

CLIENT DETAILS

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Project **Process Water Borefield**
 Order Number **LD00863**
 Samples **2**

LABORATORY DETAILS

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SGS Reference **PE111919A R0**
 Date Received **22 Mar 2018**
 Date Reported **23 Mar 2018**

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(898/20210).

Metals: LORs raised due to high conductivity.
 Metals: The over range results on ICPMS Method AN318 were reported using ICPOES method AN320.

SIGNATORIES



Hue Thanh Ly
 Metals Team Leader

Parameter	Units	LOR	PE111919A.001	PE111919A.002
Sample Number			PE111919A.001	PE111919A.002
Sample Matrix			Water	Water
Sample Date			03 Nov 2016	05 Nov 2016
Sample Name			Bore P26	Bore P60

Metals in Water (Dissolved) by ICPOES Method: AN320 Tested: 22/3/2018

Parameter	Units	LOR	PE111919A.001	PE111919A.002
Calcium, Ca	mg/L	0.2	120	86
Magnesium, Mg	mg/L	0.1	61	41
Potassium, K	mg/L	0.1	61	23
Sodium, Na	mg/L	0.5	3000	340

Trace Metals (Dissolved) in Water by ICPMS in mg/L Method: AN318 Tested: 22/3/2018

Parameter	Units	LOR	PE111919A.001	PE111919A.002
Aluminium, Al	mg/L	0.005	<0.025 †	<0.005
Antimony, Sb	mg/L	0.001	<0.005 †	<0.001
Arsenic, As	mg/L	0.001	<0.005 †	<0.001
Beryllium, Be	mg/L	0.001	<0.005 †	<0.001
Boron, B	mg/L	0.005	0.84	0.52
Cadmium, Cd	mg/L	0.0001	0.0009	<0.0001
Chromium, Cr	mg/L	0.001	<0.005 †	<0.001
Cobalt, Co	mg/L	0.001	<0.005 †	<0.001
Copper, Cu	mg/L	0.001	<0.005 †	<0.001
Iron, Fe	mg/L	0.005	<0.025 †	<0.005
Lead, Pb	mg/L	0.001	<0.005 †	<0.001
Manganese, Mn	mg/L	0.001	0.038	0.043
Molybdenum, Mo	mg/L	0.001	<0.005 †	<0.001
Nickel, Ni	mg/L	0.001	<0.005 †	<0.001
Selenium, Se	mg/L	0.001	<0.005 †	0.004
Thorium, Th	mg/L	0.001	<0.005 †	<0.001
Uranium, U	mg/L	0.001	0.011	0.007
Zinc, Zn	mg/L	0.005	<0.025 †	<0.005

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Metals in Water (Dissolved) by ICPOES Method: ME-(AU)-[ENV]AN320

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Calcium, Ca	LB143846	mg/L	0.2	<0.2	99%
Magnesium, Mg	LB143846	mg/L	0.1	<0.1	99%
Potassium, K	LB143846	mg/L	0.1	<0.1	102%
Sodium, Na	LB143846	mg/L	0.5	<0.5	103%

Trace Metals (Dissolved) in Water by ICPMS in mg/L Method: ME-(AU)-[ENV]AN318

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Aluminium, Al	LB143845	mg/L	0.005	<0.005	146%	117%
Antimony, Sb	LB143845	mg/L	0.001	<0.001	33%	104%
Arsenic, As	LB143845	mg/L	0.001	<0.001	7%	120%
Beryllium, Be	LB143845	mg/L	0.001	<0.001	18%	111%
Boron, B	LB143845	mg/L	0.005	<0.005	9%	93%
Cadmium, Cd	LB143845	mg/L	0.0001	<0.0001	25%	109%
Chromium, Cr	LB143845	mg/L	0.001	<0.001	59%	107%
Cobalt, Co	LB143845	mg/L	0.001	<0.001	5%	106%
Copper, Cu	LB143845	mg/L	0.001	<0.001	125%	113%
Iron, Fe	LB143845	mg/L	0.005	<0.005	9%	108%
Lead, Pb	LB143845	mg/L	0.001	<0.001	6%	112%
Manganese, Mn	LB143845	mg/L	0.001	<0.001	1%	109%
Molybdenum, Mo	LB143845	mg/L	0.001	<0.001	1%	108%
Nickel, Ni	LB143845	mg/L	0.001	<0.001	44%	110%
Selenium, Se	LB143845	mg/L	0.001	<0.001	5%	111%
Thorium, Th	LB143845	mg/L	0.001	<0.001	197%	97%
Uranium, U	LB143845	mg/L	0.001	<0.001	0%	107%
Zinc, Zn	LB143845	mg/L	0.005	<0.005	7%	113%

METHOD

METHODOLOGY SUMMARY

AN318	Determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.
AN320	Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components .
AN320	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
**	Indicative data, theoretical holding time exceeded.	QFL	QC result is below the lower tolerance
		-	The sample was not analysed for this analyte
		NVL	Not Validated

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.

Note that in terms of units of radioactivity:

- a. 1 Bq is equivalent to 27 pCi
- b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : <http://www.sgs.com.au/~media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf>

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