

21 March 2025

Attention: Rob Johnston
Pig Improvement Company Australia Pty Ltd
PO Box 39
Grong Grong NSW 2652
rjohnston@picaustralia.com.au

BY EMAIL

Dear Rob

Re: Environmental monitoring – PIC Grong Grong Pig Accommodation

I refer to the written request from yourself to conduct environmental monitoring at the PIC Grong Grong Pig Accommodation Grong Grong NSW. The intended recipient of this report is Rob Johnston of Pig Improvement Company Australia Pty Ltd to satisfy the requirements of NSW EPA Environmental Protection Licence No. 5471. It is assumed that third parties will not rely on this report, however DM McMahon Pty Ltd is required to be consulted if the report is to be used for any other purpose.

Objective and scope

The objective of the environmental monitoring is to satisfy the requirements of Environmental Protection Licence No. 5471 (Licence version date 9 August 2023).

The requirements of the licence are to:

- Collect groundwater samples on a six monthly basis from eight groundwater monitoring bores (Point 2, Point 3, Point 4, Point 5, Point 6, Point 7, Point 8 and Point 9). Samples will be tested for conductivity, nitrate, nitrite, nitrogen (ammonia), nitrogen (total), pH, potassium, sodium and total dissolved solids. Standing water level will be measured quarterly.

The scope of this monitoring round is to collect groundwater samples from the eight groundwater monitoring bores.

Location and description of the site

The monitoring points are located at the PIC Grong Grong Pig Accommodation, Berembled Weir Road Grong Grong NSW, **Attachment A**. The site is a 500-tonne accommodation capacity piggery and the effluent produced is applied to land by irrigation. The pig accommodation sheds are in the north east of the site with effluent storage ponds to the north

west and south west of the accommodation sheds. The irrigation area lies to the west of the accommodation sheds.

Description of the regional and local environment

The subject site lies at an elevation of approximately 153-163m AHD on a south west trending piedmont slope and alluvial flat. Soils on the higher ground are deep red clayey colluvium and residuum overlying Ordovician sediments, while the flat is far-floodplain Quaternary alluvium consisting of grey clay. The higher ground in the north east is very gently inclined while the lower ground is a level typical of the Murrumbidgee River floodplain. The Cowabbie Creek traverses the site in a south westerly direction and is joined by the Boggy Creek near the eastern site boundary. Both Cowabbie Creek and Boggy Creek are intermittent drainages with intermediate scale catchments. Bundidgerry Creek lies to the immediate south of the southern site boundary and flows in a generally westerly direction.

Records of fieldwork, including methods and results

The groundwater monitoring locations were sampled on 11 March 2025 by reference to AS5667.1:1998 Water Quality Sampling Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples and AS5667.11:1998 Part 11: Guidance on sampling of groundwaters.

Summary of results

The tabulated results can be seen in **Attachment B** and the laboratory report in **Attachment C**.

If you have any queries about the contents of this letter format report, please contact the undersigned.

Yours sincerely

A handwritten signature in dark ink, appearing to read 'D. McMahon', is written over a light-colored rectangular background.

David McMahon CPSS CEnvP SC

BAppSc SA

GradDip WRM

MEnvMgmt

MALGA MEIANZ MSSA

Disclaimer

The information contained in this report has been extracted from sources believed to be reliable and accurate. DM McMahon Pty Ltd will not assume any responsibility for the misinterpretation of information supplied in this report. The accuracy and reliability of recommendations identified in this report need to be evaluated with due care according to individual circumstances. The results of the assessment undertaken are an overall representation of the conditions encountered. It should be noted that the recommendations and findings in this report are based solely upon the said site location and the ground level conditions at the time of testing. The results of the said investigations undertaken are an overall representation of the conditions encountered. The properties of the soil within the location may change due to variations in ground conditions outside of the tested area. The author has no control or liability over site variability that may warrant further investigation that may lead to significant design changes.

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Attachments

- A.** Sampling locations map
- B.** Tabulated results
- C.** Laboratory report



Attachment A : *Sampling locations map*

314 Grong Grong River Road Grong Grong NSW 2652

Pig Improvement Company Australia Pty Ltd
Groundwater monitoring locations
NSW EPA Environmental Protection Licence 5471

Legend

- Boundary
- Point 2-9 (Groundwater)





Attachment B : *Tabulated results*

PIC Grong Grong Pig Accommodation - Environmental Protection Licence 5471 (licence version date 31 July 2023)

Monitoring period 1 September 2024 to 31 August 2025

Point 2 - Groundwater quality monitoring bore identified as P3 A (six monthly groundwater monitoring)

Parameters	Units	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25
Conductivity	µS/cm	18000	-	-	-	-	-	21000	-	-	-	-	-
Nitrate	mg/L	28	-	-	-	-	-	22	-	-	-	-	-
Nitrite	mg/L	0.098	-	-	-	-	-	0.13	-	-	-	-	-
Nitrogen (ammonia)	mg/L	<0.05	-	-	-	-	-	<0.05	-	-	-	-	-
Nitrogen (total)	mg/L	29	-	-	-	-	-	23	-	-	-	-	-
pH	pH	7.2	-	-	-	-	-	7.4	-	-	-	-	-
Phosphorus	mg/L	0.65	-	-	-	-	-	0.04	-	-	-	-	-
Potassium	mg/L	38	-	-	-	-	-	46	-	-	-	-	-
Sodium	mg/L	3300	-	-	-	-	-	3400	-	-	-	-	-
Standing water level	mBTOC	4.23	-	-	-	-	-	4.25	-	-	-	-	-
Standing water level	mAHD	148.87	-	-	-	-	-	148.85	-	-	-	-	-
Total dissolved solids	mg/L	13000	-	-	-	-	-	14000	-	-	-	-	-

PIC Grong Grong Pig Accommodation - Environmental Protection Licence 5471 (licence version date 31 July 2023)

Monitoring period 1 September 2024 to 31 August 2025

Point 3 - Groundwater quality monitoring bore identified as P5 A (six monthly groundwater monitoring)

Parameters	Units	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25
Conductivity	µS/cm	Dry	-	-	-	-	-	Dry	-	-	-	-	-
Nitrate	mg/L	Dry	-	-	-	-	-	Dry	-	-	-	-	-
Nitrite	mg/L	Dry	-	-	-	-	-	Dry	-	-	-	-	-
Nitrogen (ammonia)	mg/L	Dry	-	-	-	-	-	Dry	-	-	-	-	-
Nitrogen (total)	mg/L	Dry	-	-	-	-	-	Dry	-	-	-	-	-
pH	pH	Dry	-	-	-	-	-	Dry	-	-	-	-	-
Phosphorus	mg/L	Dry	-	-	-	-	-	Dry	-	-	-	-	-
Potassium	mg/L	Dry	-	-	-	-	-	Dry	-	-	-	-	-
Sodium	mg/L	Dry	-	-	-	-	-	Dry	-	-	-	-	-
Standing water level	mBTOC	Dry	-	-	-	-	-	Dry	-	-	-	-	-
Standing water level	mAHD	Dry	-	-	-	-	-	Dry	-	-	-	-	-
Total dissolved solids	mg/L	Dry	-	-	-	-	-	Dry	-	-	-	-	-

PIC Grong Grong Pig Accommodation - Environmental Protection Licence 5471 (licence version date 31 July 2023)													
Monitoring period 1 September 2024 to 31 August 2025													
Point 4 - Groundwater quality monitoring bore identified as P1 A (six monthly groundwater monitoring)													
Parameters	Units	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25
Conductivity	µS/cm	30000	-	-	-	-	-	33000	-	-	-	-	-
Nitrate	mg/L	<0.050	-	-	-	-	-	0.96	-	-	-	-	-
Nitrite	mg/L	<0.005	-	-	-	-	-	<0.005	-	-	-	-	-
Nitrogen (ammonia)	mg/L	<0.05	-	-	-	-	-	<0.05	-	-	-	-	-
Nitrogen (total)	mg/L	0.16	-	-	-	-	-	1.6	-	-	-	-	-
pH	pH	6.8	-	-	-	-	-	7.0	-	-	-	-	-
Phosphorus	mg/L	2.4	-	-	-	-	-	<0.02	-	-	-	-	-
Potassium	mg/L	120	-	-	-	-	-	95	-	-	-	-	-
Sodium	mg/L	5300	-	-	-	-	-	5600	-	-	-	-	-
Standing water level	mBTOC	3.02	-	-	-	-	-	3.34	-	-	-	-	-
Standing water level	mAHD	152.11	-	-	-	-	-	151.79	-	-	-	-	-
Total dissolved solids	mg/L	25000	-	-	-	-	-	25000	-	-	-	-	-

PIC Grong Grong Pig Accommodation - Environmental Protection Licence 5471 (licence version date 31 July 2023)

Monitoring period 1 September 2024 to 31 August 2025

Point 5 - Groundwater quality monitoring bore identified as P2 A (six monthly groundwater monitoring)

Parameters	Units	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25
Conductivity	µS/cm	28000	-	-	-	-	-	29000	-	-	-	-	-
Nitrate	mg/L	<0.050	-	-	-	-	-	4.0	-	-	-	-	-
Nitrite	mg/L	<0.005	-	-	-	-	-	<0.005	-	-	-	-	-
Nitrogen (ammonia)	mg/L	<0.05	-	-	-	-	-	0.25	-	-	-	-	-
Nitrogen (total)	mg/L	0.33	-	-	-	-	-	4.9	-	-	-	-	-
pH	pH	7.1	-	-	-	-	-	7.3	-	-	-	-	-
Phosphorus	mg/L	0.47	-	-	-	-	-	0.02	-	-	-	-	-
Potassium	mg/L	74	-	-	-	-	-	62	-	-	-	-	-
Sodium	mg/L	5200	-	-	-	-	-	5600	-	-	-	-	-
Standing water level	mBTOC	1.71	-	-	-	-	-	2.30	-	-	-	-	-
Standing water level	mAHD	151.37	-	-	-	-	-	150.78	-	-	-	-	-
Total dissolved solids	mg/L	21000	-	-	-	-	-	19000	-	-	-	-	-

PIC Grong Grong Pig Accommodation - Environmental Protection Licence 5471 (licence version date 31 July 2023)

Monitoring period 1 September 2024 to 31 August 2025

Point 6 - Groundwater quality monitoring bore identified as P3 B (six monthly groundwater monitoring)

Parameters	Units	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25
Conductivity	µS/cm	21000	-	-	-	-	-	22000	-	-	-	-	-
Nitrate	mg/L	18	-	-	-	-	-	18	-	-	-	-	-
Nitrite	mg/L	0.009	-	-	-	-	-	0.021	-	-	-	-	-
Nitrogen (ammonia)	mg/L	<0.05	-	-	-	-	-	<0.05	-	-	-	-	-
Nitrogen (total)	mg/L	19	-	-	-	-	-	19	-	-	-	-	-
pH	pH	7.2	-	-	-	-	-	7.3	-	-	-	-	-
Phosphorus	mg/L	1.0	-	-	-	-	-	<0.02	-	-	-	-	-
Potassium	mg/L	46	-	-	-	-	-	48	-	-	-	-	-
Sodium	mg/L	3800	-	-	-	-	-	3600	-	-	-	-	-
Standing water level	mBTOC	4.17	-	-	-	-	-	4.25	-	-	-	-	-
Standing water level	mAHD	148.91	-	-	-	-	-	148.83	-	-	-	-	-
Total dissolved solids	mg/L	15000	-	-	-	-	-	15000	-	-	-	-	-

PIC Grong Grong Pig Accommodation - Environmental Protection Licence 5471 (licence version date 31 July 2023)													
Monitoring period 1 September 2024 to 31 August 2025													
Point 7 - Groundwater quality monitoring bore identified as P5 B (six monthly groundwater monitoring)													
Parameters	Units	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25
Conductivity	µS/cm	N/A	-	-	-	-	-	N/A	-	-	-	-	-
Nitrate	mg/L	N/A	-	-	-	-	-	N/A	-	-	-	-	-
Nitrite	mg/L	N/A	-	-	-	-	-	N/A	-	-	-	-	-
Nitrogen (ammonia)	mg/L	N/A	-	-	-	-	-	N/A	-	-	-	-	-
Nitrogen (total)	mg/L	N/A	-	-	-	-	-	N/A	-	-	-	-	-
pH	pH	N/A	-	-	-	-	-	N/A	-	-	-	-	-
Phosphorus	mg/L	N/A	-	-	-	-	-	N/A	-	-	-	-	-
Potassium	mg/L	N/A	-	-	-	-	-	N/A	-	-	-	-	-
Sodium	mg/L	N/A	-	-	-	-	-	N/A	-	-	-	-	-
Standing water level	mBTOC	3.65	-	-	-	-	-	3.68	-	-	-	-	-
Standing water level	mAHD	148.15	-	-	-	-	-	148.12	-	-	-	-	-
Total dissolved solids	mg/L	N/A	-	-	-	-	-	N/A	-	-	-	-	-

N/A = not enough water to sample

PIC Grong Grong Pig Accommodation - Environmental Protection Licence 5471 (licence version date 31 July 2023)													
Monitoring period 1 September 2024 to 31 August 2025													
Point 8 - Groundwater quality monitoring bore identified as P4 A (six monthly groundwater monitoring)													
Parameters	Units	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25
Conductivity	µS/cm	10000	-	-	-	-	-	10000	-	-	-	-	-
Nitrate	mg/L	22	-	-	-	-	-	19	-	-	-	-	-
Nitrite	mg/L	<0.005	-	-	-	-	-	<0.005	-	-	-	-	-
Nitrogen (ammonia)	mg/L	<0.05	-	-	-	-	-	0.03	-	-	-	-	-
Nitrogen (total)	mg/L	22	-	-	-	-	-	21	-	-	-	-	-
pH	pH	7.6	-	-	-	-	-	7.6	-	-	-	-	-
Phosphorus	mg/L	0.57	-	-	-	-	-	0.54	-	-	-	-	-
Potassium	mg/L	8.9	-	-	-	-	-	9.5	-	-	-	-	-
Sodium	mg/L	1500	-	-	-	-	-	1400	-	-	-	-	-
Standing water level	mBTOC	3.92	-	-	-	-	-	3.70	-	-	-	-	-
Standing water level	mAHD	147.97	-	-	-	-	-	148.19	-	-	-	-	-
Total dissolved solids	mg/L	7100	-	-	-	-	-	6300	-	-	-	-	-

PIC Grong Grong Pig Accommodation - Environmental Protection Licence 5471 (licence version date 31 July 2023)

Monitoring period 1 September 2024 to 31 August 2025

Point 9 - Groundwater quality monitoring bore identified as P4 B (six monthly groundwater monitoring)

Parameters	Units	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25
Conductivity	µS/cm	7700	-	-	-	-	-	7300	-	-	-	-	-
Nitrate	mg/L	15	-	-	-	-	-	13	-	-	-	-	-
Nitrite	mg/L	<0.005	-	-	-	-	-	<0.005	-	-	-	-	-
Nitrogen (ammonia)	mg/L	0.02	-	-	-	-	-	<0.01	-	-	-	-	-
Nitrogen (total)	mg/L	16	-	-	-	-	-	13	-	-	-	-	-
pH	pH	7.5	-	-	-	-	-	7.6	-	-	-	-	-
Phosphorus	mg/L	0.48	-	-	-	-	-	0.21	-	-	-	-	-
Potassium	mg/L	7.4	-	-	-	-	-	7.8	-	-	-	-	-
Sodium	mg/L	1200	-	-	-	-	-	1200	-	-	-	-	-
Standing water level	mBTOC	3.94	-	-	-	-	-	3.69	-	-	-	-	-
Standing water level	mAHD	147.97	-	-	-	-	-	148.22	-	-	-	-	-
Total dissolved solids	mg/L	5300	-	-	-	-	-	4700	-	-	-	-	-



Attachment C : *Laboratory reports*

CLIENT DETAILS

Contact Admin
 Client DM MCMAHON
 Address 6 Jones Street
 Wagga Wagga
 PO Box 6118
 WAGGA WAGGA NSW 2650
 Telephone 61 2 69310510
 Facsimile (Not specified)
 Email admin@dmmcmahon.com.au
 Project **10350 PIC Australia Pty Ltd - Grong Gron**
 Order Number **10350**
 Samples 6

LABORATORY DETAILS

Manager Shane McDermott
 Laboratory SGS Alexandria Environmental
 Address Unit 16, 33 Maddox St
 Alexandria NSW 2015
 Telephone +61 2 8594 0400
 Facsimile +61 2 8594 0499
 Email au.environmental.sydney@sgs.com
 SGS Reference **SE279718 R0**
 Date Received 13/3/2025
 Date Reported 20/3/2025

COMMENTS


Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

Ammonia Nitrogen - The Limit of Reporting (LOR) has been raised due to matrix interference.

SIGNATORIES



Bennet LO
Senior Chemist



Dong LIANG
Metals/Inorganics Team Leader



Ying Ying ZHANG
Laboratory Technician

Anions by Ion Chromatography in Water [AN245] Tested: 14/3/2025

PARAMETER	UOM	LOR	P1 A	P2 A	P3 A	P3 B	P4 A
			WATER - 11/3/2025 SE279718.001	WATER - 11/3/2025 SE279718.002	WATER - 11/3/2025 SE279718.003	WATER - 11/3/2025 SE279718.004	WATER - 11/3/2025 SE279718.005
Nitrate Nitrogen, NO3-N	mg/L	0.005	0.96	4.0	22	18	19

PARAMETER	UOM	LOR	P4 B
			WATER - 11/3/2025 SE279718.006
Nitrate Nitrogen, NO3-N	mg/L	0.005	13

Nitrite in Water [AN277] Tested: 14/3/2025

PARAMETER	UOM	LOR	P1 A	P2 A	P3 A	P3 B	P4 A
			WATER - 11/3/2025 SE279718.001	WATER - 11/3/2025 SE279718.002	WATER - 11/3/2025 SE279718.003	WATER - 11/3/2025 SE279718.004	WATER - 11/3/2025 SE279718.005
Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	0.13	0.021	<0.005
Total Oxidised Nitrogen, NOx-N	mg/L	0.005	0.97	4.0	22	18	19

PARAMETER	UOM	LOR	P4 B
			WATER - 11/3/2025 SE279718.006
Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005
Total Oxidised Nitrogen, NOx-N	mg/L	0.005	13

Ammonia Nitrogen by Discrete Analyser [AN291] Tested: 14/3/2025

PARAMETER	UOM	LOR	P1 A	P2 A	P3 A	P3 B	P4 A
			WATER - 11/3/2025 SE279718.001	WATER - 11/3/2025 SE279718.002	WATER - 11/3/2025 SE279718.003	WATER - 11/3/2025 SE279718.004	WATER - 11/3/2025 SE279718.005
Ammonia Nitrogen, NH ₃ as N	mg/L	0.01	<0.05 †	0.25	<0.05 †	<0.05 †	0.03

PARAMETER	UOM	LOR	P4 B
			WATER - 11/3/2025 SE279718.006
Ammonia Nitrogen, NH ₃ as N	mg/L	0.01	<0.01

TKN Kjeldahl Digestion by Discrete Analyser [AN292] Tested: 17/3/2025

PARAMETER	UOM	LOR	P1 A	P2 A	P3 A	P3 B	P4 A
			WATER - 11/3/2025 SE279718.001	WATER - 11/3/2025 SE279718.002	WATER - 11/3/2025 SE279718.003	WATER - 11/3/2025 SE279718.004	WATER - 11/3/2025 SE279718.005
Total Kjeldahl Nitrogen	mg/L	0.05	0.66	0.95	1.1	0.68	1.8
Total Nitrogen (calc)	mg/L	0.05	1.6	4.9	23	19	21

PARAMETER	UOM	LOR	P4 B
			WATER - 11/3/2025 SE279718.006
Total Kjeldahl Nitrogen	mg/L	0.05	0.70
Total Nitrogen (calc)	mg/L	0.05	13

Total Phosphorus by Kjeldahl Digestion DA in Water [AN279/AN293(Sydney only)] Tested: 17/3/2025

PARAMETER	UOM	LOR	P1 A	P2 A	P3 A	P3 B	P4 A
			WATER - 11/3/2025 SE279718.001	WATER - 11/3/2025 SE279718.002	WATER - 11/3/2025 SE279718.003	WATER - 11/3/2025 SE279718.004	WATER - 11/3/2025 SE279718.005
Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	<0.02	0.02	0.04	<0.02	0.54

PARAMETER	UOM	LOR	P4 B
			WATER - 11/3/2025 SE279718.006
Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	0.21

pH in water [AN101] Tested: 14/3/2025

PARAMETER	UOM	LOR	P1 A WATER - 11/3/2025 SE279718.001	P2 A WATER - 11/3/2025 SE279718.002	P3 A WATER - 11/3/2025 SE279718.003	P3 B WATER - 11/3/2025 SE279718.004	P4 A WATER - 11/3/2025 SE279718.005
pH**	No unit	-	7.0	7.3	7.4	7.3	7.6

PARAMETER	UOM	LOR	P4 B WATER - 11/3/2025 SE279718.006
pH**	No unit	-	7.6

Conductivity and TDS by Calculation - Water [AN106] Tested: 14/3/2025

PARAMETER	UOM	LOR	P1 A WATER - 11/3/2025 SE279718.001	P2 A WATER - 11/3/2025 SE279718.002	P3 A WATER - 11/3/2025 SE279718.003	P3 B WATER - 11/3/2025 SE279718.004	P4 A WATER - 11/3/2025 SE279718.005
Conductivity @ 25 C	µS/cm	2	33000	29000	21000	22000	10000

PARAMETER	UOM	LOR	P4 B WATER - 11/3/2025 SE279718.006
Conductivity @ 25 C	µS/cm	2	7300

Metals in Water (Dissolved) by ICPOES [AN320] Tested: 17/3/2025

PARAMETER	UOM	LOR	P1 A	P2 A	P3 A	P3 B	P4 A
			WATER - 11/3/2025 SE279718.001	WATER - 11/3/2025 SE279718.002	WATER - 11/3/2025 SE279718.003	WATER - 11/3/2025 SE279718.004	WATER - 11/3/2025 SE279718.005
Sodium, Na	mg/L	0.5	5600	5600	3400	3600	1400
Potassium, K	mg/L	0.1	95	62	46	48	9.5

PARAMETER	UOM	LOR	P4 B
			WATER - 11/3/2025 SE279718.006
Sodium, Na	mg/L	0.5	1200
Potassium, K	mg/L	0.1	7.8

Total Dissolved Solids (TDS) in water [AN113] Tested: 17/3/2025

PARAMETER	UOM	LOR	P1 A WATER - 11/3/2025 SE279718.001	P2 A WATER - 11/3/2025 SE279718.002	P3 A WATER - 11/3/2025 SE279718.003	P3 B WATER - 11/3/2025 SE279718.004	P4 A WATER - 11/3/2025 SE279718.005
Total Dissolved Solids Dried at 175-185°C	mg/L	10	25000	19000	14000	15000	6300

PARAMETER	UOM	LOR	P4 B WATER - 11/3/2025 SE279718.006
Total Dissolved Solids Dried at 175-185°C	mg/L	10	4700

METHOD

METHODOLOGY SUMMARY

- AN020** Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
- AN101** pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
- AN106** Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Total Dissolved Salts can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. SGS use 0.6. Reference APHA 2510 B.
- AN106** Salinity may be calculated in terms of NaCl from the sample conductivity. This assumes all soluble salts present, measured by the conductivity, are present as NaCl.
- AN113** Total Dissolved Solids: A well-mixed filtered sample of known volume is evaporated to dryness at 180°C and the residue weighed. Approximate methods for correlating chemical analysis with dissolved solids are available. Reference APHA 2540 C.
- AN113** The Total Dissolved Solids residue may also be ignited at 550 C and volatile TDS (Organic TDS) and non-volatile TDS (Inorganic) can be determined.
- AN245** Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO₂, NO₃ and SO₄ are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
- AN277** Nitrite ions, when reacted with a reagent containing sulphanilamide and N-(1-naphthyl)-ethylenediamine dihydrochloride produce a highly coloured azo dye that is measured photometrically at 540nm.
- AN279/AN293(Sydney)** The sample is digested with Sulphuric acid, K₂SO₄ and CuSO₄. All forms of phosphorus are converted into orthophosphate. The digest is cooled and placed on the discrete analyser for colorimetric analysis.
- AN281** An unfiltered water or soil sample is first digested in a block digester with sulfuric acid, K₂SO₄ and CuSO₄. The ammonia produced following digestion is then measured colourimetrically using the Discrete Analyser. A portion of the digested sample is buffered to an alkaline pH, and interfering cations are complexed. The ammonia then reacts with salicylate and hypochlorite to give a blue colour whose absorbance is measured at 660nm and compared with calibration standards. This is proportional to the concentration of Total Kjeldahl Nitrogen in the original sample.
- AN291** Ammonia in solution reacts with hypochlorite ions from Sodium Dichloroisocyanate, and salicylate in the presence of Sodium Nitroprusside to form indophenol blue and measured at 660 nm by Discrete Analyser.
- 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

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
**	Indicative data, theoretical holding time exceeded.	NVL	Not validated.	LOR	Limit of Reporting.
***	Indicates that both * and ** apply.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Unless it is reported that sampling has been performed by SGS, the samples have been 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 and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au/en-gb/environment-health-and-safety.

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