

Supplementary report to the Detailed Site Investigation Report

407 & 457 Crookwell Rd, Kingsdale, NSW

Reference No:	DSI2022-218
Report Date:	6 November 2024
Prepared by:	CSH Consulting PTY LTD

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Revision	Details	Date	Amended By
00	Final version	4 August 2023	Julia Noonan
Supp 01	Addition of ASLP & soil testing for CrVi, Septic system decommissioned. Water testing for ground water.	6 November 2024	Kevin King

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Author: Julia NoonanB.Sc



Signed:

Reviewer: Joshua King

Signed:

Approved by: Kevin King..... Director

Signed:



Date: 7 November 2024

Distribution: Client by PDF

1. Summary of analysis results

CSH Consulting Pty Ltd were engaged by IPG Invest Projects to carry out additional sampling of soils and water at the properties at 407 & 457 Crookwell Rd, Kingsdale to provide additional clarification in order to meet the additional requirements requested by Goulburn Council. The sampling and analysis is to support the previous sampling and analysis conducted for the Detailed Site Investigation Report (DSI dated November 2022 and Supplementary report Reference No DSI2022-218-00) to support the rezoning and development application.

The objective of this report is to provide more detailed and definitive information to evaluate the likelihood of contamination on the land from hexavalent chromium (CrVI) in two samples from the Detailed site investigation, water contamination concerns and decommissioning of the septic system.

Soil samples were collected from locations within the stock yards where previous sampling was conducted. Sampling locations from the DSI were 218-3 & 218-4. The soil samples taken on the 2/10/2024 are 218/3A and 218/4A, with these two samples taken from the same location as the original sample locations. The soil samples were analysed for the presence of hexavalent chromium (CrVI) and a leachate test using ASLP for hexavalent chromium.

Hexavalent chromium

The analysis of the results for these tests were compared against the requirements of HIL A for residential use for hexavalent chromium.

The results (report 363314) of this comparison for chromium levels as hexavalent chromium stated in HIL A (100 mg/kg) and leachate testing using ASLP are that the levels from the analysis for hexavalent chromium (<1mg/kg for both samples) and ASLP for hexavalent chromium (<0.05 mg/kg for both samples) are deemed acceptable as the results are well below the HILs A: residential use limit for hexavalent chromium. The previous results that exceeded the HIL A level for chromium were analysed for chromium which encompassed chromium II, III, and VI. Due to these latest results, it can be assumed that the high levels of Chromium relate to Chromium II and III which do not pose a risk to human health. As a result, remediation of these areas is not required and there is no constraints for the soil on this site for future development.

Water

The water from the dams at 407 and 457 was sampled to determine the contaminants of concern including the waste from the septic system. The results of the analysis (report 363314 & 363314A) indicate the water is suitable stock use.

The following are the results of the analysis of the water and what guidelines the water samples were validated against.

- Water was taken from the 2 dams onsite – 1 to the north in 457 and the other to the south in 407. The water in the dams would be described as Agricultural use – stock watering as per Table 5 – Groundwater environmental values and guidelines for their protection in Schedule B1 of the NEPM and requires comparison to Australian Water Quality Guidelines (AWQG) Volume 3.
 - Nitrogen levels (shown as Amonia, nitrite or nitrate) in the water tested were below the LTV of 5mg/L in Table 9.2.19.
 - Phosphorus levels in the water tested were only just above the LTV of 0.05mg/L in Table 4.2.11 (0.06 mg/L for both samples). This limit is set, however, for water used as irrigation and to minimise the bio-clogging of the irrigation equipment only.

In the AWQG Volume 3 stipulates in section 9.2.10.4 that there has been limits set for irrigation and the limits set in Table 9.2.19 have been set to prevent significant levels of phosphorous moving into water bodies. Based on the results there does not appear to be any significant concern

- E.coli is >10 and <100 cfu/100mL.

Due to being less than 100cfu/100mL the water is below the trigger levels for water use related to raw food human crops and non-food crops and other uses. The water should not be consumed or used for irrigation of human raw food crops (veggie gardens etc) (as per Table 9.2.2 in AWQG Volume 3). Do not drink water from the dams and use appropriate personal hygiene if come in contact with the water, such as washing hands with soap.

The results from the water samples from the dam on 407, that is down stream from the septic tank indicate that the water has not been affected by the effluent from the septic system.

The water from the dams is to be drained and the dam void filled with soil from the local area and dam wall. The draining of the dams will be completed once the properties are destocked.

Septic system.

The septic tank and all associated pipe work is to be removed during the demolition of the house.

The pit created by the removal of the septic tank and any trenches for the removal of associated pipe work can be back filled with soil from the property or imported materials that are verified as being either ENM or VENM

Sydney water guidelines on septic effluent indicate that all effluent remaining in the soil from the septic system will break down in the soil within 2 to 4 weeks and will not pose a threat to human health.

Overall, based on the analysis of the soil, reported values were below the relevant criteria and the likelihood of contamination of that land is low. As a result, the site is deemed suitable for rezoning and development on the basis that remediation action plan is followed.

2. Sampling and analysis quality plan and sampling methodology

Soil samples were collected on 2/10/2024. The soil sampling was conducted in the same locations as sample 218/3 and 218/4 indicated in Figure 1.

Soils were collected using a stainless-steel trowel cleaned and decontaminated after every sample. Samples were placed in virgin 250 mL virgin glass jar with Teflon sealed screw caps.

The water was sampled using suitable sampling procedures. The dams sampled are shown in Figure 2.

All samples were labelled at the time they were taken. Samples were immediately stored in cooled storage bins prior to being delivered to the environmental laboratory under strict Chain-of-Custody conditions.



Figure 1: sampling locations



Figure 2: Dam sampling locations

3. References

CSH Consulting (2022), *Detailed Site Investigation Report*, prepared for IPG Invest Projects (Ref: DSI2022-218-01, dated 24 November 2022).

CSH Consulting (2023), *Remedial Action Plan*, prepared for IPG Invest Projects (Ref: RAP2023-218-01, dated 8 March 2023).

NEPC (2013) National Environmental Protection (Assessment of Site Contamination) Measure 1999, as amended in 2013, National Environment Protection Council.

NSW EPA, Contaminated Land Guidelines, Consultants Reporting on Contaminated Land, April 2020.

NSW EPA, *The excavated natural material order 2014*, Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation, 2014.

NSW EPA Waste Classification guidelines, Part 1 Classifying Waste, 2014.

4. Limitations

This investigation consisted of a visual survey of the site and sampling of soils and water in selected areas. The house, garage and sheds have not been surveyed as the survey will be completed as a pre-demolition survey.

Any person acting or relying on this report, in whole or in part, does so subject to the limitations expressed in this report and at their own risk.

All work is conducted in a conscientious and professional manner, with due diligence and appropriate care. However due to the disproportionate cost of potential damages or liability relative to the cost of our services, CSH Consulting Pty Ltd cannot offer any guarantee that all hazards have been identified. Liability to the client or any other party resulting from the performance or non-performance of the service, whether under contract law, tort law or otherwise, is limited by law.

CSH Consulting Pty Ltd reports are not to be reproduced or reviewed except in full. All reports are prepared for a particular client's objective, and therefore should not be used by any third party as a basis for future decision-making.

The Executive Summary must not be read in isolation, but should be read in conjunction with all sections of this report.

5. Envirolab Reports 363314 & 36314A

CERTIFICATE OF ANALYSIS 363314

Client Details

Client	CSH Consulting Pty Ltd
Attention	Kevin King
Address	3 Pass Ave, Thirroul, NSW, 2515

Sample Details

Your Reference	<u>218</u>
Number of Samples	2 Soil, 4 Water
Date samples received	04/10/2024
Date completed instructions received	04/10/2024

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

Report Details

Date results requested by	22/10/2024
Date of Issue	22/10/2024
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Greta Petzold, Operation Manager
Loren Bardwell, Development Chemist
Nick Sarlamis, Assistant Operation Manager
Timothy Toll, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

Client Reference: 218

ASLP Preparation - Neutral			
Our Reference		363314-1	363314-2
Your Reference	UNITS	218-4A YARD	218-3A RACE
Date Sampled		02/10/2024	02/10/2024
Type of sample		Soil	Soil
pH of final Leachate	pH units	5.7	6.1

Miscellaneous Inorganics					
Our Reference		363314-1	363314-2	363314-3	363314-4
Your Reference	UNITS	218-4A YARD	218-3A RACE	218/11-405	218/12-457
Date Sampled		02/10/2024	02/10/2024	02/10/2024	02/10/2024
Type of sample		Soil	Soil	Water	Water
Date prepared	-	15/10/2024	15/10/2024	15/10/2024	15/10/2024
Date analysed	-	15/10/2024	15/10/2024	15/10/2024	15/10/2024
Hexavalent Cr in ASLP	mg/L	<0.05	<0.05	[NA]	[NA]
Ammonia as N in water	mg/L	[NA]	[NA]	<0.005	0.044
Nitrate as N in water	mg/L	[NA]	[NA]	<0.005	0.02
Nitrite as N in water	mg/L	[NA]	[NA]	<0.005	<0.005
NOx as N in water	mg/L	[NA]	[NA]	<0.005	0.02
Total Nitrogen in water	mg/L	[NA]	[NA]	0.9	1.3
TKN in water	mg/L	[NA]	[NA]	0.9	1.3
Organic Nitrogen as N	mg/L	[NA]	[NA]	0.9	1.2
Phosphate as P in water	mg/L	[NA]	[NA]	<0.005	<0.005

Metals in Waters - Acid extractable			
Our Reference		363314-3	363314-4
Your Reference	UNITS	218/11-405	218/12-457
Date Sampled		02/10/2024	02/10/2024
Type of sample		Water	Water
Date prepared	-	18/10/2024	18/10/2024
Date analysed	-	18/10/2024	18/10/2024
Phosphorus - Total	mg/L	0.06	0.06

Microbiological Testing			
Our Reference		363314-5	363314-6
Your Reference	UNITS	218/11-405	218/12-457
Date Sampled		11/10/2024	11/10/2024
Type of sample		Water	Water
Date of testing	-	17/10/2024	17/10/2024
E. coli	cfu/100mL	>10 &<100	>10 &<100

Method ID	Methodology Summary
Ext-008	Subcontracted to Sonic Food & Water Testing. NATA Accreditation No. 4034.
Inorg-004	<p>Toxicity Characteristic Leaching Procedure (TCLP) using AS 4439.</p> <p>Please note that the mass used may be scaled down from default based on sample mass available.</p> <p>Samples are stored at 2-6oC before and after leachate preparation.</p>
Inorg-055	Nitrate - determined colourimetrically. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-055	Nitrite - determined colourimetrically based on APHA latest edition NO2- B. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-055/062/127	Total Nitrogen - Calculation sum of TKN and oxidised Nitrogen. Alternatively analysed by combustion and chemiluminescence.
Inorg-057	Ammonia - determined colourimetrically, based on APHA latest edition 4500-NH3 F. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a KCl extraction.
Inorg-060	Phosphate determined colourimetrically based on EPA365.1 and APHA latest edition 4500 P E. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-062	TKN - determined colourimetrically based on APHA latest edition 4500 Norg. Alternatively, TKN can be derived from calculation (Total N - NOx).
Inorg-118	<p>Hexavalent Chromium (Cr6+) - determined firstly by separation using ion chromatography followed by the colourimetric analytical finish.</p> <p>Water samples are ideally field filtered into alkali preserved containers prior to receipt for dissolved Cr6+ analysis. Unfiltered water samples into alkali preserved containers (or pH adjusted to pH 8-9 on receipt) can be classified as Total (unfiltered) Cr6+.</p> <p>Please note, for 'Total/Unfiltered' Trivalent Chromium in waters [calculated], these results may be exaggerated due to the digestive limitation of 'Total/Unfiltered' Hexavalent Chromium in NaOH at pH 8-9 compared to more comprehensive digestion for Total Chromium using the mineral acids HNO3 and HCl.</p> <p>Solid (includes soils, filters, paints, swabs for example) samples are extracted in a buffered catalysed solution prior to the analytical finish above. Water extractable options are available (e.g. as an option for filters) on request.</p> <p>Impingers may need pH adjusting to pH 8-9 prior to IC-colourimetric analytical finish.</p>
Metals-020	Determination of various metals by ICP-AES.

QUALITY CONTROL: Miscellaneous Inorganics					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			15/10/2024	[NT]	[NT]	[NT]	[NT]	15/10/2024	[NT]
Date analysed	-			15/10/2024	[NT]	[NT]	[NT]	[NT]	15/10/2024	[NT]
Hexavalent Cr in ASLP	mg/L	0.05	Inorg-118	<0.05	[NT]	[NT]	[NT]	[NT]	103	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	[NT]	[NT]	[NT]	[NT]	98	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	[NT]	[NT]	[NT]	[NT]	107	[NT]
Nitrite as N in water	mg/L	0.005	Inorg-055	<0.005	[NT]	[NT]	[NT]	[NT]	93	[NT]
NOx as N in water	mg/L	0.005	Inorg-055	<0.005	[NT]	[NT]	[NT]	[NT]	107	[NT]
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	<0.1	[NT]	[NT]	[NT]	[NT]	91	[NT]
TKN in water	mg/L	0.1	Inorg-062	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Organic Nitrogen as N	mg/L	0.2	Inorg-055/062/127	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	[NT]	[NT]	[NT]	[NT]	103	[NT]

QUALITY CONTROL: Metals in Waters - Acid extractable						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			18/10/2024	[NT]	[NT]	[NT]	[NT]	18/10/2024	[NT]
Date analysed	-			18/10/2024	[NT]	[NT]	[NT]	[NT]	18/10/2024	[NT]
Phosphorus - Total	mg/L	0.05	Metals-020	<0.05	[NT]	[NT]	[NT]	[NT]	87	[NT]

Result Definitions

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

Quality Control Definitions

Blank	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.
Duplicate	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.
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.
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.
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.
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.

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

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

Microbiology analysed by Sonic Food & Water Testing. Report No. W2424803

The time between collection and the commencement of testing should not exceed 24 hours. Samples tested outside this time may have their results compromised

CERTIFICATE OF ANALYSIS 363314-A

Client Details

Client	CSH Consulting Pty Ltd
Attention	Julia Noonan
Address	3 Pass Ave, Thirroul, NSW, 2515

Sample Details

Your Reference	<u>218</u>
Number of Samples	Additional analysis
Date samples received	04/10/2024
Date completed instructions received	23/10/2024

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	30/10/2024
Date of Issue	30/10/2024
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Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Nick Sarlamis, Assistant Operation Manager
Steven Luong, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

Misc Soil - Inorg			
Our Reference		363314-A-1	363314-A-2
Your Reference	UNITS	218-4A YARD	218-3A RACE
Date Sampled		02/10/2024	02/10/2024
Type of sample		Soil	Soil
Date prepared	-	24/10/2024	24/10/2024
Date analysed	-	24/10/2024	24/10/2024
Hexavalent Chromium, Cr ⁶⁺	mg/kg	<1	<1

Moisture			
Our Reference	UNITS	363314-A-1	363314-A-2
Your Reference		218-4A YARD	218-3A RACE
Date Sampled		02/10/2024	02/10/2024
Type of sample		Soil	Soil
Date prepared	-	24/10/2024	24/10/2024
Date analysed	-	25/10/2024	25/10/2024
Moisture	%	13	12

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-118	<p>Hexavalent Chromium (Cr6+) - determined firstly by separation using ion chromatography followed by the colourimetric analytical finish.</p> <p>Water samples are ideally field filtered into alkali preserved containers prior to receipt for dissolved Cr6+ analysis. Unfiltered water samples into alkali preserved containers (or pH adjusted to pH 8-9 on receipt) can be classified as Total (unfiltered) Cr6+.</p> <p>Please note, for 'Total/Unfiltered' Trivalent Chromium in waters [calculated], these results may be exaggerated due to the digestive limitation of 'Total/Unfiltered' Hexavalent Chromium in NaOH at pH 8-9 compared to more comprehensive digestion for Total Chromium using the mineral acids HNO3 and HCl.</p> <p>Solid (includes soils, filters, paints, swabs for example) samples are extracted in a buffered catalysed solution prior to the analytical finish above. Water extractable options are available (e.g. as an option for filters) on request.</p> <p>Impingers may need pH adjusting to pH 8-9 prior to IC-colourimetric analytical finish.</p>

QUALITY CONTROL: Misc Soil - Inorg					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			24/10/2024	1	24/10/2024	24/10/2024		24/10/2024	[NT]
Date analysed	-			24/10/2024	1	24/10/2024	24/10/2024		24/10/2024	[NT]
Hexavalent Chromium, Cr ⁶⁺	mg/kg	1	Inorg-118	<1	1	<1	<1	0	104	[NT]

Result Definitions

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Blank	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.
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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	

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6. Summary of Results

Laboratory Analysis against NEPM 1999									
Table 1A(1)	Health investigation levels for soil contaminants						Sample Reference	363314-A-1	363314-A-2
							Sample Name	218-4A YARD	218-3A RACE
							Date Sampled	2/10/2024	2/10/2024
								Soil	Soil
Group	Chemical	Residential A	Dataset mean	Dataset median	Dataset standard deviation	95% UCL	Dataset maximum	200 mm	200 mm
Metals	Chromium (VI)	100	<1	<1	0	0	<1	<1	<1