.0013 [1]	[NA]
Phosphorus	µg/sample	20	33 [1]	46
Phosphorus	µg/m3		0.022 [1]	[NA]
Lead	µg/sample	5.0	<5.0 [1]	5.4
Lead	µg/m3		<0.0033 [1]	[NA]
Sulfur	µg/sample	50	320 [1]	2700
Sulfur	µg/m3		0.22 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	15 [1]	25
Titanium	µg/m3		0.010 [1]	[NA]
Vanadium	µg/sample	2.0	2.6 [1]	<2.0
Vanadium	µg/m3		0.0017 [1]	[NA]

Certificate of Analysis PEL1153

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEL1153-01 Sample 16 15/12/2023	PEL1153-02 Blank 16 15/12/2023
Zinc	µg/sample	5.0	<5.0 [1]	210
Zinc	µg/m3		<0.0033 [1]	[NA]
Arsenic	µg/sample	2.0	<2.0 [1]	<2.0
Arsenic	µg/m3		<0.0013 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	<4.0 [1]	<4.0
Thorium	µg/m3		<0.0027 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PEL1153

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PEL1153-01	PEL1153-02
Your Reference			Sample 16	Blank 16
Date Sampled			15/12/2023	15/12/2023
Dust	mg	0.10	33	0.10
Dust	µg/m3	0.10	22	[NA]

Certificate of Analysis PEL1153

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

Certificate of Analysis PEL1153

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

Certificate of Analysis PEL1153

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PEL1153

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PEL1153

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	No	Duplicate Outliers Exist - See detailed list below
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	Yes	No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PEL1153

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	2	15/12/2023	22/12/2023	22/12/2023	Yes
	1	15/12/2023	22/12/2023	29/12/2023	Yes
Metals OHS (LL) HiVol Filter	2	15/12/2023	22/12/2023	28/12/2023	Yes
	1	15/12/2023	22/12/2023	29/12/2023	Yes
Metals OHS-Hg HiVol Filter	2	15/12/2023	22/12/2023	27/12/2023	Yes
	1	15/12/2023	22/12/2023	29/12/2023	Yes
Gravimetric Dust HiVol Filter	2	15/12/2023	21/12/2023	21/12/2023	Yes
	1	15/12/2023	21/12/2023	29/12/2023	Yes

Outliers: Duplicates

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEL2832

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PEL1153-01	DUP1	Aluminium	40.00	200[2]

Quality Control PEL1153

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEL2832

Analyte	Units	PQL	Blank	DUP1		LCS %
				PEL1153-01 Samp QC RPD %		
Aluminium	µg/sample	5.0	<5.0	<5.0	50.8 200 [2]	88.7
Antimony	µg/sample	10	<10	<10	<10 [NA]	94.8
Arsenic	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	102
Barium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	95.5
Beryllium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	110
Boron	µg/sample	20	<20	<20	<20 [NA]	89.9
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50 [NA]	85.3
Calcium	µg/sample	50	<50	<50	<50 [NA]	86.2
Chromium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	87.2
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	86.9
Copper	µg/sample	2.0	<2.0	9.80	5.60 [NA] [3]	92.6
Gallium	µg/sample	4.0	<4.0	<4.0	<4.0 [NA]	95.3
Iron	µg/sample	5.0	<5.0	712	670 6.05	88.2
Lead	µg/sample	5.0	<5.0	<5.0	<5.0 [NA]	88.1
Lithium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	91.8
Magnesium	µg/sample	50	<50	<50	<50 [NA]	87.0
Manganese	µg/sample	2.0	<2.0	7.40	7.80 [NA]	88.2
Mercury	µg/sample	0.20	<0.20	<0.20	<0.20 [NA]	94.8
Molybdenum	µg/sample	5.0	<5.0	<5.0	<5.0 [NA]	99.7
Nickel	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	85.9
Phosphorus	µg/sample	20	<20	32.8	28.4 [NA]	88.6
Potassium	µg/sample	50	<50	<50	62.0 [NA] [3]	89.5
Selenium	µg/sample	4.0	<4.0	<4.0	<4.0 [NA]	112
Sodium	µg/sample	100	<100	<100	<100 [NA]	85.3
Sulfur	µg/sample	50	<50	325	393 18.9	86.7
Thallium	µg/sample	4.0	<4.0	<4.0	<4.0 [NA]	89.1
Thorium	µg/sample	4.0	<4.0	<4.0	<4.0 [NA]	86.9
Tin	µg/sample	10	<10	<10	<10 [NA]	92.5
Titanium	µg/sample	2.0	<2.0	15.2	12.8 17.1	93.3
Uranium	µg/sample	4.0	<4.0	<4.0	<4.0 [NA]	93.7
Vanadium	µg/sample	2.0	<2.0	2.55	2.35 [NA]	90.2
Zinc	µg/sample	5.0	<5.0	<5.0	<5.0 [NA]	84.8

Quality Control PEL1153

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEL2833

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	88.7
Antimony	µg/sample	10	<10	96.4
Arsenic	µg/sample	2.0	<2.0	103
Barium	µg/sample	2.0	<2.0	95.5
Beryllium	µg/sample	2.0	<2.0	109
Boron	µg/sample	20	<20	89.9
Cadmium	µg/sample	0.50	<0.50	85.3
Calcium	µg/sample	50	<50	86.2
Chromium	µg/sample	2.0	<2.0	87.2
Cobalt	µg/sample	2.0	<2.0	86.9
Copper	µg/sample	2.0	<2.0	92.6
Gallium	µg/sample	4.0	<4.0	94.7
Iron	µg/sample	5.0	<5.0	88.2
Lead	µg/sample	5.0	<5.0	88.1
Lithium	µg/sample	2.0	<2.0	91.8
Magnesium	µg/sample	50	<50	87.0
Manganese	µg/sample	2.0	<2.0	88.2
Mercury	µg/sample	0.20	<0.20	[NA]
Molybdenum	µg/sample	5.0	<5.0	99.7
Nickel	µg/sample	2.0	<2.0	85.9
Phosphorus	µg/sample	20	<20	88.6
Potassium	µg/sample	50	<50	89.5
Selenium	µg/sample	4.0	<4.0	114
Sodium	µg/sample	100	<100	85.3
Sulfur	µg/sample	50	<50	86.7
Thallium	µg/sample	4.0	<4.0	89.9
Thorium	µg/sample	4.0	<4.0	94.8
Tin	µg/sample	10	<10	92.5
Titanium	µg/sample	2.0	<2.0	93.3
Uranium	µg/sample	4.0	<4.0	96.5
Vanadium	µg/sample	2.0	<2.0	90.2
Zinc	µg/sample	5.0	<5.0	84.8

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.2		97.6

QC Comments

Identifier	Description
[2]	Duplicate analysis precision is/are outside acceptable %RPD, re-analysis indicates possible sample heterogeneity.
[3]	Duplicate %RPD may be flagged as an outlier to routine laboratory acceptance, however, where one or both results are <10*PQL, the RPD acceptance criteria increases exponentially.

Certificate of Analysis PEL1589

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	21/12/2023
Date Instructions Received	21/12/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	04/01/2024
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Accredited for compliance with ISO/IEC 17025. Tests not covered by NATA are denoted with *.

Authorisation Details

Airborne Dust Approved By	Heram Halim
Results Approved By	Heram Halim, Operations Manager Michael Mowle, Inorganics Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEL1589

Report Amendment History

Revision	Reason for Amendment
R-03	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.
R-02	QC reporting updated to include PQL and updated RPD flag qualifiers.
R-01	Sample ID updated.

Certificate of Analysis PEL1589

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEL1589-01	Sample 17	HiVol Filter	21/12/2023	21/12/2023
PEL1589-02	Blank 17	HiVol Filter	21/12/2023	21/12/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
Sample 17	TENV40	[NA]	[NA]	1500
Blank 17	TENV41	[NA]	[NA]	[NA]

Certificate of Analysis PEL1589

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEL1589-01 Sample 17 21/12/2023	PEL1589-02 Blank 17 21/12/2023
Aluminium	µg/sample	5.0	2400 [1]	5200
Aluminium	µg/m3		1.6 [1]	[NA]
Boron	µg/sample	20	1000 [1]	12000
Boron	µg/m3		0.67 [1]	[NA]
Barium	µg/sample	2.0	180 [1]	160
Barium	µg/m3		0.12 [1]	[NA]
Calcium	µg/sample	50	2300 [1]	35000
Calcium	µg/m3		1.6 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	5.3 [1]	3.5
Chromium	µg/m3		0.0035 [1]	[NA]
Copper	µg/sample	2.0	7.7 [1]	7.8
Copper	µg/m3		0.0051 [1]	[NA]
Iron	µg/sample	5.0	4900 [1]	170
Iron	µg/m3		3.3 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	130 [1]	4500
Potassium	µg/m3		0.087 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	9.5
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	2300 [1]	14000
Magnesium	µg/m3		1.6 [1]	[NA]
Manganese	µg/sample	2.0	<2.0 [1]	17
Manganese	µg/m3		<0.0013 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	<5.0
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	1300 [1]	100000
Sodium	µg/m3		0.86 [1]	[NA]
Nickel	µg/sample	2.0	<2.0 [1]	5.4
Nickel	µg/m3		<0.0013 [1]	[NA]
Phosphorus	µg/sample	20	47 [1]	39
Phosphorus	µg/m3		0.031 [1]	[NA]
Lead	µg/sample	5.0	<5.0 [1]	<5.0
Lead	µg/m3		<0.0033 [1]	[NA]
Sulfur	µg/sample	50	1400 [1]	2200
Sulfur	µg/m3		0.92 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	150 [1]	28
Titanium	µg/m3		0.098 [1]	[NA]
Vanadium	µg/sample	2.0	14 [1]	<2.0
Vanadium	µg/m3		0.0095 [1]	[NA]

Certificate of Analysis PEL1589

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PEL1589-01 Sample 17 21/12/2023	PEL1589-02 Blank 17 21/12/2023
Zinc	µg/sample	5.0	120 [1]	110
Zinc	µg/m3		0.083 [1]	[NA]
Arsenic	µg/sample	2.0	<2.0 [1]	<2.0
Arsenic	µg/m3		<0.0013 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	5.4 [1]	<4.0
Thorium	µg/m3		0.0036 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PEL1589

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PEL1589-01	PEL1589-02
Your Reference			Sample 17	Blank 17
Date Sampled			21/12/2023	21/12/2023
Dust	mg	0.10	53	<0.10
Dust	µg/m3	0.10	35	[NA]

Certificate of Analysis PEL1589

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

Certificate of Analysis PEL1589

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

Certificate of Analysis PEL1589

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PEL1589

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PEL1589

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	No	Duplicate Outliers Exist - See detailed list below
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	No	QC Frequency Outliers Exist - See detailed list below

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PEL1589

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	1	21/12/2023	04/01/2024	04/01/2024	Yes
	2	21/12/2023	28/12/2023	29/12/2023	Yes
	1	21/12/2023	29/12/2023	29/12/2023	Yes
Metals OHS (LL) HiVol Filter	1	21/12/2023	04/01/2024	04/01/2024	Yes
	2	21/12/2023	28/12/2023	30/12/2023	Yes
	1	21/12/2023	29/12/2023	30/12/2023	Yes
Metals OHS-Hg HiVol Filter	1	21/12/2023	04/01/2024	04/01/2024	Yes
	2	21/12/2023	28/12/2023	29/12/2023	Yes
	1	21/12/2023	29/12/2023	29/12/2023	Yes
Gravimetric Dust HiVol Filter	1	21/12/2023	28/12/2023	04/01/2024	Yes
	2	21/12/2023	28/12/2023	28/12/2023	Yes

Outliers: Duplicates

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BFA0295

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PEL1589-01	DUP1	Calcium	40.00	90.3[2]
PEL1589-01	DUP1	Magnesium	40.00	43.8[2]

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BFA0295

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PEL1589-01	DUP1	Aluminium	40.00	49.9[2]

Data Quality Assessment Summary PEL1589

Outliers: QC Frequency

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BEL3148

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEL3148

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEL3152

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEL3150

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

Quality Control PEL1589

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BEL3148

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	92.6
Barium	µg/sample	2.0	<2.0	98.7
Boron	µg/sample	20	<20	93.2
Cadmium	µg/sample	0.50	<0.50	98.5
Calcium	µg/sample	50	<50	91.0
Chromium	µg/sample	2.0	<2.0	95.9
Cobalt	µg/sample	2.0	<2.0	99.9
Copper	µg/sample	2.0	<2.0	94.5
Iron	µg/sample	5.0	<5.0	100
Lead	µg/sample	5.0	<5.0	103
Lithium	µg/sample	2.0	<2.0	102
Magnesium	µg/sample	50	<50	95.3
Manganese	µg/sample	2.0	<2.0	97.8
Molybdenum	µg/sample	5.0	<5.0	109
Nickel	µg/sample	2.0	<2.0	98.1
Phosphorus	µg/sample	20	<20	98.1
Potassium	µg/sample	50	<50	95.5
Sodium	µg/sample	100	<100	95.6
Sulfur	µg/sample	50	<50	95.8
Tin	µg/sample	10	<10	98.7
Titanium	µg/sample	2.0	<2.0	93.4
Vanadium	µg/sample	2.0	<2.0	97.5
Zinc	µg/sample	5.0	<5.0	99.1

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BEL3150

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	98.4
Arsenic	µg/sample	2.0	<2.0	101
Beryllium	µg/sample	2.0	<2.0	101
Gallium	µg/sample	4.0	<4.0	91.6
Selenium	µg/sample	4.0	<4.0	119
Thallium	µg/sample	4.0	<4.0	86.7
Thorium	µg/sample	4.0	<4.0	98.5
Uranium	µg/sample	4.0	<4.0	99.5

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BEL3152

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.20	<0.20	105

Quality Control PEL1589

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BFA0295

Analyte	Units	PQL	Blank	DUP1		LCS %
				PEL1589-01 Samp QC RPD %		
Aluminium	µg/sample	5.0	<5.0	2390	1440 49.9 [2]	92.5
Antimony	µg/sample	10	<10	<10	<10 [NA]	98.8
Arsenic	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	98.9
Barium	µg/sample	2.0	<2.0	178	159 11.2	98.3
Beryllium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	98.4
Boron	µg/sample	20	<20	1010	1190 17.0	90.3
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50 [NA]	98.1
Calcium	µg/sample	50	<50	2330	882 90.3 [2]	91.3
Chromium	µg/sample	2.0	<2.0	5.29	4.31 [NA]	95.6
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	99.2
Copper	µg/sample	2.0	<2.0	7.69	10.5 [NA]	94.2
Gallium	µg/sample	4.0	<4.0	<4.0	<4.0 [NA]	90.5
Iron	µg/sample	5.0	<5.0	4910	3890 23.1	99.2
Lead	µg/sample	5.0	<5.0	<5.0	<5.0 [NA]	101
Lithium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	101
Magnesium	µg/sample	50	<50	2340	1500 43.8 [2]	95.2
Manganese	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	97.2
Mercury	µg/sample	0.20	<0.20	<0.20	<0.20 [NA]	103
Molybdenum	µg/sample	5.0	<5.0	<5.0	8.87 [NA] [3]	109
Nickel	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	97.3
Phosphorus	µg/sample	20	<20	47.1	33.7 [NA]	97.1
Potassium	µg/sample	50	<50	131	215 [NA] [3]	95.3
Selenium	µg/sample	4.0	<4.0	<4.0	<4.0 [NA]	120
Sodium	µg/sample	100	<100	1290	1740 29.9	96.0
Sulfur	µg/sample	50	<50	1390	1140 20.0	95.4
Thallium	µg/sample	4.0	<4.0	<4.0	<4.0 [NA]	97.6
Thorium	µg/sample	4.0	<4.0	5.36	4.42 [NA]	99.2
Tin	µg/sample	10	<10	<10	<10 [NA]	97.8
Titanium	µg/sample	2.0	<2.0	147	113 26.4	93.5
Uranium	µg/sample	4.0	<4.0	<4.0	<4.0 [NA]	101
Vanadium	µg/sample	2.0	<2.0	14.2	11.2 24.0	97.3
Zinc	µg/sample	5.0	<5.0	124	114 8.32	98.1

QC Comments

Identifier	Description
[2]	Duplicate analysis precision is/are outside acceptable %RPD, re-analysis indicates possible sample heterogeneity.
[3]	Duplicate %RPD may be flagged as an outlier to routine laboratory acceptance, however, where one or both results are <10*PQL, the RPD acceptance criteria increases exponentially.

Certificate of Analysis PFA0078

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	03/01/2024
Date Instructions Received	03/01/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	10/01/2024
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Authorisation Details

Airborne Dust Approved By	Heram Halim Thomas Edwards
Results Approved By	Heram Halim, Operations Manager Thomas Edwards, OHL Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PFA0078

Report Amendment History

Revision	Reason for Amendment
R-02	QC reporting updated to include PQL.
R-03	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.
R-01	Sample ID updated.

Certificate of Analysis PFA0078

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PFA0078-01	Sample 19	HiVol Filter	31/12/2023	03/01/2024
PFA0078-02	Blank 19	HiVol Filter	31/12/2023	03/01/2024

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
Sample 19	TENV44	[NA]	[NA]	1500
Blank 19	TENV45	[NA]	[NA]	[NA]

Certificate of Analysis PFA0078

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PFA0078-01 Sample 19 31/12/2023	PFA0078-02 Blank 19 31/12/2023
Aluminium	µg/sample	5.0	1000 [1]	6000
Aluminium	µg/m3		0.69 [1]	[NA]
Boron	µg/sample	20	<20 [1]	14000
Boron	µg/m3		<0.013 [1]	[NA]
Barium	µg/sample	2.0	4.4 [1]	180
Barium	µg/m3		0.0029 [1]	[NA]
Calcium	µg/sample	50	510 [1]	40000
Calcium	µg/m3		0.34 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	<2.0 [1]	3.2
Chromium	µg/m3		<0.0013 [1]	[NA]
Copper	µg/sample	2.0	4.0 [1]	8.1
Copper	µg/m3		0.0027 [1]	[NA]
Iron	µg/sample	5.0	920 [1]	170
Iron	µg/m3		0.61 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	5400 [1]	5500
Potassium	µg/m3		3.6 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	12
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	510 [1]	16000
Magnesium	µg/m3		0.34 [1]	[NA]
Manganese	µg/sample	2.0	3.4 [1]	19
Manganese	µg/m3		0.0023 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	<5.0
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	2800 [1]	120000
Sodium	µg/m3		1.9 [1]	[NA]
Nickel	µg/sample	2.0	<2.0 [1]	4.8
Nickel	µg/m3		<0.0013 [1]	[NA]
Phosphorus	µg/sample	20	22 [1]	40
Phosphorus	µg/m3		0.014 [1]	[NA]
Lead	µg/sample	5.0	<5.0 [1]	<5.0
Lead	µg/m3		<0.0033 [1]	[NA]
Sulfur	µg/sample	50	880 [1]	1900
Sulfur	µg/m3		0.59 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	12 [1]	30
Titanium	µg/m3		0.0083 [1]	[NA]
Vanadium	µg/sample	2.0	3.4 [1]	<2.0
Vanadium	µg/m3		0.0023 [1]	[NA]

Certificate of Analysis PFA0078

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PFA0078-01 Sample 19 31/12/2023	PFA0078-02 Blank 19 31/12/2023
Zinc	µg/sample	5.0	6.0 [1]	120
Zinc	µg/m3		0.0040 [1]	[NA]
Arsenic	µg/sample	2.0	<2.0 [1]	<2.0
Arsenic	µg/m3		<0.0013 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	<4.0 [1]	<4.0
Thorium	µg/m3		<0.0027 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PFA0078

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PFA0078-01	PFA0078-02
Your Reference			Sample 19	Blank 19
Date Sampled			31/12/2023	31/12/2023
Dust	mg	0.10	33	<0.10
Dust	µg/m3	0.10	22	[NA]

Certificate of Analysis PFA0078

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

Certificate of Analysis PFA0078

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

Certificate of Analysis PFA0078

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PFA0078

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PFA0078

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	No	QC Frequency Outliers Exist - See detailed list below

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PFA0078

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	1	31/12/2023	05/01/2024	09/01/2024	Yes
	2	31/12/2023	08/01/2024	08/01/2024	Yes
	1	31/12/2023	08/01/2024	10/01/2024	Yes
Metals OHS (LL) HiVol Filter	2	31/12/2023	05/01/2024	08/01/2024	Yes
	1	31/12/2023	05/01/2024	10/01/2024	Yes
Metals OHS-Hg HiVol Filter	2	31/12/2023	05/01/2024	08/01/2024	Yes
	1	31/12/2023	05/01/2024	10/01/2024	Yes
Gravimetric Dust HiVol Filter	2	31/12/2023	05/01/2024	05/01/2024	Yes
	1	31/12/2023	05/01/2024	10/01/2024	Yes

Outliers: QC Frequency

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BFA0396

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

Quality Control PFA0078

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BFA0394

Analyte	Units	PQL	Blank	DUP1	LCS %
				BFA0394-DUP1# Samp QC RPD %	
Antimony	µg/sample	10	<10	<10 <10 [NA]	95.6
Arsenic	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	105
Beryllium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	96.4
Gallium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	97.4
Selenium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	112
Thallium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	97.0
Thorium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	99.0
Uranium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	101

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BFA0396

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.20	<0.20	103

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BFA0583

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	94.1
Barium	µg/sample	2.0	<2.0	101
Boron	µg/sample	20	<20	97.4
Cadmium	µg/sample	0.50	<0.50	101
Calcium	µg/sample	50	<50	101
Chromium	µg/sample	2.0	<2.0	96.2
Cobalt	µg/sample	2.0	<2.0	101
Copper	µg/sample	2.0	<2.0	98.0
Iron	µg/sample	5.0	<5.0	103
Lead	µg/sample	5.0	<5.0	97.2
Lithium	µg/sample	2.0	<2.0	108
Magnesium	µg/sample	50	<50	99.8
Manganese	µg/sample	2.0	<2.0	97.7
Molybdenum	µg/sample	5.0	<5.0	102
Nickel	µg/sample	2.0	<2.0	94.9
Phosphorus	µg/sample	20	<20	97.8
Potassium	µg/sample	50	<50	103
Sodium	µg/sample	100	<100	99.3
Sulfur	µg/sample	50	<50	90.5
Tin	µg/sample	10	<10	94.7
Titanium	µg/sample	2.0	<2.0	92.8
Vanadium	µg/sample	2.0	<2.0	102
Zinc	µg/sample	5.0	<5.0	96.3

Certificate of Analysis PFA0606

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	15/01/2024
Date Instructions Received	15/01/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	23/01/2024
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Authorisation Details

Airborne Dust Approved By	Michael Kubiak Thomas Edwards
Results Approved By	Ben Carpenter, Metals Technician Heram Halim, Operations Manager Michael Kubiak, Lab Manager Michael Mowle, Inorganics Supervisor Thomas Edwards, OHL Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PFA0606

Report Amendment History

Revision	Reason for Amendment
R-01	QC reporting updated to include PQL.
R-02	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.

Certificate of Analysis PFA0606

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PFA0606-01	Sample 20	HiVol Filter	06/01/2024	15/01/2024
PFA0606-02	Blank 20	HiVol Filter	06/01/2024	15/01/2024

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
Sample 20	TENV46	[NA]	[NA]	1500
Blank 20	TENV47	[NA]	[NA]	[NA]

Certificate of Analysis PFA0606

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PFA0606-01 Sample 20 06/01/2024	PFA0606-02 Blank 20 06/01/2024
Aluminium	µg/sample	5.0	1500 [1]	6700
Aluminium	µg/m3		1.0 [1]	[NA]
Boron	µg/sample	20	870 [1]	15000
Boron	µg/m3		0.58 [1]	[NA]
Barium	µg/sample	2.0	15 [1]	180
Barium	µg/m3		0.010 [1]	[NA]
Calcium	µg/sample	50	5700 [1]	42000
Calcium	µg/m3		3.8 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	2.4 [1]	3.7
Chromium	µg/m3		0.0016 [1]	[NA]
Copper	µg/sample	2.0	2.2 [1]	6.4
Copper	µg/m3		0.0015 [1]	[NA]
Iron	µg/sample	5.0	1500 [1]	190
Iron	µg/m3		0.98 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	510 [1]	5700
Potassium	µg/m3		3.7 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	12
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	1500 [1]	17000
Magnesium	µg/m3		0.99 [1]	[NA]
Manganese	µg/sample	2.0	17 [1]	20
Manganese	µg/m3		0.011 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	<5.0
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	7700 [1]	120000
Sodium	µg/m3		76 [1]	[NA]
Nickel	µg/sample	2.0	<2.0 [1]	6.2
Nickel	µg/m3		<0.0013 [1]	[NA]
Phosphorus	µg/sample	20	71 [1]	45
Phosphorus	µg/m3		0.047 [1]	[NA]
Lead	µg/sample	5.0	<5.0 [1]	5.5
Lead	µg/m3		<0.0033 [1]	[NA]
Sulfur	µg/sample	50	550 [1]	2200
Sulfur	µg/m3		0.37 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	26 [1]	32
Titanium	µg/m3		0.018 [1]	[NA]
Vanadium	µg/sample	2.0	4.0 [1]	<2.0
Vanadium	µg/m3		0.0027 [1]	[NA]

Certificate of Analysis PFA0606

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PFA0606-01 Sample 20 06/01/2024	PFA0606-02 Blank 20 06/01/2024
Zinc	µg/sample	5.0	24 [1]	120
Zinc	µg/m3		0.016 [1]	[NA]
Arsenic	µg/sample	2.0	<2.0 [1]	<2.0
Arsenic	µg/m3		<0.0013 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	<4.0 [1]	<4.0
Thorium	µg/m3		<0.0027 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PFA0606

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PFA0606-01	PFA0606-02
Your Reference			Sample 20	Blank 20
Date Sampled			06/01/2024	06/01/2024
Dust	mg	0.10	46	1.1
Dust	µg/m3	0.10	30	[NA]

Certificate of Analysis PFA0606

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

Certificate of Analysis PFA0606

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

Certificate of Analysis PFA0606

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PFA0606

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PFA0606

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	No	QC Frequency Outliers Exist - See detailed list below

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PFA0606

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	1-2	06/01/2024	18/01/2024	22/01/2024	Yes
Metals OHS (LL) HiVol Filter	1-2	06/01/2024	18/01/2024	19/01/2024	Yes
Metals OHS-Hg HiVol Filter	1-2	06/01/2024	18/01/2024	19/01/2024	Yes
Gravimetric Dust HiVol Filter	2	06/01/2024	16/01/2024	16/01/2024	Yes
	1	06/01/2024	16/01/2024	24/01/2024	Yes

Data Quality Assessment Summary PFA0606

Outliers: QC Frequency

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BFA1482

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BFA1483

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BFA1482

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BFA1483

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BFA1487

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BFA1488

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BFA1484

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BFA1485

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

Quality Control PFA0606

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BFA1482

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	97.7
Barium	µg/sample	2.0	<2.0	101
Boron	µg/sample	20	<20	105
Cadmium	µg/sample	0.50	<0.50	108
Calcium	µg/sample	50	<50	92.9
Chromium	µg/sample	2.0	<2.0	102
Cobalt	µg/sample	2.0	<2.0	108
Copper	µg/sample	2.0	<2.0	98.2
Iron	µg/sample	5.0	<5.0	115
Lead	µg/sample	5.0	<5.0	102
Lithium	µg/sample	2.0	<2.0	106
Magnesium	µg/sample	50	<50	95.1
Manganese	µg/sample	2.0	<2.0	100
Molybdenum	µg/sample	5.0	<5.0	104
Nickel	µg/sample	2.0	<2.0	101
Phosphorus	µg/sample	20	<20	101
Potassium	µg/sample	50	<50	98.3
Sodium	µg/sample	100	<100	95.6
Sulfur	µg/sample	50	<50	89.9
Tin	µg/sample	10	<10	97.8
Titanium	µg/sample	2.0	<2.0	91.6
Vanadium	µg/sample	2.0	<2.0	107
Zinc	µg/sample	5.0	<5.0	103

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BFA1483

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	97.7
Barium	µg/sample	2.0	<2.0	101
Boron	µg/sample	20	<20	105
Cadmium	µg/sample	0.50	<0.50	108
Calcium	µg/sample	50	<50	92.9
Chromium	µg/sample	2.0	<2.0	102
Cobalt	µg/sample	2.0	<2.0	108
Copper	µg/sample	2.0	<2.0	98.2
Iron	µg/sample	5.0	<5.0	[NA]
Lead	µg/sample	5.0	<5.0	102
Lithium	µg/sample	2.0	<2.0	106
Magnesium	µg/sample	50	<50	95.1
Manganese	µg/sample	2.0	<2.0	100
Molybdenum	µg/sample	5.0	<5.0	104
Nickel	µg/sample	2.0	<2.0	101
Phosphorus	µg/sample	20	<20	101
Potassium	µg/sample	50	<50	98.3
Sodium	µg/sample	100	<100	95.6
Sulfur	µg/sample	50	<50	89.9
Tin	µg/sample	10	<10	97.8
Titanium	µg/sample	2.0	<2.0	91.6
Vanadium	µg/sample	2.0	<2.0	107
Zinc	µg/sample	5.0	<5.0	103

Quality Control PFA0606

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BFA1484

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	111
Arsenic	µg/sample	2.0	<2.0	111
Beryllium	µg/sample	2.0	<2.0	105
Gallium	µg/sample	4.0	<4.0	105
Selenium	µg/sample	4.0	<4.0	116
Thallium	µg/sample	4.0	<4.0	98.6
Thorium	µg/sample	4.0	<4.0	100
Uranium	µg/sample	4.0	<4.0	103

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BFA1485

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	113
Arsenic	µg/sample	2.0	<2.0	116
Beryllium	µg/sample	2.0	<2.0	104
Gallium	µg/sample	4.0	<4.0	107
Selenium	µg/sample	4.0	<4.0	118
Thallium	µg/sample	4.0	<4.0	95.9
Thorium	µg/sample	4.0	<4.0	102
Uranium	µg/sample	4.0	<4.0	106

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BFA1487

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.20	<0.20	109

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BFA1488

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.20	<0.20	108

Certificate of Analysis PFA0605

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	15/01/2024
Date Instructions Received	15/01/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	22/01/2024
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Accredited for compliance with ISO/IEC 17025. Tests not covered by NATA are denoted with *.

Authorisation Details

Airborne Dust Approved By	Michael Kubiak Thomas Edwards
Results Approved By	Ben Carpenter, Metals Technician Heram Halim, Operations Manager Michael Kubiak, Lab Manager Michael Mowle, Inorganics Supervisor Thomas Edwards, OHL Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PFA0605

Report Amendment History

Revision	Reason for Amendment
R-01	QC reporting updated to include PQL.
R-02	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.

Certificate of Analysis PFA0605

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PFA0605-01	Sample 21	HiVol Filter	12/01/2024	15/01/2024
PFA0605-02	Blank 21	HiVol Filter	12/01/2024	15/01/2024

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
Sample 21	TENV48	[NA]	[NA]	1500
Blank 21	TENV49	[NA]	[NA]	[NA]

Certificate of Analysis PFA0605

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PFA0605-01 Sample 21 12/01/2024	PFA0605-02 Blank 21 12/01/2024
Aluminium	µg/sample	5.0	1500 [1]	5500
Aluminium	µg/m3		1.0 [1]	[NA]
Boron	µg/sample	20	190 [1]	13000
Boron	µg/m3		0.13 [1]	[NA]
Barium	µg/sample	2.0	2.2 [1]	160
Barium	µg/m3		0.0015 [1]	[NA]
Calcium	µg/sample	50	1600 [1]	35000
Calcium	µg/m3		1.1 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	2.4 [1]	3.3
Chromium	µg/m3		0.0016 [1]	[NA]
Copper	µg/sample	2.0	4.8 [1]	6.2
Copper	µg/m3		0.0032 [1]	[NA]
Iron	µg/sample	5.0	1900 [1]	170
Iron	µg/m3		1.3 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	160 [1]	5000
Potassium	µg/m3		3.4 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	10
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	490 [1]	14000
Magnesium	µg/m3		0.33 [1]	[NA]
Manganese	µg/sample	2.0	5.0 [1]	17
Manganese	µg/m3		0.0033 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	5.4
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	2400 [1]	110000
Sodium	µg/m3		72 [1]	[NA]
Nickel	µg/sample	2.0	<2.0 [1]	6.0
Nickel	µg/m3		<0.0013 [1]	[NA]
Phosphorus	µg/sample	20	21 [1]	37
Phosphorus	µg/m3		0.014 [1]	[NA]
Lead	µg/sample	5.0	<5.0 [1]	5.0
Lead	µg/m3		<0.0033 [1]	[NA]
Sulfur	µg/sample	50	340 [1]	2100
Sulfur	µg/m3		0.23 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	41 [1]	27
Titanium	µg/m3		0.027 [1]	[NA]
Vanadium	µg/sample	2.0	6.3 [1]	<2.0
Vanadium	µg/m3		0.0042 [1]	[NA]

Certificate of Analysis PFA0605

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PFA0605-01 Sample 21 12/01/2024	PFA0605-02 Blank 21 12/01/2024
Zinc	µg/sample	5.0	5.2 [1]	110
Zinc	µg/m3		0.0035 [1]	[NA]
Arsenic	µg/sample	2.0	<2.0 [1]	<2.0
Arsenic	µg/m3		<0.0013 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	<4.0 [1]	<4.0
Thorium	µg/m3		<0.0027 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PFA0605

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PFA0605-01	PFA0605-02
Your Reference			Sample 21	Blank 21
Date Sampled			12/01/2024	12/01/2024
Dust	mg	0.10	32	0.89
Dust	µg/m3	0.10	21	[NA]

Certificate of Analysis PFA0605

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

Certificate of Analysis PFA0605

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

Certificate of Analysis PFA0605

Result Definitions

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LCS	Laboratory Control Sample
RPD	Relative Percent Difference
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PQL	Practical Quantitation Limit
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Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

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This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PFA0605

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PFA0605

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	No	QC Frequency Outliers Exist - See detailed list below

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PFA0605

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	1-2	12/01/2024	18/01/2024	22/01/2024	Yes
Metals OHS (LL) HiVol Filter	1-2	12/01/2024	18/01/2024	19/01/2024	Yes
Metals OHS-Hg HiVol Filter	1-2	12/01/2024	18/01/2024	19/01/2024	Yes
Gravimetric Dust HiVol Filter	2	12/01/2024	16/01/2024	16/01/2024	Yes
	1	12/01/2024	16/01/2024	24/01/2024	Yes

Data Quality Assessment Summary PFA0605

Outliers: QC Frequency

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BFA1482

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BFA1483

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BFA1482

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BFA1483

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BFA1487

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BFA1488

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BFA1484

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BFA1485

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

Quality Control PFA0605

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BFA1482

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	97.7
Barium	µg/sample	2.0	<2.0	101
Boron	µg/sample	20	<20	105
Cadmium	µg/sample	0.50	<0.50	108
Calcium	µg/sample	50	<50	92.9
Chromium	µg/sample	2.0	<2.0	102
Cobalt	µg/sample	2.0	<2.0	108
Copper	µg/sample	2.0	<2.0	98.2
Iron	µg/sample	5.0	<5.0	115
Lead	µg/sample	5.0	<5.0	102
Lithium	µg/sample	2.0	<2.0	106
Magnesium	µg/sample	50	<50	95.1
Manganese	µg/sample	2.0	<2.0	100
Molybdenum	µg/sample	5.0	<5.0	104
Nickel	µg/sample	2.0	<2.0	101
Phosphorus	µg/sample	20	<20	101
Potassium	µg/sample	50	<50	98.3
Sodium	µg/sample	100	<100	95.6
Sulfur	µg/sample	50	<50	89.9
Tin	µg/sample	10	<10	97.8
Titanium	µg/sample	2.0	<2.0	91.6
Vanadium	µg/sample	2.0	<2.0	107
Zinc	µg/sample	5.0	<5.0	103

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BFA1483

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	97.7
Barium	µg/sample	2.0	<2.0	101
Boron	µg/sample	20	<20	105
Cadmium	µg/sample	0.50	<0.50	108
Calcium	µg/sample	50	<50	92.9
Chromium	µg/sample	2.0	<2.0	102
Cobalt	µg/sample	2.0	<2.0	108
Copper	µg/sample	2.0	<2.0	98.2
Iron	µg/sample	5.0	<5.0	[NA]
Lead	µg/sample	5.0	<5.0	102
Lithium	µg/sample	2.0	<2.0	106
Magnesium	µg/sample	50	<50	95.1
Manganese	µg/sample	2.0	<2.0	100
Molybdenum	µg/sample	5.0	<5.0	104
Nickel	µg/sample	2.0	<2.0	101
Phosphorus	µg/sample	20	<20	101
Potassium	µg/sample	50	<50	98.3
Sodium	µg/sample	100	<100	95.6
Sulfur	µg/sample	50	<50	89.9
Tin	µg/sample	10	<10	97.8
Titanium	µg/sample	2.0	<2.0	91.6
Vanadium	µg/sample	2.0	<2.0	107
Zinc	µg/sample	5.0	<5.0	103

Quality Control PFA0605

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BFA1484

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	111
Arsenic	µg/sample	2.0	<2.0	111
Beryllium	µg/sample	2.0	<2.0	105
Gallium	µg/sample	4.0	<4.0	105
Selenium	µg/sample	4.0	<4.0	116
Thallium	µg/sample	4.0	<4.0	98.6
Thorium	µg/sample	4.0	<4.0	100
Uranium	µg/sample	4.0	<4.0	103

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BFA1485

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	113
Arsenic	µg/sample	2.0	<2.0	116
Beryllium	µg/sample	2.0	<2.0	104
Gallium	µg/sample	4.0	<4.0	107
Selenium	µg/sample	4.0	<4.0	118
Thallium	µg/sample	4.0	<4.0	95.9
Thorium	µg/sample	4.0	<4.0	102
Uranium	µg/sample	4.0	<4.0	106

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BFA1487

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.20	<0.20	109

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BFA1488

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.20	<0.20	108

Certificate of Analysis PFA0951

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	19/01/2024
Date Instructions Received	19/01/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	29/01/2024
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Authorisation Details

Airborne Dust Approved By	Michael Kubiak Thomas Edwards
Results Approved By	Ben Carpenter, Metals Technician Heram Halim, Operations Manager Lien Tang, Assistant Operations Manager Michael Kubiak, Lab Manager Michael Mowle, Inorganics Supervisor Thomas Edwards, OHL Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PFA0951

Report Amendment History

Revision	Reason for Amendment
R-02	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.
R-01	QC reporting updated to include PQL.

Certificate of Analysis PFA0951

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PFA0951-01	Sample 22	HiVol Filter	18/01/2024	19/01/2024
PFA0951-02	Blank 22	HiVol Filter	19/01/2024	19/01/2024

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
Sample 22	TENV50	[NA]	[NA]	1500
Blank 22	TENV51	[NA]	[NA]	[NA]

Certificate of Analysis PFA0951

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PFA0951-01 Sample 22 18/01/2024	PFA0951-02 Blank 22 19/01/2024
Aluminium	µg/sample	5.0	<5.0 [1] [3]	5900 [3]
Aluminium	µg/m3		<0.0033 [1]	[NA]
Boron	µg/sample	20	<20 [1]	13000
Boron	µg/m3		<0.013 [1]	[NA]
Barium	µg/sample	2.0	<2.0 [1]	1600
Barium	µg/m3		<0.0013 [1]	[NA]
Calcium	µg/sample	50	<50 [1]	34000
Calcium	µg/m3		<0.033 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	<2.0 [1]	3.4
Chromium	µg/m3		<0.0013 [1]	[NA]
Copper	µg/sample	2.0	2.8 [1]	6.7
Copper	µg/m3		0.0019 [1]	[NA]
Iron	µg/sample	5.0	440 [1]	190
Iron	µg/m3		0.29 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	<50 [1]	5000
Potassium	µg/m3		<0.033 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	9.6
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	<50 [1]	13000
Magnesium	µg/m3		<0.033 [1]	[NA]
Manganese	µg/sample	2.0	3.0 [1]	18
Manganese	µg/m3		0.0020 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	<5.0
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	<100 [1]	94000
Sodium	µg/m3		<0.067 [1]	[NA]
Nickel	µg/sample	2.0	<2.0 [1]	5.3
Nickel	µg/m3		<0.0013 [1]	[NA]
Phosphorus	µg/sample	20	<20 [1]	38
Phosphorus	µg/m3		0.013 [1]	[NA]
Lead	µg/sample	5.0	<5.0 [1]	5.6
Lead	µg/m3		<0.0033 [1]	[NA]
Sulfur	µg/sample	50	97 [1]	2100
Sulfur	µg/m3		0.065 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	2.0 [1]	32
Titanium	µg/m3		0.0013 [1]	[NA]
Vanadium	µg/sample	2.0	<2.0 [1]	<2.0
Vanadium	µg/m3		0.0013 [1]	[NA]

Certificate of Analysis PFA0951

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PFA0951-01 Sample 22 18/01/2024	PFA0951-02 Blank 22 19/01/2024
Zinc	µg/sample	5.0	<5.0 [1]	1200
Zinc	µg/m3		<0.0033 [1]	[NA]
Arsenic	µg/sample	2.0	<2.0 [1]	<2.0
Arsenic	µg/m3		<0.0013 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	<4.0 [1]	<4.0
Thorium	µg/m3		<0.0027 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PFA0951

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PFA0951-01	PFA0951-02
Your Reference			Sample 22	Blank 22
Date Sampled			18/01/2024	19/01/2024
Dust	mg	0.10	27	<0.10
Dust	µg/m3	0.10	18	[NA]

Certificate of Analysis PFA0951

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.
[3]	The sample results have been confirmed by a repeated digest and analysis

Certificate of Analysis PFA0951

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

Certificate of Analysis PFA0951

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PFA0951

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PFA0951

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	No	QC Frequency Outliers Exist - See detailed list below

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PFA0951

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	1	18/01/2024	24/01/2024	24/01/2024	Yes
	2	19/01/2024	24/01/2024	24/01/2024	Yes
Metals OHS (LL) HiVol Filter	1	18/01/2024	24/01/2024	24/01/2024	Yes
	2	19/01/2024	24/01/2024	24/01/2024	Yes
Metals OHS-Hg HiVol Filter	1	18/01/2024	24/01/2024	24/01/2024	Yes
	2	19/01/2024	24/01/2024	24/01/2024	Yes
Gravimetric Dust HiVol Filter	1	18/01/2024	23/01/2024	07/02/2024	Yes
	2	19/01/2024	23/01/2024	23/01/2024	Yes

Outliers: QC Frequency

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BFA2147

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BFA2147

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BFA2152

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BFA2150

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

Quality Control PFA0951

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BFA2146

Analyte	Units	PQL	Blank	DUP1		LCS %
				PFA0951-01 Samp QC RPD %		
Aluminium	µg/sample	5.0	<5.0	<5.0	<5.0 [NA] [1]	92.2
Barium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA] [1]	103
Boron	µg/sample	20	<20	<20	<20 [NA] [1]	104
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50 [NA] [1]	95.8
Calcium	µg/sample	50	<50	<50	<50 [NA] [1]	92.4
Chromium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA] [1]	96.0
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0 [NA] [1]	94.3
Copper	µg/sample	2.0	<2.0	2.80	<2.0 [NA] [1][2]	94.3
Iron	µg/sample	5.0	<5.0	439	508 14.7 [1]	94.0
Lead	µg/sample	5.0	<5.0	<5.0	<5.0 [NA] [1]	97.3
Lithium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA] [1]	99.6
Magnesium	µg/sample	50	<50	<50	<50 [NA] [1]	93.8
Manganese	µg/sample	2.0	<2.0	3.00	3.80 [NA] [1]	95.3
Molybdenum	µg/sample	5.0	<5.0	<5.0	<5.0 [NA] [1]	100
Nickel	µg/sample	2.0	<2.0	<2.0	<2.0 [NA] [1]	96.2
Phosphorus	µg/sample	20	<20	<20	21.8 [NA] [1]	92.9
Potassium	µg/sample	50	<50	<50	<50 [NA] [1]	94.7
Sodium	µg/sample	100	<100	<100	<100 [NA] [1]	95.2
Sulfur	µg/sample	50	<50	97.2	208 [NA] [1][2]	87.6
Tin	µg/sample	10	<10	<10	<10 [NA] [1]	95.4
Titanium	µg/sample	2.0	<2.0	2.00	2.60 [NA] [1]	90.7
Vanadium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA] [1]	93.0
Zinc	µg/sample	5.0	<5.0	<5.0	<5.0 [NA] [1]	98.5

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BFA2147

Analyte	Units	PQL	Blank	DUP1		LCS %
				PFA0951-01 Samp QC RPD %		
Aluminium	µg/sample	5.0	<5.0	<5.0	<5.0 [NA] [1]	92.2
Barium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA] [1]	103
Boron	µg/sample	20	<20	<20	<20 [NA] [1]	104
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50 [NA] [1]	95.8
Calcium	µg/sample	50	<50	<50	<50 [NA] [1]	92.4
Chromium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA] [1]	96.0
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0 [NA] [1]	94.3
Copper	µg/sample	2.0	<2.0	<2.0	<2.0 [NA] [1]	94.3
Iron	µg/sample	5.0	<5.0	<5.0	<5.0 [NA] [1]	94.0
Lead	µg/sample	5.0	<5.0	<5.0	<5.0 [NA] [1]	97.3
Lithium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA] [1]	99.6
Magnesium	µg/sample	50	<50	<50	<50 [NA] [1]	93.8
Manganese	µg/sample	2.0	<2.0	<2.0	<2.0 [NA] [1]	95.3
Molybdenum	µg/sample	5.0	<5.0	<5.0	<5.0 [NA] [1]	100
Nickel	µg/sample	2.0	<2.0	<2.0	<2.0 [NA] [1]	96.2
Phosphorus	µg/sample	20	<20	<20	<20 [NA] [1]	92.9
Potassium	µg/sample	50	<50	<50	<50 [NA] [1]	94.7
Sodium	µg/sample	100	<100	<100	<100 [NA] [1]	95.2
Sulfur	µg/sample	50	<50	<50	<50 [NA] [1]	87.6
Tin	µg/sample	10	<10	<10	<10 [NA] [1]	95.4
Titanium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA] [1]	90.7
Vanadium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA] [1]	93.0
Zinc	µg/sample	5.0	<5.0	<5.0	<5.0 [NA] [1]	98.5

Quality Control PFA0951

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BFA2149

Analyte	Units	PQL	Blank	DUP1	LCS %
				PFA0951-01 Samp QC RPD %	
Antimony	µg/sample	10	<10	<10 <10 [NA]	108
Arsenic	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	104
Beryllium	µg/sample	2.0	<2.0	<2.0 <2.0 [NA]	91.8
Gallium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	93.7
Selenium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	114
Thallium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	94.2
Thorium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	93.7
Uranium	µg/sample	4.0	<4.0	<4.0 <4.0 [NA]	97.2

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BFA2150

Analyte	Units	PQL	Blank		LCS %
Antimony	µg/sample	10	<10		103
Arsenic	µg/sample	2.0	<2.0		103
Beryllium	µg/sample	2.0	<2.0		89.5
Gallium	µg/sample	4.0	<4.0		93.4
Selenium	µg/sample	4.0	<4.0		113
Thallium	µg/sample	4.0	<4.0		88.5
Thorium	µg/sample	4.0	<4.0		94.2
Uranium	µg/sample	4.0	<4.0		96.2

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BFA2151

Analyte	Units	PQL	Blank	DUP1	LCS %
				PFA0951-01 Samp QC RPD %	
Mercury	µg/sample	0.20	<0.20	<0.20 <0.20 [NA]	112

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BFA2152

Analyte	Units	PQL	Blank		LCS %
Mercury	µg/sample	0.20	<0.20		110

QC Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.
[2]	Duplicate %RPD may be flagged as an outlier to routine laboratory acceptance, however, where one or both results are <10*PQL, the RPD acceptance criteria increases exponentially.

Certificate of Analysis PFA1282

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	25/01/2024
Date Instructions Received	25/01/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	02/02/2024
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Authorisation Details

Airborne Dust Approved By	Thomas Edwards
Results Approved By	Ben Carpenter, Metals Technician Heram Halim, Operations Manager Michael Mowle, Inorganics Supervisor Thomas Edwards, OHL Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PFA1282

Report Amendment History

Revision	Reason for Amendment
R-01	QC reporting updated to include PQL.
R-02	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.

Certificate of Analysis PFA1282

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PFA1282-01	Sample 23	HiVol Filter	24/01/2024	25/01/2024
PFA1282-02	Blank 23	HiVol Filter	24/01/2024	25/01/2024

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
Sample 23	TENV52	[NA]	[NA]	1500
Blank 23	TENV53	[NA]	[NA]	[NA]

Certificate of Analysis PFA1282

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PFA1282-01 Sample 23 24/01/2024	PFA1282-02 Blank 23 24/01/2024
Aluminium	µg/sample	5.0	<5.0 [1]	8600
Aluminium	µg/m3		<0.0033 [1]	[NA]
Boron	µg/sample	20	<20 [1]	18000
Boron	µg/m3		<0.013 [1]	[NA]
Barium	µg/sample	2.0	<2.0 [1]	2000
Barium	µg/m3		<0.0013 [1]	[NA]
Calcium	µg/sample	50	<50 [1]	44000
Calcium	µg/m3		<0.033 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	<2.0 [1]	3.8
Chromium	µg/m3		<0.0013 [1]	[NA]
Copper	µg/sample	2.0	2.6 [1]	7.3
Copper	µg/m3		0.0017 [1]	[NA]
Iron	µg/sample	5.0	500 [1]	240
Iron	µg/m3		0.33 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	6400 [1]	6600
Potassium	µg/m3		4.2 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	14
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	<50 [1]	17000
Magnesium	µg/m3		<0.033 [1]	[NA]
Manganese	µg/sample	2.0	4.0 [1]	24
Manganese	µg/m3		0.0027 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	<5.0
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	<100 [1]	130000
Sodium	µg/m3		<0.067 [1]	[NA]
Nickel	µg/sample	2.0	<2.0 [1]	4.2
Nickel	µg/m3		<0.0013 [1]	[NA]
Phosphorus	µg/sample	20	27 [1]	52
Phosphorus	µg/m3		0.018 [1]	[NA]
Lead	µg/sample	5.0	<5.0 [1]	5.6
Lead	µg/m3		<0.0033 [1]	[NA]
Sulfur	µg/sample	50	1000 [1]	2500
Sulfur	µg/m3		0.70 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	8.4 [1]	46
Titanium	µg/m3		0.0056 [1]	[NA]
Vanadium	µg/sample	2.0	2.3 [1]	<2.0
Vanadium	µg/m3		0.0015 [1]	[NA]

Certificate of Analysis PFA1282

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PFA1282-01 Sample 23 24/01/2024	PFA1282-02 Blank 23 24/01/2024
Zinc	µg/sample	5.0	<5.0 [1]	1200
Zinc	µg/m3		<0.0033 [1]	[NA]
Arsenic	µg/sample	2.0	<2.0 [1]	<2.0
Arsenic	µg/m3		<0.0013 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	<4.0
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	<4.0 [1]	<4.0
Thorium	µg/m3		<0.0027 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PFA1282

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PFA1282-01	PFA1282-02
Your Reference			Sample 23	Blank 23
Date Sampled			24/01/2024	24/01/2024
Dust	mg	0.10	30	<0.10
Dust	µg/m3	0.10	20	[NA]

Certificate of Analysis PFA1282

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

Certificate of Analysis PFA1282

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

Certificate of Analysis PFA1282

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PFA1282

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PFA1282

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	Yes	No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PFA1282

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	2	24/01/2024	31/01/2024	01/02/2024	Yes
	1	24/01/2024	31/01/2024	02/02/2024	Yes
Metals OHS (LL) HiVol Filter	1-2	24/01/2024	31/01/2024	01/02/2024	Yes
Metals OHS-Hg HiVol Filter	1-2	24/01/2024	31/01/2024	01/02/2024	Yes
Gravimetric Dust HiVol Filter	1-2	24/01/2024	30/01/2024	30/01/2024	Yes

Quality Control PFA1282

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BFA2811

Analyte	Units	PQL	Blank	DUP1		LCS %
				PFA1282-01 Samp QC RPD %		
Aluminium	µg/sample	5.0	<5.0	<5.0	<5.0 [NA]	92.4
Barium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	108
Boron	µg/sample	20	<20	<20	<20 [NA]	99.0
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50 [NA]	85.5
Calcium	µg/sample	50	<50	<50	<50 [NA]	93.7
Chromium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	93.5
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	90.2
Copper	µg/sample	2.0	<2.0	2.60	3.20 [NA]	99.4
Iron	µg/sample	5.0	<5.0	498	465 6.93	90.7
Lead	µg/sample	5.0	<5.0	<5.0	<5.0 [NA]	92.3
Lithium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	103
Magnesium	µg/sample	50	<50	<50	<50 [NA]	92.4
Manganese	µg/sample	2.0	<2.0	4.00	3.00 [NA]	94.8
Molybdenum	µg/sample	5.0	<5.0	<5.0	<5.0 [NA]	100
Nickel	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	92.5
Phosphorus	µg/sample	20	<20	27.2	22.4 [NA]	91.2
Potassium	µg/sample	50	<50	6360	6190 2.70	95.1
Sodium	µg/sample	100	<100	<100	<100 [NA]	91.6
Sulfur	µg/sample	50	<50	1040	1000 4.22	94.3
Tin	µg/sample	10	<10	<10	<10 [NA]	95.8
Titanium	µg/sample	2.0	<2.0	8.40	6.40 [NA]	95.9
Vanadium	µg/sample	2.0	<2.0	2.30	2.14 [NA]	91.3
Zinc	µg/sample	5.0	<5.0	<5.0	<5.0 [NA]	87.5

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BFA2812

Analyte	Units	PQL	Blank	DUP1		LCS %
				PFA1282-01 Samp QC RPD %		
Antimony	µg/sample	10	<10	<10	<10 [NA]	101
Arsenic	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	103
Beryllium	µg/sample	2.0	<2.0	<2.0	<2.0 [NA]	86.0
Gallium	µg/sample	4.0	<4.0	<4.0	<4.0 [NA]	97.4
Selenium	µg/sample	4.0	<4.0	<4.0	<4.0 [NA]	113
Thallium	µg/sample	4.0	<4.0	<4.0	<4.0 [NA]	94.0
Thorium	µg/sample	4.0	<4.0	<4.0	<4.0 [NA]	97.9
Uranium	µg/sample	4.0	<4.0	<4.0	<4.0 [NA]	101

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BFA2813

Analyte	Units	PQL	Blank	DUP1		LCS %
				PFA1282-01 Samp QC RPD %		
Mercury	µg/sample	0.20	<0.20	<0.20	<0.20 [NA]	113

Certificate of Analysis PFB0191

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	2 HiVol Filter
Date Samples Received	05/02/2024
Date Instructions Received	05/02/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	12/02/2024
Date of Reissue	25/07/2024 - This report supercedes previous report, see amendment history for details

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Authorisation Details

Airborne Dust Approved By	Thomas Edwards
Results Approved By	Ben Carpenter, Metals Technician Heram Halim, Operations Manager Thomas Edwards, OHL Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PFB0191

Report Amendment History

Revision	Reason for Amendment
R-01	QC reporting updated to include PQL.
R-02	Mercury in air calculation ($\mu\text{g}/\text{m}^3$) corrected.

Certificate of Analysis PFB0191

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PFB0191-01	Sample 24	HiVol Filter	30/01/2024	05/02/2024
PFB0191-02	Blank 24	HiVol Filter	30/01/2024	05/02/2024

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
Sample 24	TENV54	[NA]	[NA]	1500
Blank 24	TENV55	[NA]	[NA]	[NA]

Certificate of Analysis PFB0191

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PFB0191-01 Sample 24 30/01/2024	PFB0191-02 Blank 24 30/01/2024
Aluminium	µg/sample	5.0	1400 [1]	5700
Aluminium	µg/m3		0.95 [1]	[NA]
Boron	µg/sample	20	<20 [1]	13000
Boron	µg/m3		<0.013 [1]	[NA]
Barium	µg/sample	2.0	20 [1]	1600
Barium	µg/m3		0.013 [1]	[NA]
Calcium	µg/sample	50	240 [1]	32000
Calcium	µg/m3		0.16 [1]	[NA]
Cadmium	µg/sample	0.50	<0.50 [1]	<0.50
Cadmium	µg/m3		<0.00033 [1]	[NA]
Cobalt	µg/sample	2.0	<2.0 [1]	<2.0
Cobalt	µg/m3		<0.0013 [1]	[NA]
Chromium	µg/sample	2.0	26 [1]	3.7
Chromium	µg/m3		0.017 [1]	[NA]
Copper	µg/sample	2.0	3.4 [1]	5.6
Copper	µg/m3		0.0023 [1]	[NA]
Iron	µg/sample	5.0	2200 [1]	190
Iron	µg/m3		1.5 [1]	[NA]
Mercury	µg/sample	0.20	<0.20 [1]	<0.20
Mercury	µg/m3		<0.00013 [1]	[NA]
Potassium	µg/sample	50	270 [1]	4900
Potassium	µg/m3		0.18 [1]	[NA]
Lithium	µg/sample	2.0	<2.0 [1]	9.6
Lithium	µg/m3		<0.0013 [1]	[NA]
Magnesium	µg/sample	50	180 [1]	12000
Magnesium	µg/m3		0.12 [1]	[NA]
Manganese	µg/sample	2.0	6.8 [1]	18
Manganese	µg/m3		0.0045 [1]	[NA]
Molybdenum	µg/sample	5.0	<5.0 [1]	<5.0
Molybdenum	µg/m3		<0.0033 [1]	[NA]
Sodium	µg/sample	100	4800 [1]	95000
Sodium	µg/m3		3.2 [1]	[NA]
Nickel	µg/sample	2.0	<2.0 [1]	5.1
Nickel	µg/m3		<0.0013 [1]	[NA]
Phosphorus	µg/sample	20	35 [1]	39
Phosphorus	µg/m3		0.023 [1]	[NA]
Lead	µg/sample	5.0	<5.0 [1]	5.8
Lead	µg/m3		<0.0033 [1]	[NA]
Sulfur	µg/sample	50	950 [1]	2100
Sulfur	µg/m3		0.63 [1]	[NA]
Tin	µg/sample	10	<10 [1]	<10
Tin	µg/m3		<0.0067 [1]	[NA]
Titanium	µg/sample	2.0	52 [1]	31
Titanium	µg/m3		0.034 [1]	[NA]
Vanadium	µg/sample	2.0	7.1 [1]	<2.0
Vanadium	µg/m3		0.0047 [1]	[NA]

Certificate of Analysis PFB0191

Acid Extractable Metals (HiVol Filter)

Envirolab ID Your Reference Date Sampled	Units	PQL	PFB0191-01 Sample 24 30/01/2024	PFB0191-02 Blank 24 30/01/2024
Zinc	µg/sample	5.0	20 [1]	1200
Zinc	µg/m3		0.013 [1]	[NA]
Arsenic	µg/sample	2.0	2.3 [1]	<2.0
Arsenic	µg/m3		0.0015 [1]	[NA]
Beryllium	µg/sample	2.0	<2.0 [1]	<2.0
Beryllium	µg/m3		<0.0013 [1]	[NA]
Gallium*	µg/sample	4.0	<4.0 [1]	4.4
Gallium*	µg/m3		<0.0027 [1]	[NA]
Antimony	µg/sample	10	<10 [1]	<10
Antimony	µg/m3		<0.0067 [1]	[NA]
Selenium	µg/sample	4.0	<4.0 [1]	<4.0
Selenium	µg/m3		<0.0027 [1]	[NA]
Thorium	µg/sample	4.0	8.0 [1]	<4.0
Thorium	µg/m3		0.0053 [1]	[NA]
Thallium	µg/sample	4.0	<4.0 [1]	<4.0
Thallium	µg/m3		<0.0027 [1]	[NA]
Uranium	µg/sample	4.0	<4.0 [1]	<4.0
Uranium	µg/m3		<0.0027 [1]	[NA]

Certificate of Analysis PFB0191

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PFB0191-01	PFB0191-02
Your Reference			Sample 24	Blank 24
Date Sampled			30/01/2024	30/01/2024
Dust	mg	0.10	55	<0.10
Dust	µg/m3	0.10	37	[NA]

Certificate of Analysis PFB0191

Result Comments

Identifier	Description
[1]	The sample results have been blank corrected using one or more of the blank filters provided. The blank filters are not blank corrected.

Certificate of Analysis PFB0191

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
METALS-020	Determination of various metals by ICP-OES.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO ₃) are determined stoichiometrically from the base metal concentration.

Certificate of Analysis PFB0191

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PFB0191

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PFB0191

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	25/07/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	No	QC Frequency Outliers Exist - See detailed list below

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PFB0191

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS HiVol Filter	1-2	30/01/2024	07/02/2024	12/02/2024	Yes
Metals OHS (LL) HiVol Filter	1-2	30/01/2024	07/02/2024	10/02/2024	Yes
Metals OHS-Hg HiVol Filter	1-2	30/01/2024	07/02/2024	12/02/2024	Yes
Gravimetric Dust HiVol Filter	1-2	30/01/2024	06/02/2024	06/02/2024	Yes

Outliers: QC Frequency

METALS-020 | Acid Extractable Metals (HiVol Filter) | Batch BFB0668

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BFB0668

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BFB0666

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	1	0

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BFB0667

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	1	0

Quality Control PFB0191

METALS-021 | Acid Extractable Metals (HiVol Filter) | Batch BFB0666

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.20	<0.20	113

METALS-022 | Acid Extractable Metals (HiVol Filter) | Batch BFB0667

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	109
Arsenic	µg/sample	2.0	<2.0	102
Beryllium	µg/sample	2.0	<2.0	80.1
Gallium	µg/sample	4.0	<4.0	90.7
Selenium	µg/sample	4.0	<4.0	117
Thallium	µg/sample	4.0	<4.0	89.4
Thorium	µg/sample	4.0	<4.0	92.7
Uranium	µg/sample	4.0	<4.0	95.3

METALS-020/022 | Acid Extractable Metals (HiVol Filter) | Batch BFB0668

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	93.1
Barium	µg/sample	2.0	<2.0	101
Boron	µg/sample	20	<20	103
Cadmium	µg/sample	0.50	<0.50	95.5
Calcium	µg/sample	50	<50	95.0
Chromium	µg/sample	2.0	<2.0	99.6
Cobalt	µg/sample	2.0	<2.0	97.7
Copper	µg/sample	2.0	<2.0	101
Iron	µg/sample	5.0	<5.0	98.8
Lead	µg/sample	5.0	<5.0	99.6
Lithium	µg/sample	2.0	<2.0	104
Magnesium	µg/sample	50	<50	95.8
Manganese	µg/sample	2.0	<2.0	99.3
Molybdenum	µg/sample	5.0	<5.0	96.6
Nickel	µg/sample	2.0	<2.0	97.4
Phosphorus	µg/sample	20	<20	93.7
Potassium	µg/sample	50	<50	96.5
Sodium	µg/sample	100	<100	96.4
Sulfur	µg/sample	50	<50	91.6
Tin	µg/sample	10	<10	97.5
Titanium	µg/sample	2.0	<2.0	94.0
Vanadium	µg/sample	2.0	<2.0	97.3
Zinc	µg/sample	5.0	<5.0	98.5

Certificate of Analysis PEE1473

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	1 Dust Gauge
Date Samples Received	19/05/2023
Date Samples Registered	19/05/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	02/06/2023
Date of Issue	01/06/2023

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

Accredited for compliance with ISO/IEC 17025. Tests not covered by NATA are denoted with *.

Authorisation Details

Results Approved By	Heram Halim, Operations Manager
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEE1473

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEE1473-01	DDG-Pinjarra-1	Dust Gauge	15/05/2023	19/05/2023

Sample Information

Sample ID	Dust Gauge Start Date	Dust Gauge End Date	Exposure Days
DDG-Pinjarra-1	13/04/2023	15/05/2023	33

Certificate of Analysis PEE1473

Dust Deposition Gauges (Dust Gauge)

Envirolab ID	Units	PQL	PEE1473-01
Your Reference			DDG-Pinjarra-1
Date Sampled			15/05/2023
Si-Insoluble Solids	g/m2/month	0.10	0.91
Ss-Soluble Matter	g/m2/month	0.10	1.7
St-Total Solids	g/m2/month	0.10	2.6

Certificate of Analysis PEE1473

Method Summary

Method ID	Methodology Summary
INORG-050	Dust Deposition in accordance with AS3580.10.1 and AS3580.10.2.

Certificate of Analysis PEE1473

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
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Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PEE1473

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PEE1473

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	01/06/2023

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	Yes	No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PEE1473

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Dust Gauge - 3 Fractions Dust Gauge	1	15/05/2023	25/05/2023	25/05/2023	Yes

Certificate of Analysis PEF1405

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	1 Dust Gauge
Date Samples Received	21/06/2023
Date Samples Registered	21/06/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	05/07/2023
Date of Issue	03/07/2023

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Accredited for compliance with ISO/IEC 17025. Tests not covered by NATA are denoted with *.

Authorisation Details

Results Approved By	Heram Halim, Operations Manager
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEF1405

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEF1405-01	DDG-Pinjarra-2	Dust Gauge	16/06/2023	21/06/2023

Sample Information

Sample ID	Dust Gauge Start Date	Dust Gauge End Date	Exposure Days
DDG-Pinjarra-2	15/05/2023	16/06/2023	32

Certificate of Analysis PEF1405

Dust Deposition Gauges (Dust Gauge)

Envirolab ID	Units	PQL	PEF1405-01
Your Reference			DDG-Pinjarra-2
Date Sampled			16/06/2023
Si-Insoluble Solids	g/m2/month	0.10	1.0
Ss-Soluble Matter	g/m2/month	0.10	0.34
St-Total Solids	g/m2/month	0.10	1.4

Certificate of Analysis PEF1405

Method Summary

Method ID	Methodology Summary
INORG-050	Dust Deposition in accordance with AS3580.10.1 and AS3580.10.2.

Certificate of Analysis PEF1405

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PEF1405

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PEF1405

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	03/07/2023

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	Yes	No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PEF1405

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Dust Gauge - 3 Fractions Dust Gauge	1	16/06/2023	23/06/2023	26/06/2023	Yes

Certificate of Analysis PEI1525

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	1 Dust Gauge
Date Samples Received	21/09/2023
Date Instructions Received	21/09/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	06/10/2023
Date of Issue	06/10/2023

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Accredited for compliance with ISO/IEC 17025. Tests not covered by NATA are denoted with *.

Authorisation Details

Results Approved By	Michael Hall, Inorganics & Metals Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEI1525

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEI1525-01	Alcoa	Dust Gauge	21/09/2023	21/09/2023

Sample Information

Sample ID	Dust Gauge Start Date	Dust Gauge End Date	Exposure Days
Alcoa	21/08/2023	21/09/2023	31

Certificate of Analysis PEI1525

Dust Deposition Gauges (Dust Gauge)

EnviroLab ID	Units	PQL	PEI1525-01
Your Reference			Alcoa
Date Sampled			21/09/2023
Si-Insoluble Solids	g/m2/month	0.10	0.34
Ss-Soluble Matter	g/m2/month	0.10	2.0
St-Total Solids	g/m2/month	0.10	2.3

Certificate of Analysis PEI1525

Method Summary

Method ID	Methodology Summary
INORG-050	Dust Deposition in accordance with AS3580.10.1 and AS3580.10.2.

Certificate of Analysis PEI1525

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
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Duplicate

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Certificate of Analysis PEI1525

Laboratory Acceptance Criteria

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General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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Miscellaneous Information

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Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PEI1525

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	06/10/2023

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	Yes	No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PEI1525

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Dust Gauge - 3 Fractions Dust Gauge	1	21/09/2023	26/09/2023	26/09/2023	Yes

Certificate of Analysis PFA0138

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	1 Dust Gauge
Date Samples Received	04/01/2024
Date Instructions Received	04/01/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	18/01/2024
Date of Reissue	11/01/2024 - This report supercedes previous report, see amendment history for details

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Authorisation Details

Results Approved By	Lien Tang, Assistant Operations Manager
Laboratory Manager	Michael Kubiak

Certificate of Analysis PFA0138

Report Amendment History

Revision	Reason for Amendment
R-01	Sample ID updated.

Certificate of Analysis PFA0138

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PFA0138-01	DDG-Pinjarra-4	Dust Gauge	02/01/2024	04/01/2024

Sample Information

Sample ID	Dust Gauge Start Date	Dust Gauge End Date	Exposure Days
DDG-Pinjarra-4	01/12/2023	02/01/2024	32

Certificate of Analysis PFA0138

Dust Deposition Gauges (Dust Gauge)

Envirolab ID	Units	PQL	PFA0138-01
Your Reference			DDG-Pinjarra-4
Date Sampled			02/01/2024
Si-Insoluble Solids	g/m2/month	0.10	1.2
Ss-Soluble Matter	g/m2/month	0.10	0.52
St-Total Solids	g/m2/month	0.10	1.7

Certificate of Analysis PFA0138

Method Summary

Method ID	Methodology Summary
INORG-050	Dust Deposition in accordance with AS3580.10.1 and AS3580.10.2.

Certificate of Analysis PFA0138

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PFA0138

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PFA0138

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	11/01/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	Yes	No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PFA0138

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Dust Gauge - 3 Fractions Dust Gauge	1	02/01/2024	08/01/2024	08/01/2024	Yes



Certificate of Analysis PFB0190

Client Details

Client	Thomson Environmental Systems Pty Ltd
Contact	
Address	14/4 Flindell St, O'CONNOR, WA, 6163

Sample Details

Your Reference	Site File 602 - Job 5231
Number of Samples	1 Dust Gauge
Date Samples Received	05/02/2024
Date Instructions Received	05/02/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	19/02/2024
Date of Issue	13/02/2024

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Authorisation Details

Results Approved By	Lien Tang, Assistant Operations Manager
Laboratory Manager	Michael Kubiak

Certificate of Analysis PFB0190

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PFB0190-01	DDG - Pinjarra - 5	Dust Gauge	02/02/2024	05/02/2024

Sample Information

Sample ID	Dust Gauge Start Date	Dust Gauge End Date	Exposure Days
DDG - Pinjarra - 5	02/01/2024	02/02/2024	31

Certificate of Analysis PFB0190

Dust Deposition Gauges (Dust Gauge)

Envirolab ID	Units	PQL	PFB0190-01
Your Reference			DDG - Pinjarra - 5
Date Sampled			02/02/2024
Si-Insoluble Solids	g/m2/month	0.10	0.44
Ss-Soluble Matter	g/m2/month	0.10	<0.10
St-Total Solids	g/m2/month	0.10	0.44

Certificate of Analysis PFB0190

Method Summary

Method ID	Methodology Summary
INORG-050	Dust Deposition in accordance with AS3580.10.1 and AS3580.10.2.

Certificate of Analysis PFB0190

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
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NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
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Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PFB0190

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

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Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PFB0190

Client Details

Client	Thomson Environmental Systems Pty Ltd
Your Reference	Site File 602 - Job 5231
Date Issued	13/02/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	Yes	No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PFB0190

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Dust Gauge - 3 Fractions Dust Gauge	1	02/02/2024	12/02/2024	12/02/2024	Yes