

## Amy Selvaraj (DELWP)

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**From:** Andrew Helps [REDACTED]  
**Sent:** Sunday, 28 February 2021 4:28 PM  
**To:** Amy Selvaraj (DELWP)  
**Subject:** KALBAR Human Health Risk Assessment  
**Attachments:** 8330 Rev 34.pdf; Envirolab 22941-R01.pdf

[REDACTED] [REDACTED]

**EXTERNAL SENDER: Links and attachments may be unsafe.**

Good Morning Amy,

I have been asked by a number of farmers at Lindenow to look at this document.

I am somewhat stunned that this document is actually in circulation as a supposedly credible human health risk document.

My concerns are as follows:

Table 9.7 page 82 of this document is providing data at mg/L level.

Global common practice (USEPA, China EPA, EU, UNEP, Japanese EPA, National Governments etc) is to test at ug/L level.

Why do we test at ug/L level?

**Because the ICP MS machine tests to this level automatically!**

AND many of the toxic metals in water and air can kill, injure or disable people at this level.

Why are KALBAR presenting data at mg/L level – probably because you present an unformed public with a smaller number so therefore less scary.

I would love to see the spreadsheet that provided this mg/L data!

Perhaps your-self and Mr Wimbush need to talk to the Japanese about some of these toxic metals.

That is why there is a global toxic metal convention called the Minamata Convention and I am a delegated expert to this convention.

I find it interesting that KALBAR have not published the actual lab sheets!

My view is that there is something in KALBAR lab results that KALBAR do not want in the public domain.

Attached is a copy of my Rare Earth/Toxic element/Compound Calculation Template.

There are very serious problems with the Hazard Index numbers for:

Chromium – 1 sample with a Hazard index of 30,798.

Gallium – 3 samples with a Hazard Index ranging from 10,000 to 209,000.

Lanthanum - 3 samples with a Hazard Index ranging from 4101 to 111857.

Attached to this email is some testing results from a water sample at Lindenow taken by myself on the 13<sup>th</sup> of October last year. The samples were conveyed under a chain of custody to the lab in a refrigerated container

Envirolab (who I use as my Laboratory of choice for most of my work) Normally test for 40 metals for my work.

KALBAR have chosen to only put up data for 14 metals. What was really in the Envirolab Report for this testing for the other 26 metals?.

I have already put together the Radionuclide Slope Factor sheet for the Kalbar ore body – would you like a copy?

Actually, if I presume a level of intelligence and skills at KALBAR, they are probably worried about the number of RADNUCS in the ore body.

Amy could you please load down from the USA ATSDR website the following document:  
ATSDR Substance priority list full data.

You can then use this data to check some of the figures that you will get from KALBAR.

Please call me [REDACTED] if you want to discuss this data.

Kindest regards

**Andrew Helps**

[REDACTED]

[REDACTED]

**Mobile**

**UNEP Global Mercury Partnership**

**Waste Management Partnership - designated expert**

**Mercury added products and alternatives – designated expert**

**Mercury Fate and Transport Group**

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## CERTIFICATE OF ANALYSIS 22941

### Client Details

Client	Andrew Helps
Attention	Andrew Helps
Address	VIC

### Sample Details

Your Reference	<b>F01-11 Lindenow</b>
Number of Samples	2 Water, 3 Sand, 1 Sludge
Date samples received	14/10/2020
Date completed instructions received	14/10/2020

### 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.  
**Please refer to the last page of this report for any comments relating to the results.**

### Report Details

Date results requested by	16/10/2020
Date of Issue	20/10/2020
Reissue Details	This report supersedes 22941_R00 due to addition of Sulphur on all samples.
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. <b>Tests not covered by NATA are denoted with *</b>	

#### Results Approved By

Chris De Luca, Operations Manager

#### Authorised By

Pamela Adams, Laboratory Manager

Client Reference: F01-11 Lindenow

Acid Extractable metals in soil					
Our Reference		22941-2	22941-3	22941-5	22941-6
Your Reference	UNITS	L-26	L-27	L-29	L-30
Date Sampled		13/10/2020	13/10/2020	13/10/2020	13/10/2020
Type of sample		Sand	Sand	Sludge	Sand
Date digested	-	14/10/2020	14/10/2020	14/10/2020	14/10/2020
Date analysed	-	15/10/2020	15/10/2020	15/10/2020	15/10/2020
Silver	mg/kg	<1	<1	<1	<1
Aluminium	mg/kg	13,000	4,700	28,000	14,000
Antimony	mg/kg	<7	<7	<7	<7
Arsenic	mg/kg	5	<4	8	4
Boron	mg/kg	<3	<3	15	<3
Barium	mg/kg	18	15	58	22
Beryllium	mg/kg	<1	<1	<1	<1
Bismuth	mg/kg	<1	<1	<1	<1
Cadmium	mg/kg	<0.4	<0.4	<0.8	<0.4
Cobalt	mg/kg	2	1	8	3
Chromium	mg/kg	19	8	34	20
Copper	mg/kg	<1	<1	570	<1
Caesium*	mg/kg	<1	<1	<1	<1
Gallium	mg/kg	4	2	13	6
Gold*	mg/kg	<1	<1	<1	<1
Iron	mg/kg	30,000	12,000	37,000	26,000
Lanthanum*	mg/kg	16	9	27	15
Lead	mg/kg	10	4	29	11
Lithium	mg/kg	4	1	11	5
Manganese	mg/kg	33	10	190	31
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1
Molybdenum	mg/kg	<1	<1	<1	<1
Nickel	mg/kg	4	1	15	4
Selenium	mg/kg	<2	<2	<2	<2
Strontium	mg/kg	5	2	31	4
Sulphur	mg/kg	150	31	5,700	160
Tellurium	mg/kg	<1	<1	<1	<1
Thallium	mg/kg	<2	<2	<2	<2
Tin	mg/kg	<1	<1	2	<1
Titanium	mg/kg	7	9	61	6
Thorium	mg/kg	6	3	5	6
Uranium	mg/kg	<1	<1	2	1
Vanadium	mg/kg	50	28	62	54
Yttrium*	mg/kg	7.6	4.8	15	7.8

Client Reference: F01-11 Lindenow

Acid Extractable metals in soil					
Our Reference		22941-2	22941-3	22941-5	22941-6
Your Reference	UNITS	L-26	L-27	L-29	L-30
Date Sampled		13/10/2020	13/10/2020	13/10/2020	13/10/2020
Type of sample		Sand	Sand	Sludge	Sand
Zinc	mg/kg	4	1	280	3

**Client Reference: F01-11 Lindenow**

Moisture					
Our Reference		22941-2	22941-3	22941-5	22941-6
Your Reference	UNITS	L-26	L-27	L-29	L-30
Date Sampled		13/10/2020	13/10/2020	13/10/2020	13/10/2020
Type of sample		Sand	Sand	Sludge	Sand
Date prepared	-	14/10/2020	14/10/2020	14/10/2020	14/10/2020
Date analysed	-	15/10/2020	15/10/2020	15/10/2020	15/10/2020
Moisture	%	2.9	14	88	7.3

All metals in water - total			
Our Reference		22941-1	22941-4
Your Reference	UNITS	L-25	L-28
Date Sampled		13/10/2020	13/10/2020
Type of sample		Water	Water
Date prepared	-	14/10/2020	14/10/2020
Date analysed	-	14/10/2020	14/10/2020
Silver-Total	µg/L	<1	<1
Aluminium-Total	µg/L	12,000	43,000
Arsenic-Total	µg/L	3	4
Boron-Total	µg/L	30	60
Barium-Total	µg/L	37	150
Beryllium-Total	µg/L	<0.5	3
Bismuth-Total	µg/L	<1	<1
Cadmium-Total	µg/L	<0.2	<0.2
Cerium-Total*	µg/L	14	66
Cobalt-Total	µg/L	1	6
Chromium-Total	µg/L	11	48
Copper-Total	µg/L	<2	5
Caesium-Total*	µg/L	<1	2
Gallium-Total	µg/L	3	15
Mercury-Total	µg/L	<0.05	<0.05
Iron-Total	µg/L	8,100	30,000
Lanthanum-Total	µg/L	9	43
Lithium-Total	µg/L	3	15
Manganese-Total	µg/L	120	93
Molybdenum-Total	µg/L	<1	<1
Niobium-Total*	µg/L	2.7	2.4
Nickel-Total	µg/L	4	12
Lead-Total	µg/L	6	30
Rubidium-Total*	µg/L	8	31
Rhenium-Total*	µg/L	<1	<1
Antimony-Total	µg/L	<1	<1
Scandium-Total*	µg/L	<1	8
Selenium-Total	µg/L	<1	2
Tin-Total	µg/L	2	<1
Strontium-Total	µg/L	28	69
Tantalum-Total*	µg/L	<1	<1
Tellurium-Total*	µg/L	<0.5	<0.5
Thorium-Total	µg/L	1	5.0
Thallium-Total	µg/L	<1	<1



All metals in water - total			
Our Reference		22941-1	22941-4
Your Reference	UNITS	L-25	L-28
Date Sampled		13/10/2020	13/10/2020
Type of sample		Water	Water
Titanium-Total	µg/L	110	76
Uranium-Total	µg/L	0.6	3.5
Vanadium-Total	µg/L	13	53
Tungsten-Total	µg/L	<1	<1
Yttrium-Total*	µg/L	6.7	33
Zinc-Total	µg/L	9	25

Metals in Waters - Total			
Our Reference		22941-1	22941-4
Your Reference	UNITS	L-25	L-28
Date Sampled		13/10/2020	13/10/2020
Type of sample		Water	Water
Date prepared	-	20/10/2020	20/10/2020
Date analysed	-	20/10/2020	20/10/2020
Sulfur -Total	mg/L	2.0	3.6

**Client Reference: F01-11 Lindenow**

<b>Method ID</b>	<b>Methodology Summary</b>
<b>Inorg-008</b>	Moisture content determined by heating at 105 deg C for a minimum of 12 hours.
<b>Metals-020 ICP-AES</b>	Determination of various metals by ICP-AES.
<b>Metals-021 CV-AAS</b>	Determination of Mercury by Cold Vapour AAS.
<b>Metals-021 CV-AAS</b>	Determination of Mercury by Cold Vapour AAS.
<b>Metals-022 ICP-MS</b>	Determination of various metals by ICP-MS.

Client Reference: F01-11 Lindenow

QUALITY CONTROL: Acid Extractable metals in soil				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date digested	-			14/10/2020	3	14/10/2020	14/10/2020		14/10/2020	[NT]
Date analysed	-			15/10/2020	3	15/10/2020	15/10/2020		15/10/2020	[NT]
Silver	mg/kg	1	Metals-020 ICP-AES	<1	3	<1	<1	0	98	[NT]
Aluminium	mg/kg	10	Metals-020 ICP-AES	<10	3	4700	3600	27	98	[NT]
Antimony	mg/kg	7	Metals-020 ICP-AES	<7	3	<7	<7	0	102	[NT]
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	3	<4	<4	0	108	[NT]
Boron	mg/kg	3	Metals-020 ICP-AES	<3	3	<3	<3	0	89	[NT]
Barium	mg/kg	1	Metals-020 ICP-AES	<1	3	15	11	31	104	[NT]
Beryllium	mg/kg	1	Metals-020 ICP-AES	<1	3	<1	<1	0	109	[NT]
Bismuth	mg/kg	1	Metals-020 ICP-AES	<1	3	<1	<1	0	91	[NT]
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	3	<0.4	<0.4	0	104	[NT]
Cobalt	mg/kg	1	Metals-020 ICP-AES	<1	3	1	1	0	103	[NT]
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	3	8	7	13	103	[NT]
Copper	mg/kg	1	Metals-020 ICP-AES	<1	3	<1	<1	0	101	[NT]
Caesium*	mg/kg	1	Metals-020 ICP-AES	<1	3	<1	<1	0	100	[NT]
Gallium	mg/kg	1	Metals-020 ICP-AES	<1	3	2	2	0	115	[NT]
Gold*	mg/kg	1	Metals-020 ICP-AES	<1	3	<1	<1	0	99	[NT]
Iron	mg/kg	10	Metals-020 ICP-AES	<10	3	12000	13000	8	99	[NT]
Lanthanum*	mg/kg	1	Metals-020 ICP-AES	<1	3	9	8	12	111	[NT]
Lead	mg/kg	1	Metals-020 ICP-AES	<1	3	4	4	0	98	[NT]
Lithium	mg/kg	1	Metals-020 ICP-AES	<1	3	1	1	0	90	[NT]

Client Reference: F01-11 Lindenow

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Manganese	mg/kg	1	Metals-020 ICP-AES	<1	3	10	12	18	105	[NT]
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	3	<0.1	<0.1	0	110	[NT]
Molybdenum	mg/kg	1	Metals-020 ICP-AES	<1	3	<1	<1	0	100	[NT]
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	3	1	1	0	99	[NT]
Selenium	mg/kg	2	Metals-020 ICP-AES	<2	3	<2	<2	0	100	[NT]
Strontium	mg/kg	1	Metals-020 ICP-AES	<1	3	2	2	0	107	[NT]
Sulphur	mg/kg	10	Metals-020 ICP-AES	<10	3	31	33	6	105	[NT]
Tellurium	mg/kg	1	Metals-020 ICP-AES	<1	3	<1	<1	0	98	[NT]
Thallium	mg/kg	2	Metals-020 ICP-AES	<2	3	<2	<2	0	97	[NT]
Tin	mg/kg	1	Metals-020 ICP-AES	<1	3	<1	<1	0	99	[NT]
Titanium	mg/kg	1	Metals-020 ICP-AES	<1	3	9	9	0	108	[NT]
Thorium	mg/kg	2	Metals-022 ICP-MS	<2	3	3	2	40	106	[NT]
Uranium	mg/kg	1	Metals-022 ICP-MS	<1	3	<1	<1	0	107	[NT]
Vanadium	mg/kg	1	Metals-020 ICP-AES	<1	3	28	31	10	102	[NT]
Yttrium*	mg/kg	1	Metals-020 ICP-AES	<1	3	4.8	4.5	6	98	[NT]
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	3	1	<1	0	102	[NT]

Client Reference: F01-11 Lindenow

QUALITY CONTROL: All metals in water - total					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			16/10/2020	[NT]	[NT]	[NT]	[NT]	16/10/2020	[NT]
Date analysed	-			16/10/2020	[NT]	[NT]	[NT]	[NT]	16/10/2020	[NT]
Silver-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Aluminium-Total	µg/L	10	Metals-022 ICP-MS	<10	[NT]	[NT]	[NT]	[NT]	106	[NT]
Arsenic-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Boron-Total	µg/L	20	Metals-022 ICP-MS	<20	[NT]	[NT]	[NT]	[NT]	107	[NT]
Barium-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Beryllium-Total	µg/L	0.5	Metals-022 ICP-MS	<0.5	[NT]	[NT]	[NT]	[NT]	103	[NT]
Bismuth-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	119	[NT]
Cadmium-Total	µg/L	0.1	Metals-022 ICP-MS	<0.1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Cerium-Total*	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Cobalt-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Chromium-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Copper-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Caesium-Total*	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Gallium-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Mercury-Total	µg/L	0.05	Metals-021 CV-AAS	<0.05	[NT]	[NT]	[NT]	[NT]	85	[NT]
Iron-Total	µg/L	10	Metals-022 ICP-MS	<10	[NT]	[NT]	[NT]	[NT]	103	[NT]
Lanthanum-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Lithium-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Manganese-Total	µg/L	5	Metals-022 ICP-MS	<5	[NT]	[NT]	[NT]	[NT]	105	[NT]

Client Reference: F01-11 Lindenow

QUALITY CONTROL: All metals in water - total					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Molybdenum-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Niobium-Total*	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	111	[NT]
Nickel-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Lead-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Rubidium-Total*	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Rhenium-Total*	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Antimony-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Scandium-Total*	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Selenium-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Tin-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Strontium-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Tantalum-Total*	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Tellurium-Total*	µg/L	0.5	Metals-022 ICP-MS	<0.5	[NT]	[NT]	[NT]	[NT]	102	[NT]
Thorium-Total	µg/L	0.5	Metals-022 ICP-MS	<0.5	[NT]	[NT]	[NT]	[NT]	95	[NT]
Thallium-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Titanium-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Uranium-Total	µg/L	0.5	Metals-022 ICP-MS	<0.5	[NT]	[NT]	[NT]	[NT]	101	[NT]
Vanadium-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Tungsten-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Yttrium-Total*	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]

Client Reference: F01-11 Lindenow

QUALITY CONTROL: All metals in water - total					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Zinc-Total	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]



**Client Reference: F01-11 Lindenow**

QUALITY CONTROL: Metals in Waters - Total				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			20/10/2020	[NT]	[NT]	[NT]	[NT]	20/10/2020	[NT]
Date analysed	-			20/10/2020	[NT]	[NT]	[NT]	[NT]	20/10/2020	[NT]
Sulfur -Total	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	[NT]	[NT]	110	[NT]

## Result Definitions

<b>NT</b>	Not tested
<b>NA</b>	Test not required
<b>INS</b>	Insufficient sample for this test
<b>PQL</b>	Practical Quantitation Limit
<b>&lt;</b>	Less than
<b>&gt;</b>	Greater than
<b>RPD</b>	Relative Percent Difference
<b>LCS</b>	Laboratory Control Sample
<b>NS</b>	Not specified
<b>NEPM</b>	National Environmental Protection Measure
<b>NR</b>	Not Reported

## Quality Control Definitions

<b>Blank</b>	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
<b>Duplicate</b>	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
<b>Matrix Spike</b>	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.
<b>LCS (Laboratory Control Sample)</b>	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.
<b>Surrogate Spike</b>	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.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

## 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.

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 QA/QC tables for details; <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 (not SPOCAS); 60-140% for organics/SPOCAS (+/-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 insufficient in order to satisfy laboratory QA/QC protocols.

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.

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 and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

## Report Comments

METALS: The PQL has been raised for Cadmium & Copper due to the sample matrix requiring dilution.

PQL has been raised for Cadmium due to the high moisture content in the sample, resulting in a high dilution factor.