Appendix D - Laboratory analysis reports

Appendix D contains the laboratory analysis reports for High Volume Air Sampler PM_{10} and metals.

High Volume Air Sampler PM_{10} and metals

- Certificate of analysis PEC0189 (11 pages)
- Certificate of analysis PEE0182 (15 pages)
- Certificate of analysis PEF0039 (14 pages)
- Certificate of analysis PEG0086 (14 pages)
- Certificate of analysis PEH0052 (13 pages)
- Certificate of analysis PEH1915 (13 pages)
- Certificate of analysis PEI2019 (13 pages)
- Certificate of analysis PEK0279 (13 pages)
- Certificate of analysis PEL0191 (13 pages)
- Certificate of analysis PEL1517 (13 pages)
- Certificate of analysis PFB0531 (12 pages)

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Certificate of Analysis PEC0189

Client Details

Client	Department of Water & Environmental Regulation
Contact	[redacted]
Address	(DWER) Locked Bag 33, Cloisters Square, PERTH, WA, 6850

Sample Details

Your Reference	2023 Como Metals Study
Number of Samples	6 HiVol Filter
Date Samples Received	02/03/2023
Date Samples Registered	02/03/2023

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	10/03/2023
Date of Issue	20/03/2023

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

Authorisation Details

Results Approved By	Heram Halim, Operations Manager Michael Mowle, Inorganics Supervisor Todd Lee, Group Operations Manager
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEC0189

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEC0189-01	DWE139	HiVol Filter	05/02/2023	02/03/2023
PEC0189-02	DWE140	HiVol Filter	11/02/2023	02/03/2023
PEC0189-03	DWE141	HiVol Filter	17/02/2023	02/03/2023
PEC0189-04	DWE142	HiVol Filter	23/02/2023	02/03/2023
PEC0189-05	DWE143	HiVol Filter	01/03/2023	02/03/2023
PEC0189-06	DWE144	HiVol Filter	02/03/2023	02/03/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
DWE139	DWE139	[NA]	[NA]	[NA]
DWE140	DWE140	[NA]	[NA]	[NA]
DWE141	DWE141	[NA]	[NA]	[NA]
DWE142	DWE142	[NA]	[NA]	[NA]
DWE143	DWE143	[NA]	[NA]	[NA]
DWE144	DWE144	[NA]	[NA]	[NA]

Certificate of Analysis PEC0189

Acid Extractable Metals (HiVol Filter)

Envirolab ID	Units	PQL	PEC0189-01	PEC0189-02	PEC0189-03	PEC0189-04	PEC0189-05
Your Reference			DWE139	DWE140	DWE141	DWE142	DWE143
Date Sampled			05/02/2023	11/02/2023	17/02/2023	23/02/2023	01/03/2023
Silver	µg/sample	5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Aluminium	µg/sample	5.0	140	220	210	260	510
Barium	µg/sample	2.0	13	17	23	23	34
Calcium	µg/sample	50	440	720	660	1300	2100
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chromium	µg/sample	2.0	6.8	7.3	9.0	8.8	11
Copper	µg/sample	2.0	9.3	13	19	17	26
Iron	µg/sample	5.0	360	490	590	650	1100
Mercury	µg/sample	0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Potassium	µg/sample	50	240	230	160	190	130
Manganese	µg/sample	2.0	3.3	4.2	4.9	6.9	12
Nickel	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	2.8
Phosphorus	µg/sample	20	<20	<20	<20	25	22
Lead	µg/sample	5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Sulfur	µg/sample	50	900	780	700	610	320
Silicon	µg/sample	50	140	98	92	170	350
Tin	µg/sample	10	<10	<10	<10	<10	<10
Titanium	µg/sample	2.0	7.8	9.8	13	13	19
Vanadium	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	2.3
Zinc	µg/sample	5.0	8.1	15	17	17	23
Arsenic	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Antimony	µg/sample	10	<10	<10	<10	<10	<10
Selenium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Thallium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0

Envirolab ID	Units	PQL	PEC0189-06
Your Reference			DWE144
Date Sampled			02/03/2023
Silver	µg/sample	5.0	<5.0
Aluminium	µg/sample	5.0	19
Barium	µg/sample	2.0	<2.0
Calcium	µg/sample	50	66
Cadmium	µg/sample	0.50	0.78
Cobalt	µg/sample	2.0	<2.0
Chromium	µg/sample	2.0	6.2
Copper	µg/sample	2.0	<2.0
Iron	µg/sample	5.0	25
Mercury	µg/sample	0.20	<0.20
Potassium	µg/sample	50	<50
Manganese	µg/sample	2.0	<2.0
Nickel	µg/sample	2.0	<2.0
Phosphorus	µg/sample	20	<20
Lead	µg/sample	5.0	<5.0
Sulfur	µg/sample	50	<50
Silicon	µg/sample	50	<50

Acid Extractable Metals (HiVol Filter)

Envirolab ID	Units	PQL	PEC0189-06
Your Reference			DWE144
Date Sampled			02/03/2023
Tin	µg/sample	10	<10
Titanium	µg/sample	2.0	<2.0
Vanadium	µg/sample	2.0	<2.0
Zinc	µg/sample	5.0	<5.0
Arsenic	µg/sample	2.0	<2.0
Bismuth	µg/sample	4.0	<4.0
Antimony	µg/sample	10	<10
Selenium	µg/sample	4.0	<4.0
Thallium	µg/sample	4.0	<4.0

Certificate of Analysis PEC0189

Inorganic Mists (HiVol Filter)

Envirolab ID	Units	PQL	PEC0189-01	PEC0189-02	PEC0189-03	PEC0189-04	PEC0189-05
Your Reference			DWE139	DWE140	DWE141	DWE142	DWE143
Date Sampled			05/02/2023	11/02/2023	17/02/2023	23/02/2023	01/03/2023
Bromide*	µg/sample	100	<100	<100	<100	<100	<100
Chloride*	µg/sample	200	6600	8900	3000	6000	1400

Envirolab ID	Units	PQL	PEC0189-06
Your Reference			DWE144
Date Sampled			02/03/2023
Bromide*	µg/sample	100	<100
Chloride*	µg/sample	200	<200

Method Summary

Method ID	Methodology Summary
INORG-081	Anions determined by Ion Chromatography. Waters samples are filtered on receipt prior to analysis. Solids are analysed from a water extract. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
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.

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.

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 PEC0189

Client Details

Client	Department of Water & Environmental Regulation
Your Reference	2023 Como Metals Study
Date Issued	20/03/2023

Recommended Holding Time Compliance

Recommended holding time exceedances exist - See detailed list below

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 PEC0189

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS | HiVol Filter	5	01/03/2023	13/03/2023	13/03/2023	Yes
	6	02/03/2023	13/03/2023	13/03/2023	Yes
	1	05/02/2023	13/03/2023	13/03/2023	Yes
	2	11/02/2023	13/03/2023	13/03/2023	Yes
	3	17/02/2023	13/03/2023	13/03/2023	Yes
	4	23/02/2023	13/03/2023	13/03/2023	Yes
Metals OHS (LL) | HiVol Filter	5	01/03/2023	13/03/2023	13/03/2023	Yes
	6	02/03/2023	13/03/2023	13/03/2023	Yes
	1	05/02/2023	13/03/2023	13/03/2023	Yes
	2	11/02/2023	13/03/2023	13/03/2023	Yes
	3	17/02/2023	13/03/2023	13/03/2023	Yes
	4	23/02/2023	13/03/2023	13/03/2023	Yes
Metals OHS-Hg | HiVol Filter	5	01/03/2023	13/03/2023	14/03/2023	Yes
	6	02/03/2023	13/03/2023	14/03/2023	Yes
	1	05/02/2023	13/03/2023	14/03/2023	No
	2	11/02/2023	13/03/2023	14/03/2023	No
	3	17/02/2023	13/03/2023	14/03/2023	Yes
	4	23/02/2023	13/03/2023	14/03/2023	Yes
Bromide on HVF | HiVol Filter	5	01/03/2023	10/03/2023	10/03/2023	Yes
	6	02/03/2023	10/03/2023	10/03/2023	Yes
	1	05/02/2023	10/03/2023	10/03/2023	Yes
	2	11/02/2023	10/03/2023	10/03/2023	Yes
	3	17/02/2023	10/03/2023	10/03/2023	Yes
	4	23/02/2023	10/03/2023	10/03/2023	Yes
Chloride on HVF | HiVol Filter	5	01/03/2023	10/03/2023	10/03/2023	Yes
	6	02/03/2023	10/03/2023	10/03/2023	Yes
	1	05/02/2023	10/03/2023	10/03/2023	Yes
	2	11/02/2023	10/03/2023	10/03/2023	Yes
	3	17/02/2023	10/03/2023	10/03/2023	Yes
	4	23/02/2023	10/03/2023	10/03/2023	Yes

Outliers: QC Frequency

INORG-081|Inorganic Mists (HiVol Filter)| Batch BEC0971

Analysis	QC Type	Expected	Reported
Bromide on HVF	Duplicate	1	0
Chloride on HVF	Duplicate	1	0

Quality Control PEC0189

METALS-020/022|Acid Extractable Metals (HiVol Filter) | Batch BEC1196

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	95.6
Barium	µg/sample	2.0	<2.0	104
Cadmium	µg/sample	0.50	<0.50	99.8
Calcium	µg/sample	50	<50	94.7
Chromium	µg/sample	2.0	<2.0	100
Cobalt	µg/sample	2.0	<2.0	101
Copper	µg/sample	2.0	<2.0	99.4
Iron	µg/sample	5.0	<5.0	105
Lead	µg/sample	5.0	<5.0	98.0
Manganese	µg/sample	2.0	<2.0	99.1
Nickel	µg/sample	2.0	<2.0	100
Phosphorus	µg/sample	20	<20	92.5
Potassium	µg/sample	50	<50	93.7
Silicon	µg/sample	50	<50	102
Silver	µg/sample	5.0	<5.0	118
Sulfur	µg/sample	50	<50	90.7
Tin	µg/sample	10	<10	106
Titanium	µg/sample	2.0	<2.0	103
Vanadium	µg/sample	2.0	<2.0	102
Zinc	µg/sample	5.0	<5.0	100

METALS-022|Acid Extractable Metals (HiVol Filter) | Batch BEC1197

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	114
Arsenic	µg/sample	2.0	<2.0	100
Bismuth	µg/sample	4.0	<4.0	94.0
Selenium	µg/sample	4.0	<4.0	102
Thallium	µg/sample	4.0	<4.0	92.7

METALS-021|Acid Extractable Metals (HiVol Filter) | Batch BEC1198

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.20	<0.20	85.6

INORG-081|Inorganic Mists (HiVol Filter) | Batch BEC0971

Analyte	Units	PQL	Blank	LCS %
Bromide	µg/sample	100	<100	114
Chloride	µg/sample	200	<200	95.7

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Certificate of Analysis PEE0182

Client Details

Client	Department of Water & Environmental Regulation
Contact	[redacted]
Address	Prime House, 8 Davidson Terrace,, Joondalup, WA, 6027

Sample Details

Your Reference	2023 Como Metals Study
Number of Samples	11 HiVol Filter
Date Samples Received	02/05/2023
Date Samples Registered	02/05/2023

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	09/05/2023
Date of Issue	10/05/2023

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

Authorisation Details

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

Certificate of Analysis PEE0182

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEE0182-01	DWE145	HiVol Filter	07/03/2023	02/05/2023
PEE0182-02	DWE146	HiVol Filter	13/03/2023	02/05/2023
PEE0182-03	DWE147	HiVol Filter	19/03/2023	02/05/2023
PEE0182-04	DWE148	HiVol Filter	25/03/2023	02/05/2023
PEE0182-05	DWE149	HiVol Filter	31/03/2023	02/05/2023
PEE0182-06	DWE150	HiVol Filter	06/04/2023	02/05/2023
PEE0182-07	DWE151	HiVol Filter	12/04/2023	02/05/2023
PEE0182-08	DWE152	HiVol Filter	18/04/2023	02/05/2023
PEE0182-09	DWE153	HiVol Filter	24/04/2023	02/05/2023
PEE0182-10	DWE154	HiVol Filter	30/04/2023	02/05/2023
PEE0182-11	DWE155	HiVol Filter	01/05/2023	02/05/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
DWE145	DWE145	[NA]	[NA]	[NA]
DWE146	DWE146	[NA]	[NA]	[NA]
DWE147	DWE147	[NA]	[NA]	[NA]
DWE148	DWE148	[NA]	[NA]	[NA]
DWE149	DWE149	[NA]	[NA]	[NA]
DWE150	DWE150	[NA]	[NA]	[NA]
DWE151	DWE151	[NA]	[NA]	[NA]
DWE152	DWE152	[NA]	[NA]	[NA]
DWE153	DWE153	[NA]	[NA]	[NA]
DWE154	DWE154	[NA]	[NA]	[NA]
DWE155	DWE155	[NA]	[NA]	[NA]

Acid Extractable Metals (HiVol Filter)

Envirolab ID	Units	PQL	PEE0182-01	PEE0182-02	PEE0182-03	PEE0182-04	PEE0182-05
Your Reference			DWE145	DWE146	DWE147	DWE148	DWE149
Date Sampled			07/03/2023	13/03/2023	19/03/2023	25/03/2023	31/03/2023
Silver	µg/sample	5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Aluminium	µg/sample	5.0	170	190	130	140	33
Barium	µg/sample	2.0	18	27	13	20	14
Calcium	µg/sample	50	440	950	260	330	110
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chromium	µg/sample	2.0	8.5	12	8.7	11	11
Copper	µg/sample	2.0	14	20	9.5	15	12
Iron	µg/sample	5.0	460	570	310	430	240
Mercury	µg/sample	0.20	<0.20 [1]	<0.20 [1]	<0.20 [1]	<0.20 [1]	<0.20 [1]
Potassium	µg/sample	50	130	110	70	350	<50
Manganese	µg/sample	2.0	5.1	7.5	3.2	6.5	2.9
Nickel	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Phosphorus	µg/sample	20	<20	<20	<20	<20	<20
Lead	µg/sample	5.0	<5.0	8.2	<5.0	7.3	<5.0
Sulfur	µg/sample	50	370	580	210	460	190
Silicon	µg/sample	50	160	150	130	170	100
Tin	µg/sample	10	<10	<10	<10	<10	<10
Titanium	µg/sample	2.0	8.0	13	5.6	8.5	4.8
Vanadium	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Zinc	µg/sample	5.0	16	18	7.1	23	8.9
Arsenic	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Antimony	µg/sample	10	<10	<10	<10	<10	<10
Selenium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Thallium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0

Envirolab ID	Units	PQL	PEE0182-06	PEE0182-07	PEE0182-08	PEE0182-09	PEE0182-10
Your Reference			DWE150	DWE151	DWE152	DWE153	DWE154
Date Sampled			06/04/2023	12/04/2023	18/04/2023	24/04/2023	30/04/2023
Silver	µg/sample	5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Aluminium	µg/sample	5.0	140	27	78	30	82
Barium	µg/sample	2.0	29	25	26	16	25
Calcium	µg/sample	50	280	190	310	310	230
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chromium	µg/sample	2.0	11	12	11	9.1	11
Copper	µg/sample	2.0	22	18	20	13	17
Iron	µg/sample	5.0	560	400	440	250	380
Mercury	µg/sample	0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Potassium	µg/sample	50	140	58	230	110	190
Manganese	µg/sample	2.0	6.6	6.6	4.5	2.4	3.7
Nickel	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Phosphorus	µg/sample	20	<20	<20	<20	<20	<20
Lead	µg/sample	5.0	5.5	6.2	7.3	<5.0	7.4
Sulfur	µg/sample	50	240	260	530	290	460
Silicon	µg/sample	50	150	72	110	65	120

Acid Extractable Metals (HiVol Filter)

Envirolab ID	Units	PQL	PEE0182-06	PEE0182-07	PEE0182-08	PEE0182-09	PEE0182-10
Your Reference			DWE150	DWE151	DWE152	DWE153	DWE154
Date Sampled			06/04/2023	12/04/2023	18/04/2023	24/04/2023	30/04/2023
Tin	µg/sample	10	<10	<10	<10	<10	<10
Titanium	µg/sample	2.0	11	10	9.0	5.5	9.2
Vanadium	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Zinc	µg/sample	5.0	21	14	33	8.9	13
Arsenic	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Antimony	µg/sample	10	<10	<10	<10	<10	<10
Selenium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Thallium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0

Envirolab ID	Units	PQL	PEE0182-11
Your Reference			DWE155
Date Sampled			01/05/2023
Silver	µg/sample	5.0	<5.0
Aluminium	µg/sample	5.0	8.8
Barium	µg/sample	2.0	<2.0
Calcium	µg/sample	50	<50
Cadmium	µg/sample	0.50	<0.50
Cobalt	µg/sample	2.0	<2.0
Chromium	µg/sample	2.0	8.7
Copper	µg/sample	2.0	<2.0
Iron	µg/sample	5.0	<5.0
Mercury	µg/sample	0.20	<0.20
Potassium	µg/sample	50	<50
Manganese	µg/sample	2.0	<2.0
Nickel	µg/sample	2.0	<2.0
Phosphorus	µg/sample	20	<20
Lead	µg/sample	5.0	<5.0
Sulfur	µg/sample	50	<50
Silicon	µg/sample	50	<50
Tin	µg/sample	10	<10
Titanium	µg/sample	2.0	<2.0
Vanadium	µg/sample	2.0	<2.0
Zinc	µg/sample	5.0	<5.0
Arsenic	µg/sample	2.0	<2.0
Bismuth	µg/sample	4.0	<4.0
Antimony	µg/sample	10	<10
Selenium	µg/sample	4.0	<4.0
Thallium	µg/sample	4.0	<4.0

Certificate of Analysis PEE0182

Inorganic Mists (HiVol Filter)

Envirolab ID	Units	PQL	PEE0182-01	PEE0182-02	PEE0182-03	PEE0182-04	PEE0182-05
Your Reference			DWE145	DWE146	DWE147	DWE148	DWE149
Date Sampled			07/03/2023	13/03/2023	19/03/2023	25/03/2023	31/03/2023
Bromide*	µg/sample	100	<100	<100	<100	<100	<100
Chloride*	µg/sample	200	4100	2000	870	<200	<200

Envirolab ID	Units	PQL	PEE0182-06	PEE0182-07	PEE0182-08	PEE0182-09	PEE0182-10
Your Reference			DWE150	DWE151	DWE152	DWE153	DWE154
Date Sampled			06/04/2023	12/04/2023	18/04/2023	24/04/2023	30/04/2023
Bromide*	µg/sample	100	<100	<100	<100	<100	<100
Chloride*	µg/sample	200	760	1300	8000	3800	1100

Envirolab ID	Units	PQL	PEE0182-11
Your Reference			DWE155
Date Sampled			01/05/2023
Bromide*	µg/sample	100	<100
Chloride*	µg/sample	200	<200

Certificate of Analysis PEE0182

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PEE0182-01	PEE0182-02	PEE0182-03	PEE0182-04	PEE0182-05
Your Reference			DWE145	DWE146	DWE147	DWE148	DWE149
Date Sampled			07/03/2023	13/03/2023	19/03/2023	25/03/2023	31/03/2023
Dust	mg	0.10	29	26	24	23	13

Envirolab ID	Units	PQL	PEE0182-06	PEE0182-07	PEE0182-08	PEE0182-09	PEE0182-10
Your Reference			DWE150	DWE151	DWE152	DWE153	DWE154
Date Sampled			06/04/2023	12/04/2023	18/04/2023	24/04/2023	30/04/2023
Dust	mg	0.10	23	13	38	19	29

Envirolab ID	Units	PQL	PEE0182-11
Your Reference			DWE155
Date Sampled			01/05/2023
Dust	mg	0.10	3.6

Result Comments

Identifier	Description
[1]	Sample received outside of recommended Technical Holding Time (THT), however, the analysis has proceeded as requested. Note, analyte(s) integrity and therefore reported results may be affected.

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
INORG-081	Anions determined by Ion Chromatography. Waters samples are filtered on receipt prior to analysis. Solids are analysed from a water extract. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
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.

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.

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 PEE0182

Client Details

Client	Department of Water & Environmental Regulation
Your Reference	2023 Como Metals Study
Date Issued	10/05/2023

Recommended Holding Time Compliance

Recommended holding time exceedances exist - See detailed list below

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 PEE0182

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS | HiVol Filter	11	01/05/2023	09/05/2023	09/05/2023	Yes
	6	06/04/2023	09/05/2023	09/05/2023	Yes
	1	07/03/2023	09/05/2023	09/05/2023	Yes
	7	12/04/2023	09/05/2023	09/05/2023	Yes
	2	13/03/2023	09/05/2023	09/05/2023	Yes
	8	18/04/2023	09/05/2023	09/05/2023	Yes
	3	19/03/2023	09/05/2023	09/05/2023	Yes
	9	24/04/2023	09/05/2023	09/05/2023	Yes
	4	25/03/2023	09/05/2023	09/05/2023	Yes
	10	30/04/2023	09/05/2023	09/05/2023	Yes
	5	31/03/2023	09/05/2023	09/05/2023	Yes
Metals OHS (LL) | HiVol Filter	11	01/05/2023	09/05/2023	10/05/2023	Yes
	6	06/04/2023	09/05/2023	10/05/2023	Yes
	1	07/03/2023	09/05/2023	10/05/2023	Yes
	7	12/04/2023	09/05/2023	10/05/2023	Yes
	2	13/03/2023	09/05/2023	10/05/2023	Yes
	8	18/04/2023	09/05/2023	10/05/2023	Yes
	3	19/03/2023	09/05/2023	10/05/2023	Yes
	9	24/04/2023	09/05/2023	10/05/2023	Yes
	4	25/03/2023	09/05/2023	10/05/2023	Yes
	10	30/04/2023	09/05/2023	10/05/2023	Yes
	5	31/03/2023	09/05/2023	10/05/2023	Yes
Metals OHS-Hg | HiVol Filter	11	01/05/2023	09/05/2023	09/05/2023	Yes
	6	06/04/2023	09/05/2023	09/05/2023	No
	1	07/03/2023	09/05/2023	09/05/2023	No
	7	12/04/2023	09/05/2023	09/05/2023	Yes
	2	13/03/2023	09/05/2023	09/05/2023	No
	8	18/04/2023	09/05/2023	09/05/2023	Yes
	3	19/03/2023	09/05/2023	09/05/2023	No
	9	24/04/2023	09/05/2023	09/05/2023	Yes
	4	25/03/2023	09/05/2023	09/05/2023	No
	10	30/04/2023	09/05/2023	09/05/2023	Yes
	5	31/03/2023	09/05/2023	09/05/2023	No
Bromide on HVF | HiVol Filter	11	01/05/2023	09/05/2023	09/05/2023	Yes
	6	06/04/2023	09/05/2023	09/05/2023	Yes
	1	07/03/2023	09/05/2023	09/05/2023	Yes
	7	12/04/2023	09/05/2023	09/05/2023	Yes
	2	13/03/2023	09/05/2023	09/05/2023	Yes
	8	18/04/2023	09/05/2023	09/05/2023	Yes
	3	19/03/2023	09/05/2023	09/05/2023	Yes
	9	24/04/2023	09/05/2023	09/05/2023	Yes
	4	25/03/2023	09/05/2023	09/05/2023	Yes
	10	30/04/2023	09/05/2023	09/05/2023	Yes
	5	31/03/2023	09/05/2023	09/05/2023	Yes
Chloride on HVF | HiVol Filter	11	01/05/2023	09/05/2023	09/05/2023	Yes

Data Quality Assessment Summary PEE0182

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
	6	06/04/2023	09/05/2023	09/05/2023	Yes
	1	07/03/2023	09/05/2023	09/05/2023	Yes
	7	12/04/2023	09/05/2023	09/05/2023	Yes
	2	13/03/2023	09/05/2023	09/05/2023	Yes
	8	18/04/2023	09/05/2023	09/05/2023	Yes
	3	19/03/2023	09/05/2023	09/05/2023	Yes
	9	24/04/2023	09/05/2023	09/05/2023	Yes
	4	25/03/2023	09/05/2023	09/05/2023	Yes
	10	30/04/2023	09/05/2023	09/05/2023	Yes
	5	31/03/2023	09/05/2023	09/05/2023	Yes
Gravimetric Dust | HiVol Filter	11	01/05/2023	08/05/2023	08/05/2023	Yes
	6	06/04/2023	08/05/2023	08/05/2023	No
	1	07/03/2023	08/05/2023	08/05/2023	No
	7	12/04/2023	08/05/2023	08/05/2023	No
	2	13/03/2023	08/05/2023	08/05/2023	No
	8	18/04/2023	08/05/2023	08/05/2023	Yes
	3	19/03/2023	08/05/2023	08/05/2023	No
	9	24/04/2023	08/05/2023	08/05/2023	Yes
	4	25/03/2023	08/05/2023	08/05/2023	No
	10	30/04/2023	08/05/2023	08/05/2023	Yes
	5	31/03/2023	08/05/2023	08/05/2023	No

Data Quality Assessment Summary PEE0182

Outliers: QC Frequency

INORG-081|Inorganic Mists (HiVol Filter)| Batch BEE0910

Analysis	QC Type	Expected	Reported
Bromide on HVF	Duplicate	2	1
Chloride on HVF	Duplicate	2	1

METALS-020|Acid Extractable Metals (HiVol Filter)| Batch BEE0935

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	2	1

METALS-020/022|Acid Extractable Metals (HiVol Filter)| Batch BEE0935

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	2	1

METALS-021|Acid Extractable Metals (HiVol Filter)| Batch BEE0937

Analysis	QC Type	Expected	Reported
Metals OHS-Hg	Duplicate	2	1

METALS-022|Acid Extractable Metals (HiVol Filter)| Batch BEE0936

Analysis	QC Type	Expected	Reported
Metals OHS (LL)	Duplicate	2	0

Quality Control PEE0182

METALS-020/022|Acid Extractable Metals (HiVol Filter) | Batch BEE0935

Analyte	Units	PQL	Blank	DUP1 PEE0182-01 Samp | QC | RPD %	LCS %
Aluminium	µg/sample	5.0	<5.0	174 | 207 | 17.3	87.2
Barium	µg/sample	2.0	<2.0	18.2 | 19.3 | 5.87	103
Cadmium	µg/sample	0.50	<0.50	<0.50 | <0.50 | [NA]	89.8
Calcium	µg/sample	50	<50	442 | 463 | 4.70	86.8
Chromium	µg/sample	2.0	<2.0	8.52 | 10.0 | 16.4	100
Cobalt	µg/sample	2.0	<2.0	<2.0 | <2.0 | [NA]	88.8
Copper	µg/sample	2.0	<2.0	14.0 | 15.6 | 10.9	101
Iron	µg/sample	5.0	<5.0	455 | 497 | 8.78	86.2
Lead	µg/sample	5.0	<5.0	<5.0 | <5.0 | [NA]	98.5
Manganese	µg/sample	2.0	<2.0	5.07 | 5.21 | 2.65	97.4
Nickel	µg/sample	2.0	<2.0	<2.0 | <2.0 | [NA]	98.0
Phosphorus	µg/sample	20	<20	<20 | <20 | [NA]	90.2
Potassium	µg/sample	50	<50	132 | 134 | 1.37	99.7
Silicon	µg/sample	50	<50	160 | 228 | 34.9	104
Silver	µg/sample	5.0	<5.0	<5.0 | <5.0 | [NA]	90.5
Sulfur	µg/sample	50	<50	373 | 394 | 5.56	87.0
Tin	µg/sample	10	<10	<10 | <10 | [NA]	105
Titanium	µg/sample	2.0	<2.0	8.00 | 9.51 | 17.2	98.2
Vanadium	µg/sample	2.0	<2.0	<2.0 | <2.0 | [NA]	89.5
Zinc	µg/sample	5.0	<5.0	16.5 | 12.5 | 27.2	96.5

METALS-022|Acid Extractable Metals (HiVol Filter) | Batch BEE0936

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	98.1
Arsenic	µg/sample	2.0	<2.0	114
Bismuth	µg/sample	4.0	<4.0	104
Selenium	µg/sample	4.0	<4.0	119
Thallium	µg/sample	4.0	<4.0	99.6

METALS-021|Acid Extractable Metals (HiVol Filter) | Batch BEE0937

Analyte	Units	PQL	Blank	DUP1 PEE0182-01 Samp | QC | RPD %	LCS %
Mercury	µg/sample	0.20	<0.20	<0.20 | <0.20 | [NA]	102

INORG-081|Inorganic Mists (HiVol Filter) | Batch BEE0910

Analyte	Units	PQL	Blank	DUP1 PEE0182-01 Samp | QC | RPD %	LCS %
Bromide	µg/sample	100	<100	<100 | <100 | [NA]	106
Chloride	µg/sample	200	<200	4130 | 4180 | 1.34	101

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Certificate of Analysis PEF0039

Client Details

Client	Department of Water & Environmental Regulation
Contact	[redacted]
Address	Prime House, 8 Davidson Terrace,, Joondalup, WA, 6027

Sample Details

Your Reference	2023 Como Metals Study
Number of Samples	6 HiVol Filter
Date Instructions Received	01/06/2023
Date Samples Registered	01/06/2023

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	12/06/2023
Date of Reissue	14/06/2023 - 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	Michael Hall, Inorganics & Metals Supervisor Thomas Edwards, OHL Supervisor
Laboratory Manager	Michael Kubiak

Report Amendment History

Revision	Reason for Amendment
R-01	Added Thallium results.

Certificate of Analysis PEF0039

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEF0039-01	DWE156	HiVol Filter	06/05/2023	01/06/2023
PEF0039-02	DWE157	HiVol Filter	12/05/2023	01/06/2023
PEF0039-03	DWE158	HiVol Filter	18/05/2023	01/06/2023
PEF0039-04	DWE159	HiVol Filter	24/05/2023	01/06/2023
PEF0039-05	DWE160	HiVol Filter	30/05/2023	01/06/2023
PEF0039-06	DWE161	HiVol Filter	31/05/2023	01/06/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
DWE156	DWE156	[NA]	[NA]	[NA]
DWE157	DWE157	[NA]	[NA]	[NA]
DWE158	DWE158	[NA]	[NA]	[NA]
DWE159	DWE159	[NA]	[NA]	[NA]
DWE160	DWE160	[NA]	[NA]	[NA]
DWE161	DWE161	[NA]	[NA]	[NA]

Certificate of Analysis PEF0039

Acid Extractable Metals (HiVol Filter)

Envirolab ID	Units	PQL	PEF0039-01	PEF0039-02	PEF0039-03	PEF0039-04	PEF0039-05
Your Reference			DWE156	DWE157	DWE158	DWE159	DWE160
Date Sampled			06/05/2023	12/05/2023	18/05/2023	24/05/2023	30/05/2023
Silver	µg/sample	5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Aluminium	µg/sample	5.0	75	87	160	39	68
Barium	µg/sample	2.0	12	48	33	27	30
Calcium	µg/sample	50	160	340	270	310	300
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chromium	µg/sample	2.0	10	12	13	7.7	9.9
Copper	µg/sample	2.0	11	34	23	20	22
Iron	µg/sample	5.0	260	740	650	420	580
Mercury	µg/sample	0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Potassium	µg/sample	50	98	160	370	200	160
Manganese	µg/sample	2.0	4.0	7.5	7.3	4.3	5.5
Nickel	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Phosphorus	µg/sample	20	<20	<20	<20	<20	<20
Lead	µg/sample	5.0	<5.0	8.4	<5.0	<5.0	8.8
Sulfur	µg/sample	50	190	420	240	430	250
Silicon	µg/sample	50	140	180	280	78	120
Tin	µg/sample	10	<10	11	<10	<10	<10
Titanium	µg/sample	2.0	4.3	16	11	7.8	10
Vanadium	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Zinc	µg/sample	5.0	12	20	19	14	26
Arsenic	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Antimony	µg/sample	10	<10	<10	<10	<10	<10
Selenium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Thallium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0

Envirolab ID	Units	PQL	PEF0039-06
Your Reference			DWE161
Date Sampled			31/05/2023
Silver	µg/sample	5.0	<5.0
Aluminium	µg/sample	5.0	6.0
Barium	µg/sample	2.0	<2.0
Calcium	µg/sample	50	<50
Cadmium	µg/sample	0.50	<0.50
Cobalt	µg/sample	2.0	<2.0
Chromium	µg/sample	2.0	7.2
Copper	µg/sample	2.0	<2.0
Iron	µg/sample	5.0	8.5
Mercury	µg/sample	0.20	<0.20
Potassium	µg/sample	50	<50
Manganese	µg/sample	2.0	<2.0
Nickel	µg/sample	2.0	<2.0
Phosphorus	µg/sample	20	<20
Lead	µg/sample	5.0	<5.0
Sulfur	µg/sample	50	<50

Acid Extractable Metals (HiVol Filter)

Envirolab ID	Units	PQL	PEF0039-06
Your Reference			DWE161
Date Sampled			31/05/2023
Silicon	µg/sample	50	<50
Tin	µg/sample	10	<10
Titanium	µg/sample	2.0	<2.0
Vanadium	µg/sample	2.0	<2.0
Zinc	µg/sample	5.0	6.5
Arsenic	µg/sample	2.0	<2.0
Bismuth	µg/sample	4.0	<4.0
Antimony	µg/sample	10	<10
Selenium	µg/sample	4.0	<4.0
Thallium	µg/sample	4.0	<4.0

Certificate of Analysis PEF0039

Inorganic Mists (HiVol Filter)

Envirolab ID	Units	PQL	PEF0039-01	PEF0039-02	PEF0039-03	PEF0039-04	PEF0039-05
Your Reference			DWE156	DWE157	DWE158	DWE159	DWE160
Date Sampled			06/05/2023	12/05/2023	18/05/2023	24/05/2023	30/05/2023
Bromide*	µg/sample	100	<100	<100	<100	<100	<100
Chloride*	µg/sample	200	1000	3100	210	5800	2500

Envirolab ID	Units	PQL	PEF0039-06
Your Reference			DWE161
Date Sampled			31/05/2023
Bromide*	µg/sample	100	<100
Chloride*	µg/sample	200	<200

Certificate of Analysis PEF0039

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PEF0039-01	PEF0039-02	PEF0039-03	PEF0039-04	PEF0039-05
Your Reference			DWE156	DWE157	DWE158	DWE159	DWE160
Date Sampled			06/05/2023	12/05/2023	18/05/2023	24/05/2023	30/05/2023
Dust	mg	0.10	36	31	49	31	30

Envirolab ID	Units	PQL	PEF0039-06
Your Reference			DWE161
Date Sampled			31/05/2023
Dust	mg	0.10	2.1

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
INORG-081	Anions determined by Ion Chromatography. Waters samples are filtered on receipt prior to analysis. Solids are analysed from a water extract. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
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.

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.

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 PEF0039

Client Details

Client	Department of Water & Environmental Regulation
Your Reference	2023 Como Metals Study
Date Issued	14/06/2023

Recommended Holding Time Compliance

Recommended holding time exceedances exist - See detailed list below

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 PEF0039

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS | HiVol Filter	1	06/05/2023	08/06/2023	08/06/2023	Yes
	2	12/05/2023	08/06/2023	08/06/2023	Yes
	3	18/05/2023	08/06/2023	08/06/2023	Yes
	4	24/05/2023	08/06/2023	08/06/2023	Yes
	5	30/05/2023	08/06/2023	08/06/2023	Yes
	6	31/05/2023	08/06/2023	08/06/2023	Yes
Metals OHS (LL) | HiVol Filter	1	06/05/2023	08/06/2023	14/06/2023	Yes
	2	12/05/2023	08/06/2023	14/06/2023	Yes
	3	18/05/2023	08/06/2023	14/06/2023	Yes
	4	24/05/2023	08/06/2023	14/06/2023	Yes
	5	30/05/2023	08/06/2023	14/06/2023	Yes
	6	31/05/2023	08/06/2023	14/06/2023	Yes
Metals OHS-Hg | HiVol Filter	1	06/05/2023	08/06/2023	09/06/2023	No
	2	12/05/2023	08/06/2023	09/06/2023	Yes
	3	18/05/2023	08/06/2023	09/06/2023	Yes
	4	24/05/2023	08/06/2023	09/06/2023	Yes
	5	30/05/2023	08/06/2023	09/06/2023	Yes
	6	31/05/2023	08/06/2023	09/06/2023	Yes
Bromide on HVF | HiVol Filter	1	06/05/2023	12/06/2023	12/06/2023	Yes
	2	12/05/2023	12/06/2023	12/06/2023	Yes
	3	18/05/2023	12/06/2023	12/06/2023	Yes
	4	24/05/2023	12/06/2023	12/06/2023	Yes
	5	30/05/2023	12/06/2023	12/06/2023	Yes
	6	31/05/2023	12/06/2023	12/06/2023	Yes
Chloride on HVF | HiVol Filter	1	06/05/2023	12/06/2023	12/06/2023	Yes
	2	12/05/2023	12/06/2023	12/06/2023	Yes
	3	18/05/2023	12/06/2023	12/06/2023	Yes
	4	24/05/2023	12/06/2023	12/06/2023	Yes
	5	30/05/2023	12/06/2023	12/06/2023	Yes
	6	31/05/2023	12/06/2023	12/06/2023	Yes
Gravimetric Dust | HiVol Filter	1	06/05/2023	08/06/2023	08/06/2023	No
	2	12/05/2023	08/06/2023	08/06/2023	No
	3	18/05/2023	08/06/2023	08/06/2023	No
	4	24/05/2023	08/06/2023	08/06/2023	Yes
	5	30/05/2023	08/06/2023	08/06/2023	Yes
	6	31/05/2023	08/06/2023	08/06/2023	Yes

Data Quality Assessment Summary PEF0039

Outliers: Duplicates

METALS-020|Acid Extractable Metals (HiVol Filter)| Batch BEF0795

Sample ID	Duplicate ID	Analyte	% Limits	RPD
BEF0795-DUP2#	DUP2	Sulfur	40.00	60.0[1]

METALS-020/022|Acid Extractable Metals (HiVol Filter)| Batch BEF0795

Sample ID	Duplicate ID	Analyte	% Limits	RPD
BEF0795-DUP2#	DUP2	Lead	40.00	200[1]
BEF0795-DUP2#	DUP2	Zinc	40.00	200[1]

Quality Control PEF0039

METALS-020/022|Acid Extractable Metals (HiVol Filter) | Batch BEF0795

Analyte	Units	PQL	Blank	DUP1 PEF0039-01 Samp | QC | RPD %	DUP2 BEF0795-DUP2# Samp | QC | RPD %	LCS %
Aluminium	µg/sample	5.0	<5.0	75.3 | 82.8 | 9.50	<5.0 | <5.0 | [NA]	99.3
Barium	µg/sample	2.0	<2.0	12.4 | 13.5 | 8.77	<2.0 | <2.0 | [NA]	111
Cadmium	µg/sample	0.50	<0.50	<0.50 | <0.50 | [NA]	<0.50 | <0.50 | [NA]	98.3
Calcium	µg/sample	50	<50	160 | 167 | 4.33	<50 | <50 | [NA]	99.8
Chromium	µg/sample	2.0	<2.0	10.4 | 11.0 | 5.62	<2.0 | <2.0 | [NA]	104
Cobalt	µg/sample	2.0	<2.0	<2.0 | <2.0 | [NA]	<2.0 | <2.0 | [NA]	98.8
Copper	µg/sample	2.0	<2.0	10.7 | 11.1 | 3.25	<2.0 | <2.0 | [NA]	108
Iron	µg/sample	5.0	<5.0	261 | 297 | 12.7	279 | 255 | 8.85	98.8
Lead	µg/sample	5.0	<5.0	<5.0 | <5.0 | [NA]	8.90 | <5.0 | 200 [1]	100
Manganese	µg/sample	2.0	<2.0	3.95 | 4.27 | 7.69	5.60 | 4.00 | 33.3	103
Nickel	µg/sample	2.0	<2.0	<2.0 | <2.0 | [NA]	<2.0 | <2.0 | [NA]	103
Phosphorus	µg/sample	20	<20	<20 | <20 | [NA]	62.4 | 57.6 | 8.00	100
Potassium	µg/sample	50	<50	98.5 | 95.8 | 2.78	<50 | <50 | [NA]	102
Silicon	µg/sample	50	<50	143 | 174 | 19.3	<50 | <50 | [NA]	115
Silver	µg/sample	5.0	<5.0	<5.0 | <5.0 | [NA]	<5.0 | <5.0 | [NA]	99.7
Sulfur	µg/sample	50	<50	193 | 211 | 9.22	437 | 235 | 60.0 [1]	98.5
Tin	µg/sample	10	<10	<10 | <10 | [NA]	<10 | <10 | [NA]	108
Titanium	µg/sample	2.0	<2.0	4.31 | 4.68 | 8.28	<2.0 | <2.0 | [NA]	106
Vanadium	µg/sample	2.0	<2.0	<2.0 | <2.0 | [NA]	2.49 | 2.22 | 11.3	99.9
Zinc	µg/sample	5.0	<5.0	11.8 | 11.4 | 3.06	7.60 | <5.0 | 200 [1]	102

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

METALS-022|Acid Extractable Metals (HiVol Filter) | Batch BEF0796

Analyte	Units	PQL	Blank	DUP1 PEF0039-01 Samp | QC | RPD %	LCS %
Antimony	µg/sample	10	<10	<10 | <10 | [NA]	101
Arsenic	µg/sample	2.0	<2.0	<2.0 | <2.0 | [NA]	91.3
Bismuth	µg/sample	4.0	<4.0	<4.0 | <4.0 | [NA]	92.4
Selenium	µg/sample	4.0	<4.0	<4.0 | <4.0 | [NA]	93.8
Thallium	µg/sample	4.0	<4.0	<4.0 | <4.0 | [NA]	99.9

METALS-021|Acid Extractable Metals (HiVol Filter) | Batch BEF0797

Analyte	Units	PQL	Blank	DUP1 PEF0039-01 Samp | QC | RPD %	LCS %
Mercury	µg/sample	0.20	<0.20	<0.20 | <0.20 | [NA]	72.8

INORG-081|Inorganic Mists (HiVol Filter) | Batch BEF1185

Analyte	Units	PQL	Blank	LCS %
Bromide	µg/sample	100	<100	108
Chloride	µg/sample	200	<200	99.7

QC Comments

Identifier	Description
[1]	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.

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Certificate of Analysis PEG0086

Client Details

Client	Department of Water & Environmental Regulation
Contact	[redacted]
Address	Prime House, 8 Davidson Terrace,, Joondalup, WA, 6027

Sample Details

Your Reference	2023 Como Metals Study
Number of Samples	6 HiVol Filter
Date Instructions Received	03/07/2023
Date Samples Registered	03/07/2023

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	11/07/2023
Date of Reissue	13/07/2023 - 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 Mowle, Inorganics Supervisor
Laboratory Manager	Michael Kubiak

Report Amendment History

Revision	Reason for Amendment
R-01	Gravimetric analysis included

Certificate of Analysis PEG0086

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEG0086-01	162	HiVol Filter	05/06/2023	03/07/2023
PEG0086-02	163	HiVol Filter	11/06/2023	03/07/2023
PEG0086-03	164	HiVol Filter	17/06/2023	03/07/2023
PEG0086-04	165	HiVol Filter	23/06/2023	03/07/2023
PEG0086-05	166	HiVol Filter	29/06/2023	03/07/2023
PEG0086-06	167	HiVol Filter	30/06/2023	03/07/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
162	DWE162	[NA]	[NA]	[NA]
163	DWE163	[NA]	[NA]	[NA]
164	DWE164	[NA]	[NA]	[NA]
165	DWE165	[NA]	[NA]	[NA]
166	DWE166	[NA]	[NA]	[NA]
167	DWE167	[NA]	[NA]	[NA]

Certificate of Analysis PEG0086

Acid Extractable Metals (HiVol Filter)

Envirolab ID	Units	PQL	PEG0086-01	PEG0086-02	PEG0086-03	PEG0086-04	PEG0086-05
Your Reference			162	163	164	165	166
Date Sampled			05/06/2023	11/06/2023	17/06/2023	23/06/2023	29/06/2023
Silver	µg/sample	5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Aluminium	µg/sample	5.0	15	24	47	44	68
Barium	µg/sample	2.0	6.6	13	44	31	48
Calcium	µg/sample	50	180	270	280	290	260
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chromium	µg/sample	2.0	9.5	9.5	11	11	11
Copper	µg/sample	2.0	7.4	11	33	23	36
Iron	µg/sample	5.0	88	170	580	460	730
Mercury	µg/sample	0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Potassium	µg/sample	50	110	200	200	150	110
Manganese	µg/sample	2.0	<2.0	<2.0	7.9	5.7	11
Nickel	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Phosphorus	µg/sample	20	<20	<20	<20	<20	<20
Lead	µg/sample	5.0	<5.0	<5.0	6.0	<5.0	13
Sulfur	µg/sample	50	250	450	330	330	170
Silicon	µg/sample	50	<50	<50	70	<50	88
Tin	µg/sample	10	<10	<10	<10	<10	<10
Titanium	µg/sample	2.0	<2.0	3.0	11	7.5	11
Vanadium	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Zinc	µg/sample	5.0	6.5	6.0	24	15	36
Arsenic	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	3.0
Bismuth	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Antimony	µg/sample	10	<10	<10	<10	<10	11
Selenium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Thallium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0

Envirolab ID	Units	PQL	PEG0086-06
Your Reference			167
Date Sampled			30/06/2023
Silver	µg/sample	5.0	<5.0
Aluminium	µg/sample	5.0	16
Barium	µg/sample	2.0	<2.0
Calcium	µg/sample	50	57
Cadmium	µg/sample	0.50	<0.50
Cobalt	µg/sample	2.0	<2.0
Chromium	µg/sample	2.0	11
Copper	µg/sample	2.0	<2.0
Iron	µg/sample	5.0	7.2
Mercury	µg/sample	0.20	<0.20
Potassium	µg/sample	50	<50
Manganese	µg/sample	2.0	<2.0
Nickel	µg/sample	2.0	<2.0
Phosphorus	µg/sample	20	<20
Lead	µg/sample	5.0	<5.0
Sulfur	µg/sample	50	<50

Acid Extractable Metals (HiVol Filter)

Envirolab ID	Units	PQL	PEG0086-06
Your Reference			167
Date Sampled			30/06/2023
Silicon	µg/sample	50	<50
Tin	µg/sample	10	<10
Titanium	µg/sample	2.0	<2.0
Vanadium	µg/sample	2.0	<2.0
Zinc	µg/sample	5.0	<5.0
Arsenic	µg/sample	2.0	<2.0
Bismuth	µg/sample	4.0	<4.0
Antimony	µg/sample	10	<10
Selenium	µg/sample	4.0	<4.0
Thallium	µg/sample	4.0	<4.0

Certificate of Analysis PEG0086

Inorganic Mists (HiVol Filter)

Envirolab ID	Units	PQL	PEG0086-01	PEG0086-02	PEG0086-03	PEG0086-04	PEG0086-05
Your Reference			162	163	164	165	166
Date Sampled			05/06/2023	11/06/2023	17/06/2023	23/06/2023	29/06/2023
Bromide*	µg/sample	100	<100	<100	<100	<100	<100
Chloride*	µg/sample	200	4400	9800	4000	5700	<200

Envirolab ID	Units	PQL	PEG0086-06
Your Reference			167
Date Sampled			30/06/2023
Bromide*	µg/sample	100	<100
Chloride*	µg/sample	200	<200

Certificate of Analysis PEG0086

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PEG0086-01	PEG0086-02	PEG0086-03	PEG0086-04	PEG0086-05
Your Reference			162	163	164	165	166
Date Sampled			05/06/2023	11/06/2023	17/06/2023	23/06/2023	29/06/2023
Dust	mg	0.10	16	32	32	24	20

Envirolab ID	Units	PQL	PEG0086-06
Your Reference			167
Date Sampled			30/06/2023
Dust	mg	0.10	11

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
INORG-081	Anions determined by Ion Chromatography. Waters samples are filtered on receipt prior to analysis. Solids are analysed from a water extract. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
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.

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.

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 PEG0086

Client Details

Client	Department of Water & Environmental Regulation
Your Reference	2023 Como Metals Study
Date Issued	13/07/2023

Recommended Holding Time Compliance

Recommended holding time exceedances exist - See detailed list below

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 PEG0086

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS | HiVol Filter	1	05/06/2023	10/07/2023	10/07/2023	Yes
	2	11/06/2023	10/07/2023	10/07/2023	Yes
	3	17/06/2023	10/07/2023	10/07/2023	Yes
	4	23/06/2023	10/07/2023	10/07/2023	Yes
	5	29/06/2023	10/07/2023	10/07/2023	Yes
	6	30/06/2023	10/07/2023	10/07/2023	Yes
Metals OHS (LL) | HiVol Filter	1	05/06/2023	10/07/2023	10/07/2023	Yes
	2	11/06/2023	10/07/2023	10/07/2023	Yes
	3	17/06/2023	10/07/2023	10/07/2023	Yes
	4	23/06/2023	10/07/2023	10/07/2023	Yes
	5	29/06/2023	10/07/2023	10/07/2023	Yes
	6	30/06/2023	10/07/2023	10/07/2023	Yes
Metals OHS-Hg | HiVol Filter	1	05/06/2023	10/07/2023	11/07/2023	No
	2	11/06/2023	10/07/2023	11/07/2023	No
	3	17/06/2023	10/07/2023	11/07/2023	Yes
	4	23/06/2023	10/07/2023	11/07/2023	Yes
	5	29/06/2023	10/07/2023	11/07/2023	Yes
	6	30/06/2023	10/07/2023	11/07/2023	Yes
Bromide on HVF | HiVol Filter	1	05/06/2023	10/07/2023	11/07/2023	Yes
	2	11/06/2023	10/07/2023	11/07/2023	Yes
	3	17/06/2023	10/07/2023	11/07/2023	Yes
	4	23/06/2023	10/07/2023	11/07/2023	Yes
	5	29/06/2023	10/07/2023	11/07/2023	Yes
	6	30/06/2023	10/07/2023	11/07/2023	Yes
Chloride on HVF | HiVol Filter	1	05/06/2023	10/07/2023	11/07/2023	Yes
	2	11/06/2023	10/07/2023	11/07/2023	Yes
	3	17/06/2023	10/07/2023	11/07/2023	Yes
	4	23/06/2023	10/07/2023	11/07/2023	Yes
	5	29/06/2023	10/07/2023	11/07/2023	Yes
	6	30/06/2023	10/07/2023	11/07/2023	Yes
Gravimetric Dust | HiVol Filter	1	05/06/2023	13/07/2023	13/07/2023	No
	2	11/06/2023	13/07/2023	13/07/2023	No
	3	17/06/2023	13/07/2023	13/07/2023	No
	4	23/06/2023	13/07/2023	13/07/2023	Yes
	5	29/06/2023	13/07/2023	13/07/2023	Yes
	6	30/06/2023	13/07/2023	13/07/2023	Yes

Data Quality Assessment Summary PEG0086

Outliers: QC Frequency

METALS-020|Acid Extractable Metals (HiVol Filter)| Batch BEG0851

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022|Acid Extractable Metals (HiVol Filter)| Batch BEG0851

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-021|Acid Extractable Metals (HiVol Filter)| Batch BEG0853

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

METALS-022|Acid Extractable Metals (HiVol Filter)| Batch BEG0852

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

Quality Control PEG0086

METALS-020/022|Acid Extractable Metals (HiVol Filter) | Batch BEG0851

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	99.4
Barium	µg/sample	2.0	<2.0	105
Cadmium	µg/sample	0.50	<0.50	97.5
Calcium	µg/sample	50	<50	95.9
Chromium	µg/sample	2.0	<2.0	101
Cobalt	µg/sample	2.0	<2.0	97.7
Copper	µg/sample	2.0	<2.0	106
Iron	µg/sample	5.0	<5.0	101
Lead	µg/sample	5.0	<5.0	101
Manganese	µg/sample	2.0	<2.0	101
Nickel	µg/sample	2.0	<2.0	100
Phosphorus	µg/sample	20	<20	98.5
Potassium	µg/sample	50	<50	100
Silicon	µg/sample	50	<50	110
Silver	µg/sample	5.0	<5.0	97.1
Sulfur	µg/sample	50	<50	95.3
Tin	µg/sample	10	<10	98.6
Titanium	µg/sample	2.0	<2.0	95.8
Vanadium	µg/sample	2.0	<2.0	99.3
Zinc	µg/sample	5.0	<5.0	99.8

METALS-022|Acid Extractable Metals (HiVol Filter) | Batch BEG0852

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	109
Arsenic	µg/sample	2.0	<2.0	106
Bismuth	µg/sample	4.0	<4.0	105
Selenium	µg/sample	4.0	<4.0	110
Thallium	µg/sample	4.0	<4.0	96.7

METALS-021|Acid Extractable Metals (HiVol Filter) | Batch BEG0853

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.20	<0.20	103

INORG-081|Inorganic Mists (HiVol Filter) | Batch BEG0998

Analyte	Units	PQL	Blank	LCS %
Bromide	µg/sample	100	<100	101
Chloride	µg/sample	200	<200	98.8

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lab@mpl.com.au
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Certificate of Analysis PEH0052

Client Details

Client	Department of Water & Environmental Regulation
Contact	[redacted]
Address	Prime House, 8 Davidson Terrace,, Joondalup, WA, 6027

Sample Details

Your Reference	2023 Como Metals Study
Number of Samples	6 HiVol Filter
Date Samples Received	01/08/2023
Date Samples Registered	01/08/2023

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	08/08/2023
Date of Issue	08/08/2023

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

Authorisation Details

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

Certificate of Analysis PEH0052

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEH0052-01	168	HiVol Filter	05/07/2023	01/08/2023
PEH0052-02	169	HiVol Filter	11/07/2023	01/08/2023
PEH0052-03	170	HiVol Filter	17/07/2023	01/08/2023
PEH0052-04	171	HiVol Filter	23/07/2023	01/08/2023
PEH0052-05	172	HiVol Filter	29/07/2023	01/08/2023
PEH0052-06	173	HiVol Filter	31/07/2023	01/08/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
168	DWE168	[NA]	[NA]	[NA]
169	DWE169	[NA]	[NA]	[NA]
170	DWE170	[NA]	[NA]	[NA]
171	DWE171	[NA]	[NA]	[NA]
172	DWE172	[NA]	[NA]	[NA]
173	DWE173	[NA]	[NA]	[NA]

Certificate of Analysis PEH0052

Acid Extractable Metals (HiVol Filter)

Envirolab ID	Units	PQL	PEH0052-01	PEH0052-02	PEH0052-03	PEH0052-04	PEH0052-05
Your Reference			168	169	170	171	172
Date Sampled			05/07/2023	11/07/2023	17/07/2023	23/07/2023	29/07/2023
Silver	µg/sample	5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Aluminium	µg/sample	5.0	36	25	59	29	25
Barium	µg/sample	2.0	18	18	26	18	22
Calcium	µg/sample	50	280	200	360	180	220
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chromium	µg/sample	2.0	7.9	8.2	9.2	7.2	11
Copper	µg/sample	2.0	13	13	19	12	17
Iron	µg/sample	5.0	300	310	510	270	310
Mercury	µg/sample	0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Potassium	µg/sample	50	160	96	130	140	150
Manganese	µg/sample	2.0	3.5	3.3	7.6	2.6	2.5
Nickel	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Phosphorus	µg/sample	20	<20	<20	<20	<20	<20
Lead	µg/sample	5.0	<5.0	<5.0	6.5	<5.0	<5.0
Sulfur	µg/sample	50	330	190	210	240	300
Silicon	µg/sample	50	61	54	87	57	68
Tin	µg/sample	10	<10	<10	<10	<10	<10
Titanium	µg/sample	2.0	6.2	5.1	8.2	5.0	6.8
Vanadium	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Zinc	µg/sample	5.0	12	9.8	18	8.3	8.2
Arsenic	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Antimony	µg/sample	10	<10	<10	<10	<10	<10
Selenium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Thallium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0

Envirolab ID	Units	PQL	PEH0052-06
Your Reference			173
Date Sampled			31/07/2023
Silver	µg/sample	5.0	<5.0
Aluminium	µg/sample	5.0	5.0
Barium	µg/sample	2.0	<2.0
Calcium	µg/sample	50	<50
Cadmium	µg/sample	0.50	<0.50
Cobalt	µg/sample	2.0	<2.0
Chromium	µg/sample	2.0	5.2
Copper	µg/sample	2.0	<2.0
Iron	µg/sample	5.0	5.6
Mercury	µg/sample	0.20	<0.20
Potassium	µg/sample	50	<50
Manganese	µg/sample	2.0	<2.0
Nickel	µg/sample	2.0	<2.0
Phosphorus	µg/sample	20	<20
Lead	µg/sample	5.0	<5.0
Sulfur	µg/sample	50	<50

Acid Extractable Metals (HiVol Filter)

Envirolab ID	Units	PQL	PEH0052-06
Your Reference			173
Date Sampled			31/07/2023
Silicon	µg/sample	50	<50
Tin	µg/sample	10	<10
Titanium	µg/sample	2.0	<2.0
Vanadium	µg/sample	2.0	<2.0
Zinc	µg/sample	5.0	<5.0
Arsenic	µg/sample	2.0	<2.0
Bismuth	µg/sample	4.0	<4.0
Antimony	µg/sample	10	<10
Selenium	µg/sample	4.0	<4.0
Thallium	µg/sample	4.0	<4.0

Certificate of Analysis PEH0052

Inorganic Mists (HiVol Filter)

Envirolab ID	Units	PQL	PEH0052-01	PEH0052-02	PEH0052-03	PEH0052-04	PEH0052-05
Your Reference			168	169	170	171	172
Date Sampled			05/07/2023	11/07/2023	17/07/2023	23/07/2023	29/07/2023
Bromide*	µg/sample	100	<100	<100	<100	<100	<100
Chloride*	µg/sample	200	7300	2200	1100	4500	6100

Envirolab ID	Units	PQL	PEH0052-06
Your Reference			173
Date Sampled			31/07/2023
Bromide*	µg/sample	100	<100
Chloride*	µg/sample	200	<200

Certificate of Analysis PEH0052

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PEH0052-01	PEH0052-02	PEH0052-03	PEH0052-04	PEH0052-05
Your Reference			168	169	170	171	172
Date Sampled			05/07/2023	11/07/2023	17/07/2023	23/07/2023	29/07/2023
Dust	mg	0.10	37	17	20	33	26

Envirolab ID	Units	PQL	PEH0052-06
Your Reference			173
Date Sampled			31/07/2023
Dust	mg	0.10	<0.10

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
INORG-081	Anions determined by Ion Chromatography. Waters samples are filtered on receipt prior to analysis. Solids are analysed from a water extract. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
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.

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.

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 PEH0052

Client Details

Client	Department of Water & Environmental Regulation
Your Reference	2023 Como Metals Study
Date Issued	08/08/2023

Recommended Holding Time Compliance

Recommended holding time exceedances exist - See detailed list below

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 PEH0052

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS | HiVol Filter	1	05/07/2023	07/08/2023	07/08/2023	Yes
	2	11/07/2023	07/08/2023	07/08/2023	Yes
	3	17/07/2023	07/08/2023	07/08/2023	Yes
	4	23/07/2023	07/08/2023	07/08/2023	Yes
	5	29/07/2023	07/08/2023	07/08/2023	Yes
	6	31/07/2023	07/08/2023	07/08/2023	Yes
Metals OHS (LL) | HiVol Filter	1	05/07/2023	07/08/2023	08/08/2023	Yes
	2	11/07/2023	07/08/2023	08/08/2023	Yes
	3	17/07/2023	07/08/2023	08/08/2023	Yes
	4	23/07/2023	07/08/2023	08/08/2023	Yes
	5	29/07/2023	07/08/2023	08/08/2023	Yes
	6	31/07/2023	07/08/2023	08/08/2023	Yes
Metals OHS-Hg | HiVol Filter	1	05/07/2023	07/08/2023	08/08/2023	No
	2	11/07/2023	07/08/2023	08/08/2023	Yes
	3	17/07/2023	07/08/2023	08/08/2023	Yes
	4	23/07/2023	07/08/2023	08/08/2023	Yes
	5	29/07/2023	07/08/2023	08/08/2023	Yes
	6	31/07/2023	07/08/2023	08/08/2023	Yes
Bromide on HVF | HiVol Filter	1	05/07/2023	04/08/2023	04/08/2023	Yes
	2	11/07/2023	04/08/2023	04/08/2023	Yes
	3	17/07/2023	04/08/2023	04/08/2023	Yes
	4	23/07/2023	04/08/2023	04/08/2023	Yes
	5	29/07/2023	04/08/2023	04/08/2023	Yes
	6	31/07/2023	04/08/2023	04/08/2023	Yes
Chloride on HVF | HiVol Filter	1	05/07/2023	04/08/2023	04/08/2023	Yes
	2	11/07/2023	04/08/2023	04/08/2023	Yes
	3	17/07/2023	04/08/2023	04/08/2023	Yes
	4	23/07/2023	04/08/2023	04/08/2023	Yes
	5	29/07/2023	04/08/2023	04/08/2023	Yes
	6	31/07/2023	04/08/2023	04/08/2023	Yes
Gravimetric Dust | HiVol Filter	1	05/07/2023	03/08/2023	03/08/2023	No
	2	11/07/2023	03/08/2023	03/08/2023	No
	3	17/07/2023	03/08/2023	03/08/2023	Yes
	4	23/07/2023	03/08/2023	03/08/2023	Yes
	5	29/07/2023	03/08/2023	03/08/2023	Yes
	6	31/07/2023	03/08/2023	03/08/2023	Yes

Data Quality Assessment Summary PEH0052

Outliers: Duplicates

METALS-020|Acid Extractable Metals (HiVol Filter)| Batch BEH0610

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PEH0052-01	DUP1	Silicon	40.00	200[1]

Quality Control PEH0052

METALS-020/022|Acid Extractable Metals (HiVol Filter) | Batch BEH0610

Analyte	Units	PQL	Blank	DUP1 PEH0052-01 Samp | QC | RPD %	LCS %
Aluminium	µg/sample	5.0	<5.0	36.4 | 29.0 | 22.7	98.4
Barium	µg/sample	2.0	<2.0	17.8 | 14.1 | 23.2	102
Cadmium	µg/sample	0.50	<0.50	<0.50 | <0.50 | [NA]	98.8
Calcium	µg/sample	50	<50	282 | 238 | 16.8	95.2
Chromium	µg/sample	2.0	<2.0	7.90 | 8.05 | 1.96	101
Cobalt	µg/sample	2.0	<2.0	<2.0 | <2.0 | [NA]	99.0
Copper	µg/sample	2.0	<2.0	13.3 | 11.1 | 17.7	101
Iron	µg/sample	5.0	<5.0	296 | 235 | 22.9	101
Lead	µg/sample	5.0	<5.0	<5.0 | <5.0 | [NA]	99.9
Manganese	µg/sample	2.0	<2.0	3.50 | 2.81 | 21.9	101
Nickel	µg/sample	2.0	<2.0	<2.0 | <2.0 | [NA]	99.7
Phosphorus	µg/sample	20	<20	<20 | <20 | [NA]	98.1
Potassium	µg/sample	50	<50	157 | 136 | 15.0	94.8
Silicon	µg/sample	50	<50	60.6 | <50 | 200 [1]	121
Silver	µg/sample	5.0	<5.0	<5.0 | <5.0 | [NA]	90.9
Sulfur	µg/sample	50	<50	330 | 264 | 22.2	93.7
Tin	µg/sample	10	<10	<10 | <10 | [NA]	105
Titanium	µg/sample	2.0	<2.0	6.19 | 4.71 | 27.1	100
Vanadium	µg/sample	2.0	<2.0	<2.0 | <2.0 | [NA]	98.7
Zinc	µg/sample	5.0	<5.0	12.3 | 10.1 | 19.7	100

METALS-022|Acid Extractable Metals (HiVol Filter) | Batch BEH0611

Analyte	Units	PQL	Blank	DUP1 PEH0052-01 Samp | QC | RPD %	LCS %
Antimony	µg/sample	10	<10	<10 | <10 | [NA]	108
Arsenic	µg/sample	2.0	<2.0	<2.0 | <2.0 | [NA]	103
Bismuth	µg/sample	4.0	<4.0	<4.0 | <4.0 | [NA]	103
Selenium	µg/sample	4.0	<4.0	<4.0 | <4.0 | [NA]	116
Thallium	µg/sample	4.0	<4.0	<4.0 | <4.0 | [NA]	98.4

METALS-021|Acid Extractable Metals (HiVol Filter) | Batch BEH0612

Analyte	Units	PQL	Blank	DUP1 PEH0052-01 Samp | QC | RPD %	LCS %
Mercury	µg/sample	0.20	<0.20	<0.20 | <0.20 | [NA]	102

INORG-081|Inorganic Mists (HiVol Filter) | Batch BEH0534

Analyte	Units	PQL	Blank	DUP1 PEH0052-01 Samp | QC | RPD %	LCS %
Bromide	µg/sample	100	<100	<100 | <100 | [NA]	107
Chloride	µg/sample	200	<200	7260 | 6230 | 15.3	95.0

QC Comments

Identifier	Description
[1]	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.

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Certificate of Analysis PEH1915

Client Details

Client	Department of Water & Environmental Regulation
Contact	[redacted]
Address	Prime House, 8 Davidson Terrace,, Joondalup, WA, 6027

Sample Details

Your Reference	2023 Como Metals Study
Number of Samples	6 HiVol Filter
Date Samples Received	30/08/2023
Date Samples Registered	30/08/2023

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	06/09/2023
Date of Issue	07/09/2023

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

Authorisation Details

Airborne Dust Approved By	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 PEH1915

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEH1915-01	174	HiVol Filter	04/08/2023	30/08/2023
PEH1915-02	175	HiVol Filter	10/08/2023	30/08/2023
PEH1915-03	176	HiVol Filter	16/08/2023	30/08/2023
PEH1915-04	177	HiVol Filter	22/08/2023	30/08/2023
PEH1915-05	178	HiVol Filter	28/08/2023	30/08/2023
PEH1915-06	179	HiVol Filter	29/08/2023	30/08/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
174	DWE174	[NA]	[NA]	[NA]
175	DWE175	[NA]	[NA]	[NA]
176	DWE176	[NA]	[NA]	[NA]
177	DWE177	[NA]	[NA]	[NA]
178	DWE178	[NA]	[NA]	[NA]
179	DWE179	[NA]	[NA]	[NA]

Certificate of Analysis PEH1915

Acid Extractable Metals (HiVol Filter)

Envirolab ID	Units	PQL	PEH1915-01	PEH1915-02	PEH1915-03	PEH1915-04	PEH1915-05
Your Reference			174	175	176	177	178
Date Sampled			04/08/2023	10/08/2023	16/08/2023	22/08/2023	28/08/2023
Silver	µg/sample	5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Aluminium	µg/sample	5.0	45	62	42	100	38
Barium	µg/sample	2.0	38	37	30	37	27
Calcium	µg/sample	50	270	320	270	440	220
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chromium	µg/sample	2.0	11	11	12	14	11
Copper	µg/sample	2.0	27	27	22	28	19
Iron	µg/sample	5.0	620	630	520	770	450
Mercury	µg/sample	0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Potassium	µg/sample	50	120	110	110	220	110
Manganese	µg/sample	2.0	8.7	9.4	5.3	16	4.2
Nickel	µg/sample	2.0	<2.0	<2.0	2.0	2.2	<2.0
Phosphorus	µg/sample	20	<20	<20	<20	<20	<20
Lead	µg/sample	5.0	<5.0	7.2	<5.0	6.8	<5.0
Sulfur	µg/sample	50	200	290	270	480	270
Silicon	µg/sample	50	95	81	77	120	80
Tin	µg/sample	10	<10	<10	<10	<10	<10
Titanium	µg/sample	2.0	10	10	8.9	13	8.6
Vanadium	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Zinc	µg/sample	5.0	24	43	22	32	14
Arsenic	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Antimony	µg/sample	10	<10	<10	<10	<10	<10
Selenium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Thallium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0

Envirolab ID	Units	PQL	PEH1915-06
Your Reference			179
Date Sampled			29/08/2023
Silver	µg/sample	5.0	<5.0
Aluminium	µg/sample	5.0	5.3
Barium	µg/sample	2.0	<2.0
Calcium	µg/sample	50	<50
Cadmium	µg/sample	0.50	<0.50
Cobalt	µg/sample	2.0	<2.0
Chromium	µg/sample	2.0	6.3
Copper	µg/sample	2.0	<2.0
Iron	µg/sample	5.0	9.1
Mercury	µg/sample	0.20	<0.20
Potassium	µg/sample	50	<50
Manganese	µg/sample	2.0	<2.0
Nickel	µg/sample	2.0	<2.0
Phosphorus	µg/sample	20	<20
Lead	µg/sample	5.0	<5.0
Sulfur	µg/sample	50	<50

Acid Extractable Metals (HiVol Filter)

Envirolab ID	Units	PQL	PEH1915-06
Your Reference			179
Date Sampled			29/08/2023
Silicon	µg/sample	50	<50
Tin	µg/sample	10	<10
Titanium	µg/sample	2.0	<2.0
Vanadium	µg/sample	2.0	<2.0
Zinc	µg/sample	5.0	<5.0
Arsenic	µg/sample	2.0	<2.0
Bismuth	µg/sample	4.0	<4.0
Antimony	µg/sample	10	<10
Selenium	µg/sample	4.0	<4.0
Thallium	µg/sample	4.0	<4.0

Certificate of Analysis PEH1915

Inorganic Mists (HiVol Filter)

Envirolab ID	Units	PQL	PEH1915-01	PEH1915-02	PEH1915-03	PEH1915-04	PEH1915-05
Your Reference			174	175	176	177	178
Date Sampled			04/08/2023	10/08/2023	16/08/2023	22/08/2023	28/08/2023
Bromide*	µg/sample	100	<100	<100	<100	<100	<100
Chloride*	µg/sample	200	600	880	2900	4900	1900

Envirolab ID	Units	PQL	PEH1915-06
Your Reference			179
Date Sampled			29/08/2023
Bromide*	µg/sample	100	<100
Chloride*	µg/sample	200	<200

Certificate of Analysis PEH1915

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PEH1915-01	PEH1915-02	PEH1915-03	PEH1915-04	PEH1915-05
Your Reference			174	175	176	177	178
Date Sampled			04/08/2023	10/08/2023	16/08/2023	22/08/2023	28/08/2023
Dust	mg	0.10	19	16	5.1	30	21

Envirolab ID	Units	PQL	PEH1915-06
Your Reference			179
Date Sampled			29/08/2023
Dust	mg	0.10	<0.10

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
INORG-081	Anions determined by Ion Chromatography. Waters samples are filtered on receipt prior to analysis. Solids are analysed from a water extract. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
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.

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.

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 PEH1915

Client Details

Client	Department of Water & Environmental Regulation
Your Reference	2023 Como Metals Study
Date Issued	07/09/2023

Recommended Holding Time Compliance

Recommended holding time exceedances exist - See detailed list below

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 PEH1915

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS | HiVol Filter	1	04/08/2023	05/09/2023	05/09/2023	Yes
	2	10/08/2023	05/09/2023	05/09/2023	Yes
	3	16/08/2023	05/09/2023	05/09/2023	Yes
	4	22/08/2023	05/09/2023	05/09/2023	Yes
	5	28/08/2023	05/09/2023	05/09/2023	Yes
	6	29/08/2023	05/09/2023	05/09/2023	Yes
Metals OHS (LL) | HiVol Filter	1	04/08/2023	05/09/2023	05/09/2023	Yes
	2	10/08/2023	05/09/2023	05/09/2023	Yes
	3	16/08/2023	05/09/2023	05/09/2023	Yes
	4	22/08/2023	05/09/2023	05/09/2023	Yes
	5	28/08/2023	05/09/2023	05/09/2023	Yes
	6	29/08/2023	05/09/2023	05/09/2023	Yes
Metals OHS-Hg | HiVol Filter	1	04/08/2023	05/09/2023	06/09/2023	No
	2	10/08/2023	05/09/2023	06/09/2023	Yes
	3	16/08/2023	05/09/2023	06/09/2023	Yes
	4	22/08/2023	05/09/2023	06/09/2023	Yes
	5	28/08/2023	05/09/2023	06/09/2023	Yes
	6	29/08/2023	05/09/2023	06/09/2023	Yes
Bromide on HVF | HiVol Filter	1	04/08/2023	05/09/2023	05/09/2023	Yes
	2	10/08/2023	05/09/2023	05/09/2023	Yes
	3	16/08/2023	05/09/2023	05/09/2023	Yes
	4	22/08/2023	05/09/2023	05/09/2023	Yes
	5	28/08/2023	05/09/2023	05/09/2023	Yes
	6	29/08/2023	05/09/2023	05/09/2023	Yes
Chloride on HVF | HiVol Filter	1	04/08/2023	05/09/2023	05/09/2023	Yes
	2	10/08/2023	05/09/2023	05/09/2023	Yes
	3	16/08/2023	05/09/2023	05/09/2023	Yes
	4	22/08/2023	05/09/2023	05/09/2023	Yes
	5	28/08/2023	05/09/2023	05/09/2023	Yes
	6	29/08/2023	05/09/2023	05/09/2023	Yes
Gravimetric Dust | HiVol Filter	1	04/08/2023	04/09/2023	04/09/2023	No
	2	10/08/2023	04/09/2023	04/09/2023	No
	3	16/08/2023	04/09/2023	04/09/2023	Yes
	4	22/08/2023	04/09/2023	04/09/2023	Yes
	5	28/08/2023	04/09/2023	04/09/2023	Yes
	6	29/08/2023	04/09/2023	04/09/2023	Yes

Data Quality Assessment Summary PEH1915

Outliers: Duplicates

METALS-020/022|Acid Extractable Metals (HiVol Filter)| Batch BEI0393

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PEH1915-01	DUP1	Nickel	40.00	200[1]

Quality Control PEH1915

METALS-020/022|Acid Extractable Metals (HiVol Filter) | Batch BEI0393

Analyte	Units	PQL	Blank	DUP1 PEH1915-01 Samp | QC | RPD %	LCS %
Aluminium	µg/sample	5.0	<5.0	45.0 | 46.3 | 2.79	92.4
Barium	µg/sample	2.0	<2.0	38.4 | 40.2 | 4.62	100
Cadmium	µg/sample	0.50	<0.50	<0.50 | <0.50 | [NA]	98.8
Calcium	µg/sample	50	<50	269 | 275 | 2.34	96.8
Chromium	µg/sample	2.0	<2.0	11.1 | 10.7 | 3.58	99.2
Cobalt	µg/sample	2.0	<2.0	<2.0 | <2.0 | [NA]	101
Copper	µg/sample	2.0	<2.0	27.4 | 28.5 | 3.89	99.5
Iron	µg/sample	5.0	<5.0	625 | 642 | 2.79	102
Lead	µg/sample	5.0	<5.0	<5.0 | <5.0 | [NA]	96.1
Manganese	µg/sample	2.0	<2.0	8.73 | 8.96 | 2.62	98.7
Nickel	µg/sample	2.0	<2.0	<2.0 | 2.01 | 200 [1]	97.2
Phosphorus	µg/sample	20	<20	<20 | <20 | [NA]	94.7
Potassium	µg/sample	50	<50	121 | 122 | 1.31	96.6
Silicon	µg/sample	50	<50	95.2 | 92.5 | 2.86	112
Silver	µg/sample	5.0	<5.0	<5.0 | <5.0 | [NA]	99.5
Sulfur	µg/sample	50	<50	197 | 203 | 2.95	92.5
Tin	µg/sample	10	<10	<10 | <10 | [NA]	104
Titanium	µg/sample	2.0	<2.0	10.4 | 11.0 | 4.95	102
Vanadium	µg/sample	2.0	<2.0	<2.0 | <2.0 | [NA]	101
Zinc	µg/sample	5.0	<5.0	23.9 | 24.1 | 0.766	97.2

METALS-022|Acid Extractable Metals (HiVol Filter) | Batch BEI0395

Analyte	Units	PQL	Blank	DUP1 PEH1915-01 Samp | QC | RPD %	LCS %
Antimony	µg/sample	10	<10	<10 | <10 | [NA]	119
Arsenic	µg/sample	2.0	<2.0	<2.0 | <2.0 | [NA]	101
Bismuth	µg/sample	4.0	<4.0	<4.0 | <4.0 | [NA]	103
Selenium	µg/sample	4.0	<4.0	<4.0 | <4.0 | [NA]	100
Thallium	µg/sample	4.0	<4.0	<4.0 | <4.0 | [NA]	92.8

METALS-021|Acid Extractable Metals (HiVol Filter) | Batch BEI0396

Analyte	Units	PQL	Blank	DUP1 PEH1915-01 Samp | QC | RPD %	LCS %
Mercury	µg/sample	0.20	<0.20	<0.20 | <0.20 | [NA]	116

INORG-081|Inorganic Mists (HiVol Filter) | Batch BEI0394

Analyte	Units	PQL	Blank	DUP1 PEH1915-01 Samp | QC | RPD %	LCS %
Bromide	µg/sample	100	<100	<100 | <100 | [NA]	117
Chloride	µg/sample	200	<200	604 | 690 | 13.3	97.9

QC Comments

Identifier	Description
[1]	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.

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Certificate of Analysis PEI2019

Client Details

Client	Department of Water & Environmental Regulation
Contact	[redacted]
Address	Prime House, 8 Davidson Terrace,, Joondalup, WA, 6027

Sample Details

Your Reference	2023 Como Metals Study
Number of Samples	6 HiVol Filter
Date Samples Received	29/09/2023
Date Instructions Received	29/09/2023

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	09/10/2023

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

Authorisation Details

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

Certificate of Analysis PEI2019

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEI2019-01	DWE180	HiVol Filter	03/09/2023	29/09/2023
PEI2019-02	DWE181	HiVol Filter	09/09/2023	29/09/2023
PEI2019-03	DWE182	HiVol Filter	15/09/2023	29/09/2023
PEI2019-04	DWE183	HiVol Filter	21/09/2023	29/09/2023
PEI2019-05	DWE184	HiVol Filter	27/09/2023	29/09/2023
PEI2019-06	DWE185	HiVol Filter	28/09/2023	29/09/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
DWE180	DWE180	[NA]	[NA]	[NA]
DWE181	DWE181	[NA]	[NA]	[NA]
DWE182	DWE182	[NA]	[NA]	[NA]
DWE183	DWE183	[NA]	[NA]	[NA]
DWE184	DWE184	[NA]	[NA]	[NA]
DWE185	DWE185	[NA]	[NA]	[NA]

Certificate of Analysis PEI2019

Acid Extractable Metals (HiVol Filter)

Envirolab ID	Units	PQL	PEI2019-01	PEI2019-02	PEI2019-03	PEI2019-04	PEI2019-05
Your Reference			DWE180	DWE181	DWE182	DWE183	DWE184
Date Sampled			03/09/2023	09/09/2023	15/09/2023	21/09/2023	27/09/2023
Silver	µg/sample	5.0	12	11	9.1	9.8	8.0
Aluminium	µg/sample	5.0	23	55	26	200	230
Barium	µg/sample	2.0	12	19	27	45	48
Calcium	µg/sample	50	350	300	340	710	660
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chromium	µg/sample	2.0	12	10	9.1	11	12
Copper	µg/sample	2.0	9.8	12	22	30	31
Iron	µg/sample	5.0	150	290	400	850	940
Mercury	µg/sample	0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Potassium	µg/sample	50	220	130	310	220	240
Manganese	µg/sample	2.0	<2.0	3.9	3.8	12	11
Nickel	µg/sample	2.0	<2.0	<2.0	<2.0	3.8	2.4
Phosphorus	µg/sample	20	<20	<20	<20	<20	<20
Lead	µg/sample	5.0	<5.0	6.1	<5.0	<5.0	5.5
Sulfur	µg/sample	50	450	310	670	560	490
Silicon	µg/sample	50	61	93	74	240	250
Tin	µg/sample	10	11	<10	<10	10	<10
Titanium	µg/sample	2.0	3.8	6.2	7.7	15	16
Vanadium	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Zinc	µg/sample	5.0	5.3	10	10	30	30
Arsenic	µg/sample	2.0	<2.0	<2.0	<2.0	2.1	<2.0
Bismuth	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Antimony	µg/sample	10	<10	<10	<10	<10	<10
Selenium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Thallium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0

Envirolab ID	Units	PQL	PEI2019-06
Your Reference			DWE185
Date Sampled			28/09/2023
Silver	µg/sample	5.0	6.5
Aluminium	µg/sample	5.0	5.5
Barium	µg/sample	2.0	<2.0
Calcium	µg/sample	50	66
Cadmium	µg/sample	0.50	<0.50
Cobalt	µg/sample	2.0	<2.0
Chromium	µg/sample	2.0	10
Copper	µg/sample	2.0	<2.0
Iron	µg/sample	5.0	7.2
Mercury	µg/sample	0.20	<0.20
Potassium	µg/sample	50	<50
Manganese	µg/sample	2.0	<2.0
Nickel	µg/sample	2.0	<2.0
Phosphorus	µg/sample	20	<20
Lead	µg/sample	5.0	<5.0
Sulfur	µg/sample	50	<50

Acid Extractable Metals (HiVol Filter)

Envirolab ID	Units	PQL	PEI2019-06
Your Reference			DWE185
Date Sampled			28/09/2023
Silicon	µg/sample	50	<50
Tin	µg/sample	10	<10
Titanium	µg/sample	2.0	<2.0
Vanadium	µg/sample	2.0	<2.0
Zinc	µg/sample	5.0	<5.0
Arsenic	µg/sample	2.0	<2.0
Bismuth	µg/sample	4.0	<4.0
Antimony	µg/sample	10	<10
Selenium	µg/sample	4.0	<4.0
Thallium	µg/sample	4.0	<4.0

Certificate of Analysis PEI2019

Inorganic Mists (HiVol Filter)

Envirolab ID	Units	PQL	PEI2019-01	PEI2019-02	PEI2019-03	PEI2019-04	PEI2019-05
Your Reference			DWE180	DWE181	DWE182	DWE183	DWE184
Date Sampled			03/09/2023	09/09/2023	15/09/2023	21/09/2023	27/09/2023
Bromide*	µg/sample	100	<100	<100	<100	<100	<100
Chloride*	µg/sample	200	7400	3300	8600	470	610

Envirolab ID	Units	PQL	PEI2019-06
Your Reference			DWE185
Date Sampled			28/09/2023
Bromide*	µg/sample	100	<100
Chloride*	µg/sample	200	<200

Certificate of Analysis PEI2019

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PEI2019-01	PEI2019-02	PEI2019-03	PEI2019-04	PEI2019-05
Your Reference			DWE180	DWE181	DWE182	DWE183	DWE184
Date Sampled			03/09/2023	09/09/2023	15/09/2023	21/09/2023	27/09/2023
Dust	mg	0.10	24	16	29	38	42

Envirolab ID	Units	PQL	PEI2019-06
Your Reference			DWE185
Date Sampled			28/09/2023
Dust	mg	0.10	0.30

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
INORG-081	Anions determined by Ion Chromatography. Waters samples are filtered on receipt prior to analysis. Solids are analysed from a water extract. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
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.

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.

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 PEI2019

Client Details

Client	Department of Water & Environmental Regulation
Your Reference	2023 Como Metals Study
Date Issued	09/10/2023

Recommended Holding Time Compliance

Recommended holding time exceedances exist - See detailed list below

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 PEI2019

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS | HiVol Filter	1	03/09/2023	05/10/2023	06/10/2023	Yes
	2	09/09/2023	05/10/2023	06/10/2023	Yes
	3	15/09/2023	05/10/2023	06/10/2023	Yes
	4	21/09/2023	05/10/2023	06/10/2023	Yes
	5	27/09/2023	05/10/2023	06/10/2023	Yes
	6	28/09/2023	05/10/2023	06/10/2023	Yes
Metals OHS (LL) | HiVol Filter	1	03/09/2023	05/10/2023	06/10/2023	Yes
	2	09/09/2023	05/10/2023	06/10/2023	Yes
	3	15/09/2023	05/10/2023	06/10/2023	Yes
	4	21/09/2023	05/10/2023	06/10/2023	Yes
	5	27/09/2023	05/10/2023	06/10/2023	Yes
	6	28/09/2023	05/10/2023	06/10/2023	Yes
Metals OHS-Hg | HiVol Filter	1	03/09/2023	05/10/2023	06/10/2023	No
	2	09/09/2023	05/10/2023	06/10/2023	Yes
	3	15/09/2023	05/10/2023	06/10/2023	Yes
	4	21/09/2023	05/10/2023	06/10/2023	Yes
	5	27/09/2023	05/10/2023	06/10/2023	Yes
	6	28/09/2023	05/10/2023	06/10/2023	Yes
Bromide on HVF | HiVol Filter	1	03/09/2023	05/10/2023	05/10/2023	Yes
	2	09/09/2023	05/10/2023	05/10/2023	Yes
	3	15/09/2023	05/10/2023	05/10/2023	Yes
	4	21/09/2023	05/10/2023	05/10/2023	Yes
	5	27/09/2023	05/10/2023	05/10/2023	Yes
	6	28/09/2023	05/10/2023	05/10/2023	Yes
Chloride on HVF | HiVol Filter	1	03/09/2023	05/10/2023	05/10/2023	Yes
	2	09/09/2023	05/10/2023	05/10/2023	Yes
	3	15/09/2023	05/10/2023	05/10/2023	Yes
	4	21/09/2023	05/10/2023	05/10/2023	Yes
	5	27/09/2023	05/10/2023	05/10/2023	Yes
	6	28/09/2023	05/10/2023	05/10/2023	Yes
Gravimetric Dust | HiVol Filter	1	03/09/2023	05/10/2023	05/10/2023	No
	2	09/09/2023	05/10/2023	05/10/2023	No
	3	15/09/2023	05/10/2023	05/10/2023	Yes
	4	21/09/2023	05/10/2023	05/10/2023	Yes
	5	27/09/2023	05/10/2023	05/10/2023	Yes
	6	28/09/2023	05/10/2023	05/10/2023	Yes

Data Quality Assessment Summary PEI2019

Outliers: QC Frequency

METALS-020|Acid Extractable Metals (HiVol Filter)| Batch BEJ0644

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022|Acid Extractable Metals (HiVol Filter)| Batch BEJ0644

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-021|Acid Extractable Metals (HiVol Filter)| Batch BEJ0648

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

METALS-022|Acid Extractable Metals (HiVol Filter)| Batch BEJ0646

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

Quality Control PEI2019

METALS-020/022|Acid Extractable Metals (HiVol Filter) | Batch BEJ0644

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	102
Barium	µg/sample	2.0	<2.0	115
Cadmium	µg/sample	0.50	<0.50	99.7
Calcium	µg/sample	50	<50	109
Chromium	µg/sample	2.0	<2.0	105
Cobalt	µg/sample	2.0	<2.0	101
Copper	µg/sample	2.0	<2.0	108
Iron	µg/sample	5.0	<5.0	104
Lead	µg/sample	5.0	<5.0	105
Manganese	µg/sample	2.0	<2.0	107
Nickel	µg/sample	2.0	<2.0	104
Phosphorus	µg/sample	20	<20	95.3
Potassium	µg/sample	50	<50	115
Silicon	µg/sample	50	<50	124
Silver	µg/sample	5.0	<5.0	115
Sulfur	µg/sample	50	<50	108
Tin	µg/sample	10	<10	103
Titanium	µg/sample	2.0	<2.0	99.7
Vanadium	µg/sample	2.0	<2.0	101
Zinc	µg/sample	5.0	<5.0	104

METALS-022|Acid Extractable Metals (HiVol Filter) | Batch BEJ0646

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	109
Arsenic	µg/sample	2.0	<2.0	104
Bismuth	µg/sample	4.0	<4.0	91.8
Selenium	µg/sample	4.0	<4.0	115
Thallium	µg/sample	4.0	<4.0	90.8

METALS-021|Acid Extractable Metals (HiVol Filter) | Batch BEJ0648

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.20	<0.20	81.6

INORG-081|Inorganic Mists (HiVol Filter) | Batch BEJ0636

Analyte	Units	PQL	Blank	DUP1 PEI2019-01 Samp | QC | RPD %	LCS %
Bromide	µg/sample	100	<100	<100 | <100 | [NA]	113
Chloride	µg/sample	200	<200	7430 | 7430 | 0.0153	97.9

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Certificate of Analysis PEK0279

Client Details

Client	Department of Water & Environmental Regulation
Contact	[redacted]
Address	Prime House, 8 Davidson Terrace,, Joondalup, WA, 6027

Sample Details

Your Reference	2023 Como Metals Study
Number of Samples	7 HiVol Filter
Date Samples Received	03/11/2023
Date Instructions Received	03/11/2023

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	10/11/2023
Date of Issue	13/11/2023

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Authorisation Details

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

Certificate of Analysis PEK0279

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEK0279-01	186	HiVol Filter	03/10/2023	03/11/2023
PEK0279-02	187	HiVol Filter	09/10/2023	03/11/2023
PEK0279-03	188	HiVol Filter	15/10/2023	03/11/2023
PEK0279-04	189	HiVol Filter	21/10/2023	03/11/2023
PEK0279-05	190	HiVol Filter	27/10/2023	03/11/2023
PEK0279-06	191	HiVol Filter	31/10/2023	03/11/2023
PEK0279-07	192	HiVol Filter	02/11/2023	03/11/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
186	DWE186	[NA]	[NA]	[NA]
187	DWE187	[NA]	[NA]	[NA]
188	DWE188	[NA]	[NA]	[NA]
189	DWE189	[NA]	[NA]	[NA]
190	DWE190	[NA]	[NA]	[NA]
191	DWE191	[NA]	[NA]	[NA]
192	DWE192	[NA]	[NA]	[NA]

Certificate of Analysis PEK0279

Acid Extractable Metals (HiVol Filter)

Envirolab ID	Units	PQL	PEK0279-01	PEK0279-02	PEK0279-03	PEK0279-04	PEK0279-05
Your Reference			186	187	188	189	190
Date Sampled			03/10/2023	09/10/2023	15/10/2023	21/10/2023	27/10/2023
Silver	µg/sample	5.0	31	29	35	29	23
Aluminium	µg/sample	5.0	48	140	230	350	210
Barium	µg/sample	2.0	24	22	21	37	25
Calcium	µg/sample	50	360	460	530	650	730
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chromium	µg/sample	2.0	9.3	9.5	13	11	12
Copper	µg/sample	2.0	17	15	12	25	17
Iron	µg/sample	5.0	370	430	480	830	500
Mercury	µg/sample	0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Potassium	µg/sample	50	160	150	690	180	170
Manganese	µg/sample	2.0	4.1	5.0	5.2	8.5	4.0
Nickel	µg/sample	2.0	<2.0	<2.0	<2.0	2.0	<2.0
Phosphorus	µg/sample	20	<20	<20	<20	<20	<20
Lead	µg/sample	5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Sulfur	µg/sample	50	450	870	460	690	560
Silicon	µg/sample	50	54	79	230	100	91
Tin	µg/sample	10	<10	<10	<10	12	<10
Titanium	µg/sample	2.0	8.1	9.0	10	19	11
Vanadium	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Zinc	µg/sample	5.0	16	17	13	21	11
Arsenic	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Antimony	µg/sample	10	<10	<10	<10	<10	<10
Selenium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Thallium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0

Envirolab ID	Units	PQL	PEK0279-06	PEK0279-07
Your Reference			191	192
Date Sampled			31/10/2023	02/11/2023
Silver	µg/sample	5.0	21	17
Aluminium	µg/sample	5.0	6.1	420
Barium	µg/sample	2.0	<2.0	32
Calcium	µg/sample	50	61	990
Cadmium	µg/sample	0.50	<0.50	<0.50
Cobalt	µg/sample	2.0	<2.0	<2.0
Chromium	µg/sample	2.0	5.1	13
Copper	µg/sample	2.0	<2.0	23
Iron	µg/sample	5.0	<5.0	910
Mercury	µg/sample	0.20	<0.20	<0.20
Potassium	µg/sample	50	<50	170
Manganese	µg/sample	2.0	<2.0	11
Nickel	µg/sample	2.0	<2.0	2.2

Certificate of Analysis PEK0279

Acid Extractable Metals (HiVol Filter)

Envirolab ID	Units	PQL	PEK0279-06	PEK0279-07
Your Reference			191	192
Date Sampled			31/10/2023	02/11/2023
Phosphorus	µg/sample	20	<20	23
Lead	µg/sample	5.0	<5.0	5.4
Sulfur	µg/sample	50	<50	470
Silicon	µg/sample	50	<50	130
Tin	µg/sample	10	<10	<10
Titanium	µg/sample	2.0	<2.0	18
Vanadium	µg/sample	2.0	<2.0	<2.0
Zinc	µg/sample	5.0	<5.0	22
Arsenic	µg/sample	2.0	<2.0	<2.0
Bismuth	µg/sample	4.0	<4.0	<4.0
Antimony	µg/sample	10	<10	<10
Selenium	µg/sample	4.0	<4.0	<4.0
Thallium	µg/sample	4.0	<4.0	<4.0

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Inorganic Mists (HiVol Filter)

Envirolab ID	Units	PQL	PEK0279-01	PEK0279-02	PEK0279-03	PEK0279-04	PEK0279-05
Your Reference			186	187	188	189	190
Date Sampled			03/10/2023	09/10/2023	15/10/2023	21/10/2023	27/10/2023
Bromide*	µg/sample	100	<100	<100	<100	<100	<100
Chloride*	µg/sample	200	6000	2100	940	1800	6000

Envirolab ID	Units	PQL	PEK0279-06	PEK0279-07
Your Reference			191	192
Date Sampled			31/10/2023	02/11/2023
Bromide*	µg/sample	100	<100	<100
Chloride*	µg/sample	200	<200	2400

Certificate of Analysis PEK0279

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PEK0279-01	PEK0279-02	PEK0279-03	PEK0279-04	PEK0279-05
Your Reference			186	187	188	189	190
Date Sampled			03/10/2023	09/10/2023	15/10/2023	21/10/2023	27/10/2023
Dust	mg	0.10	23	24	47	34	30

Envirolab ID	Units	PQL	PEK0279-06	PEK0279-07
Your Reference			191	192
Date Sampled			31/10/2023	02/11/2023
Dust	mg	0.10	0.70	30

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
INORG-081	Anions determined by Ion Chromatography. Waters samples are filtered on receipt prior to analysis. Solids are analysed from a water extract. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
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.

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.

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.

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

Data Quality Assessment Summary PEK0279

Client Details

Client	Department of Water & Environmental Regulation
Your Reference	2023 Como Metals Study
Date Issued	13/11/2023

Recommended Holding Time Compliance

Recommended holding time exceedances exist - See detailed list below

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 PEK0279

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS | HiVol Filter	7	02/11/2023	09/11/2023	10/11/2023	Yes
	1	03/10/2023	09/11/2023	10/11/2023	Yes
	2	09/10/2023	09/11/2023	10/11/2023	Yes
	3	15/10/2023	09/11/2023	10/11/2023	Yes
	4	21/10/2023	09/11/2023	10/11/2023	Yes
	5	27/10/2023	09/11/2023	10/11/2023	Yes
	6	31/10/2023	09/11/2023	10/11/2023	Yes
Metals OHS (LL) | HiVol Filter	7	02/11/2023	09/11/2023	11/11/2023	Yes
	1	03/10/2023	09/11/2023	11/11/2023	Yes
	2	09/10/2023	09/11/2023	11/11/2023	Yes
	3	15/10/2023	09/11/2023	11/11/2023	Yes
	4	21/10/2023	09/11/2023	11/11/2023	Yes
	5	27/10/2023	09/11/2023	11/11/2023	Yes
	6	31/10/2023	09/11/2023	11/11/2023	Yes
Metals OHS-Hg | HiVol Filter	7	02/11/2023	09/11/2023	10/11/2023	Yes
	1	03/10/2023	09/11/2023	10/11/2023	No
	2	09/10/2023	09/11/2023	10/11/2023	No
	3	15/10/2023	09/11/2023	10/11/2023	Yes
	4	21/10/2023	09/11/2023	10/11/2023	Yes
	5	27/10/2023	09/11/2023	10/11/2023	Yes
	6	31/10/2023	09/11/2023	10/11/2023	Yes
Bromide on HVF | HiVol Filter	7	02/11/2023	08/11/2023	09/11/2023	Yes
	1	03/10/2023	08/11/2023	09/11/2023	Yes
	2	09/10/2023	08/11/2023	09/11/2023	Yes
	3	15/10/2023	08/11/2023	09/11/2023	Yes
	4	21/10/2023	08/11/2023	09/11/2023	Yes
	5	27/10/2023	08/11/2023	09/11/2023	Yes
	6	31/10/2023	08/11/2023	09/11/2023	Yes
Chloride on HVF | HiVol Filter	7	02/11/2023	08/11/2023	09/11/2023	Yes
	1	03/10/2023	08/11/2023	09/11/2023	Yes
	2	09/10/2023	08/11/2023	09/11/2023	Yes
	3	15/10/2023	08/11/2023	09/11/2023	Yes
	4	21/10/2023	08/11/2023	09/11/2023	Yes
	5	27/10/2023	08/11/2023	09/11/2023	Yes
	6	31/10/2023	08/11/2023	09/11/2023	Yes
Gravimetric Dust | HiVol Filter	7	02/11/2023	13/11/2023	13/11/2023	Yes
	1	03/10/2023	13/11/2023	13/11/2023	No
	2	09/10/2023	13/11/2023	13/11/2023	No
	3	15/10/2023	13/11/2023	13/11/2023	No
	4	21/10/2023	13/11/2023	13/11/2023	No
	5	27/10/2023	13/11/2023	13/11/2023	Yes

Data Quality Assessment Summary PEK0279

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
	6	31/10/2023	13/11/2023	13/11/2023	Yes

Outliers: QC Frequency

METALS-020|Acid Extractable Metals (HiVol Filter)| Batch BEK1135

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022|Acid Extractable Metals (HiVol Filter)| Batch BEK1135

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-021|Acid Extractable Metals (HiVol Filter)| Batch BEK1138

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

METALS-022|Acid Extractable Metals (HiVol Filter)| Batch BEK1137

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

Quality Control PEK0279

METALS-020/022|Acid Extractable Metals (HiVol Filter) | Batch BEK1135

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	98.8
Barium	µg/sample	2.0	<2.0	122
Cadmium	µg/sample	0.50	<0.50	100
Calcium	µg/sample	50	<50	93.6
Chromium	µg/sample	2.0	<2.0	101
Cobalt	µg/sample	2.0	<2.0	101
Copper	µg/sample	2.0	<2.0	101
Iron	µg/sample	5.0	<5.0	101
Lead	µg/sample	5.0	<5.0	101
Manganese	µg/sample	2.0	<2.0	99.9
Nickel	µg/sample	2.0	<2.0	98.2
Phosphorus	µg/sample	20	<20	97.9
Potassium	µg/sample	50	<50	103
Silicon	µg/sample	50	<50	127
Silver	µg/sample	5.0	<5.0	126
Sulfur	µg/sample	50	<50	103
Tin	µg/sample	10	<10	110
Titanium	µg/sample	2.0	<2.0	107
Vanadium	µg/sample	2.0	<2.0	102
Zinc	µg/sample	5.0	<5.0	99.5

METALS-022|Acid Extractable Metals (HiVol Filter) | Batch BEK1137

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	114
Arsenic	µg/sample	2.0	<2.0	115
Bismuth	µg/sample	4.0	<4.0	106
Selenium	µg/sample	4.0	<4.0	127
Thallium	µg/sample	4.0	<4.0	98.6

METALS-021|Acid Extractable Metals (HiVol Filter) | Batch BEK1138

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

INORG-081|Inorganic Mists (HiVol Filter) | Batch BEK0851

Analyte	Units	PQL	Blank	DUP1 PEK0279-01 Samp | QC | RPD %	LCS %
Bromide	µg/sample	100	<100	<100 | <100 | [NA]	99.2
Chloride	µg/sample	200	<200	6040 | 6030 | 0.0424	96.0

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Certificate of Analysis PEL0191

Client Details

Client	Department of Water & Environmental Regulation
Contact	[redacted]
Address	Prime House, 8 Davidson Terrace,, Joondalup, WA, 6027

Sample Details

Your Reference	2023 Como Metals Study
Number of Samples	6 HiVol Filter
Date Samples Received	04/12/2023
Date Instructions Received	04/12/2023

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	12/12/2023
Date of Issue	11/12/2023

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

Certificate of Analysis PEL0191

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEL0191-01	DWE193	HiVol Filter	08/11/2023	04/12/2023
PEL0191-02	DWE194	HiVol Filter	14/11/2023	04/12/2023
PEL0191-03	DWE195	HiVol Filter	20/11/2023	04/12/2023
PEL0191-04	DWE196	HiVol Filter	26/11/2023	04/12/2023
PEL0191-05	DWE197	HiVol Filter	27/11/2023	04/12/2023
PEL0191-06	DWE198	HiVol Filter	02/12/2023	04/12/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
DWE193	DWE193	[NA]	[NA]	[NA]
DWE194	DWE194	[NA]	[NA]	[NA]
DWE195	DWE195	[NA]	[NA]	[NA]
DWE196	DWE196	[NA]	[NA]	[NA]
DWE197	DWE197	[NA]	[NA]	[NA]
DWE198	DWE198	[NA]	[NA]	[NA]

Acid Extractable Metals (HiVol Filter)

Envirolab ID	Units	PQL	PEL0191-01	PEL0191-02	PEL0191-03	PEL0191-04	PEL0191-05
Your Reference			DWE193	DWE194	DWE195	DWE196	DWE197
Date Sampled			08/11/2023	14/11/2023	20/11/2023	26/11/2023	27/11/2023
Silver	µg/sample	5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Aluminium	µg/sample	5.0	250	140	400	230	8.2
Barium	µg/sample	2.0	27	16	21	11	<2.0
Calcium	µg/sample	50	670	440	660	530	54
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chromium	µg/sample	2.0	11	12	11	9.4	5.6
Copper	µg/sample	2.0	18	12	15	8.1	<2.0
Iron	µg/sample	5.0	690	420	730	430	7.6
Mercury	µg/sample	0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Potassium	µg/sample	50	140	210	170	170	<50
Manganese	µg/sample	2.0	9.8	5.0	7.1	4.0	<2.0
Nickel	µg/sample	2.0	2.7	<2.0	3.0	2.1	<2.0
Phosphorus	µg/sample	20	<20	<20	20	<20	<20
Lead	µg/sample	5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Sulfur	µg/sample	50	430	700	450	590	<50
Silicon	µg/sample	50	140	90	140	110	<50
Tin	µg/sample	10	<10	<10	<10	<10	<10
Titanium	µg/sample	2.0	13	6.8	12	5.8	<2.0
Vanadium	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Zinc	µg/sample	5.0	27	16	18	8.7	<5.0
Arsenic	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Antimony	µg/sample	10	<10	<10	<10	<10	<10
Selenium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Thallium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0

Envirolab ID	Units	PQL	PEL0191-06
Your Reference			DWE198
Date Sampled			02/12/2023
Silver	µg/sample	5.0	<5.0
Aluminium	µg/sample	5.0	69
Barium	µg/sample	2.0	12
Calcium	µg/sample	50	240
Cadmium	µg/sample	0.50	<0.50
Cobalt	µg/sample	2.0	<2.0
Chromium	µg/sample	2.0	10
Copper	µg/sample	2.0	9.0
Iron	µg/sample	5.0	230
Mercury	µg/sample	0.20	<0.20
Potassium	µg/sample	50	100
Manganese	µg/sample	2.0	2.1
Nickel	µg/sample	2.0	<2.0
Phosphorus	µg/sample	20	<20
Lead	µg/sample	5.0	<5.0
Sulfur	µg/sample	50	410

Acid Extractable Metals (HiVol Filter)

Envirolab ID	Units	PQL	PEL0191-06
Your Reference			DWE198
Date Sampled			02/12/2023
Silicon	µg/sample	50	53
Tin	µg/sample	10	<10
Titanium	µg/sample	2.0	4.7
Vanadium	µg/sample	2.0	<2.0
Zinc	µg/sample	5.0	8.8
Arsenic	µg/sample	2.0	<2.0
Bismuth	µg/sample	4.0	<4.0
Antimony	µg/sample	10	<10
Selenium	µg/sample	4.0	<4.0
Thallium	µg/sample	4.0	<4.0

Certificate of Analysis PEL0191

Inorganic Mists (HiVol Filter)

Envirolab ID	Units	PQL	PEL0191-01	PEL0191-02	PEL0191-03	PEL0191-04	PEL0191-05
Your Reference			DWE193	DWE194	DWE195	DWE196	DWE197
Date Sampled			08/11/2023	14/11/2023	20/11/2023	26/11/2023	27/11/2023
Bromide*	µg/sample	100	<100	<100	<100	<100	<100
Chloride*	µg/sample	200	1200	3700	2100	3400	<200

Envirolab ID	Units	PQL	PEL0191-06
Your Reference			DWE198
Date Sampled			02/12/2023
Bromide*	µg/sample	100	<100
Chloride*	µg/sample	200	3100

Certificate of Analysis PEL0191

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PEL0191-01	PEL0191-02	PEL0191-03	PEL0191-04	PEL0191-05
Your Reference			DWE193	DWE194	DWE195	DWE196	DWE197
Date Sampled			08/11/2023	14/11/2023	20/11/2023	26/11/2023	27/11/2023
Dust	mg	0.10	26	30	30	30	0.55

Envirolab ID	Units	PQL	PEL0191-06
Your Reference			DWE198
Date Sampled			02/12/2023
Dust	mg	0.10	23

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
INORG-081	Anions determined by Ion Chromatography. Waters samples are filtered on receipt prior to analysis. Solids are analysed from a water extract. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
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.

Result Definitions

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NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
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<	Less than
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NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
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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.

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 PEL0191

Client Details

Client	Department of Water & Environmental Regulation
Your Reference	2023 Como Metals Study
Date Issued	11/12/2023

Recommended Holding Time Compliance

Recommended holding time exceedances exist - See detailed list below

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 PEL0191

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS | HiVol Filter	6	02/12/2023	08/12/2023	08/12/2023	Yes
	1	08/11/2023	08/12/2023	08/12/2023	Yes
	2	14/11/2023	08/12/2023	08/12/2023	Yes
	3	20/11/2023	08/12/2023	08/12/2023	Yes
	4	26/11/2023	08/12/2023	08/12/2023	Yes
	5	27/11/2023	08/12/2023	08/12/2023	Yes
Metals OHS (LL) | HiVol Filter	6	02/12/2023	08/12/2023	08/12/2023	Yes
	1	08/11/2023	08/12/2023	08/12/2023	Yes
	2	14/11/2023	08/12/2023	08/12/2023	Yes
	3	20/11/2023	08/12/2023	08/12/2023	Yes
	4	26/11/2023	08/12/2023	08/12/2023	Yes
	5	27/11/2023	08/12/2023	08/12/2023	Yes
Metals OHS-Hg | HiVol Filter	6	02/12/2023	08/12/2023	08/12/2023	Yes
	1	08/11/2023	08/12/2023	08/12/2023	No
	2	14/11/2023	08/12/2023	08/12/2023	Yes
	3	20/11/2023	08/12/2023	08/12/2023	Yes
	4	26/11/2023	08/12/2023	08/12/2023	Yes
	5	27/11/2023	08/12/2023	08/12/2023	Yes
Bromide on HVF | HiVol Filter	6	02/12/2023	06/12/2023	07/12/2023	Yes
	1	08/11/2023	06/12/2023	07/12/2023	Yes
	2	14/11/2023	06/12/2023	07/12/2023	Yes
	3	20/11/2023	06/12/2023	07/12/2023	Yes
	4	26/11/2023	06/12/2023	07/12/2023	Yes
	5	27/11/2023	06/12/2023	07/12/2023	Yes
Chloride on HVF | HiVol Filter	6	02/12/2023	06/12/2023	07/12/2023	Yes
	1	08/11/2023	06/12/2023	07/12/2023	Yes
	2	14/11/2023	06/12/2023	07/12/2023	Yes
	3	20/11/2023	06/12/2023	07/12/2023	Yes
	4	26/11/2023	06/12/2023	07/12/2023	Yes
	5	27/11/2023	06/12/2023	07/12/2023	Yes
Gravimetric Dust | HiVol Filter	6	02/12/2023	06/12/2023	06/12/2023	Yes
	1	08/11/2023	06/12/2023	06/12/2023	No
	2	14/11/2023	06/12/2023	06/12/2023	No
	3	20/11/2023	06/12/2023	06/12/2023	Yes
	4	26/11/2023	06/12/2023	06/12/2023	Yes
	5	27/11/2023	06/12/2023	06/12/2023	Yes

Data Quality Assessment Summary PEL0191

Outliers: QC Frequency

INORG-081|Inorganic Mists (HiVol Filter)| Batch BEL0724

Analysis	QC Type	Expected	Reported
Bromide on HVF	Duplicate	1	0
Chloride on HVF	Duplicate	1	0

METALS-020|Acid Extractable Metals (HiVol Filter)| Batch BEL0964

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022|Acid Extractable Metals (HiVol Filter)| Batch BEL0964

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-021|Acid Extractable Metals (HiVol Filter)| Batch BEL0970

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

METALS-022|Acid Extractable Metals (HiVol Filter)| Batch BEL0969

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

Quality Control PEL0191

METALS-020/022|Acid Extractable Metals (HiVol Filter) | Batch BEL0964

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	100
Barium	µg/sample	2.0	<2.0	106
Cadmium	µg/sample	0.50	<0.50	94.5
Calcium	µg/sample	50	<50	97.0
Chromium	µg/sample	2.0	<2.0	99.7
Cobalt	µg/sample	2.0	<2.0	95.2
Copper	µg/sample	2.0	<2.0	99.3
Iron	µg/sample	5.0	<5.0	97.0
Lead	µg/sample	5.0	<5.0	98.5
Manganese	µg/sample	2.0	<2.0	99.7
Nickel	µg/sample	2.0	<2.0	98.4
Phosphorus	µg/sample	20	<20	101
Potassium	µg/sample	50	<50	96.6
Silicon	µg/sample	50	<50	106
Silver	µg/sample	5.0	<5.0	96.9
Sulfur	µg/sample	50	<50	97.7
Tin	µg/sample	10	<10	102
Titanium	µg/sample	2.0	<2.0	99.9
Vanadium	µg/sample	2.0	<2.0	97.1
Zinc	µg/sample	5.0	<5.0	99.4

METALS-022|Acid Extractable Metals (HiVol Filter) | Batch BEL0969

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	114
Arsenic	µg/sample	2.0	<2.0	122
Bismuth	µg/sample	4.0	<4.0	106
Selenium	µg/sample	4.0	<4.0	126
Thallium	µg/sample	4.0	<4.0	104

METALS-021|Acid Extractable Metals (HiVol Filter) | Batch BEL0970

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.20	<0.20	95.6

INORG-081|Inorganic Mists (HiVol Filter) | Batch BEL0724

Analyte	Units	PQL	Blank	LCS %
Bromide	µg/sample	100	<100	82.4
Chloride	µg/sample	200	<200	98.2

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Certificate of Analysis PEL1517

Client Details

Client	Department of Water & Environmental Regulation
Contact	[redacted]
Address	Prime House, 8 Davidson Terrace,, Joondalup, WA, 6027

Sample Details

Your Reference	2023 Como Metals Study
Number of Samples	4 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 soils and on an as received basis for other matrices.

Report Details

Date Results Requested by	04/01/2024
Date of Reissue	26/05/2025 - This report supercedes previous report, see amendment history for details

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

Authorisation Details

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

Report Amendment History

Revision	Reason for Amendment
R-01	Scope of analysis corrected

Certificate of Analysis PEL1517

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEL1517-01	199	HiVol Filter	08/12/2023	21/12/2023
PEL1517-02	200	HiVol Filter	14/12/2023	21/12/2023
PEL1517-03	201	HiVol Filter	20/12/2023	21/12/2023
PEL1517-04	202	HiVol Filter	21/12/2023	21/12/2023

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
199	DWE199	[NA]	[NA]	[NA]
200	DWE200	[NA]	[NA]	[NA]
201	DWE201	[NA]	[NA]	[NA]
202	DWE202	[NA]	[NA]	[NA]

Certificate of Analysis PEL1517

Acid Extractable Metals (HiVol Filter)

Envirolab ID	Units	PQL	PEL1517-01	PEL1517-02	PEL1517-03	PEL1517-04
Your Reference			199	200	201	202
Date Sampled			08/12/2023	14/12/2023	20/12/2023	21/12/2023
Silver	µg/sample	5.0	<5.0	5.9	12	7.1
Aluminium	µg/sample	5.0	290	200	190	14
Barium	µg/sample	2.0	19	17	17	<2.0
Calcium	µg/sample	50	1400	640	550	66
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50	<0.50
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0
Chromium	µg/sample	2.0	11	9.1	8.5	5.5
Copper	µg/sample	2.0	14	13	12	<2.0
Iron	µg/sample	5.0	540	460	470	6.2
Mercury	µg/sample	0.20	<0.20	<0.20	<0.20	<0.20
Potassium	µg/sample	50	180	170	110	<50
Manganese	µg/sample	2.0	5.7	5.3	6.0	<2.0
Nickel	µg/sample	2.0	4.0	2.1	<2.0	<2.0
Phosphorus	µg/sample	20	23	<20	<20	<20
Lead	µg/sample	5.0	<5.0	<5.0	<5.0	<5.0
Sulfur	µg/sample	50	570	700	340	<50
Silicon	µg/sample	50	150	140	170	<50
Tin	µg/sample	10	<10	<10	<10	<10
Titanium	µg/sample	2.0	9.3	7.1	6.0	<2.0
Vanadium	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0
Zinc	µg/sample	5.0	15	15	10	<5.0
Arsenic	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0
Antimony	µg/sample	10	<10	<10	<10	<10
Selenium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0
Thallium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0

Inorganic Mists (HiVol Filter)

Envirolab ID	Units	PQL	PEL1517-01	PEL1517-02	PEL1517-03	PEL1517-04
Your Reference			199	200	201	202
Date Sampled			08/12/2023	14/12/2023	20/12/2023	21/12/2023
Bromide*	µg/sample	100	<100	<100	<100	<100
Chloride*	µg/sample	200	3300	2700	1100	<200

Certificate of Analysis PEL1517

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PEL1517-01	PEL1517-02	PEL1517-03	PEL1517-04
Your Reference			199	200	201	202
Date Sampled			08/12/2023	14/12/2023	20/12/2023	21/12/2023
Dust	mg	0.10	38	36	27	1.0

Method Summary

Method ID	Methodology Summary
INORG-081	Anions determined by Ion Chromatography. Waters samples are filtered on receipt prior to analysis. Solids are analysed from a water extract. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
INORG-100	Gravimetric determination of Inhalable dust as per AS3640. NSW Resources Regulator have licenced (MLA0017505) Envirolab/MPL for the Analysis of Inhalable & Respirable Dust and Respirable Crystaline Silica.
METALS-020	Determination of various metals by ICP-OES. Where salts (oxides, chlorides etc.) are calculated from the element concentration stoichiometrically there is no guarantee that the salt form is completely soluble in the acids used in the preparation.
METALS-020/022	Determination of various metals by ICP-OES or ICP-MS. Where salts (oxides, chlorides etc.) are calculated from the element concentration stoichiometrically there is no guarantee that the salt form is completely soluble in the acids used in the preparation.
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. Where salts (oxides, chlorides etc.) are calculated from the element concentration stoichiometrically there is no guarantee that the salt form is completely soluble in the acids used in the preparation.

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.

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 volumes are typically provided by customers (often as flow rate(s) and sampling time(s) and/or simply volume(s) sampled or exposure times (determines 'volume' passive badges are exposed to)). Hence in such circumstances the volume measurement is inevitably not covered by Envirolab's NATA accreditation. An exception may occur where Envirolab Newcastle does the sampling where accreditation exists for certain types of sampling and hence volume determination(s). Note air volumes are often used to determine concentrations for dust and/or analyses on filters, sorbents and in impingers. For canister sampling, the air volume is covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PEL1517

Client Details

Client	Department of Water & Environmental Regulation
Your Reference	2023 Como Metals Study
Date Issued	26/05/2025

Recommended Holding Time Compliance

Recommended holding time exceedances exist - See detailed list below

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 PEL1517

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS | HiVol Filter	1	08/12/2023	02/01/2024	02/01/2024	Yes
	2	14/12/2023	02/01/2024	02/01/2024	Yes
	3	20/12/2023	02/01/2024	02/01/2024	Yes
	4	21/12/2023	02/01/2024	02/01/2024	Yes
Metals OHS (LL) | HiVol Filter	1	08/12/2023	02/01/2024	03/01/2024	Yes
	2	14/12/2023	02/01/2024	03/01/2024	Yes
	3	20/12/2023	02/01/2024	03/01/2024	Yes
	4	21/12/2023	02/01/2024	03/01/2024	Yes
Metals OHS-Hg | HiVol Filter	1	08/12/2023	02/01/2024	02/01/2024	Yes
	2	14/12/2023	02/01/2024	02/01/2024	Yes
	3	20/12/2023	02/01/2024	02/01/2024	Yes
	4	21/12/2023	02/01/2024	02/01/2024	Yes
Bromide on HVF | HiVol Filter	1	08/12/2023	02/01/2024	02/01/2024	Yes
	2	14/12/2023	02/01/2024	02/01/2024	Yes
	3	20/12/2023	02/01/2024	02/01/2024	Yes
	4	21/12/2023	02/01/2024	02/01/2024	Yes
Chloride on HVF | HiVol Filter	1	08/12/2023	02/01/2024	02/01/2024	Yes
	2	14/12/2023	02/01/2024	02/01/2024	Yes
	3	20/12/2023	02/01/2024	02/01/2024	Yes
	4	21/12/2023	02/01/2024	02/01/2024	Yes
Gravimetric Dust | HiVol Filter	1	08/12/2023	29/12/2023	29/12/2023	No
	2	14/12/2023	29/12/2023	29/12/2023	Yes
	3	20/12/2023	29/12/2023	29/12/2023	Yes
	4	21/12/2023	29/12/2023	29/12/2023	Yes

Data Quality Assessment Summary PEL1517

Outliers: QC Frequency

METALS-020|Acid Extractable Metals (HiVol Filter)| Batch BFA0005

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-020/022|Acid Extractable Metals (HiVol Filter)| Batch BFA0005

Analysis	QC Type	Expected	Reported
Metals OHS	Duplicate	1	0

METALS-021|Acid Extractable Metals (HiVol Filter)| Batch BFA0008

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

METALS-022|Acid Extractable Metals (HiVol Filter)| Batch BFA0007

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

Quality Control PEL1517

METALS-020/022|Acid Extractable Metals (HiVol Filter) | Batch BFA0005

Analyte	Units	PQL	Blank	LCS %
Aluminium	µg/sample	5.0	<5.0	99.2
Barium	µg/sample	2.0	<2.0	102
Cadmium	µg/sample	0.50	<0.50	96.2
Calcium	µg/sample	50	<50	89.7
Chromium	µg/sample	2.0	<2.0	94.0
Cobalt	µg/sample	2.0	<2.0	97.6
Copper	µg/sample	2.0	<2.0	93.5
Iron	µg/sample	5.0	<5.0	98.1
Lead	µg/sample	5.0	<5.0	97.8
Manganese	µg/sample	2.0	<2.0	95.6
Nickel	µg/sample	2.0	<2.0	93.9
Phosphorus	µg/sample	20	<20	98.2
Potassium	µg/sample	50	<50	92.2
Silicon	µg/sample	50	<50	129
Silver	µg/sample	5.0	<5.0	94.7
Sulfur	µg/sample	50	<50	94.5
Tin	µg/sample	10	<10	101
Titanium	µg/sample	2.0	<2.0	97.3
Vanadium	µg/sample	2.0	<2.0	97.0
Zinc	µg/sample	5.0	<5.0	95.6

METALS-022|Acid Extractable Metals (HiVol Filter) | Batch BFA0007

Analyte	Units	PQL	Blank	LCS %
Antimony	µg/sample	10	<10	103
Arsenic	µg/sample	2.0	<2.0	115
Bismuth	µg/sample	4.0	<4.0	103
Selenium	µg/sample	4.0	<4.0	121
Thallium	µg/sample	4.0	<4.0	98.0

METALS-021|Acid Extractable Metals (HiVol Filter) | Batch BFA0008

Analyte	Units	PQL	Blank	LCS %
Mercury	µg/sample	0.20	<0.20	120

INORG-081|Inorganic Mists (HiVol Filter) | Batch BFA0012

Analyte	Units	PQL	Blank	LCS %
Bromide	µg/sample	100	<100	98.9
Chloride	µg/sample	200	<200	97.4

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Certificate of Analysis PFB0531

Client Details

Client	Department of Water & Environmental Regulation
Contact	[redacted]
Address	Prime House, 8 Davidson Terrace,, Joondalup, WA, 6027

Sample Details

Your Reference	2023 Como Metals Study
Number of Samples	7 HiVol Filter
Date Samples Received	09/02/2024
Date Instructions Received	09/02/2024

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	16/02/2024
Date of Issue	17/02/2024

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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 PFB0531

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PFB0531-01	203	HiVol Filter	07/01/2024	09/02/2024
PFB0531-02	204	HiVol Filter	13/01/2024	09/02/2024
PFB0531-03	205	HiVol Filter	19/01/2024	09/02/2024
PFB0531-04	206	HiVol Filter	25/01/2024	09/02/2024
PFB0531-05	207	HiVol Filter	31/01/2024	09/02/2024
PFB0531-06	208	HiVol Filter	06/02/2024	09/02/2024
PFB0531-07	209	HiVol Filter	07/02/2024	09/02/2024

Sample Information

Sample ID	Filter ID	Flow Rate (L/min)	Time Sampled (min)	Air Volume (m3)
203	DWE203	[NA]	[NA]	[NA]
204	DWE204	[NA]	[NA]	[NA]
205	DWE205	[NA]	[NA]	[NA]
206	DWE206	[NA]	[NA]	[NA]
207	DWE207	[NA]	[NA]	[NA]
208	DWE208	[NA]	[NA]	[NA]
209	DWE209	[NA]	[NA]	[NA]

Certificate of Analysis PFB0531

Acid Extractable Metals (HiVol Filter)

Envirolab ID	Units	PQL	PFB0531-01	PFB0531-02	PFB0531-03	PFB0531-04	PFB0531-05
Your Reference			203	204	205	206	207
Date Sampled			07/01/2024	13/01/2024	19/01/2024	25/01/2024	31/01/2024
Silver	µg/sample	5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Aluminium	µg/sample	5.0	170	200	89	420	360
Barium	µg/sample	2.0	14	21	20	20	32
Calcium	µg/sample	50	310	440	440	1200	880
Cadmium	µg/sample	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cobalt	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chromium	µg/sample	2.0	13	12	13	14	12
Copper	µg/sample	2.0	10	15	14	14	22
Iron	µg/sample	5.0	330	480	330	680	800
Mercury	µg/sample	0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Potassium	µg/sample	50	86	170	82	330	200
Manganese	µg/sample	2.0	3.1	7.2	3.9	7.1	9.4
Nickel	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Phosphorus	µg/sample	20	<20	<20	<20	25	29
Lead	µg/sample	5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Sulfur	µg/sample	50	450	730	400	1100	750
Silicon	µg/sample	50	170	240	130	260	350
Tin	µg/sample	10	<10	<10	<10	<10	<10
Titanium	µg/sample	2.0	6.4	9.5	8.8	13	14
Vanadium	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Zinc	µg/sample	5.0	<5.0	8.7	8.2	12	17
Arsenic	µg/sample	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Antimony	µg/sample	10	<10	<10	<10	<10	<10
Selenium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Thallium	µg/sample	4.0	<4.0	<4.0	<4.0	<4.0	<4.0

Envirolab ID	Units	PQL	PFB0531-06	PFB0531-07
Your Reference			208	209
Date Sampled			06/02/2024	07/02/2024
Silver	µg/sample	5.0	<5.0	<5.0
Aluminium	µg/sample	5.0	290	<5.0
Barium	µg/sample	2.0	20	<2.0
Calcium	µg/sample	50	740	<50
Cadmium	µg/sample	0.50	<0.50	<0.50
Cobalt	µg/sample	2.0	<2.0	<2.0
Chromium	µg/sample	2.0	13	10
Copper	µg/sample	2.0	14	<2.0
Iron	µg/sample	5.0	590	11
Mercury	µg/sample	0.20	<0.20	<0.20
Potassium	µg/sample	50	120	<50
Manganese	µg/sample	2.0	7.1	<2.0
Nickel	µg/sample	2.0	<2.0	<2.0
Phosphorus	µg/sample	20	21	<20
Lead	µg/sample	5.0	<5.0	<5.0
Sulfur	µg/sample	50	500	<50

Certificate of Analysis PFB0531

Acid Extractable Metals (HiVol Filter)

Envirolab ID	Units	PQL	PFB0531-06	PFB0531-07
Your Reference			208	209
Date Sampled			06/02/2024	07/02/2024
Silicon	µg/sample	50	290	<50
Tin	µg/sample	10	<10	<10
Titanium	µg/sample	2.0	12	<2.0
Vanadium	µg/sample	2.0	<2.0	<2.0
Zinc	µg/sample	5.0	11	<5.0
Arsenic	µg/sample	2.0	<2.0	<2.0
Bismuth	µg/sample	4.0	<4.0	<4.0
Antimony	µg/sample	10	<10	<10
Selenium	µg/sample	4.0	<4.0	<4.0
Thallium	µg/sample	4.0	<4.0	<4.0

Certificate of Analysis PFB0531

Inorganic Mists (HiVol Filter)

Envirolab ID	Units	PQL	PFB0531-01	PFB0531-02	PFB0531-03	PFB0531-04	PFB0531-05
Your Reference			203	204	205	206	207
Date Sampled			07/01/2024	13/01/2024	19/01/2024	25/01/2024	31/01/2024
Bromide*	µg/sample	100	<100	<100	<100	<100	<100
Chloride*	µg/sample	200	1600	3200	2100	13000	5100

Envirolab ID	Units	PQL	PFB0531-06	PFB0531-07
Your Reference			208	209
Date Sampled			06/02/2024	07/02/2024
Bromide*	µg/sample	100	<100	<100
Chloride*	µg/sample	200	2300	<200

Certificate of Analysis PFB0531

HVAS Dust (HiVol Filter)

Envirolab ID	Units	PQL	PFB0531-01	PFB0531-02	PFB0531-03	PFB0531-04	PFB0531-05
Your Reference			203	204	205	206	207
Date Sampled			07/01/2024	13/01/2024	19/01/2024	25/01/2024	31/01/2024
Dust	mg	0.10	18	26	13	49	37

Envirolab ID	Units	PQL	PFB0531-06	PFB0531-07
Your Reference			208	209
Date Sampled			06/02/2024	07/02/2024
Dust	mg	0.10	25	1.6

Method Summary

Method ID	Methodology Summary
DUST-004 HVAS	Determination of Gravimetric Dust
INORG-081	Anions determined by Ion Chromatography. Waters samples are filtered on receipt prior to analysis. Solids are analysed from a water extract. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
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.

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.

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 PFB0531

Client Details

Client	Department of Water & Environmental Regulation
Your Reference	2023 Como Metals Study
Date Issued	17/02/2024

Recommended Holding Time Compliance

Recommended holding time exceedances exist - See detailed list below

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 PFB0531

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals OHS | HiVol Filter	6	06/02/2024	15/02/2024	16/02/2024	Yes
	1	07/01/2024	15/02/2024	16/02/2024	Yes
	7	07/02/2024	15/02/2024	16/02/2024	Yes
	2	13/01/2024	15/02/2024	16/02/2024	Yes
	3	19/01/2024	15/02/2024	16/02/2024	Yes
	4	25/01/2024	15/02/2024	16/02/2024	Yes
	5	31/01/2024	15/02/2024	16/02/2024	Yes
Metals OHS (LL) | HiVol Filter	6	06/02/2024	15/02/2024	16/02/2024	Yes
	1	07/01/2024	15/02/2024	16/02/2024	Yes
	7	07/02/2024	15/02/2024	16/02/2024	Yes
	2	13/01/2024	15/02/2024	16/02/2024	Yes
	3	19/01/2024	15/02/2024	16/02/2024	Yes
	4	25/01/2024	15/02/2024	16/02/2024	Yes
	5	31/01/2024	15/02/2024	16/02/2024	Yes
Metals OHS-Hg | HiVol Filter	6	06/02/2024	15/02/2024	16/02/2024	Yes
	1	07/01/2024	15/02/2024	16/02/2024	No
	7	07/02/2024	15/02/2024	16/02/2024	Yes
	2	13/01/2024	15/02/2024	16/02/2024	No
	3	19/01/2024	15/02/2024	16/02/2024	Yes
	4	25/01/2024	15/02/2024	16/02/2024	Yes
	5	31/01/2024	15/02/2024	16/02/2024	Yes
Bromide on HVF | HiVol Filter	6	06/02/2024	13/02/2024	15/02/2024	Yes
	1	07/01/2024	13/02/2024	15/02/2024	Yes
	7	07/02/2024	13/02/2024	15/02/2024	Yes
	2	13/01/2024	13/02/2024	15/02/2024	Yes
	3	19/01/2024	13/02/2024	15/02/2024	Yes
	4	25/01/2024	13/02/2024	15/02/2024	Yes
	5	31/01/2024	13/02/2024	15/02/2024	Yes
Chloride on HVF | HiVol Filter	6	06/02/2024	13/02/2024	15/02/2024	Yes
	1	07/01/2024	13/02/2024	15/02/2024	Yes
	7	07/02/2024	13/02/2024	15/02/2024	Yes
	2	13/01/2024	13/02/2024	15/02/2024	Yes
	3	19/01/2024	13/02/2024	15/02/2024	Yes
	4	25/01/2024	13/02/2024	15/02/2024	Yes
	5	31/01/2024	13/02/2024	15/02/2024	Yes
Gravimetric Dust | HiVol Filter	6	06/02/2024	13/02/2024	13/02/2024	Yes
	1	07/01/2024	13/02/2024	13/02/2024	No
	7	07/02/2024	13/02/2024	13/02/2024	Yes
	2	13/01/2024	13/02/2024	13/02/2024	No
	3	19/01/2024	13/02/2024	13/02/2024	No
	4	25/01/2024	13/02/2024	13/02/2024	Yes
	5	31/01/2024	13/02/2024	13/02/2024	Yes

Quality Control PFB0531

METALS-021|Acid Extractable Metals (HiVol Filter) | Batch BFB1577

Analyte	Units	PQL	Blank	DUP1 PFB0531-01 Samp | QC | RPD %	LCS %
Mercury	µg/sample	0.20	<0.20	<0.20 | <0.20 | [NA]	98.4

METALS-022|Acid Extractable Metals (HiVol Filter) | Batch BFB1578

Analyte	Units	PQL	Blank	DUP1 PFB0531-01 Samp | QC | RPD %	LCS %
Antimony	µg/sample	10	<10	<10 | <10 | [NA]	120
Arsenic	µg/sample	2.0	<2.0	<2.0 | <2.0 | [NA]	105
Bismuth	µg/sample	4.0	<4.0	<4.0 | <4.0 | [NA]	97.1
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]	82.0

METALS-020/022|Acid Extractable Metals (HiVol Filter) | Batch BFB1579

Analyte	Units	PQL	Blank	DUP1 PFB0531-01 Samp | QC | RPD %	LCS %
Aluminium	µg/sample	5.0	<5.0	166 | 180 | 8.25	94.2
Barium	µg/sample	2.0	<2.0	14.0 | 14.5 | 3.12	103
Cadmium	µg/sample	0.50	<0.50	<0.50 | <0.50 | [NA]	94.6
Calcium	µg/sample	50	<50	307 | 338 | 9.77	92.9
Chromium	µg/sample	2.0	<2.0	13.3 | 13.3 | 0.376	101
Cobalt	µg/sample	2.0	<2.0	<2.0 | <2.0 | [NA]	95.3
Copper	µg/sample	2.0	<2.0	10.1 | 10.5 | 3.72	105
Iron	µg/sample	5.0	<5.0	334 | 342 | 2.28	96.2
Lead	µg/sample	5.0	<5.0	<5.0 | <5.0 | [NA]	99.7
Manganese	µg/sample	2.0	<2.0	3.05 | 3.37 | 9.90	100
Nickel	µg/sample	2.0	<2.0	<2.0 | <2.0 | [NA]	98.4
Phosphorus	µg/sample	20	<20	<20 | <20 | [NA]	106
Potassium	µg/sample	50	<50	85.8 | 95.2 | 10.4	100
Silicon	µg/sample	50	<50	170 | 188 | 9.96	105
Silver	µg/sample	5.0	<5.0	<5.0 | <5.0 | [NA]	97.7
Sulfur	µg/sample	50	<50	452 | 444 | 1.83	104
Tin	µg/sample	10	<10	<10 | <10 | [NA]	98.9
Titanium	µg/sample	2.0	<2.0	6.40 | 6.30 | 1.51	98.8
Vanadium	µg/sample	2.0	<2.0	<2.0 | <2.0 | [NA]	95.7
Zinc	µg/sample	5.0	<5.0	<5.0 | <5.0 | [NA]	98.0

INORG-081|Inorganic Mists (HiVol Filter) | Batch BFB1422

Analyte	Units	PQL	Blank	DUP1 PFB0531-01 Samp | QC | RPD %	LCS %
Bromide	µg/sample	100	<100	<100 | <100 | [NA]	102
Chloride	µg/sample	200	<200	1620 | 1610 | 0.222	90.8