Attachment 3

Groundwater Responses

WINCHESTER SOUTH PROJECT

Environmental Impact Statement

Response to Submissions

WHITEHAVEN COAL

Resource Strategies

27 March 2023

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Whitehaven WS Pty Ltd
Level 22, 12 Creek Street
Brisbane QLD 4000 Australia

Attention: Brendan Dillon

Dear Brendan,

Winchester South Project
Response to Submissions
Groundwater Responses

1 Introduction

The Revised Draft Environmental Impact Statement (EIS) for the Winchester South Project (the Project) was placed on public notification from 21 November 2022 to 19 December 2022. A number of government agencies, including the Department of Environment and Science (DES), provided submissions on the Revised Draft EIS and raised a number of matters in relation to groundwater. This letter has been prepared by SLR Consulting Australia Pty Ltd (SLR Consulting) and provides responses to these submissions.

2 DES Submission

The following matters raised in the DES submission, relating to the potential Environmental Authority conditions, are addressed in Proposed Environmental Authority Conditions – Schedule E – Groundwater in Section 3 of this letter:

- Matter 584.13
- Matter 584.21
- Matter 584.25
- Matter 584.62
- Matter 584.66
- Matter 584.67
- Matter 584.68
- Matter 584.69
- Matter 584.70

Responses to other matters raised by DES are provided below.

2.1 Matter 584.22 – Alluvium Monitoring

Discuss the alluvium component of the proposed groundwater monitoring network and explain why the three nominated Isaac River Alluvium monitored units (e.g. Knob Hill 1, Knob Hill 2 and Winnett Bore) are considered sufficient for monitoring the alluvium aquifer during operations. Provide evidence, including details on the linkages across identified aquifers. Provide justification regarding the Winnett bore as targeting the alluvium.

Clarify why the proponent response states: 'As such, no further monitoring would be required within the alluvial groundwater system.' For example, is this meaning the proposed groundwater monitoring network is not monitoring impacts during operations on the alluvial groundwater system?

Based on the peer reviewed, numerical groundwater modelling results, the Project is not anticipated to have measurable impacts to the alluvium of the Isaac River. As described in Section 6.3 of the Groundwater Assessment (SLR Consulting, 2022), the Project would result in negligible groundwater level drawdown within the alluvium. Furthermore, there would be no mechanism for groundwater quality impacts from seepage from the out-of-pit waste rock emplacements to impact the alluvium.

However, Whitehaven WS has committed to the ongoing implementation of the proposed groundwater monitoring network and monitoring regime described in *Proposed Environmental Authority – Schedule E – Groundwater* in **Section 3** of this letter. Specifically, the proposed groundwater monitoring network contains three Project monitoring bores installed into the alluvium of the Isaac River that are subject to ongoing monitoring prior to, during and after Project operations. These monitoring bores cover the distribution of alluvium where it is located closest to the Project, adjacent the northern and north-eastern parts of the Project, so that the predicted lack of impact to the alluvium from the Project can be validated as part of routine EA groundwater level and quality monitoring. As such, the three monitoring bores within the alluvium are deemed sufficient for monitoring potential impacts of the Project.

Winnet Bore is a backup landholder supply bore located on the bank of the Isaac River adjacent (within 90 m) to the main stream channel. Based on the field-verified depth of approximately 18 m and a standing water level of approximately 16.5 m below ground level (Hydrogeologist.com.au, 2019) measured in May 2019, the location on the bank of the Isaac River and location within the regionally mapped extent of Quaternary alluvium (Department of Natural Resources, Mines and Energy, 2017) mapping and the refined extent of the Isaac River alluvium (SLR Consulting, 2022), the Winnet bore is expected to be accessing the alluvial aquifer associated with the Isaac River. Furthermore, the relatively shallow depth and water table level measured at the Winnet Bore is within the expected range of an alluvial bore along the Isaac River within the region. The groundwater salinity measurements that have been undertaken since 2019 also supports that the Winnet Bore is accessing the Isaac River alluvium, showing a relatively fresh average groundwater salinity of 2,816 µS/cm, typical of other alluvial bores in the Project and surrounding monitoring networks along the Isaac River. The relatively low salinity also suggests Winnet Bore has received relatively recent and rapid freshwater (streamflow) recharge typically observed at other alluvial bores in the region, and is significantly below the groundwater salinity sampled at the non-alluvial groundwater monitoring bores for the Project, which are typically in the range of 8,000 – 16,000 µS/cm (**Attachment A**).

Notwithstanding the above, in consideration of the feedback received from government agencies including DES regarding alluvium monitoring SLR suggests that Whitehaven WS consider installing an additional two monitoring bores into the Isaac River Alluvium as part of the Project's monitoring network. These two additional bores should be installed near to, but outside of the pumping influence of the Winnet, Knob Hill 1, Knob Hill 2 bores.

2.2 Matter 584.25 – Potential impacts to Stygofauna

The draft EIS is to include a scientific, reasoned evidence based explanation in the stygofauna section/ attachment, explaining how stygofauna species would be protected from changes in water quality.

The draft EIS should clarify and/or amend the statement that there were no stygofauna species recorded in 2022.

As described in the Groundwater Assessment (SLR Consulting, 2022), no stygofauna species were recorded from bores sampled during the Project field survey undertaken by Ecological Service Professionals (ESP) for the Aquatic Ecology and Stygofauna Assessment (ESP, 2022). The high salinity of groundwater throughout the broader region suggests that the groundwater environment is not ideal for stygofauna; however, fresher groundwater in the alluvium associated with the Isaac River may provide a habitat for stygofauna (noting again that none were found in the alluvium during the Project field survey).

Groundwater quality impacts can be caused by two principal means; direct release of 'contaminants' to groundwater, or induced movement of different quality groundwater as a result of groundwater level changes. As the Project is not anticipated to have measurable groundwater level impacts to the alluvium of the Isaac River (SLR Consulting, 2022), induced movement of water within the alluvium is not considered likely and therefore groundwater quality impacts arising from groundwater drawdown is not anticipated.

Another theoretical mechanism for potential changes to groundwater quality could be in seepage from out-of-pit and in-pit waste rock emplacements, due to rainfall inundation, to the surrounding groundwater regime. However, the Project would involve capture of runoff from disturbed areas, such as waste rock emplacement areas (both active and under rehabilitation) and would be managed as part of the sediment and mine-affected water systems, designed to reuse water, and operate to minimise off-site discharges.

Numerical groundwater modelling undertaken for the Groundwater Assessment (SLR Consulting, 2022) shows that the inward hydraulic flow gradients from the in-pit and out-of-pit waste rock emplacement areas to the open cut pits during mining and residual voids post-mining would inhibit seepage from the mine landform to the Isaac River alluvium. A hydraulic gradient would not exist to enable interaction between waste rock material and the surrounding alluvium. Also, the in-situ Cainozoic sediments present between the alluvium and regolith and the out-of-pit waste rock emplacements generally comprise surficial soil and clays, up to 10 m in thickness, and these surficial clays would inhibit potential seepage from the out-of-pit waste rock emplacements to the underlying regolith and alluvium. Therefore, there would be no mechanism for groundwater seepage from the waste rock emplacements to impact on groundwater quality in the Isaac River alluvium. Notwithstanding, leachate testing shows that any seepage from the mine landform (i.e. leachate from the out-of-pit waste rock emplacement) would generally be fresh and low in sulphur (S) content, minimising the potential for impacts to groundwater quality.

All workshop and fuel/chemical storage areas at the Project would be developed in accordance with current Australian Standards. This includes refuelling areas and chemical storage areas to be designed with adequate bunding and equipped for immediate spill clean-up. These controls represent standard practice and a legislated requirement at mining operations for preventing the contamination of the groundwater regime. Therefore, there is limited potential for groundwater contamination to occur with relation to workshops and fuel/chemical storage. Sewage effluent would be contained within the affected mine water system to limit the potential impacts of the sewage effluent on the surrounding groundwater regime.

In summary, in the event that stygofauna are present in the alluvium, there are no identified mechanisms for the Project to impact groundwater quality (or quantity) in the Isaac River alluvium that would affect stygofauna.

2.3 Matter 584.28 – Environmental Values

The draft EIS is to include the legislated EVs for surface and groundwater in the draft EIS stage. This is to provide clarity and transparency of what will be assessed as part of the draft EIS.

The legislated Environmental Values (EVs) relevant to groundwater at the Project are described and documented in Section 2 of **Attachment A**.

2.4 Matter 584.90 – Data from Adjoining Mines

Clearly articulate how data from adjoining mines was incorporated into the groundwater assessment (e.g., monitoring data only used; used in validation of model, provided information to design the monitoring network, provided information on drawdown).

Explain if data from other mines will be used to monitor impacts at the proposed Winchester South mine site as part of the proposed groundwater monitoring network during operations.

The Groundwater Assessment (SLR Consulting, 2022) was prepared using project specific information and groundwater monitoring and other data collected and collated as part of recent groundwater assessments for the nearby Moorvale South Project, Eagle Downs Mine and Olive Downs Project. Whitehaven WS has established groundwater data sharing agreements, which allows for the sharing of groundwater data, models and documentation between the owners of these developments. Under these agreements, data used as part of each groundwater assessment for these developments was incorporated into the Groundwater Assessment for the Project (SLR Consulting, 2022) where relevant, with key items as follows:

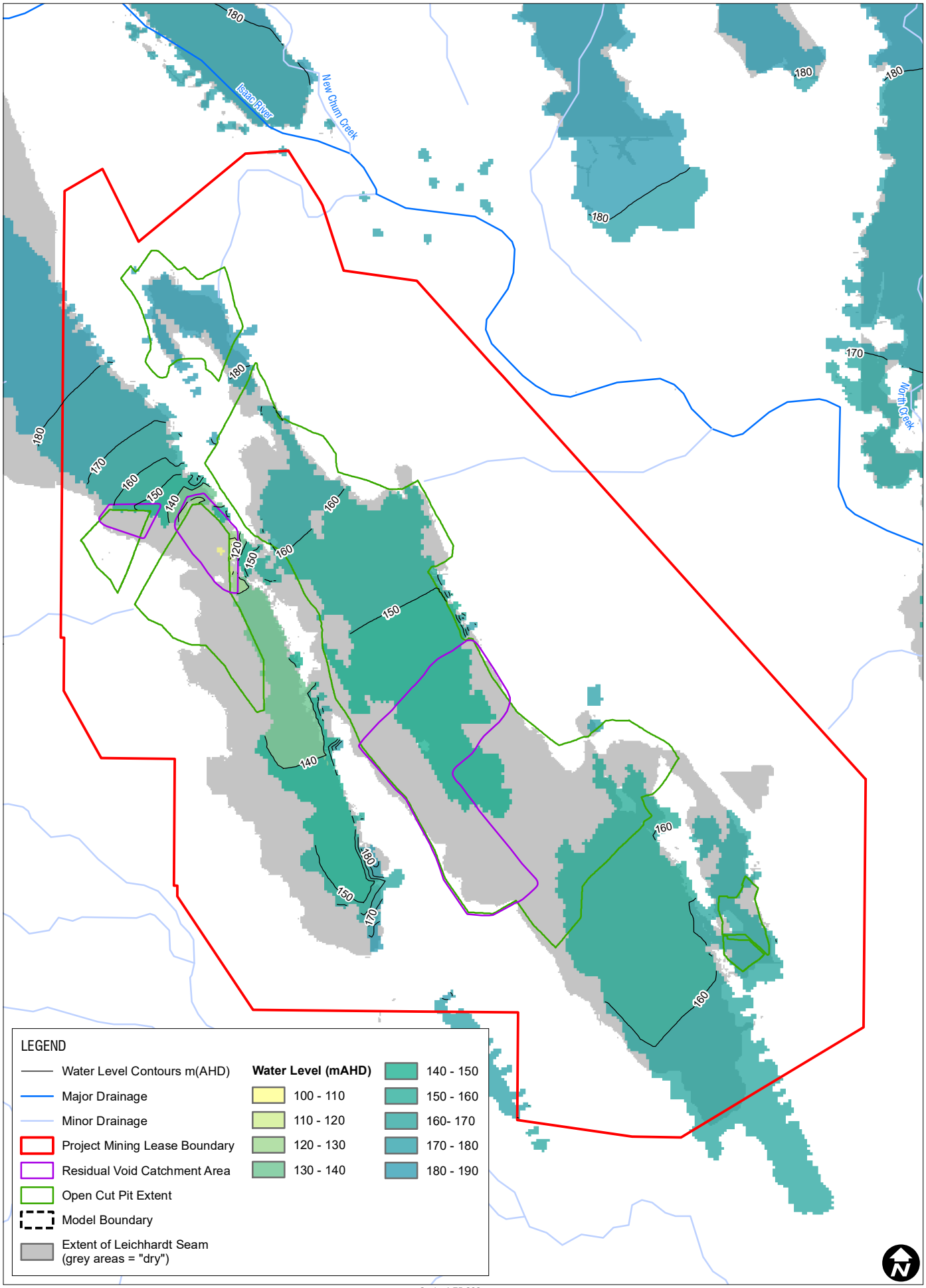
- Surrounding project data was used to inform conceptualisation of the groundwater system described in Section 4 and Section 5 of the Groundwater Assessment, including definition of the relevant aquifers and aquitards, unit extents and thicknesses, formation hydraulic properties, and groundwater levels and flow directions;
- Geology models from surrounding projects were used in the definition of Project groundwater model layer structure away from the Project site;
- Mine planning information from surrounding projects was used in the definition of Project groundwater model mining representation outside of the Project;
- Aquifer and aquitard hydraulic parameter data derived from testing undertaken at surrounding projects was used in the definition of parameter ranges adopted by the Project groundwater model; and
- Groundwater monitoring data from surrounding projects was used in the Project groundwater model calibration process to expand the available calibration dataset outside of the data available for the Project-only groundwater monitoring network.

The data sharing agreements allow continued sharing of groundwater information and data during project operations. The Project's proposed groundwater monitoring network was therefore designed in cognisance of the monitoring networks present at these adjacent operations. For example, since the Olive Downs Project monitoring network contains a large number of bores monitoring the Isaac River Alluvium northeast of the Project downstream of the Project's own alluvium monitoring bores, as such installation of additional monitoring bores in that area of the alluvium as part of the Project is not required, as monitoring in the alluvium is sufficient based on the Olive Downs Project's monitoring network.

2.5 Matter 584.92 – Post-Mining Equilibrium Groundwater Levels

In Attachment 5 the figures showing contours for long-term groundwater levels (e.g., Figure 6-14 and Figure 6-15) are very difficult to interpret. DES recognises it is beneficial to show the contours for the broader landscape. It is recommended additional figures be provided that just show the counters within the mining lease area (and immediate area surrounding the mine). Cross-sections at suitable intervals should also be provided. Otherwise, the reader can not understand the contours across the site and how the voids, including any that are backfilled, fit in the landscape.

Figure 6-14 (Predicted Groundwater Levels in the Leichhardt Seam [Layer 5] – Post-Mining Equilibrium) and Figure 6-15 (Predicted Groundwater Levels in the Vermont Seam [Layer 7] – Post-Mining Equilibrium) of the Groundwater Assessment (SLR Consulting, 2022) provide predicted groundwater level elevation contours in the main Permian coal measures groundwater units in the long-term post-mining. Figures 6-14 and 6-15 were provided at a spatial scale to represent the regional groundwater system in which the Project is located. Rescaled figures (Project mining lease scale) are provided as **Figure 1** and **Figure 2**.



H:\Projects-SLR\620-BNE\620.13245 Winchester South Groundwater\05 SLR Data\01 CAD\GIS\ArcGIS\06 DES Response\620.13245_F1 Predicted Groundwater Levels in the Leichhardt Seam (Layer 5) – Post-Mining Equilibrium.mxd

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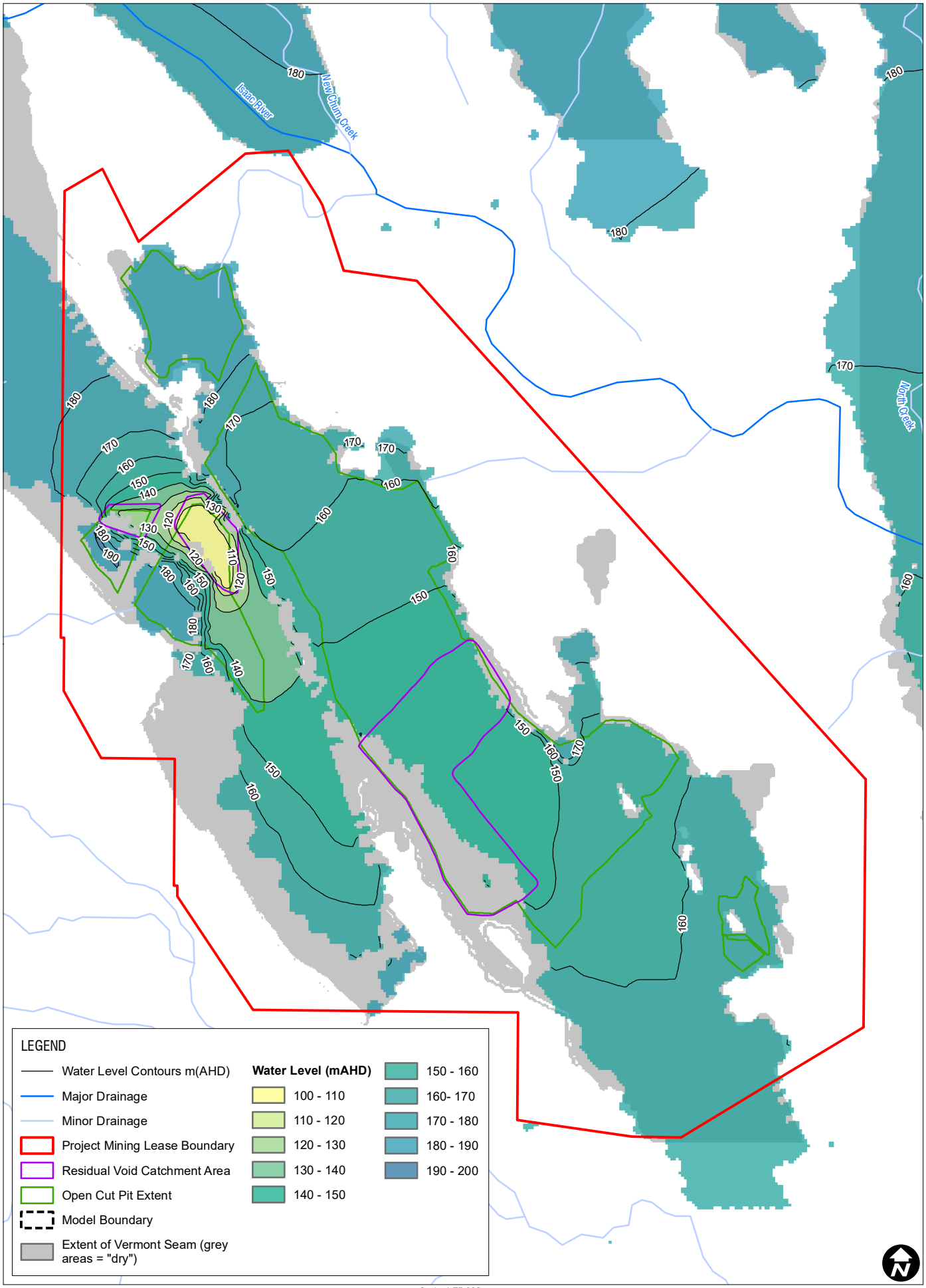
Predicted Groundwater Levels in the Leichhardt Seam (Layer 5) – Post-Mining Equilibrium

FIGURE 1



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Predicted Groundwater Levels in the Vermont Seam (Layer 7) – Post-Mining Equilibrium

FIGURE 2

3 Proposed Environmental Authority Conditions – Schedule E – Groundwater

SCHEDULE E: GROUNDWATER	
Number	**Condition**
E1	The holder of this environmental authority must not release contaminants to groundwater.
E2	**Groundwater Monitoring Program** The holder of this authority must develop and implement a groundwater monitoring program.
E3	Groundwater monitoring and analysis must be performed by an appropriately qualified person.
E4	The groundwater monitoring program must: (a) be in accordance with **Table E1 – Groundwater Monitoring Locations and Frequency;** (b) identify potential sources of contamination to groundwater from the mining activity; (c) identify potential groundwater impacts due to the mining activity; (d) document a sampling, monitoring and data analysis methodology designed to achieve the following objectives: (i) establish baseline datasets from existing monitoring bores; (ii) detect any impacts to groundwater levels due to the mining activity; (iii) detect any impacts to groundwater quality due to the mining activity; (iv) determine trends in groundwater quality; and (v) determine trends in groundwater level. (e) include an appropriate quality assurance and quality control program; (f) include a conceptual numerical groundwater model; and (g) include a review process to improve the program.
E5	The **baseline** datasets, as referred to in Condition **E4** of this environmental authority, are to consist of at least eight values collected over a minimum of at least 12 months prior to commencement of mining activities.
E6	**Groundwater Quality** Groundwater quality must be monitored at the locations and frequencies to be defined in **Table E1 - Groundwater Monitoring Locations and Frequency**, for quality characteristics identified in **Table E2 - Groundwater Quality Limits**.
E7	Groundwater quality measured at monitoring bores identified in **Table E1 – Groundwater Monitoring Locations and Frequency** must not exceed the limits specified in **Table E2 – Groundwater Quality Limits** on any three consecutive sampling occasions.
E8	In the event groundwater quality measured at any monitoring bore exceeds the corresponding limits in **Table E2 – Groundwater Quality Limits** on any single sampling occasion, the environmental authority holder must resample the underground water within the monitoring bore for the parameter exceeded, within 10 business days of receipt of the results. Whether the results of the resampling event exceeds for the same parameter or not, a further resample is not required for that sampling occasion.
E9	In the event that groundwater quality exceedance results are confirmed by resampling, as specified in **Condition E8**, the holder of this environmental authority must: (a) notify the administering authority via Water Tracking and Reporting System (WaTERS) or subsequent updated system within 10 business days of receiving the resampling result; and (b) within three months of receiving the result, complete, and submit via WaTERS, an investigation undertaken by a suitably qualified person outlining: (i) details of the investigations carried out; (ii) whether the result is directly associated with mining activities of the Project, and, if so; (1) whether environmental harm has occurred; and (2) any action required to mitigate environmental harm. (iii) a review of the groundwater quality limits specified in **Table E2 – Groundwater Quality Limits**, and, if the exceedance was not a result of mining activities of the Project, provide a revised groundwater quality limit for the relevant parameter for ongoing monitoring and update in **Table E2 – Groundwater Quality Limits** for approval by the administering authority.

SCHEDULE E: GROUNDWATER	
Number	**Condition**
E10	**Groundwater Levels** Groundwater levels when measured at the monitoring locations and frequency specified in **Table E3 – Groundwater Level Monitoring** must not exceed the groundwater level trigger thresholds specified in **Table E3 – Groundwater Level Monitoring**, unless otherwise agreed in writing with the administering authority.
E11	In the event that groundwater fluctuations in excess of the groundwater level trigger thresholds specified **in Table E3 – Groundwater Level Monitoring** are detected, the holder of this environmental authority must: (a) notify the administering authority via WaTERS within 24-hours; (b) undertake an investigation within 10 business days of detection to determine the cause of fluctuations; and (c) undertake a review of the groundwater level trigger thresholds specified in **Table E3 – Groundwater Level Monitoring**, and, if the exceedance was not a result of mining activities of the Project, provide a revised groundwater level trigger threshold for ongoing monitoring and update in **Table E3 – Groundwater Level Monitoring** for approval by the administering authority.
E12	In the event that groundwater fluctuations are found to have been influenced by mining activities the holder of this environmental authority must meet the notification requirement of **Condition E11** of this environmental authority.
E13	The exceedance investigation under **Condition E11** must be completed and submitted to the administering authority via WaTERS within three months of notifying the administering authority.
E14	**Groundwater Monitoring** Results of groundwater quality and level monitoring must be submitted to the administering authority via WaTERS each calendar year.
E15	The groundwater monitoring program must be reviewed on an annual basis by an appropriately qualified person to determine if it continues to meet the requirements stated in **Condition E4**.
E16	The groundwater numerical model must be reviewed and validated (including boundary and recharge conditions) to incorporate groundwater monitoring data and measured mine dewatering volumes from the groundwater monitoring program in **Condition E4**. The review must be conducted within **two years** of commencement of any mining operations and at least every **five years** thereafter, or at other intervals specified by the administering authority in writing.
E17	**Bore Construction, Maintenance and Decommissioning** The construction, maintenance, management and decommissioning of groundwater bores (including groundwater monitoring bores) must be undertaken in a manner that prevents or minimises impacts to the environment and ensures the integrity of the bores to obtain accurate and reliable data collection.
E18	Where the removal of a bore will occur as a direct result of the mining activity, the impact on the monitoring program must be evaluated and a replacement bore must be constructed in a similar location, for continuity and to ensure that groundwater monitoring continues to meet the requirements in **Condition E4**.

Table E1: Groundwater Monitoring Locations and Frequency

Monitoring Point		Location (GDA2020)		Surface RL (mAHD)	Screen Depth (m)	Monitoring Frequency	Target Aquifer
		Latitude	Longitude				
C2105R		-22.223470	148.306460	209.09	57.0 – 60.0	D/Q	Leichhardt Seam
C2136		-22.175047	148.277810	199.39	62.6 – 65.6	D/Q	Leichhardt Seam
G2304R		-22.211711	148.292722	216.24	53.0 – 56.0	D/Q	Vermont Seam
G2307		-22.169684	148.269412	194.42	78.0 – 81.0	D/Q	Vermont Seam
R2008		-22.217293	148.269820	220.32	31.5 – 33.0	D/Q	Leichhardt Seam
R2009R		-22.215100	148.274195	220.24	77.0 – 83.0	D/Q	Rangal Coal Measures Interburden
R2010R		-22.212739	148.278035	216.67	60.0 – 63.0	D/Q	Leichhardt Seam
R2032		-22.187696	148.265830	205.31	78.1 – 81.1	D/Q	Leichhardt Seam
R2034R		-22.192343	148.257171	221.60	36.0 – 39.0	D/Q	Rangal Coal Measures Interburden
R2035		-22.194568	148.253233	223.54	34.4 – 37.4	D/Q	Vermont Seam
R2054		-22.167432	148.253477	203.60	79.5 – 82.5	D/Q	Rangal Coal Measures Interburden
R2055		-22.169669	148.249211	207.46	64.9 – 67.9	D/Q	Vermont Seam
Knob Hill 1*		-22.115211	148.270125	191^	-	D/Q	Isaac River Alluvium
Knob Hill 2*		-22.113565	148.264546	193^	-	D/Q	Isaac River Alluvium
Winnet Bore		-22.149704	148.307145	187^	-	D/Q	Isaac River Alluvium
NB_1R		-22.162189#	148.296681#	200^	22 – 25#	D/Q	Regolith
NB_2P		-22.156908#	148.242950#	207^	122 – 125#	D/Q	Leichhardt Seam
NB_3P		-22.229013#	148.320230#	202^	82 – 85#	D/Q	Leichhardt Seam
VWP1	Sensor 1	-22.152207	148.283131	192.81	50.0	D	Fort Cooper Coal Measures overburden
	Sensor 2				90.0		Fort Cooper Coal Measures coal seam
	Sensor 3				150.0		Fort Cooper Coal Measures underburden
VWP2	Sensor 1	-22.182743	148.316373	201.68	50.0	D	Fort Cooper Coal Measures overburden
	Sensor 2				90.0		Fort Cooper Coal Measures overburden
	Sensor 3				150.0		Fort Cooper Coal Measures coal seam

Note: Monitoring is not required where a bore has been removed as a direct result of the mining activity.
D = Daily level monitoring using automatic logger; Q = Quarterly water quality sampling
* = Privately owned bore, inclusion in monitoring network dependent on continued approval to access the bore from bore owner
# = Approximate, bore not yet installed; to be confirmed following drilling
^ = Approximate, to be confirmed via survey

Table E2: Groundwater Quality Limits

Monitoring Point	Field pH	EC (µS/cm)	Al (mg/L)	Ca (mg/L)	Cl (mg/L)	Mg (mg/L)	Mn (mg/L)	Na (mg/L)	SO4 (mg/L)	Zn (mg/L)	As (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Pb (mg/L)	Hg (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)
C2105R	6.3 – 8.5	32380	0.055[1]	970	11340	1020	1.9[1]	5416	12	3[2]	0.01[3]	0.002[3]	0.05[3]	0.1[4]	1[2]	0.01[3]	0.0006[1]	0.011[1]	0.05[4]	0.1[3]
C2136	6.5 – 8.5[1]	16940		416	5863	494	0.1[2]	2868	127	0.008[1]		0.0002[2]	0.001[2]		0.0014[1]	0.0034[1]			0.01[3]	
G2304R		29760		751	10700	748	0.32	5190	250[2]	0.049		0.002[3]	0.05[3]		1[2]	0.01[3]			0.05[4]	
G2307		16110		338	5819	259	0.04	3040		0.025		0.0002[2]	0.001[2]		0.0014[1]	0.0034[1]			0.01[3]	
R2008		16730		259	5784	210	0.1[2]	3485		0.028										
R2009R		12725		131	4233	67	0.42	2695	155	0.008[1]	0.03									
R2010R		27860		403	10155	466	0.59	5754	250[2]	3[2]	0.06	0.002[3]	0.05[3]		1[2]	0.01[3]			0.05[4]	
R2032		11820		324	4086	124	0.004	2346		0.044	0.01[3]	0.0002[2]	0.001[2]		0.0014[1]	0.0034[1]			0.01[3]	
R2034R		18640		630	4360	465	1.48	3842	3980	0.108	0.03			0.02	1[2]			0.04		
R2035		4884		144	1240	68	0.14	919	250[2]	0.008[1]	0.01[3]			0.1[4]	0.0014[1]			0.011[1]		
R2054		8422		156	2673	36	0.003	1733		0.016										
R2055		8447		218	2675	121	0.01	1593		0.027										
Knob Hill 1*		8208		302	2312	267	0.71	1069	582	0.008[1]				0.002	1[2]					
Knob Hill 2*		995		51	154	36	1.21	116	21	0.008[1]	0.003			0.004	0.0014[1]					
Winnet Bore		3111		124	774	115	0.45	374	99	0.017	0.01[3]			0.1[4]				0.003		
NB_1R		7500[5]		1000[5]	250[5]	2000[5]	0.1[2]	180[5]	250[2]	0.008[1]								0.011[1]		
NB_2P		30640		912	11200	966	0.56	5470	118	0.04	0.04	0.0005	0.005	0.005	0.005	0.005		0.007	0.05	0.005
NB_3P																				

1. Isaac River Sub-basin - ANZECC 2000 - Aquatic 95% spp 2. ADWG – Aesthetic 3. ADWG – Health 4. Isaac River Sub-basin – Irrigation 5. Isaac River Sub-basin – Stock

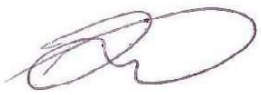
Table E3: Groundwater Level Monitoring

Monitoring Point		Level Trigger Threshold
C2105R		> 17.0 metres beyond baseline data ranges
C2136		> 42.6 metres beyond baseline data ranges
G2304R		> 24.0 metres beyond baseline data ranges
G2307		> 62.0 metres beyond baseline data ranges
R2008		> 2 metres beyond baseline data ranges
R2009R		> 2 metres beyond baseline data ranges
R2010R		> 2 metres beyond baseline data ranges
R2032		> 27.6 metres beyond baseline data ranges
R2034R		> 2 metres beyond baseline data ranges
R2035		> 2 metres beyond baseline data ranges
R2054		> 79.2 metres beyond baseline data ranges
R2055		> 7.5 metres beyond baseline data ranges
Knob Hill 1		> 2 metres beyond baseline data ranges
Knob Hill 2		> 2 metres beyond baseline data ranges
Winnet Bore		> 2 metres beyond baseline data ranges
NB_1R		> 2.1 metres beyond baseline data ranges
NB_2P		> 10.0 metres beyond baseline data ranges
NB_3P		> 20.6 metres beyond baseline data ranges
VWP1	Sensor 1	> 2 metres beyond baseline data ranges
	Sensor 2	> 2 metres beyond baseline data ranges
	Sensor 3	> 2 metres beyond baseline data ranges
VWP2	Sensor 1	> 2 metres beyond baseline data ranges
	Sensor 2	> 2 metres beyond baseline data ranges
	Sensor 3	> 2 metres beyond baseline data ranges

4 Closing

I trust the information presented herein meets your expectations.

Yours sincerely



DERWIN LYONS
Technical Director

Checked/
Authorised by: BMR

5 References

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Hydrogeologist.com.au (2019) Winchester South Baseline Water Monitoring May 2019. Prepared for Whitehaven Coal Pty Ltd.

SLR Consulting (2022) Winchester South Project Groundwater Assessment. Prepared for Whitehaven WS Pty Ltd.

Attachment A – Environmental Authority Trigger Level Derivation Technical Report

WINCHESTER SOUTH PROJECT

Environmental Authority Groundwater Limits and Triggers Derivation Report

Prepared for:

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BRISBANE QLD 4000

SLR Ref: 620.13245.90000 -R01
Version No: -v2.0
March 2023

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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Whitehaven WS Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
620.13245.90000 -R01-v2.0	27 March 2023	I Epari	D Lyons	D Lyons
620.13245.90000 -R01-v1.0	28 February 2023	Sharkey, I Epari	D Lyons	D Lyons

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1 Introduction

1.1 Background

This report documents the development of and justification for the proposed Environmental Authority (EA) groundwater quality limits and groundwater level trigger thresholds for the Winchester South Project (the Project). Development of the proposed groundwater quality limits is based on the process outlined in *Using monitoring data to assess groundwater quality and potential environmental impacts* (Department of Environment and Science [DES], 2021).

1.2 Methodology

1.2.1 Groundwater Quality Limits

The development of the groundwater quality limits includes the review of existing Project groundwater quality monitoring data and subsequent derivation of proposed groundwater quality limits for each EA monitoring bore, based on the process outlined in *Using monitoring data to assess groundwater quality and potential environmental impacts* (DES, 2021):

1. Determine summary statistics (i.e. 20th, 50th, 80th and 95th percentiles) for each bore or group of bores for all indicators using all available data.

2. Identify relevant default toxicant guidelines and relevant Water Quality Objectives (WQO).

3. The 80th percentile of each indicator at each bore should be compared with the guideline and WQO. Use dissolved metal concentrations for default toxicant guideline values (ANZG, 2018).

4. If less than eight samples were available or are greater than the limit of reporting (LOR) the default toxicant guideline is applied.

5. Site-specific values are determined using the 80th and 95th percentile at each bore or group of bores if required.

6. Box plots and time series plots should be produced and compared to the default toxicant guidelines, relevant WQOs and site-specific values.

7. Determine appropriate site-specific limits. The limits are appropriate if they are sufficiently conservative to ensure environmental impact does not occur, but do not result in false non-compliances.

8. Determine an appropriate compliance approach.

9. Evaluate the proposed limits and compliance approach.

Section 2 of DES (2021) describes the guideline "*outlines a process to review groundwater quality monitoring data, including (i) the information required to assess groundwater quality, (ii) approaches used to define site-specific groundwater guidelines and (iii) comparisons of measured values with default guidelines, WQOs, site-specific guidelines derived from locally relevant background, reference or baseline groundwater quality data*".

This report follows the process to review groundwater quality monitoring data and the adoption of site-specific groundwater limits or an alternative compliance approach as summarised in Section 2 of DES (2021). Each stage, as detailed in DES (2021), is presented in **Table 1** along with the relevant section in this report (or supporting reports).

Table 1 DES (2021) Methodology and Corresponding Sections in this Report

DES (2021) Methodology - Stages	Relevant Section in this Report or Supporting Report
Identify EVs for groundwater and relevant default guidelines and WQOs	**Section 2**
Describe site characteristics	Refer to SLR (2022)
Describe bore characteristics	**Section 1.3**
Analyse groundwater quality monitoring data	**Section 3**
Identifying site-specific guidelines for groundwater quality, if required	**Section 4**
Determine an appropriate compliance approach	**Section 4.3**
Evaluate site-specific groundwater guidelines, triggers, limits and compliance approach	**Section 4.4**

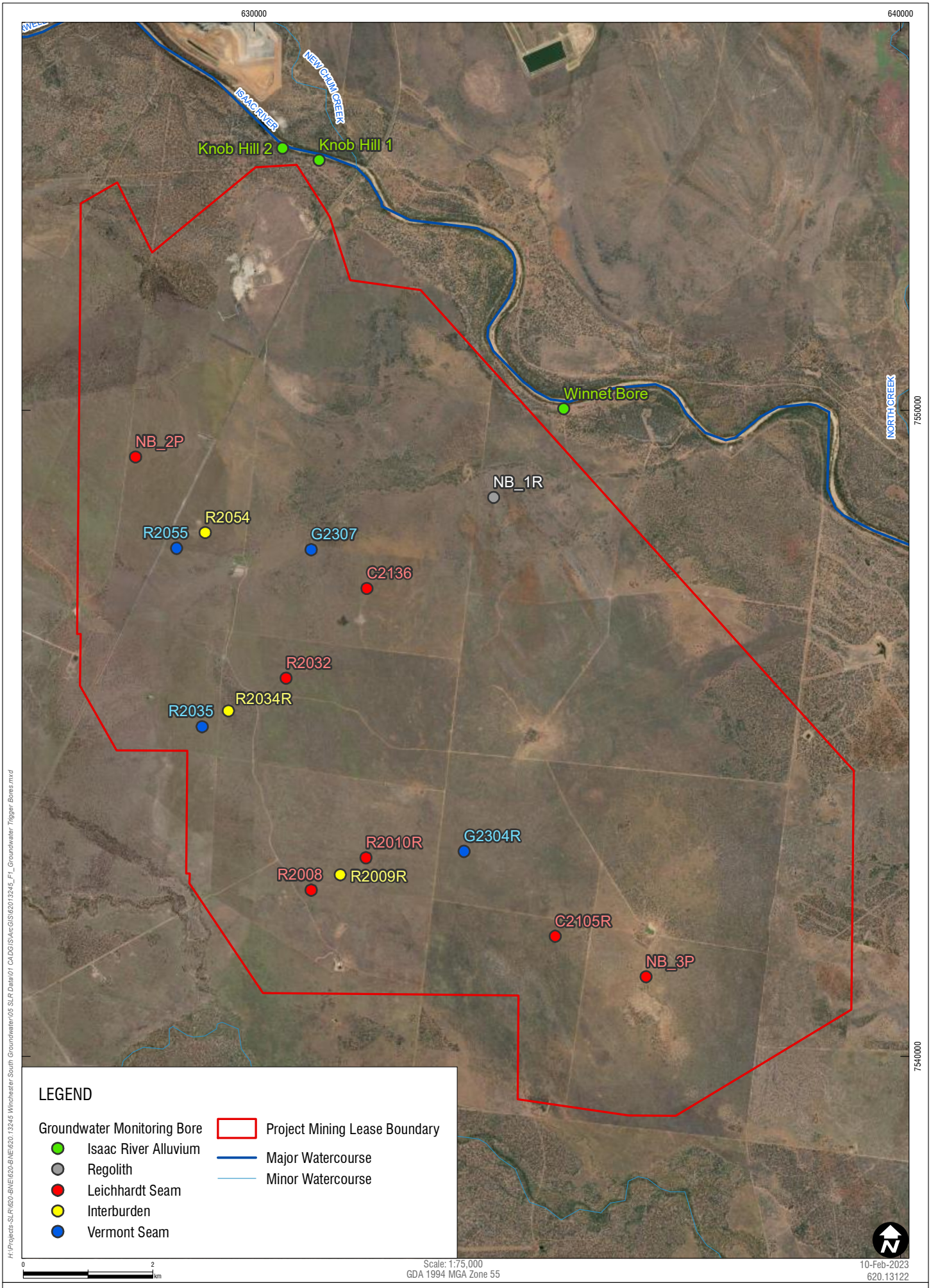
1.2.2 Groundwater Level Trigger Thresholds

The groundwater level trigger threshold development presented herein includes a review of existing Project groundwater modelling predictions with respect to groundwater level drawdown predictions at Project monitoring bores, and establishment of proposed level trigger thresholds according to those predictions that are considered appropriate for the EA.

It should be noted that a modelled groundwater drawdown may no longer be relevant where a bore is destroyed as part of the planned mining progression and therefore for any particular bore that becomes subject to the mining footprint these proposed triggers would only be used up to this point.

1.3 Groundwater Monitoring Network

The Project's proposed EA groundwater monitoring network is shown on **Figure 1** and the bore details are provided in **Table 2**.



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Groundwater Monitoring Bores

FIGURE 1

Table 2 Project Groundwater Monitoring Network

Bore	Type	Latitude (GDA2020)	Longitude (GDA2020)	Surface Elevation (mAHD)	Screen Depth (MB/PB) or Sensor Depth (VWP) (mbgl)	TD (mbgl)	Monitored Unit	SWL	WQ	Location Description
C2105R	MB	-22.223470	148.306460	209.09	57.0 – 60.0	60.0	Leichhardt Seam	D/Q	Q	South-east part of Main Pit
C2136	MB	-22.175047	148.277810	199.39	62.6 – 65.6	65.6	Leichhardt Seam	D/Q	Q	Central part of Main Pit
G2304R	MB	-22.211711	148.292722	216.24	53.0 – 56.0	56.0	Vermont Seam	D/Q	Q	South-east part of Main Pit
G2307	MB	-22.169684	148.269412	194.42	78.0 – 81.0	81.0	Vermont Seam	D/Q	Q	North-west part of Main Pit
R2008	MB	-22.217293	148.269820	220.32	31.5 – 33.0	-*	Leichhardt Seam	D/Q	Q	West-southwest of Main Pit
R2009R	MB	-22.215100	148.274195	220.24	77.0 – 83.0	83.0	Interburden	D/Q	Q	West-southwest of Main Pit
R2010R	MB	-22.212739	148.278035	216.67	60.0 – 63.0	66.0	Leichhardt Seam	D/Q	Q	West-southwest of Main Pit
R2032	MB	-22.187696	148.265830	205.31	78.1 – 81.1	81.1	Leichhardt Seam	D/Q	Q	South-east of West Pit
R2034R	MB	-22.192343	148.257171	221.60	36.0 – 39.0	39.5	Interburden	D/Q	Q	South-west of West Pit
R2035	MB	-22.194568	148.253233	223.54	34.4 – 37.4	37.4	Vermont Seam	D/Q	Q	South-west of West Pit
R2054	MB	-22.167432	148.253477	203.60	79.5 – 82.5	82.5	Interburden	D/Q	Q	Northern part of West Pit
R2055	MB	-22.169669	148.249211	207.46	64.9 – 67.9	67.9	Vermont Seam	D/Q	Q	Northern part of West Pit
NB_1R#	MB	-22.162189	148.296681	200#	22 – 25#	25#	Regolith	D/Q	Q	Between Main Pit and Isaac River alluvium
NB_2P#	MB	-22.156908	148.242950	207#	122 – 125#	125#	Leichhardt Seam	D/Q	Q	Between Railway Pit and North-west Pit
NB_3P#	MB	-22.229013	148.320230	202#	82 – 85#	85#	Leichhardt Seam	D/Q	Q	Southeast of Main Pit
Knob Hill 1‡	PB	-22.115211	148.270125	191*	-	-*	Isaac River Alluvium	n/a+	Q	Isaac River alluvium north of the Project
Knob Hill 2‡	PB	-22.113565	148.264546	193*	-	24.3	Isaac River Alluvium	D/Q	Q	Isaac River alluvium north of the Project

Bore	Type	Latitude (GDA2020)	Longitude (GDA2020)	Surface Elevation (mAHD)	Screen Depth (MB/PB) or Sensor Depth (VWP) (mbgl)	TD (mbgl)	Monitored Unit	SWL	WQ	Location Description
Winnet Bore‡	PB	-22.149704	148.307145	187*	-	18.1	Isaac River Alluvium	D/Q	Q	Isaac River alluvium north-east of the Project
VWP1	VWP	-22.152207	148.283131	192.81	Sensor 1 – 50.0	155.0	Fort Cooper Coal Measures overburden	D	n/a	Between Main Pit and Isaac River alluvium
					Sensor 2 – 90.0		Fort Cooper Coal Measures coal seam	D		
					Sensor 3 – 150.0		Fort Cooper Coal Measures underburden	D		
VWP2	VWP	-22.182743	148.316373	201.68	Sensor 1 – 50.0	155.0	Fort Cooper Coal Measures overburden	D	n/a	Between Main Pit and Isaac River alluvium
					Sensor 2 – 90.0		Fort Cooper Coal Measures overburden	D		
					Sensor 3 – 150.0		Fort Cooper Coal Measures coal seam	D		

MB – Monitoring bore
VWP – Vibrating Wire Piezometer
PB – Privately-owned bore
n/a – Not Applicable

SWL – Standing water level (purpose of monitoring location)
WQ – Water quality monitoring (purpose of monitoring location)
Q – Quarterly monitoring frequency
TD – total depth
– location coordinates and depth data nominal; to be confirmed after drilling/bore installation

D – Daily monitoring frequency using automatic logger
‡ - Inclusion in monitoring network dependent on continued approval to access the bore from bore owner
D/Q – Daily monitoring frequency using automatic logger and manually dipped on a quarterly basis
+ - Unable to monitor SWL due to pump installed, but can still sample for water quality
mAHD = metres Australian Height Datum.
mbgl = metres below groundwater level.

2 Environmental Values

2.1 Scheduled Environmental Values

Groundwater resources within the vicinity of the Project are scheduled under the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (EPP [Water and Wetland Biodiversity]) as the Isaac Groundwaters of the Isaac River Sub-basin of the Fitzroy Basin (WQ1310) (Queensland Government, 2013). The legislated Environmental Values (EVs) for these groundwaters (Department of Environment and Heritage Protection [DEHP], 2011) are listed in **Table 3.**

Table 3 Environmental Values of Isaac Groundwaters of the Isaac River Sub-basin of the Fitzroy Basin (DEHP, 2011)

Environmental Value (EV)	Description
Aquatic Ecosystems	The intrinsic value of aquatic ecosystems, habitat and wildlife in waterways and riparian areas, for example, biodiversity, ecological interactions, plants, animals, key species (such as turtles, platypus, seagrass and dugongs) and their habitat, food and drinking water. Waterways include perennial and intermittent surface waters, groundwaters, tidal and non-tidal waters, lakes, storages, reservoirs, dams, wetlands, swamps, marshes, lagoons, canals, natural and artificial channels and the bed and banks of waterways.
Irrigation	Suitability of water supply for irrigation, for example, irrigation of crops, pastures, parks, gardens and recreational areas.
Farm Water Supply/Use	Suitability of domestic farm water supply, other than drinking water. For example, water used for laundry and produce preparation.
Stock Watering	Suitability of water supply for production of healthy livestock.
Primary Recreation	Health of humans during recreation which involves direct contact and a high probability of water being swallowed, for example, swimming, surfing, windsurfing, diving and water-skiing. Primary recreational use, of water, means full body contact with the water, including, for example, diving, swimming, surfing, waterskiing and windsurfing.
Drinking Water Supply	Suitability of raw drinking water supply. This assumes minimal treatment of water is required, for example, coarse screening and/or disinfection.
Cultural and Spiritual Values	Indigenous and non-indigenous cultural heritage, for example: • custodial, spiritual, cultural and traditional heritage, hunting, gathering and ritual responsibilities • symbols, landmarks and icons (such as waterways, turtles and frogs) • lifestyles (such as agriculture and fishing). Cultural and spiritual values, of water, means its aesthetic, historical, scientific, social or other significance, to the present generation or past or future generations.

2.2 Water Quality Objectives and Proposed Environmental Authority Parameters

Water Quality Objectives (WQOs) are long-term goals for water quality management (DEHP, 2011) and relate specifically to the different EVs. The purpose of defining WQOs is to support and protect EVs. They are numerical concentration levels or narrative statements of indicators established for receiving waters to support and protect the designated EVs for those waters. They are based on scientific criteria or water quality guidelines but may be modified by other inputs (e.g. social, cultural, economic).

Where groundwater quality analysis results exceed the relevant WQO for a particular EV, it is considered indicative that the groundwater may be unsuitable for supporting that particular EV.

DEHP (2011) provides WQOs for the EVs described in **Section 2.1** and provided in the *Australian Drinking Water Guidelines* (ADWG) (National Health and Medical Research Council [NHMRC] and National Resource Management Ministerial Council [NRMMC], 2011) and *Environmental Protection (Water) Policy 2009 Isaac River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including all waters of the Isaac River Sub-basin (including Connors River)* (DEHP, 2011), as summarised in **Table 4**. These parameters have been adopted as the relevant parameters for the groundwater quality limits in the EA. Where site-specific groundwater quality limits are not available for these parameters, the relevant EVs in **Table 4** have been adopted.

Table 4 Water Quality Objectives for Isaac River Sub-basin Environmental Values

Water Quality Indicator	Unit	ADWG Guidelines[1]		Isaac River Sub-basin EVs		
		Health	Aesthetic	Irrigation[2] (STV)	Stock Watering[3]	Aquatic 95%[4]
pH	-	-	6.5 to 8.5	-	-	6.5 to 8.5
Electrical Conductivity[4]	µS/cm	-	900*	-	7500*	-
Aluminium	mg/L	-	0.2	20	5	0.055
Calcium	mg/L	-	-	-	1000	-
Chloride	mg/L	-	250	-	-	-
Magnesium	mg/L	-	-	-	2000	-
Manganese	mg/L	0.5	0.1	10	-	1.9
Sodium	mg/L	-	180	-	-	-
Sulfate	mg/L	-	250	-	1000	-
Zinc	mg/L	-	3	5	20	0.008
Arsenic	mg/L	0.01	-	2.0	0.5	0.024
Cadmium	mg/L	0.002	-	0.05	0.01	0.0002
Chromium	mg/L	0.05	-	1	1	0.001
Cobalt	mg/L	-	-	0.1	1	-
Copper	mg/L	2	1	5	1	0.0014
Lead	mg/L	0.01	-	5	0.1	0.0034
Mercury	mg/L	0.001	-	0.002	0.002	0.0006
Nickel	mg/L	0.02	-	2	1	0.011
Selenium	mg/L	0.01	-	0.05	0.02	0.011
Silver	mg/L	0.1	-	-	-	0.00005

1. Table 10.6 of ADWG Version 3.8 (NHMRC and NRMMC, 2011): Guidelines – Health and Aesthetic.
2. Table 9 of Isaac River Sub-basin Environmental Values and Water Quality Objectives (DEHP, 2011): Irrigation EV Short-term values.
3. Table 11 of Isaac River Sub-basin Environmental Values and Water Quality Objectives (DEHP, 2011): Stock watering EV.
4. Table 3.4.1 of Australian and New Zealand Guidelines for Fresh and Marine Water Quality: trigger values for slightly-moderately disturbed systems (95% level of species protection) (Australian and New Zealand Environment and Conservation Council [ANZECC] and Agriculture and Resource Management Council of Australia and New Zealand [ARMCANZ] [2000]).

* Converted based on 0.67 * TDs = EC (ANZECC and ARMCANZ [2000]).
mg/L = milligrams per litre
µS/cm = microSiemens per centimetre

3 Water Quality Monitoring Data Analysis

3.1 Review of Data Availability

The first step in the groundwater quality limit derivation process was assessment of the data availability for each groundwater monitoring bore in the monitoring database. **Table 5** provides the water quality data available and monitoring timeframe for each of the groundwater monitoring bores. Of the 18 groundwater monitoring bores, 15 had sufficient data to provide the site-specific trigger limits in accordance with DES (2021) (highlighted in green in **Table 5**). Three additional bores (NB_1R, NB_2P and NB_3P) are yet to be constructed and will be incorporated into the monitoring network following drilling and construction.

Table 5 Review of Data Availability for Groundwater Quality Limit Derivation

Monitoring point	Data Start	Data End	Number of data points	Target aquifer	Monitoring point status
C2105R	Nov-2019	Dec-2022	10	Leichhardt Seam	Existing
C2136	Mar-2019	Dec-2022	19	Leichhardt Seam	Existing
G2304R	Nov-2019	Sep-2022	11	Vermont Seam	Existing
G2307	Mar-2019	Dec-2022	19	Vermont Seam	Existing
R2008	Feb-2019	Sep-2022	19	Leichhardt Seam	Existing
R2009R	Nov-2019	Sep-2022	9	RCM Interburden	Existing
R2010R	Nov-2019	Sep-2022	10	Leichhardt Seam	Existing
R2032	Feb-2019	Dec-2022	19	Leichhardt Seam	Existing
R2034R	Jun-2020	Dec-2022	9	RCM Interburden	Existing
R2035	Feb-2019	Dec-2022	19	Vermont Seam	Existing
R2054	Feb-2019	Dec-2022	18	RCM Interburden	Existing
R2055	Feb-2019	Dec-2022	19	Vermont Seam	Existing
Knob Hill 1	May-2019	Dec-2022	16	Isaac River Alluvium	Existing
Knob Hill 2	May-2019	Dec-2022	16	Isaac River Alluvium	Existing
Winnet Bore	May-2019	Dec-2022	16	Isaac River Alluvium	Existing
NB_1R	-	-	-	Regolith	To be constructed
NB_2P	-	-	-	Leichhardt Seam	To be constructed
NB_3P	-	-	-	Leichhardt Seam	To be constructed

3.2 Summary Statistics and Baseline Data

Summary statistics for all bores using the entire dataset are shown in **Appendix A** on a bore-by-bore basis. Summary statistics grouped by aquifer are presented in **Appendix B** (with outliers). Median values for proposed EA parameters per aquifer are shown in **Table 6**. A boxplot for each proposed EA parameter for all bores is presented in **Appendix C**. These boxplots provide an inter-bore comparison for each analyte and show the data spread at each bore.

Table 6 Median Values for Proposed Environmental Authority Water Quality Parameters in Proposed Environmental Authority Bores

Analyte	Units	Isaac River Alluvium	Leichhardt Seam	Rangal Coal Measures (RCM) Interburden	Vermont Seam
pH (Field)	pH units	6.76	6.94	7.2	7.07
Electrical Conductivity (Lab)	µS/cm	2800	15600	8270	8365
Aluminium	mg/L	0.01*	0.01*	0.01*	0.01*
Arsenic	mg/L	0.001*	0.001*	0.001*	0.001*
Cadmium	mg/L	0.0001*	0.0001*	0.0001*	0.0001*
Calcium	mg/L	111	255	126	192
Chloride	mg/L	588	5505	2650	2645
Chromium	mg/L	0.001*	0.001*	0.001*	0.001*
Cobalt	mg/L	0.002	0.001*	0.001*	0.001*
Copper	mg/L	0.001*	0.001*	0.001*	0.001*
Lead	mg/L	0.001*	0.001*	0.001*	0.001*
Magnesium	mg/L	107	295	36	117
Manganese	mg/L	0.5965	0.02	0.0125	0.042
Mercury	mg/L	0.0001*	0.0001*	0.0001*	0.0001*
Nickel	mg/L	0.001*	0.001*	0.001*	0.001*
Selenium	mg/L	0.01*	0.01*	0.01*	0.01*
Silver	mg/L	0.001*	0.001*	0.001*	0.001*
Sodium	mg/L	342	2750	1690	1545
Sulfate as SO_4 – Turbidimetric	mg/L	84	1*	7	1*
Zinc	mg/L	0.005*	0.019	0.011	0.011

* = Median is equal to the Limit of Reporting (LOR) value

3.3 Ionic Composition

Ionic composition on a bore-by-bore basis is presented on a Piper diagram (**Figure 2**). Monitoring bores are visualised based on aquifer type – Leichhardt Seam (red), Vermont Seam (blue), Isaac River Alluvium (green) and Rangal Coal Measures Interburden (yellow).

The majority of the monitoring bores are of sodium (Na) and potassium (K) cation dominance with proportionally higher concentrations of chloride type anions (Cl). **Figure 2** shows the water types for the majority of the monitoring bores are Na-Ca-Mg-HCO_3 dominant. Monitoring bores with screened intervals in the Isaac River Alluvium formation show lower concentrations of Na cations and Cl anions, and also show comparatively lower electrical conductivity (EC) values suggesting more regular recharge with fresher water. **Figure 2** shows, the monitoring bores with screened intervals in the Vermont Seam (G2304R, G2307, R2035 and R2055) appear to have the most variance in composition in the Piper diagram, however the average EC ranges from 4,600 µS/cm (R2035) to 27,000 µS/cm (G2304R).

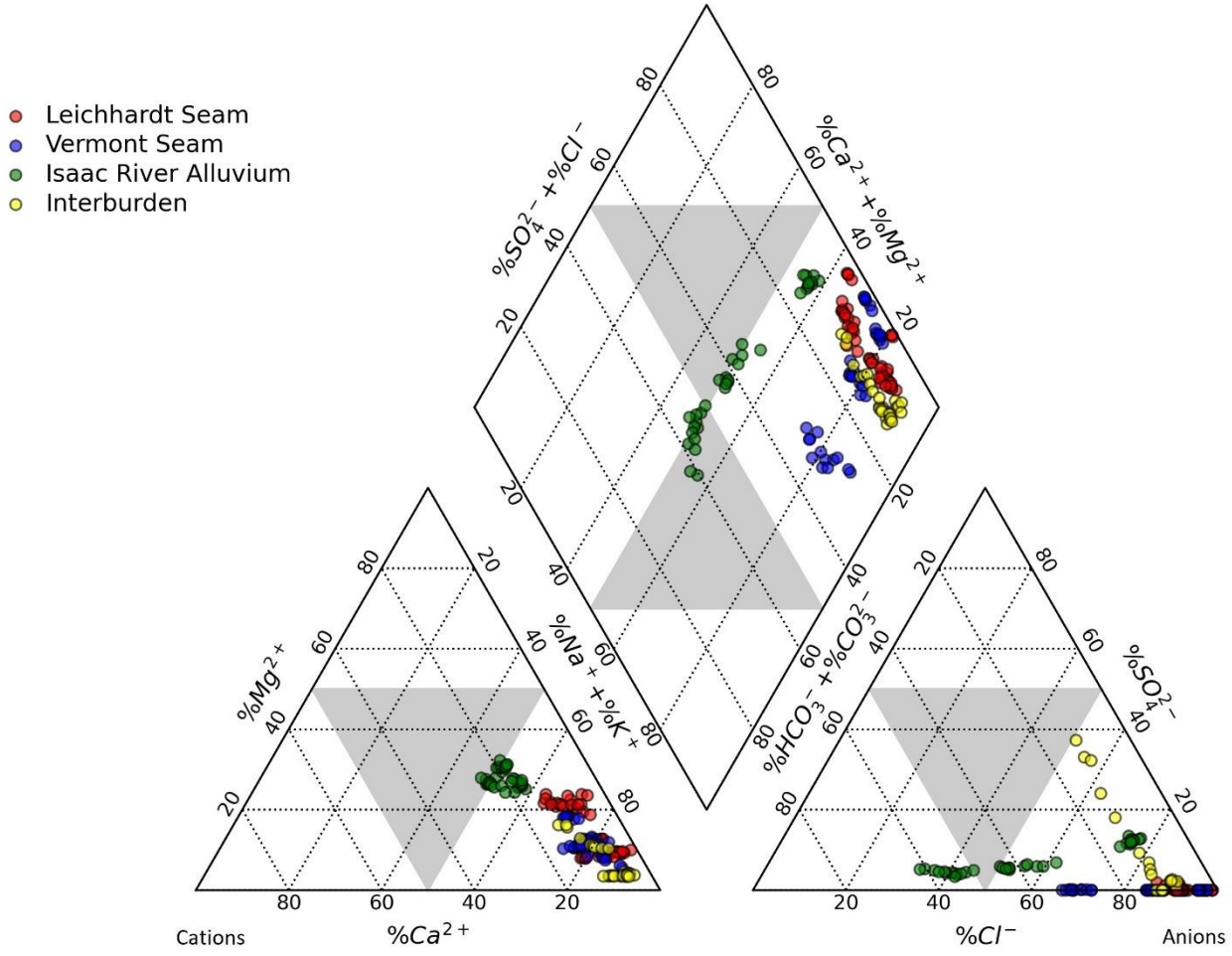


Figure 2 Piper Diagram

3.4 Time Series Analysis

Time series plots for all bores are presented as **Appendix D.** An example plot from **Appendix D** is provided in **Figure 3** to show the methodology used to analyse each monitoring bore and parameter/analyte:

1. Plot time series of the raw data (**Figure 3**, left), including Mann-Kendall statistics (trends).
2. Plot the boxplot for the raw data to identify statistical outliers (**Figure 3**, middle).
3. Review the statistical outliers, remove outliers if deemed "true outliers" (**Section 3.4.1**).
4. Plot time series with outliers removed (**Figure 3**, right).
5. Apply the 80th and 95th percentile of the data set (outlier removed).
6. Analyse trends for the data set (outlier removed), **Section 3.4.2.**

3.4.1 Outliers

Outliers are identified within the dataset and have been screened statistically using the 1.5-times interquartile range rule (DES, 2021). Any data point that is more than 1.5 times the interquartile range above the third quartile or below the first quartile is identified as a statistical outlier. The approach for treatment of outliers is consistent with DES (2021). However, given Project mining has not started yet and thus the dataset is likely not influenced by mining activities, it may be appropriate to keep as many data points as possible in the baseline data set (i.e. a statistical outlier might be a valid data point). Regardless, identified outliers have been removed to be consistent with DES (2021) despite the fact that this outlier data could be classified as legitimate baseline data.

The removed outliers are visualised in **Appendix D** (refer to **Figure 3** for an example). Updated summary statistics (i.e. without outliers) are shown in **Appendix E**.

3.4.2 Time Series Trends

The Mann-Kendall statistical trend test was used to detect potential trends in the dataset (outliers removed, refer to **Section 3.4.1**) for all bores where sufficient data is available, with the results shown in **Table 7** (and **Appendix E**).

The Mann-Kendall test is used as a first pass check to determine if a dataset contains a statistically significant trend that warrants further analysis to assess if a real trend exists, and therefore the data may be inappropriate to use in the derivation of site-specific triggers. Interpretation of Mann-Kendall results relies on the p-value and the Kendall rank correlation coefficient (tau). A p-value less than 0.05 means there is a statistically significant trend in the data. Tau shows the relation between the variance of data, with a positive tau indicating a positive trend and a negative tau indicating a negative trend. If the p-value is greater than 0.05, no statistically significant trend is present in the data.

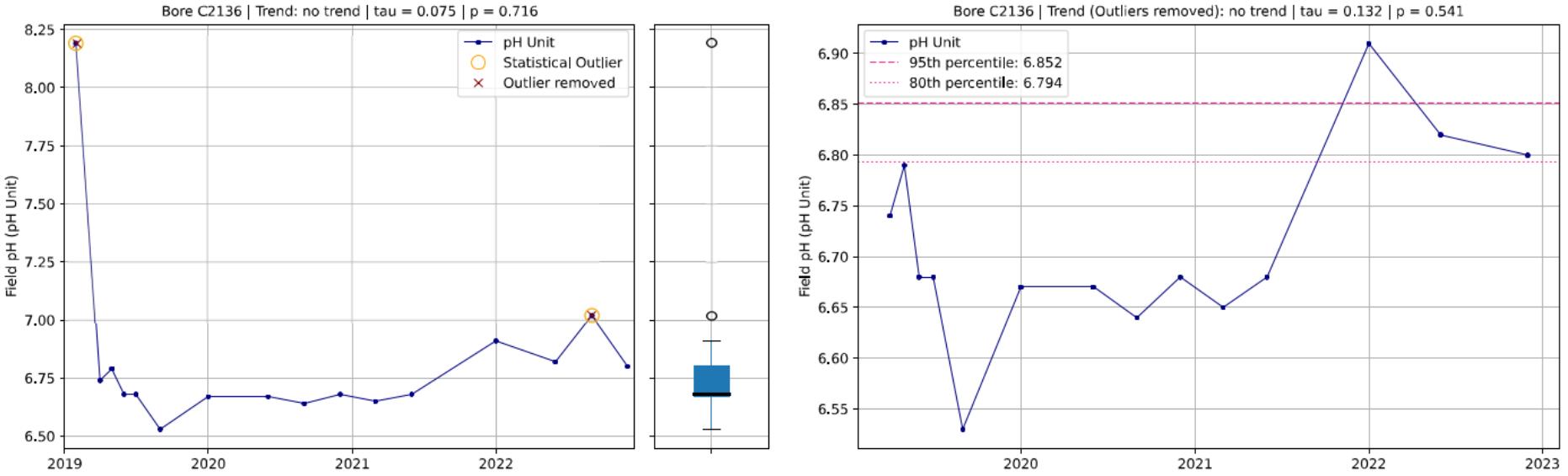


Figure 3 Example for a Time Series, with Outlier Identification and Trend Analysis consistent with DES (2021)

Table 7 Mann-Kendall Statistical Trend Test Results

Bore	Field pH	EC (µS/cm)	Al (mg/L)	Ca (mg/L)	Cl (mg/L)	Mg (mg/L)	Mn (mg/L)	Na (mg/L)	SO_4 (mg/L)	Zn (mg/L)	As (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Pb (mg/L)	Hg (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)
C2105R	-	-	-	-	na	-	-	-	-	-	na	-	-	-	-	-	-	na	-	-
C2136	-	dec	-	dec	dec	dec	-	dec	dec	-	dec	-	-	-	-	-	-	-	-	-
G2304R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2307	-	-	-	dec	-	inc	-	inc	-	-	-	-	-	-	-	-	-	-	-	-
Knob Hill 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Knob Hill 2	-	dec	-	dec	dec	dec	dec	dec	dec	-	-	-	-	dec	-	-	-	-	-	-
R2008	-	dec	-	-	-	-	-	-	-	inc	-	-	-	-	-	-	-	-	-	-
R2009R	-	na	na	-	na	na	-	na	-	na	-	-	na	-	na	-	-	na	-	-
R2010R	-	dec	-	-	-	-	-	-	-	-	dec	-	-	na	-	-	-	-	-	-
R2032	-	-	-	dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R2034R	-	dec	-	dec	-	dec	dec	dec	dec	-	dec	-	na	dec	na	na	-	-	-	na
R2035	inc	dec	-	dec	dec	dec	dec	-	dec	-	-	-	-	-	-	-	-	-	-	-
R2054	-	-	-	dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R2055	-	-	-	dec	-	-	-	inc	-	-	-	-	-	-	-	-	-	-	-	-
Winnet Bore	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

-= no trend

na = not enough data points for Mann-Kendall trend test

dec = declining trend identified

inc = increasing trend identified

Table 8 lists the identified statistical trends per bore and parameter, with an assessment of whether the identified statistical trend is a real trend indicating the data cannot be used for limit setting, or whether the data remains appropriate for derivation of limits despite the identified statistical trend.

As a summary of the **Table 8**, most of the identified trends were decreasing trends over the observation time and were associated with major ions, which are natural constituents of the water (and consequently EC). Where a decreasing trend occurred and the site-specific value was more conservative than the guideline value, the site-specific value was still applied. In other instances, where an increasing trend occurred, the site-specific value was applied if there was no suitable guideline value available.

Table 8 Assessment of Identified Statistical Trends

Bore	Parameter (trend direction)	Aquifer	Trend assessment
C2136	Arsenic (decrease)	Leichhardt Seam	Arsenic concentrations show a decrease from 0.004 to 0.001 mg/L. The site-specific value should not be applied due to this trend and the most sensitive guideline value is applied instead.
C2136	Calcium (decrease)	Leichhardt Seam	The first 7 datapoints show a fluctuating increase in calcium concentrations reaching a maximum of 483 mg/L late 2019. From late 2019 to late 2022 there is a fluctuating downward trend with concentrations decreasing to 156 mg/L in late 2022. It is likely the fluctuating downward trend is due to natural variations. The significance of the trend could change with more data becoming available in the future. It is proposed to use the site specific data for trigger limit derivation despite the data showing a trend.
C2136	Chloride (decrease)	Leichhardt Seam	Data shows a fluctuating downward trend from 5980 mg/L to 4010 mg/L between the 2019 to late 2022 period. It is likely the fluctuating downward trend is due to natural variations. The significance of the trend could change with more data becoming available in the future. It is proposed to use the data for trigger limit derivation.
C2136	Electrical Conductivity (decrease)	Leichhardt Seam	Between 2019 and 2020 EC data collected from bores within the Leichhardt seam showed high fluctuating values. Since early 2020 EC has shown an overall decreasing trend changing from 17300 µS/cm to 12100 µS/cm. It is unknown what changed this shift (for example climatic conditions or a change in sampling methodology). The trend appears to be levelling out or could potentially reverse once more data becomes available, showing the natural variability of the seam water quality. It is proposed to use the site specific data for trigger limit derivation.
C2136	Magnesium (decrease)	Leichhardt Seam	Data shows high variability with a downward fluctuating trend. Concentrations decrease from 496 mg/L to 315 mg/L between the 2019 to late 2022 period. Due to the low difference in concentration over an extended period, it is likely the fluctuating downward trend is due to natural variations. The significance of the trend could change with more data becoming available in the future. It is proposed to use the data for trigger limit derivation.

Bore	Parameter (trend direction)	Aquifer	Trend assessment
C2136	Sodium (decrease)	Leichhardt Seam	Data shows a high variability downward trend between early 2019 to late 2022 with concentrations decreasing from 2940 mg/L to 2380 mg/L by late 2022. Due to the low difference in concentration (560 mg/L) over the 4-year period it is likely the data is showing the natural fluctuation of concentration. The trend could possibly reverse once more data becomes available; it is proposed to use the data for trigger limit variation.
C2136	Sulfate (decrease)	Leichhardt Seam	Data shows a variable downward trend with concentrations decreasing from 143 mg/L to 75 mg/L from mid-2019 to late-2022. The data is likely showing the natural variation in sulfate concentrations and the trend could possibly reverse once more data becomes available. It is proposed to use the data for trigger limit derivation since it is the most conservative appropriate guideline.
G2307	Calcium (decrease)	Vermont Seam	The first 7 data points during 2019 show a fluctuating upward trend. From late-2019 to late-2022 the data shows a fluctuating downward trend with concentrations changing from 377 mg/L to 226 mg/L by late 2022. The difference of 150 mg/L of calcium over a 3-year period is likely due to natural variation. It is proposed to use the data for trigger limit derivation.
G2307	Magnesium (increase)	Vermont Seam	Data shows fluctuating upward trend from 240 mg/L to 254 mg/L from the 2019 to late 2022 period. Due to the low difference in concentration over an extended period, it is likely the fluctuating upward trend is due to natural variations. The trend appears to be levelling off meaning the significance of the trend could change when more data becomes available. It is proposed to use the data for trigger limit derivation.
G2307	Sodium (increase)	Vermont Seam	Data shows high variability upward trend with concentrations increasing from 2680 mg/L to 3040 mg/L. Due to the low difference in concentration (360 mg/L) over a 4-year period it is likely the data is showing the natural fluctuation of concentration. The trend could possibly reverse once more data becomes available; it is proposed to use the data for trigger limit derivation.
Knob Hill 2	Calcium (decrease)	Isaac River Alluvium	Data shows an upward trend of calcium concentrations over the 2019 period before a downward trend into 2022. The downward trend shows concentrations decreasing from 52 mg/L to 26 mg/L by late 2022. The fluctuations of 26 mg/L of calcium concentration over a 3-year period are likely due to natural variations. It is proposed to use the data for trigger limit derivation.
Knob Hill 2	Chloride (decrease)	Isaac River Alluvium	Data shows a fluctuating downward trend from with concentrations decreasing from 160 mg/L to 61 mg/L between the 2019 to late 2022 period. It is likely the fluctuating downward trend is due to natural variations. The significance of the trend could change with more data becoming available in the future. It is proposed to use the data for trigger limit derivation.
Knob Hill 2	Cobalt (decrease)	Isaac River Alluvium	Data shows steady downward stepping concentrations of cobalt between early 2019 to late 2022 decreasing from 0.0040 mg/L to 0.0010 mg/L. The data is likely showing the natural variation in cobalt concentrations and the trend could possibly reverse once more data becomes available. It is proposed to use the data for trigger limit derivation since it is the most conservative appropriate guideline.

Bore	Parameter (trend direction)	Aquifer	Trend assessment
Knob Hill 2	Electrical Conductivity (decrease)	Isaac River Alluvium	During the first year of monitoring in 2019, a general increase in EC values can be seen. Since early 2020 an overall steady decrease in EC has been recorded dropping from 1050 µS/cm to 517 µS/cm late 2022. The trend could potentially reverse once more data becomes available, showing the natural variability. It is proposed to use the data for trigger limit derivation.
Knob Hill 2	Magnesium (decrease)	Isaac River Alluvium	Data shows a variable downward trend after 2021 with concentrations decreasing from around 30-35 mg/L to 18 mg/L. Due to the low difference in concentration over an extended period it is likely the data is showing natural variation in magnesium concentrations. It is proposed to use the data for trigger limit derivation despite this decreasing trend.
Knob Hill 2	Manganese (decrease)	Isaac River Alluvium	Data shows a downward trend with some variability with concentrations decreasing from 1.25 mg/L to 0.53 mg/L from mid-2020 to late-2022. Due to the low difference in concentration over an extended period it is likely the data is showing natural variation in manganese concentrations. It is proposed to use the data for trigger limit derivation.
Knob Hill 2	Sodium (decrease)	Isaac River Alluvium	Data shows a variable downward trend with concentrations decreasing from 115 mg/L late 2019 to 55 mg/L mid 2022 before again increasing to 75 mg/L in late 2022. The trend appears to be levelling out and could possibly reverse further once more data becomes available. Since the difference in concentration over an extended period is low it is proposed to use the data for trigger limit derivation.
Knob Hill 2	Sulfate (decrease)	Isaac River Alluvium	Data shows a variable downward trend with concentrations decreasing from 21 mg/L to 13 mg/L from mid-2019 to late 2022. The data is likely showing the natural variation in sulfate concentrations and the trend could possibly reverse once more data becomes available. It is proposed to use the data for trigger limit derivation since it is the most conservative appropriate guideline.
R2008	Electrical Conductivity (decrease)	Leichhardt Seam	Between 2019 and 2020 EC data collected from bores within the Leichhardt seam showed high fluctuating values. Since early 2020 EC has shown an overall decreasing trend changing from 16700 µS/cm to 14700 µS/cm. It is unknown what changed this shift (for example climatic conditions or a change in sampling methodology). The trend appears to be levelling out or could potentially reverse once more data becomes available, showing the natural variability of the seam. It is proposed to use the data for trigger limit derivation.
R2008	Zinc (increase)	Leichhardt Seam	Data shows highly variable slight upward trend from early 2019 to late 2022 with concentrations increasing from 0.005 mg/L to 0.035 mg/L by late 2022. The data is likely showing the natural variation in zinc concentrations and the trend could possibly reverse once more data becomes available. It is proposed to use the data for trigger limit derivation.
R2010R	Arsenic (decrease)	Leichhardt Seam	Data shows a variable downward trend between late 2019 to late 2022. The data is likely showing the natural variation in arsenic concentrations and the trend could possibly reverse once more data becomes available. It is proposed to use the data for trigger limit derivation.

Bore	Parameter (trend direction)	Aquifer	Trend assessment
R2010R	Electrical Conductivity (decrease)	Leichhardt Seam	Between 2019 and 2020 EC data collected from bores within the Leichhardt seam showed high fluctuating values. Since early 2020 EC has shown an overall decreasing trend reducing from 27900 µS/cm to 24500 µS/cm. It is unknown what caused this shift (for example climatic conditions or a change in sampling methodology). The trend appears to be levelling out or could potentially reverse once more data becomes available, showing the natural variability of the seam. It is proposed to use the data for trigger limit derivation.
R2032	Calcium (decrease)	Leichhardt Seam	The first seven data points during 2019 show a fluctuating upward trend. From late 2019 to late 2022 the data shows a fluctuating downward trend with concentrations changing from 370 mg/L to 145 mg/L by late 2022. The difference of 225 mg/L of calcium over a 3-year period is likely due to natural variation. It is proposed to use the data for trigger limit derivation.
R2034R	Arsenic (decrease)	RCM Interburden	Data shows a downward trend between late 2019 to late 2022. The data is likely showing the natural variation in arsenic concentrations and the trend could possibly reverse once more data becomes available. It is proposed to use the data for trigger limit derivation.
R2034R	Calcium (decrease)	RCM Interburden	The nine data points from mid-2020 to late-2022 shows a downward trend of calcium concentrations decreasing from 700 mg/L to 150 mg/L by late 2022. It is likely the decrease in concentration is due to natural fluctuations. It is proposed to use the data for trigger limit derivation. The significance of the trend could change with more data becoming available in the future.
R2034R	Cobalt (decrease)	RCM Interburden	Data shows steady downward trend of cobalt concentration between early 2019 to late 2022 decreasing from 0.026 mg/L to 0.0023 mg/L by late 2022. The data is likely showing the natural variation in cobalt concentrations and the trend could possibly reverse once more data becomes available. It is proposed to use the data for trigger limit derivation.
R2034R	Electrical Conductivity (decrease)	RCM Interburden	Data shows a downward trend in EC decreasing from 1900 µS/cm to 12100 µS/cm from mid-2020 to late 2022 and appears to be levelling out. Given the short length of this data set, the downward trend could be part of a natural cycle. The trend could potentially reverse once more data becomes available, showing the natural variability. It is proposed to use the data for trigger limit derivation
R2034R	Magnesium (decrease)	RCM Interburden	Data shows a clear downward trend between early 2021 to late 2022 with concentrations decreasing from 500 mg/L to 175 mg/L by late 2022. The trend appears to be levelling out or could potentially reverse once more data becomes available, showing the natural variability. It is proposed to use the data for trigger limit derivation
R2034R	Manganese (decrease)	RCM Interburden	Data shows a downward trend with some variability with concentrations decreasing from 1.25 mg/L to 0.53 mg/L from mid-2020 to late 2022. The trend appears to be levelling out with the last four data points showing a variance of 0.2 mg/L. It is possible the trend could reverse once more data becomes available; it is proposed to use the data for trigger limit derivation since it is the most conservative appropriate guideline.

Bore	Parameter (trend direction)	Aquifer	Trend assessment
R2034R	Sodium (decrease)	RCM Interburden	From mid-2020 to late-2022 concentrations show a variable downward trend decreasing from 4100 mg/L to 2450 mg/L before again increasing to 2650 mg/L. The data is likely showing the natural variation in sodium concentrations and the trend could possibly reverse once more data becomes available. It is proposed to use the data for trigger limit derivation since it is the most conservative appropriate guideline.
R2034R	Sulfate (decrease)	RCM Interburden	Data shows a downward trend with concentrations decreasing from 4200 mg/L to 250 mg/L from mid-2019 to late 2022. The data is likely showing the natural variation in sulfate concentrations and the trend could possibly reverse once more data becomes available. It is proposed to use the data for trigger limit derivation.
R2035	Calcium (decrease)	Vermont Seam	Data shows an upward trend of calcium concentrations over the 2019 period before a downward trend into 2022. The fluctuations of approximately 100 mg/L of calcium concentration over a 3-year period are likely due to natural variations. It is proposed to use the data for trigger limit derivation.
R2035	Chloride (decrease)	Vermont Seam	Data shows a fluctuating downward trend from approximately 1275 mg/L to 1100 mg/L between the 2019 to late 2022 period. It is likely the fluctuating downward trend is due to natural variations. The significance of the trend could change with more data becoming available in the future. It is proposed to use the data for trigger limit derivation.
R2035	Electrical Conductivity (decrease)	Vermont Seam	Data shows a downward trend in EC in the range of 5000 µS/cm to 4300 µS/cm between 2019 to late 2022. A decrease of approximately 700 µS/cm over a 3-year period is likely due to natural fluctuations. It is proposed to use the data for trigger limit derivation.
R2035	Magnesium (decrease)	Vermont Seam	Data shows a clear upward trend during 2019 with concentrations increasing from 35 mg/L to 69 mg/L. Concentrations then downwardly trend into 2022 reaching 25 mg/L before again increasing into 2022 to 35 mg/L. Due to the low difference in concentration over an extended period it is likely the data is showing natural variation in magnesium concentrations. It is proposed to use the data for trigger limit derivation.
R2035	Manganese (decrease)	Vermont Seam	First three data points during early 2019 show an increase in concentration from 0.04 mg/L to 0.14 mg/L. From mid-2019 to mid-2022 concentrations show a variable downward trend reaching a minimum of 0.041 mg/L before again increasing to 0.059 mg/L. The data is likely showing the natural variation in manganese concentrations. It is proposed to use the data for trigger limit derivation since it is the most conservative appropriate guideline.
R2035	pH Field (increase)	Vermont Seam	pH of 8.4 was recorded during the first sampling event in 2019. The previous 15 samples show the pH fluctuating between 6.98 and 7.77. Instead of using trending data it is proposed to use the Isaac River Sub-basin – ANZECC and ARMCANZ (2000) – Aquatic 95% guideline, which limits the pH to between 6.5 – 8.5, which covers the current data set.
R2035	Sulfate (decrease)	Vermont Seam	Data shows high variability in sulfate concentrations between 1 mg/L and 5 mg/L from mid-2019 to late 2022. The data is likely showing the natural variation in sulfate concentrations. It is proposed to use the data for trigger limit derivation since it is the most conservative appropriate guideline.

Bore	Parameter (trend direction)	Aquifer	Trend assessment
R2054	Calcium (decrease)	RCM Interburden	The first seven data points during 2019 show a fluctuating upward trend. From late 2019 to late 2022 the data shows a fluctuating downward trend with concentrations changing from 179 mg/L to 90 mg/L by late 2022. The difference of 89 mg/L of calcium over a 3-year period is likely due to natural variation. It is proposed to use the data for trigger limit derivation.
R2055	Calcium (decrease)	Vermont Seam	The first seven data points during 2019 show a fluctuating upward trend. From late 2019 to late 2022 the data shows a fluctuating downward trend with concentrations changing from 250 mg/L to 40 mg/L by late 2022. The difference of 210 mg/L of calcium over a 3-year period is likely due to natural variation. It is proposed to use the data for trigger limit derivation.
R2055	Sodium (increase)	Vermont Seam	Data shows high variability upward trend with concentrations increasing from 1300 mg/L to 1700 mg/L. Due to the low difference in concentration (400 mg/L) over a 4-year period it is likely the data is showing the natural variation in concentration. The trend could possibly reverse once more data becomes available; it is proposed to use the data for trigger limit derivation as no suitable guideline values are available.

4 Site Specific Groundwater Quality Limit Derivation

The revised dataset summary statistics (e.g. with outliers removed) shown in **Appendix E** were used in the following **Section 4.2.2** to **Section 4.2.21** to derive appropriate groundwater quality limits for the EA.

Appendix E provides a summary of the statistics for each parameter (e.g. sample count, minimum, median, maximum, percentile ranges, etc.) in table format for each monitoring bore (**Figure 4**). **Appendix E** provides a table for each monitoring bore and provides the following:

- Water quality guideline and WQO for each parameter, rows 1 to 6.
- Summary statistics (after removal of outliers), rows 7 to 18, with comparison of the 80th percentile with the guideline (20th and 80th percentile for pH) in row 16.
    - Trigger derivation considerations: number of samples, percentage LOR and trends (rows 19 to 22).
- If all rows 20 to 22 are blank (i.e. more than eight samples, less than 15% of LORs and no trends identified) the derived site specific limits for the groundwater monitoring bore have been adopted.
- If any of rows 20 to 22 are not blank (i.e. less than eight samples, more than 15% of LORs and/or trends identified) a site-specific limit could not be derived, and therefore the Water quality guideline and WQO values were applied (colour coded according to rows 2 to 6).

	Field pH	Electrical Conductivity (µS/cm)	Aluminium Dissolved (mg/L)
Water quality Guidelines			
Isacc River Sub-basin - ANZECC 2000 - Aquatic 95% spp	6.5-8.5	-	0.055
ADWG Guidelines - Aesthetic	6.5-8.5	900	0.2
ADWG Guidelines - Health	-	-	-
Isacc River Sub-basin - Irrigation	-	-	20
Isacc River Sub-basin - Stock	-	7500	5
Statistics			
Count	14	16	16
Percent of LOR	0	0	100
Date from	01-05-2019	27-05-2019	27-05-2019
Date to	01-12-2022	15-12-2022	15-12-2022
Minimum	6.5	5470	0.01
5th percentile	6.5	5905	0.01
20th percentile	6.6	6420	0.01
Median	6.7	7235	0.01
80th percentile	6.8	7850	0.01
95th percentile	6.9	8208	0.01
Maximum	6.9	8890	0.01
Trigger derivation considerations			
Trigger Development not possbile due less than 8 samples			
Trigger Development not possbile due to more than 15% of values <LOR			x
Trend (after outlier removal)			
Proposed Trigger Limits			
Limit A (80th Percentile)			
Limit B (95th Percentile) or applicable guidleline	6.5-8.5	8208	0.055

Figure 4 Example of the Trigger Derivation Table

4.1 Number of Relevant Sampling Events

The first step to deriving site-specific groundwater quality limits (DES, 2021; Section 5) is to confirm the number of sampling events (data points) available for each bore and analyte. DES (2021) recommends a minimum of 18 samples over at least 24 months to derive site specific limits but allows using eight or more samples to derive interim site-specific limits. **Table 9** shows the number of samples for each bore and parameter/analyte in the dataset (with outliers removed). The cells highlighted in green indicate there is sufficient data to derive site specific limits and cells highlighted in orange indicate that the dataset is too small to derive limits in accordance with DES (2021).

Table 9 Number of Sampling Events for Bores (Outliers Removed)

Bore	pH	EC	Al	Ca	Cl	Mg	Mn	Na	SO4	Zn	As	Cd	Cr	Co	Cu	Pb	Hg	Ni	Si	Ag
C2105R	8	8	9	9	7*	10	8	10	10	10	7*	9	8	9	9	9	10	7*	9	9
C2136	14	19	19	19	19	19	18	19	19	17	17	19	19	19	19	19	19	17	19	19
G2304R	9	9	10	11	11	11	9	10	9	10	9	10	10	9	10	10	11	9	10	10
G2307	15	19	19	19	19	18	19	18	19	19	18	18	18	18	18	18	19	18	18	18
Knob Hill 1	14	16	16	16	15	15	13	15	16	13	15	16	16	9	15	16	16	16	16	15
Knob Hill 2	13	16	16	16	16	16	16	16	16	12	16	16	16	16	16	16	16	16	16	16
R2008	13	15	18	19	15	15	17	15	18	17	18	19	18	19	18	19	19	17	19	19
R2009R	9	6*	7*	8	6*	6*	8	6*	9	6*	8	8	7*	8	7*	8	8	7*	8	8
R2010R	8	9	8	8	10	8	9	9	8	8	10	8	8	7	8	8	10	9	8	9
R2032	14	17	19	19	17	18	18	19	18	19	19	19	18	19	19	19	19	18	19	19
R2034R	9	9	8	9	9	9	8	9	9	9	8	8	7*	9	7*	7*	9	8	8	7*
R2035	15	19	18	19	16	19	19	19	16	16	15	19	19	19	19	19	19	17	19	19
R2054	15	17	17	18	16	17	15	18	17	16	18	18	18	18	18	18	18	18	18	18
R2055	14	19	19	19	18	18	18	19	19	17	19	19	19	19	19	19	19	18	19	19
Winnet Bore	15	14	14	15	14	13	15	13	15	15	16	15	15	15	14	16	16	15	15	15

* - Derived trigger limits adopted as interim values

The dataset for bore C2105R contains seven of the eight datapoints required for site specific limit derivation for chloride, arsenic, and nickel concentrations. Chloride concentrations appear to be fluctuating around 11,200 mg/L since late 2019 with no visible trend apparent. It is recommended that the statistically derived groundwater quality limit for chloride at this bore (11,340 mg/L) be adopted for the interim since the groundwater naturally exceeds relevant guideline values, until the minimum 8 datapoints are acquired. For arsenic and nickel, the most conservative relative guideline should be adopted for the interim, 0.01 mg/L (ADWG Guidelines – Health) and 0.011 mg/L (Isaac River Sub-basin – Aquatic 95%) respectively, since the seven available datapoints for these parameters are below guideline values.

For bore R2009R, it is recommended that the statistically derived groundwater quality limit for electrical conductivity, chloride, magnesium and sodium be adopted for the interim since the groundwater naturally exceeds the relevant guideline values for these parameters. The recommended values are as follows: EC – 12725 µS/cm, chloride – 4233 mg/L, magnesium – 67 mg/L and sodium – 2695 mg/L.

For aluminium, zinc, chromium, copper and nickel the most conservative relative guideline be adopted for the interim which, in all cases, is the Isaac River Sub-basin – Aquatic 95%. Aluminium – 0.055 mg/L, zinc 0.008 mg/L, copper – 0.0014 mg/L and nickel – 0.011 mg/L.

For bore R2010R, it is recommended the most conservative relative guideline value of 0.1 mg/L (Isaac River Sub-basin – Irrigation) be adopted for the interim for cobalt.

For bore 2034R, it is recommended the most conservative relative guideline be applied to chromium and lead which, in both cases, is the Isaac River Sub-basin – Aquatic 95%, 0.001 mg/L and 0.0034 mg/L respectively. For copper and silver the 95th percentile is above the most conservative guideline, there the second most conservative guideline is recommended: copper 1 mg/L (ADWG Guidelines – Aesthetic) and silver 0.1 mg/L (ADWG Guidelines – Health).

Further, the DES (2021) guideline specifies a limit of 10-15% of values below LOR for a dataset to be suitable to derive site specific limits from. **Table 10** lists each bore and analyte with their respective percentage of values below LOR. Highlighted cells indicate that the dataset is not suitable for site specific limit derivation for the particular bore and parameter according to DES (2021).

Table 10 Percentage of Data Points Below LOR (outliers removed)

Bore	pH	EC	Al	Ca	Cl	Mg	Mn	Na	SO4	Zn	As	Cd	Cr	Co	Cu	Pb	Hg	Ni	Si	Ag
C2105R	0	0	100	0	0	0	0	0	10	40	86	100	100	89	100	100	100	100	100	100
C2136	0	0	100	0	0	0	0	0	0	71	59	100	100	100	95	100	100	100	100	100
G2304R	0	0	100	0	0	0	0	0	78	10	100	100	100	89	100	100	100	100	100	100
G2307	0	0	95	0	0	0	0	0	95	11	100	100	100	100	100	100	100	100	100	100
Knob Hill 1	0	0	100	0	0	0	0	0	0	85	87	100	100	0	53	100	100	19	100	100
Knob Hill 2	0	0	100	0	0	0	0	0	0	100	0	100	94	0	100	100	100	81	100	100
R2008	0	0	100	0	0	0	0	0	94	6	89	100	100	100	94	100	100	100	100	84
R2009R	0	0	100	0	0	0	0	0	0	67	0	88	100	25	100	100	100	0	100	100
R2010R	0	0	100	0	0	0	11	0	88	88	0	100	100	100	100	100	100	56	100	89
R2032	0	0	100	0	0	0	0	0	100	0	100	100	100	100	89	95	100	100	100	100
R2034R	0	0	100	0	0	0	0	0	0	11	13	100	86	11	71	100	100	0	100	100
R2035	0	0	100	0	0	0	0	0	25	38	60	100	95	95	100	100	100	94	100	100
R2054	0	0	100	0	0	0	0	0	100	6	94	100	100	100	94	100	100	100	100	100
R2055	0	0	100	0	0	0	0	0	100	12	100	100	100	100	95	100	100	100	100	100
Winnet Bore	0	0	100	0	0	0	0	0	0	40	88	100	93	67	93	94	100	0	100	100

4.2 Appropriateness of Available Guideline Values

Comparison of the available revised groundwater quality database with the relevant EV guideline values/WQOs identified in **Section 2** is provided visually on the boxplots presented in **Appendix D**. Discussion of this comparison is provided in the following sections by parameter.

4.2.1 General Approach to Assess Most Suitable Guideline Values and Water Quality Objectives

Following review and revision of the groundwater quality database (**Section 3**), the methodology outlined in DES (2021) is to:

- Compare the 20th (for pH lower guideline value) and 80th (for pH upper guideline) percentile of the dataset to the relevant EV guideline values (refer to **Table 3**for relevant guidelines and WQOs) - **Appendix E.**
- Assess whether the derived site-specific groundwater limits are more appropriate than existing default EV guidelines and WQOs (**Sections 4.2.2** to **4.2.21**).

DES (2021) provide four scenarios that may arise when assessing whether default guidelines/WQOs or site-specific groundwater limits are most appropriate for the area:

- "*Default guidelines and WQOs are available and the 80th percentile from site-specific bores are not substantially different from the default guideline or WQO. In this case it is recommended that the default values are adopted.*
- *Default guidelines and WQOs are available and the 80th percentile values from site-specific bores are significantly less than the default guideline or WQO. In this situation, for indicators where the site-specific values are significantly better than default values, then the site-specific values should be adopted. However, for toxicants, if the local groundwater quality is less than the default guideline (ANZG 2018), then the toxicant default guideline value may still be applicable.*
- *Default guidelines and WQOs are not available. In this situation, the 80th percentile value from the local bores (even where slightly impacted in some circumstances, which would need to be agreed by the regulator) may be the best available option for deriving a site-specific guideline. It is therefore, recommended that the site-specific values be adopted.*
- *Default guidelines and WQOs are available and the 80th percentile values from site-specific bores exceed the default guidelines. If the site-specific values better reflect the local conditions, then site-specific values would typically be adopted*".

4.2.2 pH (Field pH)

The pH dataset for all bores is within the most conservative guideline value range, except for C2105R; i.e. Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% range of species protection (spp) (6.5 - 8.5). The Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp range is therefore appropriate for use as the pH water quality limits (i.e. 6.5 to 8.5).

For C2105R the 5th percentile for pH is 6.3, which is 0.2 pH units below the relevant guideline lower limit, ie. the Isaac River Sub-basin – ANZECC and ARMCANZ (2000)– Aquatic 95% spp range (6.5 - 8.5). It is proposed to extend this range with the lower limit of 6.3, to include the site-specific information. The final pH trigger limit is pH 6.3-8.5, with an exceedance occurring if the lower or upper limits are exceeded three consecutive times (either above or below).

For the proposed monitoring bores, NB_1R, NB_2P and NB_3P, the most conservative of the relevant guidelines/WQOs should be adopted as the interim limit, i.e. the Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp (6.5 - 8.5), until site specific limits can be derived.

4.2.3 Electrical Conductivity (Lab EC)

For all bores, site-specific water quality limits were derived due to the availability of sufficient data.

For the proposed monitoring bores, NB_2P and NB_3P, it is recommended the 95th percentile for the Leichhardt Seam data be adopted as the interim site-specific limit for EC (30,640 µS/cm).

For the proposed monitoring bore, NB_1R, the most conservative of the relevant guidelines/WQOs should be adopted as the interim limit, i.e. the Isaac River Sub-basin – Stock (7,500 µS/cm), until a site-specific limit can be derived.

4.2.4 Aluminium Dissolved

For all bores, more than 15% of aluminium concentrations were below LOR, as such site-specific water quality limits could not be derived. The most conservative guideline value was therefore adopted as the groundwater quality limit, i.e. the Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp (0.055 mg/L).

For the proposed monitoring bores, NB_1R, NB_2P and NB_3P, the most conservative of the relevant guidelines/WQOs should be adopted as the interim limits, i.e. Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% (0.055 mg/L), until site specific limits can be derived.

4.2.5 Calcium Dissolved

For all bores, sufficient data exist to derive site-specific water quality limits. All derived site-specific water quality limits are below the most conservative guideline value, i.e. Isaac River Sub-basin – Stock (1000 mg/L).

For the proposed monitoring bores, NB_2P and NB_3P, it is recommended the 95th percentile for the Leichhardt Seam data be adopted as the interim limit for calcium (912 mg/L).

For the proposed monitoring bore, NB_1R, the most conservative of the relevant guidelines/WQOs should be adopted as the interim limit, i.e. the Isaac River Sub-basin – Stock (1000 mg/L), until a site-specific limit can be derived.

4.2.6 Chloride Dissolved

For all bores, site-specific water quality limits were able to be derived since sufficient data was available.

For the proposed monitoring bores, NB_2P and NB_3P, it is recommended the 95th percentile for the Leichhardt Seam data be adopted as the interim limit for chloride (11200 mg/L).

For the proposed monitoring bore, NB_1R, the most conservative of the relevant guidelines/WQOs should be adopted as the interim limit, i.e. the ADWG Guidelines - Aesthetic (250 mg/L), until a site-specific limit can be derived.

4.2.7 Magnesium Dissolved

For all bores, sufficient data exists to derive site-specific water quality limits. All site-specific water quality limits are below the most conservative guideline, i.e. Isaac River Sub-basin – Stock (2000 mg/L).

For the proposed monitoring bores, NB_2P and NB_3P, it is recommended the 95th percentile for the Leichhardt Seam data be adopted as the interim limit for magnesium (966 mg/L).

For the proposed monitoring bore, NB_1R, the most conservative of the relevant guidelines/WQOs should be adopted as the interim limits, i.e. the Isaac River Sub-basin – Stock (2000 mg/L), until a site-specific limit can be derived.

4.2.8 Manganese Dissolved

For all bores, site-specific water quality limits were able to be derived since sufficient data was available.

For the proposed monitoring bores, NB_2P and NB_3P, it is recommended the 95th percentile for the Leichhardt Seam data be adopted as the interim limit for manganese (0.56 mg/L).

For the proposed monitoring bore, NB_1R, the most conservative of the relevant guidelines/WQOs should be adopted as the interim limit, i.e. the ADWG Guidelines – Aesthetic (0.1 mg/L), until a site-specific limit can be derived.

4.2.9 Sodium Dissolved

For all bores, site-specific water quality limits were able to be derived since sufficient data was available.

For the proposed monitoring bores, NB_2P and NB_3P, it is recommended the 95th percentile for the Leichhardt Seam data be adopted as the interim limit for sodium (5470 mg/L).

For the proposed monitoring bore, NB_1R, the most conservative of the relevant guidelines/WQOs should be adopted as the interim limit, i.e. the ADWG Guidelines – Aesthetic (180 mg/L), until a site-specific limit can be derived.

4.2.10 Sulfate as SO_4 (Turbidimetric)

Bores G2304R, G2307, R2008, R2010R, R2032, R2035, R2054 and R2055 all contained datasets that have more than 15% of their values below LOR, meaning site-specific water quality limits cannot be derived. Instead, the most conservative value above the LOR was applied, i.e. ADWG Guidelines – Aesthetic (250 mg/L). For the remaining bores, site-specific water quality limits were derived since sufficient data was available.

For the proposed monitoring bores, NB_2P and NB_3P, it is recommended the 95th percentile for the Leichhardt Seam data be adopted as the interim limit for sulfate (118 mg/L).

For the proposed monitoring bore, NB_1R, the most conservative of the relevant guidelines/WQOs should be adopted as the interim limit, i.e. the ADWG Guidelines – Aesthetic (250 mg/L), until a site-specific limit can be derived.

4.2.11 Zinc Dissolved

Bores C2105R and R2010R contained datasets which have more than 15% of their values below LOR, meaning site-specific water quality limits cannot be derived. Since the 95th percentile of the dataset for these bores was above the most conservative guideline value, the next most conservative was used, i.e. ADWG Guidelines – Aesthetic (3 mg/L).

Bores C2136, Knob Hill 1, Knob Hill2, R2009R, and R2035 also contain datasets which have more than 15% of their values below LOR. In these cases, the 95th percentile of the dataset was below the most conservative value, therefore allowing the guideline value to be used as the water quality limit, i.e. Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp (0.008 mg/L).

The datasets for the remaining bores were sufficient to derive site-specific limits.

For the proposed monitoring bores, NB_2P and NB_3P, it is recommended the 95th percentile for the Leichhardt Seam data be adopted as the interim limit for zinc (0.04 mg/L).

For the proposed monitoring bore, NB_1R, the most conservative of the relevant guidelines/WQOs should be adopted as the interim limit, i.e. the Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp (0.008 mg/L), until a site-specific limit can be derived.

4.2.12 Arsenic Dissolved

Datasets for all bores except Knob Hill 2, R2009R, R2010R and R2034R have more than 15% of their values below LOR, meaning site-specific water quality limits cannot be derived. Instead, the most conservative guideline value above the LOR was applied, i.e. ADWG Guidelines - Health (0.01 mg/L). The remaining bores contained sufficient data to derive site-specific limits.

For the proposed monitoring bores, NB_2P and NB_3P, it is recommended the 95th percentile for the Leichhardt Seam data be adopted as the interim limit for arsenic (0.04 mg/L).

For the proposed monitoring bore, NB_1R, the most conservative of the relevant guidelines/WQOs should be adopted as the interim limit, i.e. the ADWG Guidelines – Health (0.01mg/L), until a site-specific limit can be derived.

4.2.13 Cadmium Dissolved

Bores C2105R, G2304R and R2010R contained datasets which have more than 15% of their values below LOR, meaning site-specific water quality limits cannot be derived. Since the 95th percentile of the dataset for these bores is above the most conservative guideline, the next most conservative guideline value was used, i.e. ADWG Guidelines - Health (0.002mg/L).

The remaining bores also contain datasets that have more than 15% of their values below LOR. In these cases, the 95th percentile is below the most conservative guideline value, therefore allowing the most conservative guideline value to be used as the water quality limit, i.e. Isaac River Sub-basin – ANZECC and ARMCANZ (2000) – Aquatic 95% spp (0.0002mg/L).

For the proposed monitoring bores, NB_2P and NB_3P, it is recommended the 95th percentile for the Leichhardt Seam data be adopted as the interim limit for cadmium (0.0005 mg/L).

For the proposed monitoring bore, NB_1R, the most conservative of the relevant guidelines/WQOs should be adopted as the interim limit, i.e. the Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp (0.0002mg/L), until a site-specific limit can be derived.

4.2.14 Chromium Dissolved

Bores C2105R, G2304R and R2010R have datasets which have more than 15% of their values below LOR, meaning site-specific water quality limits cannot be derived. Since the 95th percentile for these bores is above the most conservative guideline, the next most conservative was used, i.e. ADWG Guidelines – Health (0.05 mg/L).

The remaining bores also contain datasets which have more than 15% of their values below LOR. In these cases, the 95th percentile is below the most conservative guideline value, therefore allowing the most conservative guideline value to be used as the water quality limit, i.e. Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp (0.001 mg/L).

For the proposed monitoring bores, NB_2P and NB_3P, it is recommended the 95th percentile for the Leichhardt Seam data be adopted as the interim limit for chromium (0.005 mg/L).

For the proposed monitoring bore, NB_1R, the most conservative of the relevant guidelines/WQOs should be adopted as the interim limit, i.e. the Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp (0.001 mg/L), until a site-specific limit can be derived.

4.2.15 Cobalt Dissolved

Bores Knob Hill 1, Knob Hill 2 and R2034R have sufficient data to derive site-specific values. For the remainder of the bores, more than 15% of their values are below LOR, meaning site-specific values can not be derived. The next most conservative guideline value above the LOR was therefore used as the water quality limit, i.e. Isaac River Sub-basin – Irrigation (0.1mg/L).

For the proposed monitoring bores, NB_2P and NB_3P, it is recommended the 95th percentile for the Leichhardt Seam data be adopted as the interim limit for cobalt (0.005 mg/L).

For the proposed monitoring bore, NB_1R, the most conservative of the relevant guidelines/WQOs should be adopted as the interim limit, i.e. the Isaac River Sub-basin – Irrigation (0.1 mg/L), until a site-specific limit can be derived.

4.2.16 Copper Dissolved

Bores C2105R, G2304R, Knob Hill 1, R2010R and R2034R contain datasets which have more than 15% of their values below LOR, meaning site-specific water quality limits cannot be derived. Since the 95th percentile of the dataset for these bores is above the most conservative guideline value, the next most conservative value above the LOR was used as the water quality limit, i.e. ADWG Guidelines – Aesthetic (1mg/L).

The remaining bores also contained data sets which had more than 15% of their values below LOR. In these cases, the 95th percentile was below the most conservative guideline value, therefore allowing the most conservative guideline value to be used as the water quality guideline, i.e. Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp (0.0014mg/L).

For the proposed monitoring bores, NB_2P and NB_3P, it is recommended the 95th percentile for the Leichhardt Seam data be adopted as the interim limit for copper (0.005 mg/L).

For the proposed monitoring bore, NB_1R, the most conservative of the relevant guidelines/WQOs should be adopted as the interim limit, i.e. the Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp (0.0014 mg/L), until a site-specific limit can be derived.

4.2.17 Lead Dissolved

Bores C2105R, G2304R and R2010R contain datasets which have more than 15% of their values below LOR, meaning site-specific water quality limits can not be derived. Since the 95th percentile of the dataset for these bores is above the most conservative guideline value, the next most conservative guideline value was used, i.e. ADWG Guidelines - Health (0.01mg/L).

The remaining bores also contain datasets which have more than 15% of their values below LOR. In these cases, the 95th percentile of the dataset was below the most conservative guideline value, therefore allowing the most conservative guideline value to be used as the water quality limit, i.e. Isaac River Sub-basin – ANZECC and ARMCANZ (2000) – Aquatic 95% spp (0.0034mg/L).

For the proposed monitoring bores, NB_2P and NB_3P, it is recommended the 95th percentile for the Leichhardt Seam data be adopted as the interim limit for lead (0.005 mg/L), until site-specific limits can be derived.

For the proposed monitoring bore, NB_1R, the most conservative of the relevant guidelines/WQOs should be adopted as the interim limit, i.e. the Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp (0.0034 mg/L), until a site-specific limit can be derived.

4.2.18 Mercury Dissolved

All bores contain datasets which have more than 15% of their values below LOR, meaning site-specific water quality limits cannot be derived. In these cases, the 95th percentile of the dataset was below the most conservative guideline value, therefore allowing the most conservative guideline value to be used as the water quality limit, i.e. the Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp (0.0006 mg/L).

For the proposed monitoring bores, NB_1R, NB_2P and NB_3P, the most conservative of the relevant guidelines/WQOs should be adopted as the interim limits, i.e. Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp (0.0006 mg/L), until site-specific limits can be derived.

4.2.19 Nickel Dissolved

For bores R2034R and Winnet Bore, sufficient data exists to derive site-specific trigger limits. The remaining bores contain datasets with more than 15% of values below LOR, therefore the most conservative guideline value above the LOR was used as the water quality limit, i.e. Isaac River Sub-basin – ANZECC and ARMCANZ (2000) – Aquatic 95% spp (0.011 mg/L).

For the proposed monitoring bores, NB_2P and NB_3P, it is recommended the 95th percentile for the Leichhardt Seam data be adopted as the interim limit for nickel (0.007 mg/L), until site-specific limits can be derived.

For the proposed monitoring bore, NB_1R, the most conservative of the relevant guidelines/WQOs should be adopted as the interim limit, i.e. the Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp (0.011 mg/L), until a site-specific limit can be derived.

4.2.20 Selenium Dissolved

Bores C2105R, G2304R and R2010R have datasets which have more than 15% of their values below LOR, meaning site-specific water quality limits cannot be derived. Since the 95th percentile of the dataset for these bores is above the most conservative guideline value, the next most conservative value above the LOR was used, i.e. Isaac River Sub-basin - Irrigation (0.05mg/L)

The remaining bores also contain datasets which have more than 15% of their values below LOR. In these cases, the 95th percentile of the dataset is below the most conservative guideline value therefore allowing the most conservative guideline value to be used as water quality limit, i.e. ADWG Guidelines - Health (0.01mg/L).

For the proposed monitoring bores, NB_2P and NB_3P, it is recommended the 95th percentile for the Leichhardt Seam data be adopted as the interim limit for selenium (0.05 mg/L), until site-specific limits can be derived.

For the proposed monitoring bore, NB_1R, the most conservative of the relevant guidelines/WQOs should be adopted as the interim limit, i.e. the ADWG Guidelines – Health (0.01 mg/L), until a site-specific limit can be derived.

4.2.21 Silver Dissolved

All bores have datasets which have more than 15% of their values below LOR, meaning site-specific water quality limits cannot be derived. Since the 95th percentile of the dataset for these bores is above the most conservative guideline value, the next most conservative guideline value was used, i.e. ADWG Guidelines - Health (0.1 mg/L).

For the proposed monitoring bores, NB_2P and NB_3P, it is recommended the 95th percentile for the Leichhardt Seam data be adopted as the interim limit for selenium (0.005 mg/L), until site-specific limits can be derived.

For the proposed monitoring bore, NB_1R, the most conservative of the relevant guidelines/WQOs should be adopted as the interim limit, i.e. the ADWG Guidelines – Health (0.01 mg/L), until a site-specific limit can be derived.

4.3 Proposed Limits and Compliance Approach

The proposed EA compliance approach discussed below follows the proposed EA. It uses a single limit per parameter (called the groundwater quality limit). As discussed in **Section 4.2** the limits are based on either:

- For existing bores:
  - the 95th percentile of site-specific data where applicable/appropriate; or
  - the most conservative identified guideline value above the 80th percentile of the existing dataset.
- For proposed bores:
  - for the two proposed Leichhardt Seam bores (NB_2P and NB_3P), the 95th percentile of site-specific data for Project bores accessing the Leichhardt Seam; or
  - for the proposed Regolith bore (NB_1R), the most conservative identified guideline value.

The groundwater quality limit is applied for three consecutive samples, i.e. consecutive sampling events above the relevant limit would result in an exceedance of the EA, and an exceedance investigation would need to be undertaken.

Proposed limits based on the assessment provided in **Section 4** are summarised in **Table 11**.

Table 11 Initial Proposed Environmental Authority Parameter Limits

Parameter	Bore	Groundwater Quality Limit	Groundwater Quality Limit Justification
pH - Field	C2105R	6.3-8.5	95th percentile of bore specific dataset
	C2136	6.5-8.5	Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp
	G2304R		
	G2307		
	Knob Hill 1		
	Knob Hill 2		
	R2008		
	R2009R		
	R2010R		
	R2032		
	R2034R		
	R2035		
	R2054		
	R2055		
	Winnet Bore		
Electrical Conductivity – Lab (µS/cm)	C2105R	32380	95th percentile of bore specific dataset
	C2136	16940	
	G2304R	29760	
	G2307	16110	
	Knob Hill 1	8208	
	Knob Hill 2	995	
	R2008	16730	
	R2009R	12725	
	R2010R	27860	
	R2032	11820	
	R2034R	18640	
	R2035	4884	
	R2054	8422	
	R2055	8447	
	Winnet Bore	3111	
Aluminium Dissolved (mg/L)	C2105R	0.055	Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp
	C2136		
	G2304R		
	G2307		
	Knob Hill 1		
	Knob Hill 2		

Parameter	Bore	Groundwater Quality Limit	Groundwater Quality Limit Justification
	R2008		
	R2009R		
	R2010R		
	R2032		
	R2034R		
	R2035		
	R2054		
	R2055		
	Winnet Bore		
Calcium Dissolved (mg/L)	C2105R	970	95th percentile of bore specific dataset
	C2136	416	
	G2304R	751	
	G2307	337	
	Knob Hill 1	302	
	Knob Hill 2	51	
	R2008	259	
	R2009R	131	
	R2010R	403	
	R2032	323	
	R2034R	630	
	R2035	144	
	R2054	156	
	R2055	218	
	Winnet Bore	124	
Chloride (mg/L)	C2105R	11340	95th percentile of bore specific dataset
	C2136	5863	
	G2304R	10700	
	G2307	5819	
	Knob Hill 1	2312	
	Knob Hill 2	154	
	R2008	5784	
	R2009R	4233	
	R2010R	10155	
	R2032	4086	
	R2034R	4360	
	R2035	1240	
	R2054	2673	
	R2055	2675	

Parameter	Bore	Groundwater Quality Limit	Groundwater Quality Limit Justification
	Winnet Bore	774	
Magnesium Dissolved (mg/L)	C2105R	1020	95th percentile of bore specific dataset
	C2136	494	
	G2304R	748	
	G2307	259	
	Knob Hill 1	267	
	Knob Hill 2	36	
	R2008	209	
	R2009R	67	
	R2010R	466	
	R2032	124	
	R2034R	465	
	R2035	68	
	R2054	36	
	R2055	121	
	Winnet Bore	115	
Manganese Dissolved (mg/L)	C2105R	0.62	95th percentile of bore specific dataset
	C2136	0.02	
	G2304R	0.32	
	G2307	0.04	
	Knob Hill 1	0.71	
	Knob Hill 2	1.21	
	R2008	0.05	
	R2009R	0.42	
	R2010R	0.59	
	R2032	0.004	
	R2034R	1.48	
	R2035	0.14	
	R2054	0.003	
	R2055	0.01	
	Winnet Bore	0.45	
Sodium Dissolved (mg/L)	C2105R	5416	95th percentile of bore specific dataset
	C2136	2868	
	G2304R	5190	
	G2307	3040	
	Knob Hill 1	1069	
	Knob Hill 2	116	
	R2008	3485	

Parameter	Bore	Groundwater Quality Limit	Groundwater Quality Limit Justification
	R2009R	2695	
	R2010R	5754	
	R2032	2346	
	R2034R	3842	
	R2035	919	
	R2054	1733	
	R2055	1593	
	Winnet Bore	374	
Sulfate (mg/L)	G2304R	250	ADWG Guidelines - Aesthetic
	G2307		
	R2008		
	R2010R		
	R2032		
	R2035		
	R2054		
	R2055		
	C2105R	12	95th percentile of bore specific dataset
	C2136	127	
	Knob Hill 1	582	
	Knob Hill 2	21	
	R2009R	155	
	R2034R	3980	
	Winnet Bore	99	
Zinc Dissolved (mg/L)	C2105R	3	ADWG Guidelines - Aesthetic
	R2010R		
	C2136	0.008	Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp
	Knob Hill 1		
	Knob Hill 2		
	R2009R		
	R2035		
	G2304R	0.049	95th percentile of bore specific dataset
	G2307	0.025	
	R2008	0.028	
	R2032	0.044	
	R2034R	0.108	
	R2054	0.016	
	R2055	0.027	
	Winnet Bore	0.017	

Parameter	Bore	Groundwater Quality Limit	Groundwater Quality Limit Justification
Arsenic Dissolved (mg/L)	C2105R	0.01	ADWG Guidelines - Health
	C2136		
	G2304R		
	G2307		
	Knob Hill 1		
	R2008		
	R2032		
	R2035		
	R2054		
	R2055		
	Winnet Bore		
	Knob Hill 2	0.003	95th percentile of bore specific dataset
	R2009R	0.03	
	R2010R	0.06	
	R2034R	0.03	
Cadmium Dissolved (mg/L)	C2105R	0.002	ADWG Guidelines - Health
	G2304R		
	R2010R		
	C2136	0.0002	Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp
	G2307		
	Knob Hill 1		
	Knob Hill 2		
	R2008		
	R2009R		
	R2032		
	R2034R		
	R2035		
	R2054		
	R2055		
	Winnet Bore		
Chromium Dissolved (mg/L)	C2105R	0.05	Isaac River Sub-basin - Irrigation
	G2304R		
	R2010R		
	R2032	0.001	
	R2034R		
	C2136		Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp
	G2307		
	Knob Hill 1		

Parameter	Bore	Groundwater Quality Limit	Groundwater Quality Limit Justification
	Knob Hill 2		
	R2008		
	R2009R		
	R2035		
	R2054		
	R2055		
	Winnet Bore		
Cobalt Dissolved (mg/L)	Knob Hill 1	0.002	95th percentile of bore specific dataset
	Knob Hill 2	0.004	
	R2034R	0.02	
	C2105R	0.1	Isaac River Sub-basin - Irrigation
	C2136		
	G2304R		
	G2307		
	R2008		
	R2009R		
	R2010R		
	R2032		
	R2035		
	R2054		
	R2055		
	Winnet Bore		
	C2105R		
Copper Dissolved (mg/L)	G2304R	1	ADWG Guidelines - Aesthetic
	Knob Hill 1		
	R2010R		
	R2034R		
	C2105R		
	G2307	0.0014	Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp
	Knob Hill 2		
	R2008		
	R2009R		
	R2032		
	R2035		
	R2054		
	R2055		
	Winnet Bore		
	C2136		

Parameter	Bore	Groundwater Quality Limit	Groundwater Quality Limit Justification
Lead Dissolved (mg/L)	G2304R	0.01	ADWG Guidelines - Health
	R2010R		
	C2105R		
	G2307	0.0034	Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp
	Knob Hill 1		
	Knob Hill 2		
	R2008		
	R2009R		
	R2032		
	R2034R		
	R2035		
	R2054		
	R2055		
	Winnet Bore		
	C2136		
Mercury Dissolved (mg/L)	C2136	0.0006	Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp
	G2304R		
	G2307		
	Knob Hill 1		
	Knob Hill 2		
	R2008		
	R2009R		
	R2010R		
	R2032		
	R2034R		
	R2035		
	R2054		
	R2055		
	Winnet Bore		
	R2034R		
Nickel Dissolved (mg/L)	Winnet Bore	0.003	95th percentile of bore specific dataset
	R2034R	0.04	
	C2136	0.011	Isaac River Sub-basin - ANZECC and ARMCANZ (2000) - Aquatic 95% spp
	G2304R		
	G2307		
	Knob Hill 1		
	Knob Hill 2		
	R2008		

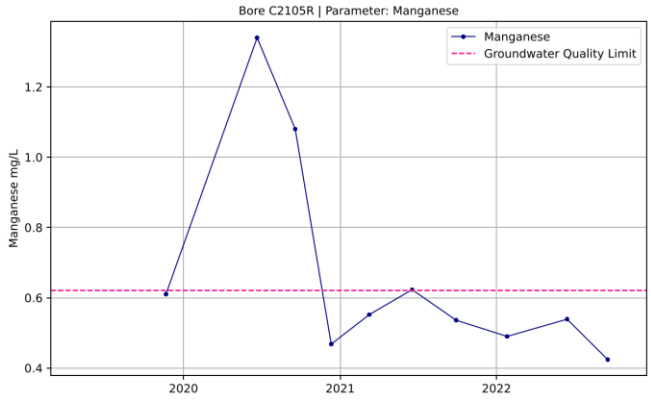
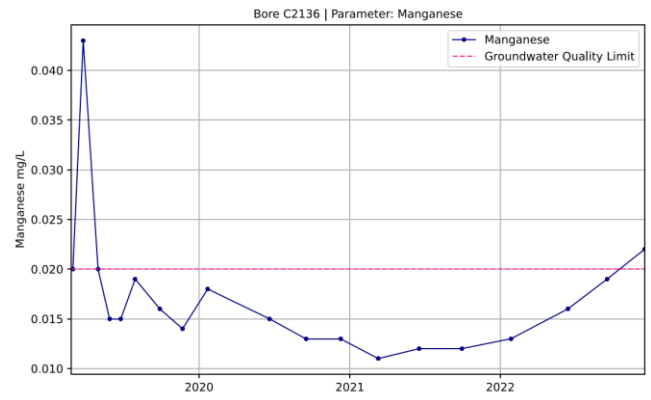
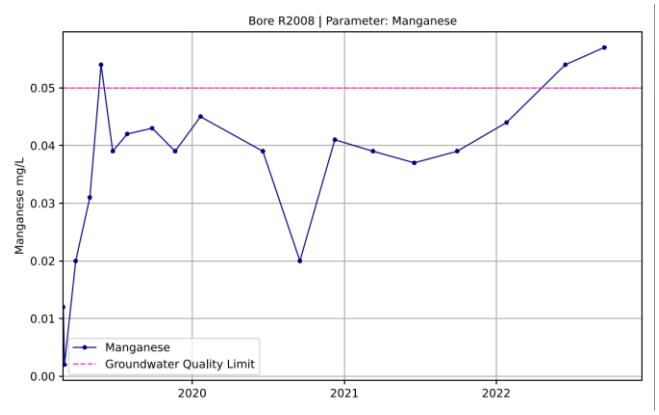
Parameter	Bore	Groundwater Quality Limit	Groundwater Quality Limit Justification
	R2009R		
	R2010R		
	R2032		
	R2035		
	R2054		
	R2055		
	C2105R		
Selenium Dissolved (mg/L)	G2304R	0.05	Isaac River Sub-basin - Irrigation
	R2010R		
	C2105R		
	G2307	0.01	ADWG Guidelines - Health 95th percentile of bore specific dataset
	Knob Hill 1		
	Knob Hill 2		
	R2008		
	R2009R		
	R2032		
	R2034R		
	R2035		
	R2054		
	R2055		
	Winnet Bore		
	C2136		
Silver Dissolved (mg/L)	C2136	0.1	ADWG Guidelines - Health
	G2304R		
	G2307		
	Knob Hill 1		
	Knob Hill 2		
	R2008		
	R2009R		
	R2010R		
	R2032		
	R2034R		
	R2035		
	R2054		
	R2055		
	Winnet Bore		
	C2105R		

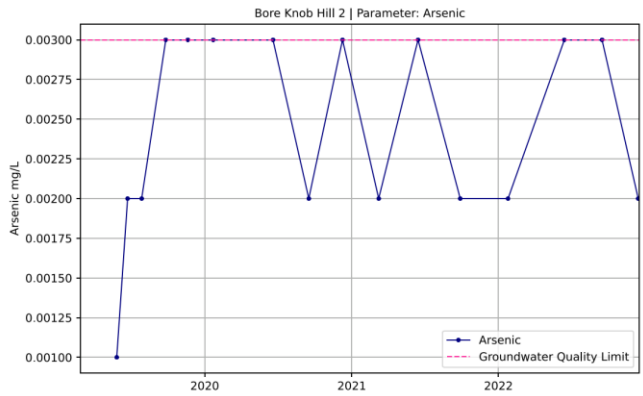
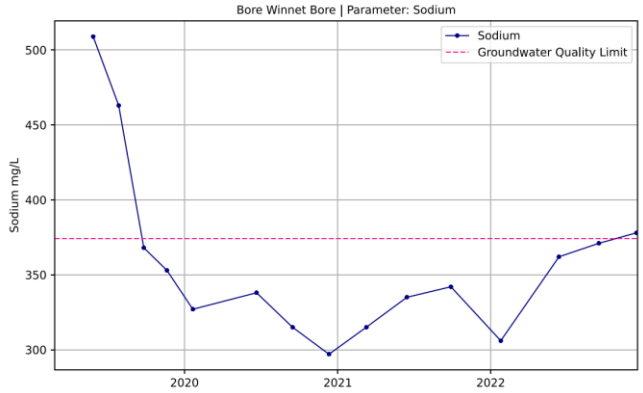
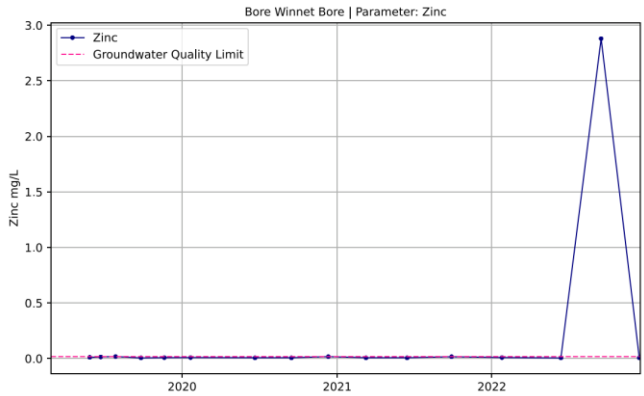
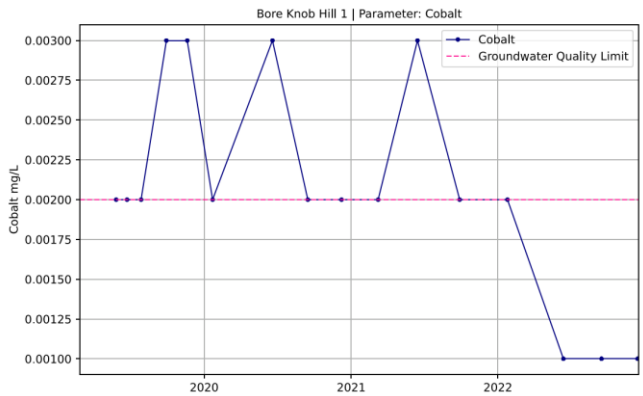
4.4 Testing

The initial proposed limits presented above have been tested against the historical dataset using the proposed compliance approach. Notable exceedances and proposed changes are documented in **Table 12**.

The final proposed trigger values are presented in **Section 6**, **Table 14**.

Table 12 Trigger Testing Results

Trigger testing	Notes	Changes proposed
	The proposed site specific quality limit was tested on the historical data set. 2020, two consecutive observations were higher than the proposed limit (derived without the two observations which are statistical outliers). The more recent observations are well below the limit, however, it is possible that the higher observations re-occur and potentially result in a non-compliance.	It is proposed to apply the default toxicant guideline value for Manganese (1.9 mg/L).
	The initial proposed groundwater quality limit is based on the 95th percentile of the site-specific dataset. The last five samples have shown a clear upward trend, noting this trend must be natural variation since Project activities have not commenced. If the trend continues, the next two samples may exceed the proposed groundwater quality limit.	It is proposed to use the most conservative guideline limit above the existing dataset (ADWG Guidelines – Aesthetic of 0.1 mg/L) for this bore.
	The initial proposed groundwater quality limit is based on the 95th percentile of the site-specific dataset. The last five samples have shown a clear upward trend. If the trend continues the next samples may exceed the proposed groundwater quality limit.	It is proposed to use the most conservative guideline limit above the existing dataset (ADWG Guidelines – Aesthetic of 0.1 mg/L) for this bore.

Trigger testing	Notes	Changes proposed
	The initial proposed groundwater quality limit is based on the 95th percentile of the site-specific dataset. Four historic samples in a row are equal to the proposed groundwater quality limit, but do not exceed the limit. This is not a non-compliance as the limit is not exceeded, and therefore no changes are proposed.	None.
	The initial proposed groundwater quality limit is based on the 95th percentile of the site-specific dataset. The last three samples have shown an upward trend, and if the trend continues the next two samples may exceed the proposed groundwater quality limit.	Since the 95th percentile exceeds the available water quality guideline (ADWG Guidelines – Aesthetics, 180 mg/L), no changes are proposed at this time and the site-specific statistics remain the most appropriate means to establish a limit.
	The initial proposed groundwater quality limit is based on the 95th percentile of the site-specific dataset, which includes six values at the LOR. The first three samples at this bore may exceed the proposed groundwater quality limit. As Project mining has not yet begun these data points are considered to be valid and related to natural variation.	Derive groundwater quality limit by removing the six LOR values and calculating the 95th percentile based on the remaining 9 data points, which is still valid under DES (2021). It is proposed to use the derived revised 95th percentile value as the groundwater quality limit (i.e. 0.017 mg/L).
	The initial proposed groundwater quality limit is based on the 95th percentile of the site-specific dataset. Many historic samples are equal to the proposed groundwater quality limit and several historic values are above the proposed limit, however, there is no non-compliance as the limit is not exceeded on three consecutive occasions, and therefore no changes are proposed.	None.

5 Groundwater Level Trigger Thresholds

5.1 Approach

The methodology adopted to develop the proposed EA groundwater level trigger thresholds was based on numerical groundwater modelling predictions for the Project reported in SLR (2022). The outputs of the numerical groundwater model were reviewed with respect to predicted groundwater levels at the monitoring bores for the EA over the life of the Project. By comparison of groundwater level predictions at the commencement of Project mining and then during mining, cumulative groundwater drawdown values were calculated. The maximum groundwater level drawdown predicted at each monitoring bore for the EA over the life of the Project was then extracted from those calculations, providing groundwater level trigger thresholds at each bore that are not expected to be exceeded. Exceedance of these groundwater drawdown values would therefore indicate the potential for Project groundwater impacts beyond those modelled, and thus this approach is considered appropriate for the EA.

The numerical groundwater model for the Project as reported in SLR (2022) predicted groundwater drawdown of less than 2 metres (m) at several proposed EA bores. It is considered that drawdown values of less than 2 m are not appropriate for the groundwater level trigger thresholds for the EA since natural groundwater level variability of up to approximately 2 m is expected over the life of the Project. This is due to climate variability and other non-Project influences, as presented in the baseline conditions assessment in SLR (2022). The 2 m drawdown limit is also the lowest of the *Water Act 2000* bore trigger threshold values used within Chapter 3 of the Water Act as a basis for defining the potential for impacts to third-party groundwater extraction bores. Therefore, in cases where groundwater drawdown of less than 2 m over the life of the Project is predicted at monitoring bores, a lower limit value of 2 m is adopted for the groundwater level trigger thresholds for the EA. It is noted that this approach is consistent with that adopted in the EA for adjacent mining projects.

5.2 Model Drawdown Predictions

The numerical groundwater model drawdown predictions at the monitoring bores for the EA over the life of the Project are provided in **Table 13**, as well as the corresponding proposed EA groundwater level trigger thresholds. The proposed EA groundwater level trigger thresholds are only relevant for active bores and do not apply once the bores are mined through, as several bores are identified to be under the proposed Project mine plan (see right-hand most column in **Table 13**). For these bores, the proposed EA groundwater level trigger thresholds represent the maximum predicted groundwater drawdown at the bore immediately prior to it being mined through.

Table 13 Modelled Groundwater Level Drawdown over the life of Project

Monitoring point	Monitored Unit	Maximum Predicted Drawdown (m)	Proposed EA Groundwater Level Trigger Threshold	Notes
C2105R	Leichhardt Seam	17.0	> 17.0 m beyond baseline data ranges	-
C2136	Leichhardt Seam	42.6	> 42.6 m beyond baseline data ranges	Bore mined through in Mine Year 12
G2304R	Vermont Seam	24.0	> 24.0 m beyond baseline data ranges	Bore mined through in Mine Year 23
G2307	Vermont Seam	62.0	> 62.0 m beyond baseline data ranges	Bore mined through in Mine Year 8
R2008	Leichhardt Seam	0.2	> 2 m beyond baseline data ranges	-
R2009R	Interburden	1.4	> 2 m beyond baseline data ranges	-
R2010R	Leichhardt Seam	1.9	> 2 m beyond baseline data ranges	-
R2032	Leichhardt Seam	27.6	> 27.6 m beyond baseline data ranges	-
R2034R	Interburden	1.6	> 2 m beyond baseline data ranges	-
R2035	Vermont Seam	0.0	> 2 m beyond baseline data ranges	-
R2054	Interburden	79.2	> 79.2 m beyond baseline data ranges	Bore mined through in Mine Year 28
R2055	Vermont Seam	7.5	> 7.5 m beyond baseline data ranges	-
NB_1R	Regolith	2.1	> 2.1 m beyond baseline data ranges	-
NB_2P	Leichhardt Seam	10.0	> 10.0 m beyond baseline data ranges	-
NB_3P	Leichhardt Seam	20.6	> 20.6 m beyond baseline data ranges	-
Knob Hill 1	Isaac River Alluvium	0.0	> 2 m beyond baseline data ranges	-
Knob Hill 2	Isaac River Alluvium	0.1	> 2 m beyond baseline data ranges	-
Winnet Bore	Isaac River Alluvium	0.0	> 2 m beyond baseline data ranges	-

Monitoring point	Monitored Unit	Maximum Predicted Drawdown (m)	Proposed EA Groundwater Level Trigger Threshold	Notes
VWP1 Sensor 1	Fort Cooper Coal Measures overburden	0.6	> 2 m beyond baseline data ranges	-
VWP1 Sensor 2	Fort Cooper Coal Measures coal seam	0.0	> 2 m beyond baseline data ranges	-
VWP1 Sensor 3	Fort Cooper Coal Measures underburden	0.0	> 2 m beyond baseline data ranges	-
VWP2 Sensor 1	Fort Cooper Coal Measures overburden	0.1	> 2 m beyond baseline data ranges	-
VWP2 Sensor 2	Fort Cooper Coal Measures overburden	0.1	> 2 m beyond baseline data ranges	-
VWP2 Sensor 3	Fort Cooper Coal Measures coal seam	0.0	> 2 m beyond baseline data ranges	-

6 Conclusions

6.1 Groundwater Quality Limits

A review of the Project baseline groundwater quality monitoring data was conducted in accordance with the DES (2021) to derive the groundwater quality limits for the EA. Following definition of the relevant EVs and appropriate water quality guidelines and WQOs to define the suite of parameters included in the EA, a statistical analysis of the groundwater quality database and removal of data outliers was undertaken. The revised database was then used to derive the appropriate groundwater quality limits for the EA for each of the parameters, in consideration of the relevant EV protection water quality guidelines and WQOs. These triggers were tested and adjusted as required.

For the monitoring bores with no water quality data available (i.e. bores yet to be drilled), the statistics from an aquifer type group for other Project monitoring bores were used to derive interim triggers for the two proposed new Leichhardt Seam bores, and guideline limits were adopted for the proposed bore in the regolith, since there are no existing Project monitoring bores installed into the regolith. These proposed groundwater quality limits should be regarded as interim only, and should be reviewed once data at these monitoring bores become available.

The groundwater quality limits for the EA resulting from this assessment are summarised in **Table 14**.

6.2 Groundwater Level Trigger Thresholds

Review of existing Project groundwater modelling predictions was conducted with the intent to define groundwater level trigger thresholds for the Project EA. Model predictions of groundwater level change over the life of the Project at each proposed EA bore were used to establish the proposed groundwater level trigger thresholds, using the maximum predicted groundwater level drawdown at each bore over the life of the Project. This approach is considered appropriate for the Project's EA as exceedance of those groundwater level drawdown values would indicate the potential for Project groundwater impacts beyond those expected/modelled.

The proposed EA groundwater level trigger thresholds resulting from this assessment are provided as in **Table 15**.

Table 14 Proposed Environmental Authority Groundwater Quality Limits

Monitoring Point	Field pH	EC (µS/cm)	Al (mg/L)	Ca (mg/L)	Cl (mg/L)	Mg (mg/L)	Mn (mg/L)	Na (mg/L)	SO_4 (mg/L)	Zn (mg/L)	As (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Pb (mg/L)	Hg (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)
C2105R	6.3-8.5	32380	0.055	970	11340	1020	1.9	5416	12	3	0.01	0.002	0.05	0.1	1	0.01	0.0006	0.011	0.05	0.1
C2136	6.5-8.5	16940	0.055	416	5863	494	0.1	2868	127	0.008	0.01	0.0002	0.001	0.1	0.0014	0.0034	0.0006	0.011	0.01	0.1
G2304R	6.5-8.5	29760	0.055	751	10700	748	0.32	5190	250	0.049	0.01	0.002	0.05	0.1	1	0.01	0.0006	0.011	0.05	0.1
G2307	6.5-8.5	16110	0.055	338	5819	259	0.04	3040	250	0.025	0.01	0.0002	0.001	0.1	0.0014	0.0034	0.0006	0.011	0.01	0.1
R2008	6.5-8.5	16730	0.055	259	5784	210	0.1	3485	250	0.028	0.01	0.0002	0.001	0.1	0.0014	0.0034	0.0006	0.011	0.01	0.1
R2009R	6.5-8.5	12725	0.055	131	4233	67	0.42	2695	155	0.008	0.03	0.0002	0.001	0.1	0.0014	0.0034	0.0006	0.011	0.01	0.1
R2010R	6.5-8.5	27860	0.055	403	10155	466	0.59	5754	250	3	0.06	0.002	0.05	0.1	1	0.01	0.0006	0.011	0.05	0.1
R2032	6.5-8.5	11820	0.055	324	4086	124	0.004	2346	250	0.044	0.01	0.0002	0.001	0.1	0.0014	0.0034	0.0006	0.011	0.01	0.1
R2034R	6.5-8.5	18640	0.055	630	4360	465	1.48	3842	3980	0.108	0.03	0.0002	0.001	0.02	1	0.0034	0.0006	0.04	0.01	0.1
R2035	6.5-8.5	4884	0.055	144	1240	68	0.14	919	250	0.008	0.01	0.0002	0.001	0.1	0.0014	0.0034	0.0006	0.011	0.01	0.1
R2054	6.5-8.5	8422	0.055	156	2673	36	0.003	1733	250	0.016	0.01	0.0002	0.001	0.1	0.0014	0.0034	0.0006	0.011	0.01	0.1
R2055	6.5-8.5	8447	0.055	218	2675	121	0.01	1593	250	0.027	0.01	0.0002	0.001	0.1	0.0014	0.0034	0.0006	0.011	0.01	0.1
Knob Hill 1	6.5-8.5	8208	0.055	302	2312	267	0.71	1069	582	0.008	0.01	0.0002	0.001	0.002	1	0.0034	0.0006	0.011	0.01	0.1
Knob Hill 2	6.5-8.5	995	0.055	51	154	36	1.21	116	21	0.008	0.003	0.0002	0.001	0.004	0.0014	0.0034	0.0006	0.011	0.01	0.1
Winnet Bore	6.5-8.5	3111	0.055	124	774	115	0.45	374	99	0.017	0.01	0.0002	0.001	0.1	0.0014	0.0034	0.0006	0.003	0.01	0.1
NB_1R	6.5-8.5	7500	0.055	1000	250	2000	0.1	180	250	0.008	0.01	0.0002	0.001	0.1	0.0014	0.0034	0.0006	0.011	0.01	0.1
NB_2P	6.5-8.5	30640	0.055	912	11200	966	0.56	5470	118	0.04	0.04	0.0005	0.005	0.005	0.005	0.005	0.0006	0.007	0.05	0.005
NB_3P	6.5-8.5	30640	0.055	912	11200	966	0.56	5470	118	0.04	0.04	0.0005	0.005	0.005	0.005	0.005	0.0006	0.007	0.05	0.005

Blue – Isaac River Sub-basin – ANZECC and ARMCANZ (2000) – Aquatic 95% spp

Orange – ADWG Guidelines – Aesthetic

Light orange – ADWG Guidelines – Health

Green – Isaac River Sub-basin – Irrigation

Light Green – Isaac River Sub-basin – Stock

Table 15 Proposed Environmental Authority Groundwater Level Trigger Thresholds

Monitoring point	Monitored Unit	Groundwater Level Trigger Threshold
C2105R	Leichhardt Seam	> 17.0 m beyond baseline data ranges
C2136	Leichhardt Seam	> 42.6 m beyond baseline data ranges
G2304R	Vermont Seam	> 24.0 m beyond baseline data ranges
G2307	Vermont Seam	> 62.0 m beyond baseline data ranges
R2008	Leichhardt Seam	> 2 m beyond baseline data ranges
R2009R	Interburden	> 2 m beyond baseline data ranges
R2010R	Leichhardt Seam	> 2 m beyond baseline data ranges
R2032	Leichhardt Seam	> 27.6 m beyond baseline data ranges
R2034R	Interburden	> 2 m beyond baseline data ranges
R2035	Vermont Seam	> 2 m beyond baseline data ranges
R2054	Interburden	> 79.2 m beyond baseline data ranges
R2055	Vermont Seam	> 7.5 m beyond baseline data ranges
Knob Hill 1	Isaac River Alluvium	> 2 m beyond baseline data ranges
Knob Hill 2	Isaac River Alluvium	> 2 m beyond baseline data ranges
Winnet Bore	Isaac River Alluvium	> 2 m beyond baseline data ranges
VWP1 Sensor 1	Fort Cooper Coal Measures overburden	> 2 m beyond baseline data ranges
VWP1 Sensor 2	Fort Cooper Coal Measures coal seam	> 2 m beyond baseline data ranges
VWP1 Sensor 3	Fort Cooper Coal Measures underburden	> 2 m beyond baseline data ranges
VWP2 Sensor 1	Fort Cooper Coal Measures overburden	> 2 m beyond baseline data ranges
VWP2 Sensor 2	Fort Cooper Coal Measures overburden	> 2 m beyond baseline data ranges
VWP2 Sensor 3	Fort Cooper Coal Measures coal seam	> 2 m beyond baseline data ranges
NB_1R	Regolith	> 2.1 m beyond baseline data ranges
NB_2P	Leichhardt Seam	> 10.0 m beyond baseline data ranges
NB_3P	Leichhardt Seam	> 20.6 m beyond baseline data ranges

7 References

Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Volume 3, Primary Industries.

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APPENDIX A

Project Monitoring Bore Summary Statistics – Complete Dataset

Bore	Parameter	count	% LOR	Minimum Date	Maximum Date	Minimum	5th	20th	median	80th	95th	Maximum	MK trend	p	tau
C2105R	Field pH	10	0	01-01-2020	01-12-2022	6.23	6.302	6.398	6.54	6.852	7.5335	7.79	no trend	0.474	0.2
C2105R	Electrical Conductivity	10	0	21-11-2019	18-09-2022	21400	23335	29060	30400	31440	32260	32800	decreasing	0.007	-0.689
C2105R	Sulfate as SO4 - Turbidimetric	10	10	21-11-2019	18-09-2022	1	1	1.8	7	8	11.85	15	no trend	0.234	-0.311
C2105R	Aluminium	10	100	21-11-2019	18-09-2022	0.01	0.028	0.05	0.05	0.05	0.05	0.05	no trend	0.728	0.067
C2105R	Arsenic	10	70	21-11-2019	18-09-2022	0.001	0.0028	0.005	0.005	0.0064	0.008	0.008	no trend	0.413	-0.2
C2105R	Cadmium	10	100	21-11-2019	18-09-2022	0.0001	0.00028	0.0005	0.0005	0.0005	0.0005	0.0005	no trend	0.728	0.067
C2105R	Chromium	10	90	21-11-2019	18-09-2022	0.001	0.0028	0.005	0.005	0.005	0.0094	0.013	no trend	0.796	0.067
C2105R	Cobalt	10	90	21-11-2019	18-09-2022	0.001	0.0028	0.005	0.005	0.005	0.005	0.005	no trend	0.728	0.067
C2105R	Copper	10	100	21-11-2019	18-09-2022	0.001	0.0028	0.005	0.005	0.005	0.005	0.005	no trend	0.728	0.067
C2105R	Lead	10	100	21-11-2019	18-09-2022	0.001	0.0028	0.005	0.005	0.005	0.005	0.005	no trend	0.728	0.067
C2105R	Manganese	10	0	21-11-2019	18-09-2022	0.424	0.4438	0.4856	0.5455	0.7144	1.223	1.34	decreasing	0.049	-0.511
C2105R	Nickel	10	80	21-11-2019	18-09-2022	0.001	0.0028	0.005	0.005	0.0054	0.00975	0.012	no trend	0.911	-0.044
C2105R	Selenium	10	100	21-11-2019	18-09-2022	0.01	0.028	0.05	0.05	0.05	0.05	0.05	no trend	0.728	0.067
C2105R	Silver	10	100	21-11-2019	18-09-2022	0.001	0.0028	0.005	0.005	0.005	0.005	0.005	no trend	0.728	0.067
C2105R	Zinc	10	40	21-11-2019	18-09-2022	0.021	0.0228	0.025	0.0285	0.0424	0.0473	0.05	no trend	0.853	-0.067
C2105R	Mercury	10	100	21-11-2019	18-09-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
C2105R	Chloride	10	0	21-11-2019	18-09-2022	10500	10545	10920	11150	11240	11565	11700	no trend	0.362	-0.244
C2105R	Calcium	10	0	21-11-2019	18-09-2022	793	829	874.6	905.5	930.4	969.65	971	no trend	0.721	-0.111
C2105R	Magnesium	10	0	21-11-2019	18-09-2022	890	895.4	938	965.5	1003.2	1020	1020	no trend	1	-0.022
C2105R	Sodium	10	0	21-11-2019	18-09-2022	4760	4823	4948	5090	5290	5415.5	5420	no trend	0.592	0.156

Bore	Parameter	count	% LOR	Minimum Date	Maximum Date	Minimum	5th	20th	median	80th	95th	Maximum	MK trend	p	tau
C2136	Field pH	16	0	01-02-2019	01-12-2022	6.53	6.6125	6.67	6.68	6.82	7.3125	8.19	no trend	0.716	0.075
C2136	Electrical Conductivity	19	0	01-03-2019	17-12-2022	11100	11460	13500	15100	16240	16940	17300	decreasing	0	-0.602
C2136	Sulfate as SO4 - Turbidimetric	19	0	01-03-2019	17-12-2022	55	64.9	81	107	118.4	126.8	143	decreasing	0.002	-0.526
C2136	Aluminium	19	100	01-03-2019	17-12-2022	0.01	0.01	0.01	0.01	0.01	0.01	0.01	no trend	1	0
C2136	Arsenic	19	53	01-03-2019	17-12-2022	0.001	0.001	0.001	0.001	0.002	0.004	0.004	decreasing	0.001	-0.491
C2136	Cadmium	19	100	01-03-2019	17-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
C2136	Chromium	19	100	01-03-2019	17-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
C2136	Cobalt	19	100	01-03-2019	17-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
C2136	Copper	19	95	01-03-2019	17-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
C2136	Lead	19	100	01-03-2019	17-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
C2136	Manganese	19	0	01-03-2019	17-12-2022	0.011	0.0119	0.013	0.015	0.0194	0.0241	0.043	no trend	0.078	-0.298
C2136	Nickel	19	89	01-03-2019	17-12-2022	0.001	0.001	0.001	0.001	0.001	0.002	0.002	decreasing	0.028	-0.199
C2136	Selenium	19	100	01-03-2019	17-12-2022	0.01	0.01	0.01	0.01	0.01	0.01	0.01	no trend	1	0
C2136	Silver	19	100	01-03-2019	17-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
C2136	Zinc	19	63	01-03-2019	17-12-2022	0.005	0.005	0.005	0.005	0.007	0.012	0.021	no trend	0.322	-0.146
C2136	Mercury	19	100	01-03-2019	17-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
C2136	Chloride	19	0	01-03-2019	17-12-2022	3840	3993	4724	5170	5674	5863	5980	decreasing	0.003	-0.497
C2136	Calcium	19	0	01-03-2019	17-12-2022	136	151.3	192.4	276	364.8	416.4	483	decreasing	0	-0.591
C2136	Magnesium	19	0	01-03-2019	17-12-2022	295	295.9	352.4	407	474.6	494.2	496	decreasing	0.014	-0.415
C2136	Sodium	19	0	01-03-2019	17-12-2022	2100	2154	2404	2510	2696	2868	2940	decreasing	0.025	-0.38

Bore	Parameter	count	% LOR	Minimum Date	Maximum Date	Minimum	5th	20th	median	80th	95th	Maximum	MK trend	p	tau
G2304R	Field pH	9	0	01-01-2020	01-09-2022	6.56	6.576	6.636	6.79	7.032	7.206	7.21	no trend	0.754	0.111
G2304R	Electrical Conductivity	11	0	21-11-2019	18-09-2022	20800	23350	28200	28700	29200	29700	30000	decreasing	0.013	-0.6
G2304R	Sulfate as SO4 - Turbidimetric	11	64	21-11-2019	18-09-2022	1	1	1	1	1	2.5	3	no trend	0.483	-0.127
G2304R	Aluminium	11	100	21-11-2019	18-09-2022	0.01	0.03	0.05	0.05	0.05	0.05	0.05	no trend	0.874	0.036
G2304R	Arsenic	11	82	21-11-2019	18-09-2022	0.003	0.004	0.005	0.005	0.005	0.007	0.009	no trend	1	-0.018
G2304R	Cadmium	11	100	21-11-2019	18-09-2022	0.0001	0.0003	0.0005	0.0005	0.0005	0.0005	0.0005	no trend	0.874	0.036
G2304R	Chromium	11	100	21-11-2019	18-09-2022	0.001	0.003	0.005	0.005	0.005	0.005	0.005	no trend	0.874	0.036
G2304R	Cobalt	11	73	21-11-2019	18-09-2022	0.005	0.005	0.005	0.005	0.005	0.015	0.02	no trend	0.242	-0.2
G2304R	Copper	11	100	21-11-2019	18-09-2022	0.001	0.003	0.005	0.005	0.005	0.005	0.005	no trend	0.874	0.036
G2304R	Lead	11	100	21-11-2019	18-09-2022	0.001	0.003	0.005	0.005	0.005	0.005	0.005	no trend	0.874	0.036
G2304R	Manganese	11	0	21-11-2019	18-09-2022	0.07	0.078	0.089	0.101	0.435	0.816	1.01	no trend	0.119	-0.382
G2304R	Nickel	11	82	21-11-2019	18-09-2022	0.003	0.004	0.005	0.005	0.005	0.006	0.007	no trend	0.815	-0.055
G2304R	Selenium	11	100	21-11-2019	18-09-2022	0.01	0.03	0.05	0.05	0.05	0.05	0.05	no trend	0.874	0.036
G2304R	Silver	11	100	21-11-2019	18-09-2022	0.001	0.003	0.005	0.005	0.005	0.005	0.005	no trend	0.874	0.036
G2304R	Zinc	11	9	21-11-2019	18-09-2022	0.025	0.0265	0.032	0.038	0.049	0.0705	0.092	no trend	1	0.018
G2304R	Mercury	11	100	21-11-2019	18-09-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
G2304R	Chloride	11	0	21-11-2019	18-09-2022	9970	9985	10200	10400	10500	10700	10800	no trend	1	0
G2304R	Calcium	11	0	21-11-2019	18-09-2022	488	506.5	583	672	738	750.5	763	no trend	0.938	-0.036
G2304R	Magnesium	11	0	21-11-2019	18-09-2022	600	621	651	682	710	748	772	no trend	0.585	-0.145
G2304R	Sodium	11	0	21-11-2019	18-09-2022	4740	4830	4940	5090	5190	5460	5730	no trend	0.31	0.255

Bore	Parameter	count	% LOR	Minimum Date	Maximum Date	Minimum	5th	20th	median	80th	95th	Maximum	MK trend	p	tau
G2307	Field pH	16	0	01-02-2019	01-12-2022	6.93	6.9375	6.99	7.095	7.16	7.455	8.16	no trend	0.279	-0.208
G2307	Electrical Conductivity	19	0	01-03-2019	16-12-2022	14500	14590	15060	15500	15840	16110	16200	no trend	0.861	0.035
G2307	Sulfate as SO4 - Turbidimetric	19	95	01-03-2019	16-12-2022	1	1	1	1	1	1	1	no trend	1	0
G2307	Aluminium	19	95	01-03-2019	16-12-2022	0.01	0.01	0.01	0.01	0.01	0.014	0.05	no trend	0.315	0.07
G2307	Arsenic	19	100	01-03-2019	16-12-2022	0.001	0.001	0.001	0.001	0.001	0.0014	0.005	no trend	0.315	0.07
G2307	Cadmium	19	100	01-03-2019	16-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.00014	0.0005	no trend	0.315	0.07
G2307	Chromium	19	100	01-03-2019	16-12-2022	0.001	0.001	0.001	0.001	0.001	0.0014	0.005	no trend	0.315	0.07
G2307	Cobalt	19	100	01-03-2019	16-12-2022	0.001	0.001	0.001	0.001	0.001	0.0014	0.005	no trend	0.315	0.07
G2307	Copper	19	100	01-03-2019	16-12-2022	0.001	0.001	0.001	0.001	0.001	0.0014	0.005	no trend	0.315	0.07
G2307	Lead	19	100	01-03-2019	16-12-2022	0.001	0.001	0.001	0.001	0.001	0.0014	0.005	no trend	0.315	0.07
G2307	Manganese	19	0	01-03-2019	16-12-2022	0.032	0.032	0.033	0.034	0.042	0.0437	0.05	no trend	0.694	-0.07
G2307	Nickel	19	100	01-03-2019	16-12-2022	0.001	0.001	0.001	0.001	0.001	0.0014	0.005	no trend	0.315	0.07
G2307	Selenium	19	100	01-03-2019	16-12-2022	0.01	0.01	0.01	0.01	0.01	0.014	0.05	no trend	0.315	0.07
G2307	Silver	19	100	01-03-2019	16-12-2022	0.001	0.001	0.001	0.001	0.001	0.0014	0.005	no trend	0.315	0.07
G2307	Zinc	19	11	01-03-2019	16-12-2022	0.005	0.005	0.008	0.012	0.0194	0.0255	0.03	no trend	0.477	-0.123
G2307	Mercury	19	100	01-03-2019	16-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
G2307	Chloride	19	0	01-03-2019	16-12-2022	5200	5245	5390	5540	5698	5819	5900	no trend	0.074	0.304
G2307	Calcium	19	0	01-03-2019	16-12-2022	199	212.5	230.8	261	308.6	337.4	377	decreasing	0	-0.596
G2307	Magnesium	19	0	01-03-2019	16-12-2022	221	230	238	252	256.8	264.3	285	increasing	0.006	0.462
G2307	Sodium	19	0	01-03-2019	16-12-2022	2560	2668	2824	2900	2964	3040	3040	increasing	0.001	0.556

Bore	Parameter	count	% LOR	Minimum Date	Maximum Date	Minimum	5th	20th	median	80th	95th	Maximum	MK trend	p	tau
R2008	Field pH	15	0	01-02-2019	01-09-2022	6.83	6.886	6.94	7.08	7.264	8.129	8.5	no trend	0.586	-0.114
R2008	Electrical Conductivity	19	0	25-02-2019	18-09-2022	5500	9352	13260	15800	16380	16710	16800	no trend	0.834	0.041
R2008	Sulfate as SO4 - Turbidimetric	19	89	25-02-2019	18-09-2022	1	1	1	1	1	1.1	2	no trend	0.315	-0.07
R2008	Aluminium	19	95	25-02-2019	18-09-2022	0.01	0.01	0.01	0.01	0.01	0.011	0.02	no trend	0.121	-0.105
R2008	Arsenic	19	84	25-02-2019	18-09-2022	0.001	0.001	0.001	0.001	0.001	0.0011	0.002	no trend	0.171	-0.094
R2008	Cadmium	19	100	25-02-2019	18-09-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
R2008	Chromium	19	95	25-02-2019	18-09-2022	0.001	0.001	0.001	0.001	0.001	0.0014	0.005	no trend	0.315	0.07
R2008	Cobalt	19	100	25-02-2019	18-09-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2008	Copper	19	89	25-02-2019	18-09-2022	0.001	0.001	0.001	0.001	0.001	0.0011	0.002	no trend	0.315	0.07
R2008	Lead	19	100	25-02-2019	18-09-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2008	Manganese	19	0	25-02-2019	18-09-2022	0.002	0.011	0.0266	0.039	0.0444	0.0543	0.057	increasing	0.016	0.404
R2008	Nickel	19	89	25-02-2019	18-09-2022	0.001	0.001	0.001	0.001	0.001	0.002	0.002	no trend	0.642	-0.047
R2008	Selenium	19	100	25-02-2019	18-09-2022	0.01	0.01	0.01	0.01	0.01	0.01	0.01	no trend	1	0
R2008	Silver	19	84	25-02-2019	18-09-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2008	Zinc	19	5	25-02-2019	18-09-2022	0.005	0.005	0.01	0.014	0.024	0.0419	0.086	increasing	0.01	0.433
R2008	Mercury	19	100	25-02-2019	18-09-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
R2008	Chloride	19	0	25-02-2019	18-09-2022	1420	3004	4598	5520	5678	5768	5840	no trend	0.183	0.228
R2008	Calcium	19	0	25-02-2019	18-09-2022	31	35.5	111	145	220.6	258.8	293	no trend	0.675	-0.076
R2008	Magnesium	19	0	25-02-2019	18-09-2022	8	50.3	141.6	188	199.8	206.5	220	increasing	0.016	0.409
R2008	Sodium	19	0	25-02-2019	18-09-2022	1110	1758	2656	3230	3372	3475	3520	increasing	0.009	0.444

Bore	Parameter	count	% LOR	Minimum Date	Maximum Date	Minimum	5th	20th	median	80th	95th	Maximum	MK trend	p	tau
R2009R	Field pH	9	0	01-01-2020	01-09-2022	6.95	6.982	7.066	7.21	7.626	7.746	7.81	no trend	0.251	0.333
R2009R	Electrical Conductivity	9	0	23-11-2019	18-09-2022	3910	4826	9080	11700	12480	17820	21100	no trend	0.754	-0.111
R2009R	Sulfate as SO4 - Turbidimetric	9	0	23-11-2019	18-09-2022	13	27.8	51.8	80	136	155.2	168	no trend	0.059	0.528
R2009R	Aluminium	8	88	23-11-2019	18-09-2022	0.01	0.01	0.01	0.01	0.01	0.0165	0.02	no trend	0.19	-0.25
R2009R	Arsenic	8	0	23-11-2019	18-09-2022	0.007	0.0084	0.0122	0.017	0.0236	0.02595	0.027	no trend	0.063	0.571
R2009R	Cadmium	8	88	23-11-2019	18-09-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
R2009R	Chromium	8	88	23-11-2019	18-09-2022	0.001	0.001	0.001	0.001	0.001	0.00165	0.002	no trend	0.663	0.107
R2009R	Cobalt	8	25	23-11-2019	18-09-2022	0.001	0.001	0.0014	0.002	0.0058	0.007	0.007	no trend	0.07	-0.536
R2009R	Copper	8	88	23-11-2019	18-09-2022	0.001	0.001	0.001	0.001	0.001	0.0023	0.003	no trend	0.663	-0.107
R2009R	Lead	8	100	23-11-2019	18-09-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2009R	Manganese	8	0	23-11-2019	18-09-2022	0.075	0.07885	0.1044	0.2055	0.3388	0.41625	0.439	no trend	0.536	-0.214
R2009R	Nickel	8	0	23-11-2019	18-09-2022	0.004	0.0047	0.006	0.006	0.0148	0.02125	0.023	no trend	0.894	-0.071
R2009R	Selenium	8	100	23-11-2019	18-09-2022	0.01	0.01	0.01	0.01	0.01	0.01	0.01	no trend	1	0
R2009R	Silver	8	100	23-11-2019	18-09-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2009R	Zinc	8	50	23-11-2019	18-09-2022	0.005	0.005	0.005	0.006	0.0182	0.0276	0.029	no trend	0.507	-0.214
R2009R	Mercury	8	100	23-11-2019	18-09-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
R2009R	Chloride	9	0	23-11-2019	18-09-2022	978	1250.8	2908	3900	4208	6182	7470	no trend	0.602	-0.167
R2009R	Calcium	9	0	23-11-2019	18-09-2022	40	41.6	62	105	128.8	228.4	292	no trend	1	0
R2009R	Magnesium	9	0	23-11-2019	18-09-2022	17	17.8	42.4	59	66.4	134.8	180	no trend	1	-0.028
R2009R	Sodium	9	0	23-11-2019	18-09-2022	911	1082.6	1994	2500	2674	3484	4000	no trend	0.466	0.222

Bore	Parameter	count	% LOR	Minimum Date	Maximum Date	Minimum	5th	20th	median	80th	95th	Maximum	MK trend	p	tau
R2010R	Field pH	9	0	01-01-2020	01-09-2022	6.67	6.694	6.73	6.81	7.066	7.762	8.17	no trend	0.402	0.25
R2010R	Electrical Conductivity	10	0	21-11-2019	18-09-2022	23600	24005	25700	27200	27560	27855	27900	decreasing	0.007	-0.689
R2010R	Sulfate as SO4 - Turbidimetric	10	70	21-11-2019	18-09-2022	1	1	1	1	1.4	3	3	no trend	0.151	-0.267
R2010R	Aluminium	10	100	21-11-2019	18-09-2022	0.01	0.01	0.042	0.05	0.05	0.05	0.05	no trend	0.361	0.178
R2010R	Arsenic	10	0	21-11-2019	18-09-2022	0.006	0.015	0.0284	0.0355	0.0524	0.0573	0.06	decreasing	0.032	-0.556
R2010R	Cadmium	10	100	21-11-2019	18-09-2022	0.0001	0.0001	0.00042	0.0005	0.0005	0.0005	0.0005	no trend	0.361	0.178
R2010R	Chromium	10	100	21-11-2019	18-09-2022	0.001	0.001	0.0042	0.005	0.005	0.005	0.005	no trend	0.361	0.178
R2010R	Cobalt	10	70	21-11-2019	18-09-2022	0.002	0.0029	0.0048	0.005	0.005	0.0061	0.007	no trend	1	0
R2010R	Copper	10	100	21-11-2019	18-09-2022	0.001	0.001	0.0042	0.005	0.005	0.005	0.005	no trend	0.361	0.178
R2010R	Lead	10	100	21-11-2019	18-09-2022	0.001	0.001	0.0042	0.005	0.005	0.005	0.005	no trend	0.361	0.178
R2010R	Manganese	10	10	21-11-2019	18-09-2022	0.005	0.01535	0.028	0.0355	0.0556	0.08675	0.107	decreasing	0.025	-0.578
R2010R	Nickel	10	50	21-11-2019	18-09-2022	0.004	0.00445	0.005	0.005	0.0082	0.01285	0.016	no trend	0.053	-0.444
R2010R	Selenium	10	100	21-11-2019	18-09-2022	0.01	0.01	0.042	0.05	0.05	0.05	0.05	no trend	0.361	0.178
R2010R	Silver	10	90	21-11-2019	18-09-2022	0.001	0.0028	0.005	0.005	0.005	0.005	0.005	no trend	0.296	0.156
R2010R	Zinc	10	70	21-11-2019	18-09-2022	0.014	0.01895	0.025	0.025	0.025	0.02995	0.034	no trend	1	0.022
R2010R	Mercury	10	100	21-11-2019	18-09-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
R2010R	Chloride	10	0	21-11-2019	18-09-2022	9370	9374.5	9572	9700	10020	10155	10200	no trend	0.858	-0.067
R2010R	Calcium	10	0	21-11-2019	18-09-2022	136	180.55	311.8	366	396.4	402.4	406	no trend	0.107	0.422
R2010R	Magnesium	10	0	21-11-2019	18-09-2022	424	424.45	436.2	453.5	480.4	529.3	532	no trend	0.178	0.356
R2010R	Sodium	10	0	21-11-2019	18-09-2022	4940	5084	5260	5420	5678	6198.5	6500	increasing	0.025	0.578

Bore	Parameter	count	% LOR	Minimum Date	Maximum Date	Minimum	5th	20th	median	80th	95th	Maximum	MK trend	p	tau
R2032	Field pH	16	0	01-02-2019	01-12-2022	6.93	6.93	6.96	7.065	7.14	7.4875	7.96	no trend	0.527	0.125
R2032	Electrical Conductivity	19	0	28-02-2019	17-12-2022	10700	10790	11260	11500	11740	11810	11900	decreasing	0.024	-0.38
R2032	Sulfate as SO4 - Turbidimetric	18	100	28-02-2019	17-12-2022	1	1	1	1	1	1	1	no trend	1	0
R2032	Aluminium	19	100	28-02-2019	17-12-2022	0.01	0.01	0.01	0.01	0.01	0.01	0.01	no trend	1	0
R2032	Arsenic	19	100	28-02-2019	17-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2032	Cadmium	19	100	28-02-2019	17-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
R2032	Chromium	19	95	28-02-2019	17-12-2022	0.001	0.001	0.001	0.001	0.001	0.0017	0.008	no trend	0.523	0.047
R2032	Cobalt	19	100	28-02-2019	17-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2032	Copper	19	89	28-02-2019	17-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2032	Lead	19	95	28-02-2019	17-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2032	Manganese	19	0	28-02-2019	17-12-2022	0.002	0.002	0.002	0.003	0.004	0.0053	0.008	no trend	0.182	0.216
R2032	Nickel	19	95	28-02-2019	17-12-2022	0.001	0.001	0.001	0.001	0.001	0.0011	0.002	no trend	0.411	0.058
R2032	Selenium	19	100	28-02-2019	17-12-2022	0.01	0.01	0.01	0.01	0.01	0.01	0.01	no trend	1	0
R2032	Silver	19	100	28-02-2019	17-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2032	Zinc	19	0	28-02-2019	17-12-2022	0.005	0.0086	0.0106	0.019	0.0304	0.0436	0.049	no trend	0.806	-0.047
R2032	Mercury	19	100	28-02-2019	17-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
R2032	Chloride	18	0	28-02-2019	17-12-2022	3400	3604	3778	3825	3980	4084.5	4110	no trend	0.272	-0.196
R2032	Calcium	19	0	28-02-2019	17-12-2022	129	140.7	180.6	214	286.4	323.5	382	decreasing	0	-0.614
R2032	Magnesium	19	0	28-02-2019	17-12-2022	105	107.7	111	117	121.2	125	134	no trend	0.343	0.164
R2032	Sodium	19	0	28-02-2019	17-12-2022	2020	2065	2110	2190	2270	2346	2400	no trend	0.058	0.322

Bore	Parameter	count	% LOR	Minimum Date	Maximum Date	Minimum	5th	20th	median	80th	95th	Maximum	MK trend	p	tau
R2034R	Field pH	9	0	01-06-2020	01-12-2022	6.74	6.752	6.8	6.87	7.028	7.088	7.12	no trend	0.076	0.5
R2034R	Electrical Conductivity	9	0	19-06-2020	17-12-2022	10600	11240	12320	14200	16600	18640	19600	decreasing	0.001	-0.889
R2034R	Sulfate as SO4 - Turbidimetric	9	0	19-06-2020	17-12-2022	246	281.6	407.6	1360	3452	3980	4280	decreasing	0	-1
R2034R	Aluminium	9	100	19-06-2020	17-12-2022	0.01	0.01	0.01	0.01	0.01	0.034	0.05	no trend	0.846	0.056
R2034R	Arsenic	9	11	19-06-2020	17-12-2022	0.003	0.003	0.003	0.011	0.0298	0.1366	0.203	decreasing	0.003	-0.806
R2034R	Cadmium	9	100	19-06-2020	17-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.00034	0.0005	no trend	0.846	0.056
R2034R	Chromium	9	78	19-06-2020	17-12-2022	0.001	0.001	0.001	0.001	0.0018	0.0042	0.005	no trend	0.562	-0.139
R2034R	Cobalt	9	11	19-06-2020	17-12-2022	0.002	0.002	0.002	0.005	0.0172	0.0244	0.028	decreasing	0.003	-0.806
R2034R	Copper	9	67	19-06-2020	17-12-2022	0.001	0.001	0.001	0.001	0.0028	0.0046	0.005	no trend	0.164	-0.361
R2034R	Lead	9	89	19-06-2020	17-12-2022	0.001	0.001	0.001	0.001	0.0018	0.0042	0.005	no trend	0.562	-0.139
R2034R	Manganese	9	0	19-06-2020	17-12-2022	0.403	0.4038	0.4128	0.601	1.358	2.498	3.07	decreasing	0.005	-0.778
R2034R	Nickel	9	0	19-06-2020	17-12-2022	0.006	0.0076	0.0124	0.02	0.0358	0.0628	0.074	no trend	0.118	-0.444
R2034R	Selenium	9	100	19-06-2020	17-12-2022	0.01	0.01	0.01	0.01	0.01	0.034	0.05	no trend	0.846	0.056
R2034R	Silver	9	89	19-06-2020	17-12-2022	0.001	0.001	0.001	0.001	0.0026	0.005	0.005	no trend	0.884	-0.056
R2034R	Zinc	9	11	19-06-2020	17-12-2022	0.005	0.0086	0.0212	0.047	0.0928	0.1084	0.114	no trend	1	0
R2034R	Mercury	9	100	19-06-2020	17-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
R2034R	Chloride	9	0	19-06-2020	17-12-2022	3840	3852	3894	3960	4300	4360	4400	no trend	0.171	-0.389
R2034R	Calcium	9	0	19-06-2020	17-12-2022	166	174.8	220.4	310	520.4	630.2	699	decreasing	0	-1
R2034R	Magnesium	9	0	19-06-2020	17-12-2022	165	168.6	177.6	226	414.4	464.8	496	decreasing	0.001	-0.889
R2034R	Sodium	9	0	19-06-2020	17-12-2022	2420	2464	2536	2990	3500	3842	4030	decreasing	0.002	-0.833

Bore	Parameter	count	% LOR	Minimum Date	Maximum Date	Minimum	5th	20th	median	80th	95th	Maximum	MK trend	p	tau
R2054	Field pH	17	0	01-02-2019	01-12-2022	7.11	7.126	7.192	7.26	7.332	7.832	8.4	no trend	0.433	-0.147
R2054	Electrical Conductivity	18	0	28-02-2019	19-09-2022	7570	7638	7914	8075	8228	8419	8470	no trend	0.096	-0.294
R2054	Sulfate as SO4 - Turbidimetric	17	100	28-02-2019	19-09-2022	1	1	1	1	1	1	1	no trend	1	0
R2054	Aluminium	18	94	28-02-2019	19-09-2022	0.01	0.01	0.01	0.01	0.01	0.0115	0.02	no trend	0.123	-0.111
R2054	Arsenic	18	94	28-02-2019	19-09-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2054	Cadmium	18	100	28-02-2019	19-09-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
R2054	Chromium	18	100	28-02-2019	19-09-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2054	Cobalt	18	100	28-02-2019	19-09-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2054	Copper	18	94	28-02-2019	19-09-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2054	Lead	18	100	28-02-2019	19-09-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2054	Manganese	18	0	28-02-2019	19-09-2022	0.002	0.002	0.002	0.002	0.003	0.01075	0.015	no trend	0.294	-0.157
R2054	Nickel	18	100	28-02-2019	19-09-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2054	Selenium	18	100	28-02-2019	19-09-2022	0.01	0.01	0.01	0.01	0.01	0.01	0.01	no trend	1	0
R2054	Silver	18	100	28-02-2019	19-09-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2054	Zinc	18	6	28-02-2019	19-09-2022	0.005	0.0067	0.0074	0.01	0.0148	0.0231	0.035	no trend	0.702	-0.072
R2054	Mercury	18	100	28-02-2019	19-09-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
R2054	Chloride	17	0	28-02-2019	19-09-2022	2260	2388	2492	2540	2632	2668	2740	no trend	0.837	-0.044
R2054	Calcium	18	0	28-02-2019	19-09-2022	81	81	88	103	136	156.05	179	decreasing	0.005	-0.49
R2054	Magnesium	18	0	28-02-2019	19-09-2022	32	32.85	34	35	36	49.6	121	no trend	0.726	0.065
R2054	Sodium	18	0	28-02-2019	19-09-2022	1460	1502.5	1548	1610	1666	1733	1750	no trend	0.159	0.248

Bore	Parameter	count	% LOR	Minimum Date	Maximum Date	Minimum	5th	20th	median	80th	95th	Maximum	MK trend	p	tau
R2055	Field pH	16	0	01-02-2019	01-12-2022	6.86	6.875	6.92	7.05	7.2	7.6	7.75	no trend	0.964	-0.017
R2055	Electrical Conductivity	19	0	28-02-2019	18-12-2022	7660	7687	7990	8200	8358	8447	8600	no trend	0.054	-0.327
R2055	Sulfate as SO4 - Turbidimetric	19	100	28-02-2019	18-12-2022	1	1	1	1	1	1	1	no trend	1	0
R2055	Aluminium	19	100	28-02-2019	18-12-2022	0.01	0.01	0.01	0.01	0.01	0.01	0.01	no trend	1	0
R2055	Arsenic	19	100	28-02-2019	18-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2055	Cadmium	19	100	28-02-2019	18-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
R2055	Chromium	19	100	28-02-2019	18-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2055	Cobalt	19	100	28-02-2019	18-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2055	Copper	19	95	28-02-2019	18-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2055	Lead	19	100	28-02-2019	18-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2055	Manganese	19	0	28-02-2019	18-12-2022	0.002	0.0065	0.008	0.01	0.0104	0.0121	0.013	no trend	0.914	0.023
R2055	Nickel	19	95	28-02-2019	18-12-2022	0.001	0.001	0.001	0.001	0.001	0.0011	0.002	no trend	0.411	0.058
R2055	Selenium	19	100	28-02-2019	18-12-2022	0.01	0.01	0.01	0.01	0.01	0.01	0.01	no trend	1	0
R2055	Silver	19	100	28-02-2019	18-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2055	Zinc	19	11	28-02-2019	18-12-2022	0.005	0.005	0.008	0.011	0.024	0.0478	0.073	no trend	0.361	-0.158
R2055	Mercury	19	100	28-02-2019	18-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
R2055	Chloride	19	0	28-02-2019	18-12-2022	2230	2419	2478	2580	2644	2673	2700	no trend	0.309	-0.175
R2055	Calcium	19	0	28-02-2019	18-12-2022	86	90.5	118.6	138	191.6	217.6	250	decreasing	0	-0.626
R2055	Magnesium	19	0	28-02-2019	18-12-2022	38	98.3	108.6	112	116.8	121.1	122	no trend	0.833	0.041
R2055	Sodium	19	0	28-02-2019	18-12-2022	1390	1399	1446	1480	1544	1593	1620	increasing	0.01	0.433

Bore	Parameter	count	% LOR	Minimum Date	Maximum Date	Minimum	5th	20th	median	80th	95th	Maximum	MK trend	p	tau
Knob Hill 1	Field pH	15	0	01-05-2019	01-12-2022	6.47	6.512	6.624	6.73	6.82	7.315	8.26	no trend	0.254	-0.229
Knob Hill 1	Electrical Conductivity	16	0	27-05-2019	15-12-2022	5470	5905	6420	7235	7850	8207.5	8890	no trend	0.321	-0.192
Knob Hill 1	Sulfate as SO4 - Turbidimetric	16	0	27-05-2019	15-12-2022	303	347.25	393	452	507	581.75	626	no trend	0.753	-0.067
Knob Hill 1	Aluminium	16	100	27-05-2019	15-12-2022	0.01	0.01	0.01	0.01	0.01	0.01	0.01	no trend	1	0
Knob Hill 1	Arsenic	16	81	27-05-2019	15-12-2022	0.001	0.001	0.001	0.001	0.001	0.0085	0.031	no trend	0.278	0.092
Knob Hill 1	Cadmium	16	100	27-05-2019	15-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
Knob Hill 1	Chromium	16	100	27-05-2019	15-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
Knob Hill 1	Cobalt	16	13	27-05-2019	15-12-2022	0.001	0.001	0.002	0.002	0.003	0.003	0.003	decreasing	0.043	-0.342
Knob Hill 1	Copper	16	50	27-05-2019	15-12-2022	0.001	0.001	0.001	0.001	0.002	0.00525	0.012	no trend	0.646	0.083
Knob Hill 1	Lead	16	100	27-05-2019	15-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
Knob Hill 1	Manganese	16	0	27-05-2019	15-12-2022	0.003	0.2895	0.591	0.6465	0.688	0.871	1.33	no trend	0.822	0.05
Knob Hill 1	Nickel	16	19	27-05-2019	15-12-2022	0.001	0.001	0.001	0.002	0.002	0.003	0.003	no trend	0.96	-0.017
Knob Hill 1	Selenium	16	100	27-05-2019	15-12-2022	0.01	0.01	0.01	0.01	0.01	0.01	0.01	no trend	1	0
Knob Hill 1	Silver	16	94	27-05-2019	15-12-2022	0.001	0.001	0.001	0.001	0.001	0.00175	0.004	no trend	1	0.008
Knob Hill 1	Zinc	16	69	27-05-2019	15-12-2022	0.005	0.005	0.005	0.005	0.005	0.028	0.037	no trend	0.548	0.083
Knob Hill 1	Mercury	16	100	27-05-2019	15-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
Knob Hill 1	Chloride	16	0	27-05-2019	15-12-2022	1520	1662.5	1800	1980	2220	2515	2830	no trend	0.787	-0.058
Knob Hill 1	Calcium	16	0	27-05-2019	15-12-2022	188	188.75	231	249.5	273	302.25	312	no trend	0.279	-0.208
Knob Hill 1	Magnesium	16	0	27-05-2019	15-12-2022	182	207.5	219	240	254	302.25	333	no trend	0.471	0.142
Knob Hill 1	Sodium	16	0	27-05-2019	15-12-2022	707	780.5	882	964	1060	1142.5	1300	no trend	0.417	-0.158

Bore	Parameter	count	% LOR	Minimum Date	Maximum Date	Minimum	5th	20th	median	80th	95th	Maximum	MK trend	p	tau
Knob Hill 2	Field pH	15	0	01-05-2019	01-12-2022	5.84	6.477	6.768	6.96	7.026	7.598	8.48	no trend	0.729	0.076
Knob Hill 2	Electrical Conductivity	16	0	27-05-2019	15-12-2022	517	529	583	832.5	929	994.5	1050	decreasing	0	-0.733
Knob Hill 2	Sulfate as SO4 - Turbidimetric	16	0	27-05-2019	15-12-2022	13	13	14	17	20	21	21	decreasing	0	-0.767
Knob Hill 2	Aluminium	16	100	27-05-2019	15-12-2022	0.01	0.01	0.01	0.01	0.01	0.01	0.01	no trend	1	0
Knob Hill 2	Arsenic	16	0	27-05-2019	15-12-2022	0.001	0.00175	0.002	0.0025	0.003	0.003	0.003	no trend	0.54	0.108
Knob Hill 2	Cadmium	16	100	27-05-2019	15-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
Knob Hill 2	Chromium	16	94	27-05-2019	15-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
Knob Hill 2	Cobalt	16	0	27-05-2019	15-12-2022	0.001	0.001	0.001	0.002	0.003	0.004	0.004	decreasing	0	-0.767
Knob Hill 2	Copper	16	100	27-05-2019	15-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
Knob Hill 2	Lead	16	100	27-05-2019	15-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
Knob Hill 2	Manganese	16	0	27-05-2019	15-12-2022	0.532	0.53275	0.568	0.8825	1.08	1.205	1.22	decreasing	0	-0.867
Knob Hill 2	Nickel	16	81	27-05-2019	15-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
Knob Hill 2	Selenium	16	100	27-05-2019	15-12-2022	0.01	0.01	0.01	0.01	0.01	0.01	0.01	no trend	1	0
Knob Hill 2	Silver	16	100	27-05-2019	15-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
Knob Hill 2	Zinc	16	75	27-05-2019	15-12-2022	0.005	0.005	0.005	0.005	0.006	0.01575	0.024	no trend	0.676	-0.067
Knob Hill 2	Mercury	16	100	27-05-2019	15-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
Knob Hill 2	Chloride	16	0	27-05-2019	15-12-2022	61	61	87	124.5	145	154	160	decreasing	0	-0.7
Knob Hill 2	Calcium	16	0	27-05-2019	15-12-2022	21	22.5	26	39.5	45	51.25	52	decreasing	0.004	-0.542
Knob Hill 2	Magnesium	16	0	27-05-2019	15-12-2022	16	16.75	18	28	31	36	36	decreasing	0.001	-0.642
Knob Hill 2	Sodium	16	0	27-05-2019	15-12-2022	63	66	74	95.5	107	115.5	117	decreasing	0	-0.667

Bore	Parameter	count	% LOR	Minimum Date	Maximum Date	Minimum	5th	20th	median	80th	95th	Maximum	MK trend	p	tau
Winnet Bore	Field pH	15	0	01-05-2019	01-12-2022	6.46	6.467	6.634	6.75	6.91	7.138	7.18	no trend	0.457	-0.152
Winnet Bore	Electrical Conductivity	15	0	28-05-2019	15-12-2022	2420	2469	2532	2800	3022	3404	3740	no trend	0.151	-0.286
Winnet Bore	Sulfate as SO4 - Turbidimetric	15	0	28-05-2019	15-12-2022	70	70.7	76.4	84	93.6	99.2	102	no trend	0.487	-0.143
Winnet Bore	Aluminium	16	88	28-05-2019	15-12-2022	0.01	0.01	0.01	0.01	0.01	0.68	2.63	no trend	1	-0.008
Winnet Bore	Arsenic	16	88	28-05-2019	15-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
Winnet Bore	Cadmium	16	94	28-05-2019	15-12-2022	5.00E-05	8.75E-05	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	0.193	0.108
Winnet Bore	Chromium	16	88	28-05-2019	15-12-2022	0.001	0.001	0.001	0.001	0.001	0.00225	0.006	no trend	0.193	-0.108
Winnet Bore	Cobalt	16	63	28-05-2019	15-12-2022	0.001	0.001	0.001	0.001	0.002	0.00325	0.004	no trend	1	0
Winnet Bore	Copper	16	81	28-05-2019	15-12-2022	0.001	0.001	0.001	0.001	0.001	0.004	0.004	no trend	1	0
Winnet Bore	Lead	16	94	28-05-2019	15-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
Winnet Bore	Manganese	16	0	28-05-2019	15-12-2022	0.108	0.11325	0.168	0.2425	0.407	0.87075	1.89	no trend	0.26	0.217
Winnet Bore	Nickel	16	0	28-05-2019	15-12-2022	0.001	0.001	0.001	0.002	0.003	0.00425	0.005	no trend	0.885	-0.033
Winnet Bore	Selenium	16	94	28-05-2019	15-12-2022	0.005	0.00875	0.01	0.01	0.01	0.01	0.01	no trend	0.193	0.108
Winnet Bore	Silver	16	94	28-05-2019	15-12-2022	0.0005	0.000875	0.001	0.001	0.001	0.001	0.001	no trend	0.193	0.108
Winnet Bore	Zinc	16	38	28-05-2019	15-12-2022	0.005	0.005	0.005	0.0085	0.016	0.7335	2.88	no trend	0.745	-0.067
Winnet Bore	Mercury	16	100	28-05-2019	15-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
Winnet Bore	Chloride	15	0	28-05-2019	15-12-2022	481	508.3	528.2	588	690	839.2	954	no trend	0.113	-0.314
Winnet Bore	Calcium	15	0	28-05-2019	15-12-2022	94	94	101.8	111	118.2	123.6	132	no trend	0.518	-0.133
Winnet Bore	Magnesium	15	0	28-05-2019	15-12-2022	97	97	100.6	107	112.4	138.9	148	no trend	0.136	0.295
Winnet Bore	Sodium	15	0	28-05-2019	15-12-2022	297	303.3	315	342	372.4	476.8	509	no trend	0.519	-0.133

Bore	Parameter	count	% LOR	Minimum Date	Maximum Date	Minimum	5th	20th	median	80th	95th	Maximum	MK trend	p	tau
R2035	Field pH	16	0	01-02-2019	01-12-2022	6.98	7.01	7.06	7.265	7.59	7.94	8.45	no trend	0.114	0.3
R2035	Electrical Conductivity	19	0	28-02-2019	17-12-2022	4100	4208	4290	4680	4828	4884	5100	decreasing	0.001	-0.556
R2035	Sulfate as SO4 - Turbidimetric	19	21	28-02-2019	17-12-2022	1	1	1	3	4.4	16.4	20	decreasing	0.001	-0.55
R2035	Aluminium	19	95	28-02-2019	17-12-2022	0.01	0.01	0.01	0.01	0.01	0.016	0.07	no trend	0.121	-0.105
R2035	Arsenic	19	47	28-02-2019	17-12-2022	0.001	0.001	0.001	0.001	0.0014	0.0023	0.005	no trend	0.371	-0.111
R2035	Cadmium	19	100	28-02-2019	17-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
R2035	Chromium	19	95	28-02-2019	17-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2035	Cobalt	19	95	28-02-2019	17-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2035	Copper	19	100	28-02-2019	17-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2035	Lead	19	100	28-02-2019	17-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2035	Manganese	19	0	28-02-2019	17-12-2022	0.042	0.0456	0.0576	0.085	0.1122	0.1364	0.14	decreasing	0	-0.608
R2035	Nickel	19	84	28-02-2019	17-12-2022	0.001	0.001	0.001	0.001	0.001	0.0024	0.006	no trend	0.426	-0.076
R2035	Selenium	19	100	28-02-2019	17-12-2022	0.01	0.01	0.01	0.01	0.01	0.01	0.01	no trend	1	0
R2035	Silver	19	100	28-02-2019	17-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
R2035	Zinc	19	32	28-02-2019	17-12-2022	0.005	0.005	0.005	0.006	0.0094	0.0328	0.04	no trend	0.206	-0.205
R2035	Mercury	19	100	28-02-2019	17-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
R2035	Chloride	19	0	28-02-2019	17-12-2022	999	1017.9	1102	1160	1190	1234	1270	decreasing	0	-0.626
R2035	Calcium	19	0	28-02-2019	17-12-2022	44	44.9	65.8	77	127	143.9	170	decreasing	0.002	-0.526
R2035	Magnesium	19	0	28-02-2019	17-12-2022	27	29.7	35.6	49	64.8	68.1	69	decreasing	0.009	-0.444
R2035	Sodium	19	0	28-02-2019	17-12-2022	818	837.8	857.6	874	910	919	937	no trend	0.972	0.012

APPENDIX B

Aquifer Baseline Summary Statistics

Aquifer	para	count	%_LOR	Minimum Date	Maximum Date	mini	5th	20th	median	80th	95th	max	MK trend	p	tau
Leichhardt Seam	Field pH	66	0	01-02-2019	01-12-2022	6.23	6.45	6.68	6.935	7.14	7.9675	8.5	no trend	1	0
Leichhardt Seam	Electrical Conductivity	77	0	25-02-2019	17-12-2022	5500	10780	11500	15600	25940	30640	32800	no trend	0.55	0.047
Leichhardt Seam	Aluminium	77	99	25-02-2019	17-12-2022	0.01	0.01	0.01	0.01	0.05	0.05	0.05	increasing	0.039	0.118
Leichhardt Seam	Calcium	77	0	25-02-2019	17-12-2022	31	112	156.4	255	382	912.4	971	no trend	0.413	-0.064
Leichhardt Seam	Chloride	76	0	25-02-2019	17-12-2022	1420	3607.5	3890	5505	9690	11200	11700	no trend	0.151	0.113
Leichhardt Seam	Magnesium	77	0	25-02-2019	17-12-2022	8	102	118.2	295	478.2	966	1020	increasing	0.019	0.183
Leichhardt Seam	Manganese	77	1	25-02-2019	17-12-2022	0.002	0.002	0.004	0.02	0.0522	0.5636	1.34	no trend	0.201	0.099
Leichhardt Seam	Sodium	77	0	25-02-2019	17-12-2022	1110	2062	2192	2750	5000	5470	6500	increasing	0.004	0.224
Leichhardt Seam	Sulfate as SO4 - Turbidimetric	76	57	25-02-2019	17-12-2022	1	1	1	1	81	118.25	143	no trend	0.436	-0.054
Leichhardt Seam	Zinc	77	31	25-02-2019	17-12-2022	0.005	0.005	0.007	0.019	0.0258	0.0432	0.086	no trend	0.055	0.148
Leichhardt Seam	Arsenic	77	68	25-02-2019	17-12-2022	0.001	0.001	0.001	0.001	0.005	0.0392	0.06	no trend	0.705	0.026
Leichhardt Seam	Cadmium	77	100	25-02-2019	17-12-2022	0.0001	0.0001	0.0001	0.0001	0.0005	0.0005	0.0005	increasing	0.013	0.138
Leichhardt Seam	Chromium	77	96	25-02-2019	17-12-2022	0.001	0.001	0.001	0.001	0.005	0.005	0.013	increasing	0.006	0.16
Leichhardt Seam	Cobalt	77	95	25-02-2019	17-12-2022	0.001	0.001	0.001	0.001	0.005	0.005	0.007	increasing	0.022	0.134
Leichhardt Seam	Copper	77	94	25-02-2019	17-12-2022	0.001	0.001	0.001	0.001	0.005	0.005	0.005	increasing	0.009	0.149
Leichhardt Seam	Lead	77	99	25-02-2019	17-12-2022	0.001	0.001	0.001	0.001	0.005	0.005	0.005	increasing	0.014	0.137
Leichhardt Seam	Mercury	77	100	25-02-2019	17-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
Leichhardt Seam	Nickel	77	84	25-02-2019	17-12-2022	0.001	0.001	0.001	0.001	0.005	0.0072	0.016	no trend	0.194	0.083
Leichhardt Seam	Selenium	77	100	25-02-2019	17-12-2022	0.01	0.01	0.01	0.01	0.05	0.05	0.05	increasing	0.013	0.138
Leichhardt Seam	Silver	77	95	25-02-2019	17-12-2022	0.001	0.001	0.001	0.001	0.005	0.005	0.005	increasing	0.014	0.14

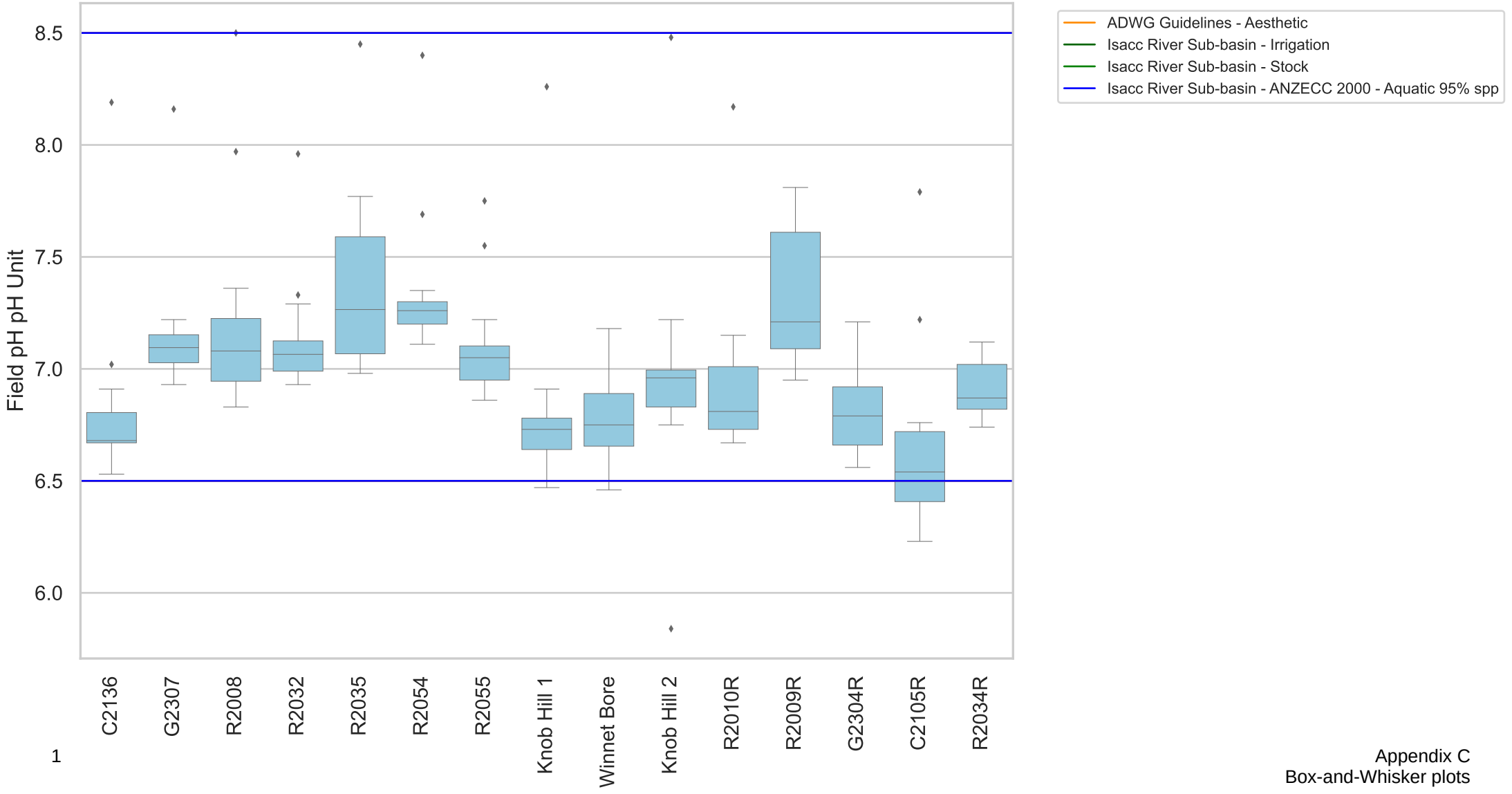
Aquifer	para	count	%_LOR	Minimum Date	Maximum Date	mini	5th	20th	median	80th	95th	max	MK trend	p	tau
Vermont Seam	Field pH	57	0	01-02-2019	01-12-2022	6.56	6.692	6.932	7.07	7.252	7.754	8.45	no trend	0.962	0.005
Vermont Seam	Electrical Conductivity	68	0	28-02-2019	18-12-2022	4100	4290	4820	8365	15900	28865	30000	no trend	0.987	0.002
Vermont Seam	Aluminium	68	97	28-02-2019	18-12-2022	0.01	0.01	0.01	0.01	0.01	0.05	0.07	no trend	0.241	0.065
Vermont Seam	Calcium	68	0	28-02-2019	18-12-2022	44	65.05	106.2	192	311	711.2	763	no trend	0.251	-0.096
Vermont Seam	Chloride	68	0	28-02-2019	18-12-2022	999	1084.5	1190	2645	5764	10465	10800	no trend	0.553	0.05
Vermont Seam	Magnesium	68	0	28-02-2019	18-12-2022	27	35.35	59	117	258	700.55	772	no trend	0.333	0.081
Vermont Seam	Manganese	68	0	28-02-2019	18-12-2022	0.002	0.008	0.01	0.042	0.0956	0.1476	1.01	no trend	0.742	-0.028
Vermont Seam	Sodium	68	0	28-02-2019	18-12-2022	818	857.35	903.2	1545	2988	5159	5730	increasing	0.042	0.169
Vermont Seam	Sulfate as SO4 - Turbidimetric	68	71	28-02-2019	18-12-2022	1	1	1	1	2	4.65	20	no trend	0.052	-0.117
Vermont Seam	Zinc	68	16	28-02-2019	18-12-2022	0.005	0.005	0.006	0.011	0.0312	0.04865	0.092	no trend	0.651	-0.038
Vermont Seam	Arsenic	68	82	28-02-2019	18-12-2022	0.001	0.001	0.001	0.001	0.002	0.005	0.009	no trend	0.226	0.075
Vermont Seam	Cadmium	68	100	28-02-2019	18-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0005	0.0005	no trend	0.06	0.1
Vermont Seam	Chromium	68	99	28-02-2019	18-12-2022	0.001	0.001	0.001	0.001	0.001	0.005	0.005	no trend	0.06	0.1
Vermont Seam	Cobalt	68	94	28-02-2019	18-12-2022	0.001	0.001	0.001	0.001	0.001	0.005	0.02	no trend	0.075	0.098
Vermont Seam	Copper	68	99	28-02-2019	18-12-2022	0.001	0.001	0.001	0.001	0.001	0.005	0.005	no trend	0.065	0.098
Vermont Seam	Lead	68	100	28-02-2019	18-12-2022	0.001	0.001	0.001	0.001	0.001	0.005	0.005	no trend	0.065	0.098
Vermont Seam	Mercury	68	100	28-02-2019	18-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
Vermont Seam	Nickel	68	91	28-02-2019	18-12-2022	0.001	0.001	0.001	0.001	0.002	0.005	0.007	no trend	0.132	0.09
Vermont Seam	Selenium	68	100	28-02-2019	18-12-2022	0.01	0.01	0.01	0.01	0.01	0.05	0.05	no trend	0.065	0.098
Vermont Seam	Silver	68	100	28-02-2019	18-12-2022	0.001	0.001	0.001	0.001	0.001	0.005	0.005	no trend	0.065	0.098

Aquifer	para	count	%_LOR	Minimum Date	Maximum Date	mini	5th	20th	median	80th	95th	max	MK trend	p	tau
Isaac River Alluvium	Field pH	45	0	01-05-2019	01-12-2022	5.84	6.47	6.648	6.76	6.972	7.212	8.48	no trend	0.577	-0.059
Isaac River Alluvium	Electrical Conductivity	47	0	27-05-2019	15-12-2022	517	580.2	905	2800	6698	7941	8890	no trend	0.219	-0.125
Isaac River Alluvium	Aluminium	48	96	27-05-2019	15-12-2022	0.01	0.01	0.01	0.01	0.01	0.01	2.63	no trend	0.918	-0.004
Isaac River Alluvium	Calcium	47	0	27-05-2019	15-12-2022	21	25.3	42.2	111	242	281.4	312	no trend	0.354	-0.094
Isaac River Alluvium	Chloride	47	0	27-05-2019	15-12-2022	61	80.7	141.6	588	1922	2255	2830	no trend	0.237	-0.12
Isaac River Alluvium	Magnesium	47	0	27-05-2019	15-12-2022	16	18	29.4	107	231.4	255.4	333	no trend	0.797	-0.027
Isaac River Alluvium	Manganese	48	0	27-05-2019	15-12-2022	0.003	0.1241	0.2516	0.5965	0.8836	1.213	1.89	no trend	0.116	-0.158
Isaac River Alluvium	Sodium	47	0	27-05-2019	15-12-2022	63	69.8	100.2	342	919.8	1060	1300	no trend	0.322	-0.101
Isaac River Alluvium	Sulfate as SO4 - Turbidimetric	47	0	27-05-2019	15-12-2022	13	13.3	18.2	84	441.8	534.3	626	no trend	0.322	-0.101
Isaac River Alluvium	Zinc	48	60	27-05-2019	15-12-2022	0.005	0.005	0.005	0.005	0.0118	0.02465	2.88	no trend	0.958	0.005
Isaac River Alluvium	Arsenic	48	56	27-05-2019	15-12-2022	0.001	0.001	0.001	0.001	0.002	0.003	0.031	no trend	0.381	0.074
Isaac River Alluvium	Cadmium	48	98	27-05-2019	15-12-2022	5.00E-05	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	0.149	0.036
Isaac River Alluvium	Chromium	48	94	27-05-2019	15-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.006	no trend	0.149	-0.036
Isaac River Alluvium	Cobalt	48	25	27-05-2019	15-12-2022	0.001	0.001	0.001	0.002	0.003	0.00365	0.004	decreasing	0	-0.336
Isaac River Alluvium	Copper	48	77	27-05-2019	15-12-2022	0.001	0.001	0.001	0.001	0.001	0.00365	0.012	no trend	0.885	0.011
Isaac River Alluvium	Lead	48	98	27-05-2019	15-12-2022	0.001	0.001	0.001	0.001	0.001	0.001	0.001	no trend	1	0
Isaac River Alluvium	Mercury	48	100	27-05-2019	15-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
Isaac River Alluvium	Nickel	48	33	27-05-2019	15-12-2022	0.001	0.001	0.001	0.001	0.002	0.003	0.005	no trend	0.818	-0.021
Isaac River Alluvium	Selenium	48	98	27-05-2019	15-12-2022	0.005	0.01	0.01	0.01	0.01	0.01	0.01	no trend	0.17	0.035
Isaac River Alluvium	Silver	48	96	27-05-2019	15-12-2022	0.0005	0.001	0.001	0.001	0.001	0.001	0.004	no trend	0.327	0.035

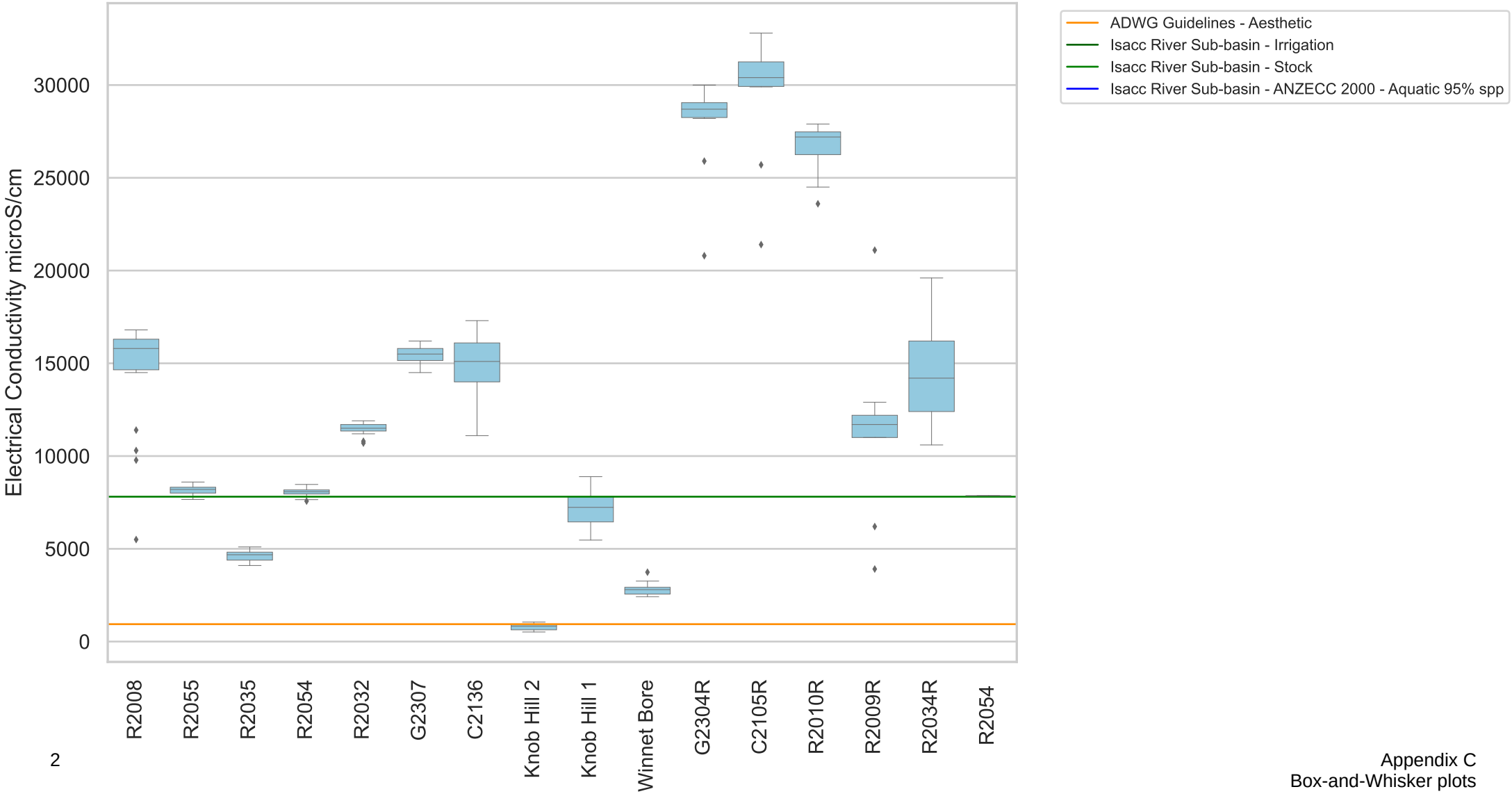
Aquifer	para	count	%_LOR	Minimum Date	Maximum Date	mini	5th	20th	median	80th	95th	max	MK trend	p	tau
Interburden	Field pH	35	0	01-02-2019	01-12-2022	6.74	6.805	7.016	7.2	7.332	7.726	8.4	no trend	0.418	-0.097
Interburden	Electrical Conductivity	37	0	28-02-2019	18-12-2022	3910	7296	7954	8270	12800	17680	21100	no trend	0.774	0.035
Interburden	Aluminium	36	94	28-02-2019	18-12-2022	0.01	0.01	0.01	0.01	0.01	0.02	0.05	no trend	0.331	-0.056
Interburden	Calcium	37	0	28-02-2019	18-12-2022	40	68	90	126	231.2	518.2	699	no trend	0.32	-0.116
Interburden	Chloride	36	0	28-02-2019	18-12-2022	978	2110	2510	2650	4080	4325	7470	no trend	0.406	0.098
Interburden	Magnesium	37	0	28-02-2019	18-12-2022	17	29.4	34	36	178.8	413.2	496	no trend	0.134	0.173
Interburden	Manganese	36	0	28-02-2019	18-12-2022	0.002	0.002	0.002	0.0125	0.418	1.2875	3.07	no trend	0.371	0.103
Interburden	Sodium	37	0	28-02-2019	18-12-2022	911	1436	1574	1690	2658	3648	4030	no trend	0.06	0.218
Interburden	Sulfate as SO4 - Turbidimetric	36	50	28-02-2019	18-12-2022	1	1	1	7	335	3432.5	4280	no trend	0.125	0.168
Interburden	Zinc	36	17	28-02-2019	18-12-2022	0.005	0.005	0.007	0.011	0.029	0.091	0.114	no trend	0.641	-0.056
Interburden	Arsenic	36	53	28-02-2019	18-12-2022	0.001	0.001	0.001	0.001	0.016	0.0295	0.203	no trend	0.198	0.14
Interburden	Cadmium	36	97	28-02-2019	18-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0005	no trend	0.441	0.027
Interburden	Chromium	36	92	28-02-2019	18-12-2022	0.001	0.001	0.001	0.001	0.001	0.00225	0.005	no trend	0.587	0.032
Interburden	Cobalt	36	61	28-02-2019	18-12-2022	0.001	0.001	0.001	0.001	0.004	0.01675	0.028	no trend	0.702	0.041
Interburden	Copper	36	86	28-02-2019	18-12-2022	0.001	0.001	0.001	0.001	0.001	0.00325	0.005	no trend	0.802	-0.019
Interburden	Lead	36	97	28-02-2019	18-12-2022	0.001	0.001	0.001	0.001	0.001	0.0015	0.005	no trend	0.89	0.008
Interburden	Mercury	36	100	28-02-2019	18-12-2022	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	no trend	1	0
Interburden	Nickel	36	53	28-02-2019	18-12-2022	0.001	0.001	0.001	0.001	0.018	0.03325	0.074	no trend	0.131	0.163
Interburden	Selenium	36	100	28-02-2019	18-12-2022	0.01	0.01	0.01	0.01	0.01	0.01	0.05	no trend	0.441	0.027
Interburden	Silver	36	97	28-02-2019	18-12-2022	0.001	0.001	0.001	0.001	0.001	0.002	0.005	no trend	0.654	0.022

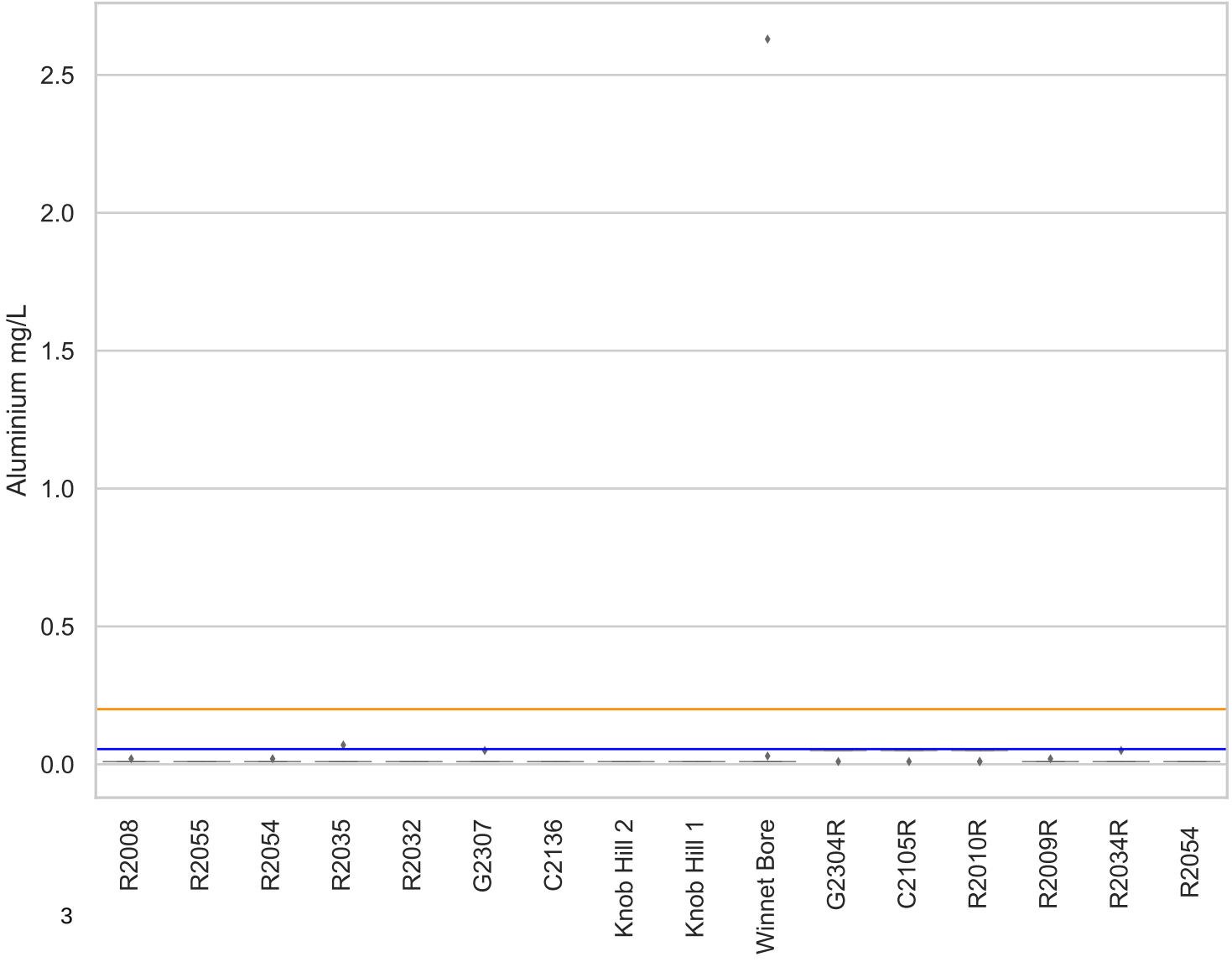
APPENDIX C

Boxplots



Appendix C
Box-and-Whisker plots


ADWG Guidelines - Aesthetic
Isacc River Sub-basin - Irrigation
Isacc River Sub-basin - Stock
Isacc River Sub-basin - ANZECC 2000 - Aquatic 95% spp
Electrical Conductivity microS/cm
30000
25000
20000
15000
10000
5000
0
R2008
R2055
R2035
R2054
R2032
G2307
C2136
Knob Hill 2
Knob Hill 1
Winnet Bore
G2304R
C2105R
R2010R
R2009R
R2034R
R2054



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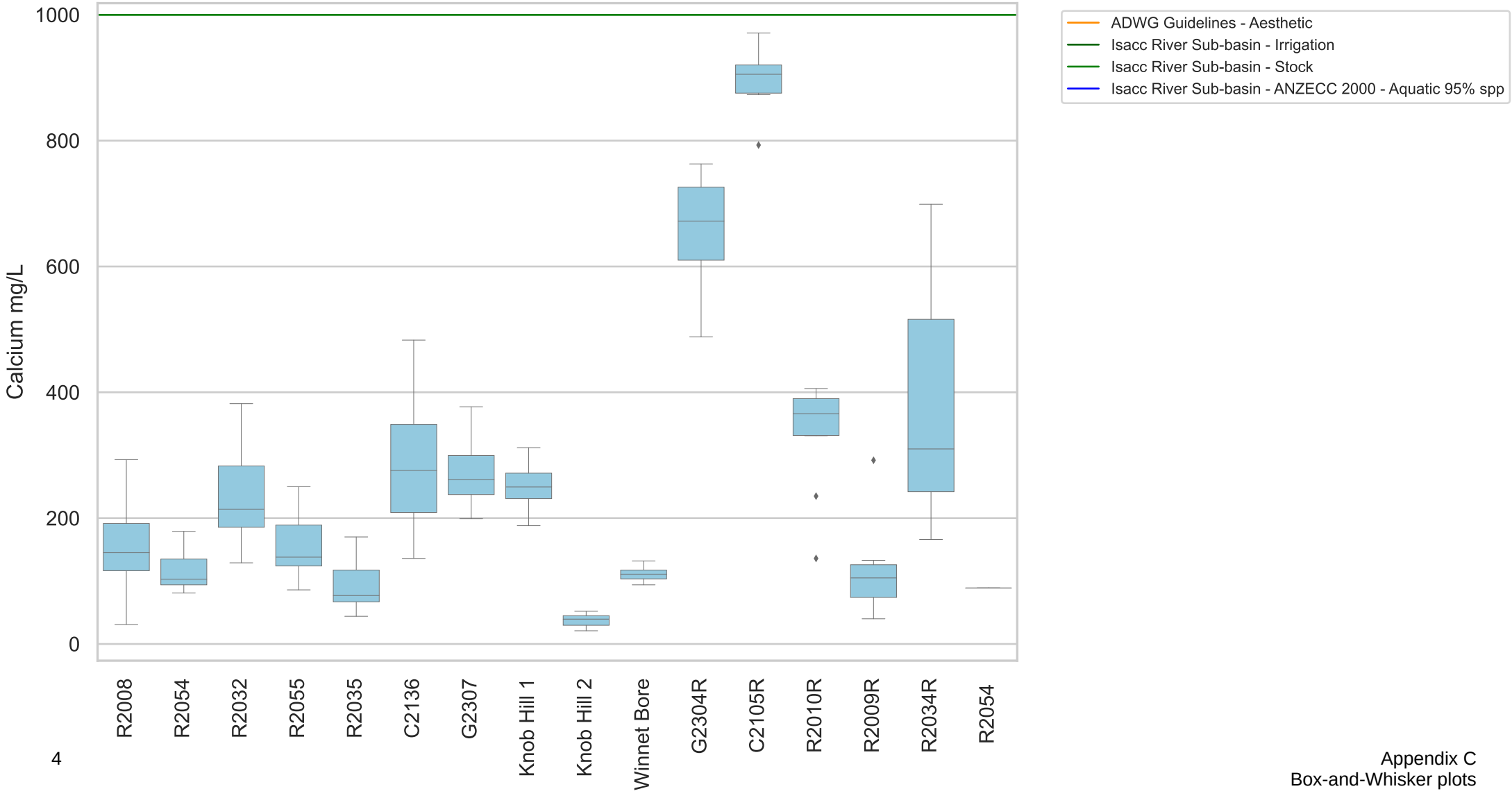
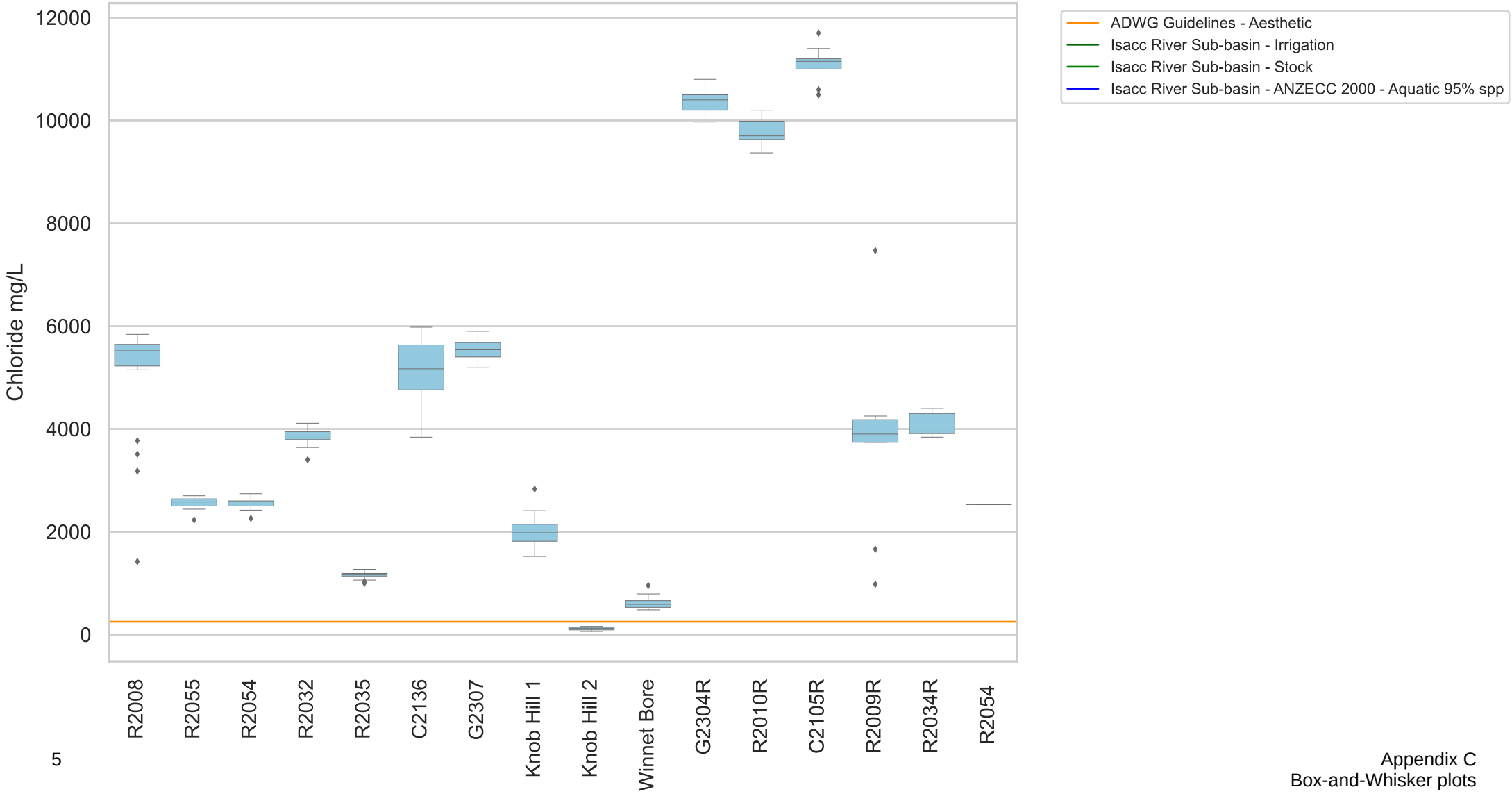
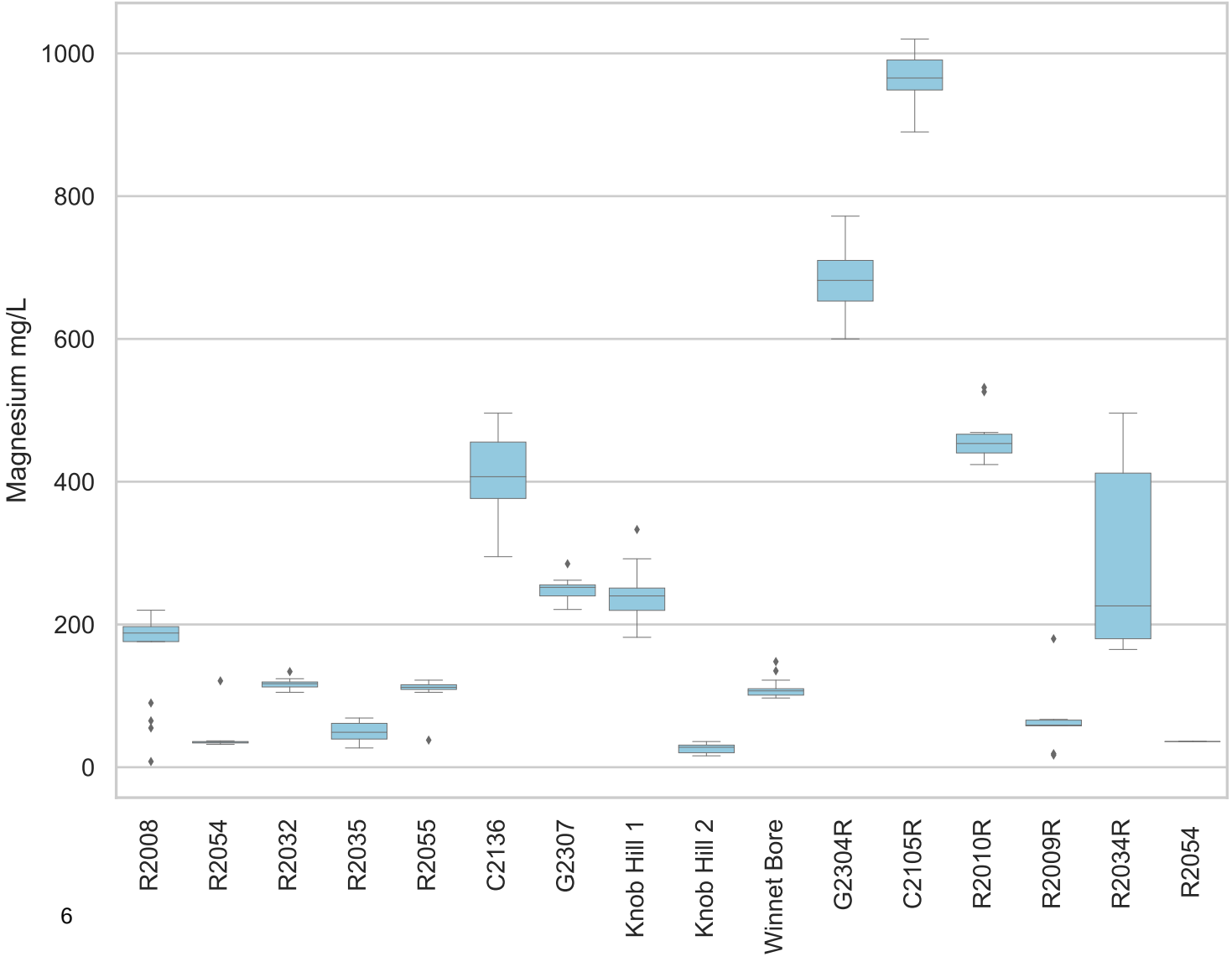
Appendix C
Box-and-Whisker plots

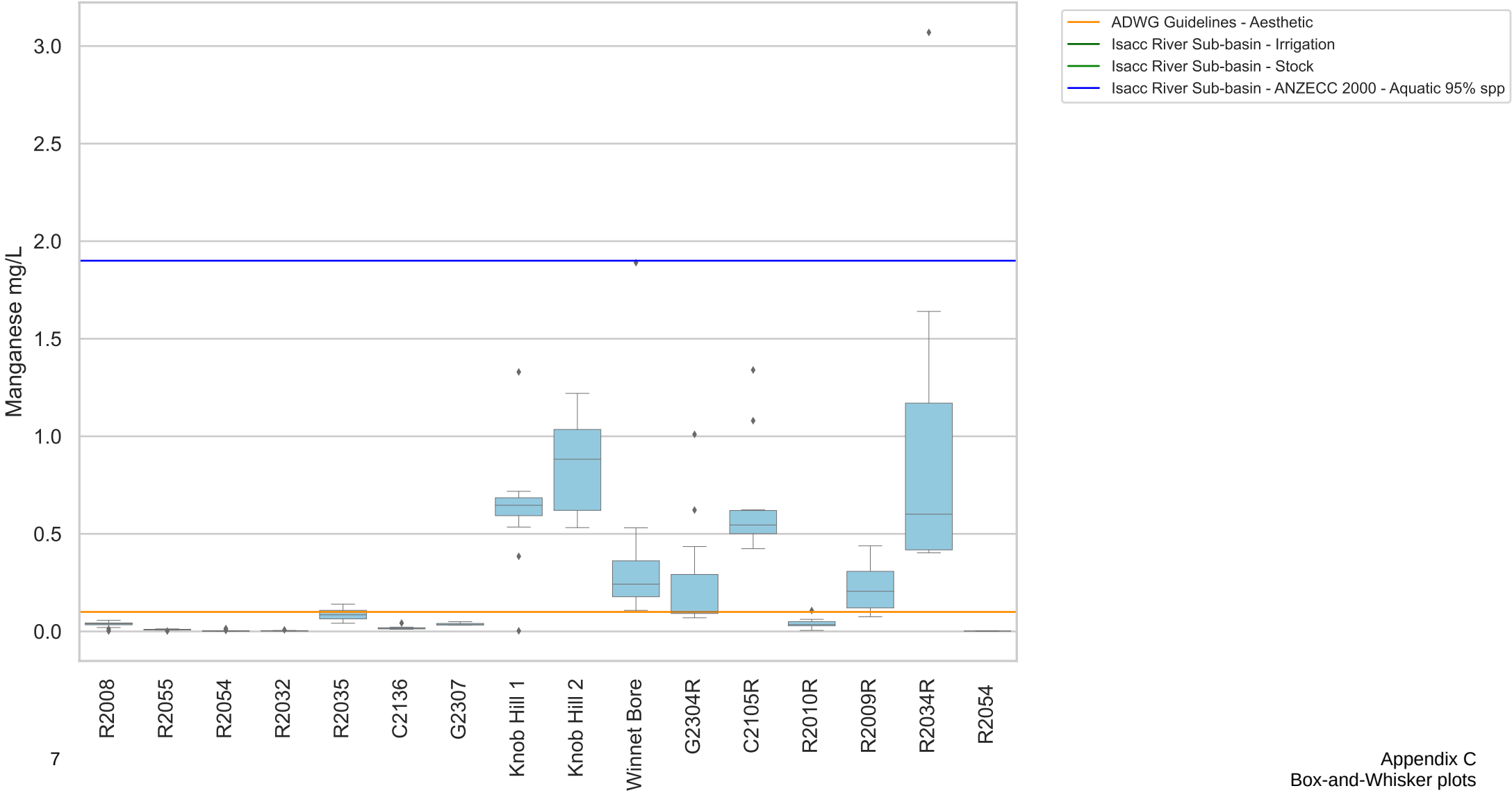


Appendix C
Box-and-Whisker plots

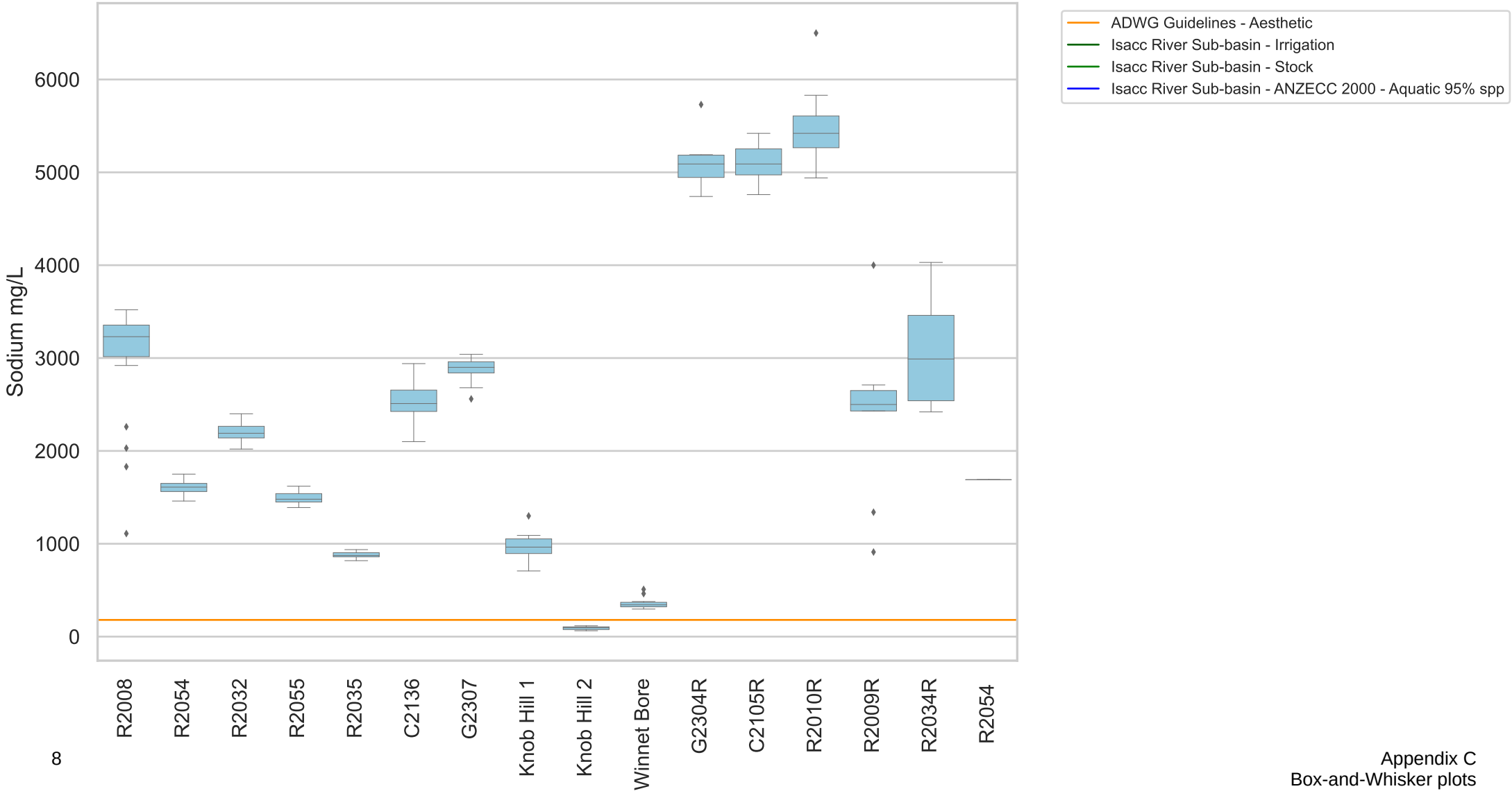

ADWG Guidelines - Aesthetic
Isacc River Sub-basin - Irrigation
Isacc River Sub-basin - Stock
Isacc River Sub-basin - ANZECC 2000 - Aquatic 95% spp
Chloride mg/L
12000
10000
8000
6000
4000
2000
0
R2008
R2055
R2054
R2032
R2035
C2136
G2307
Knob Hill 1
Knob Hill 2
Winnet Bore
G2304R
R2010R
C2105R
R2009R
R2034R
R2054



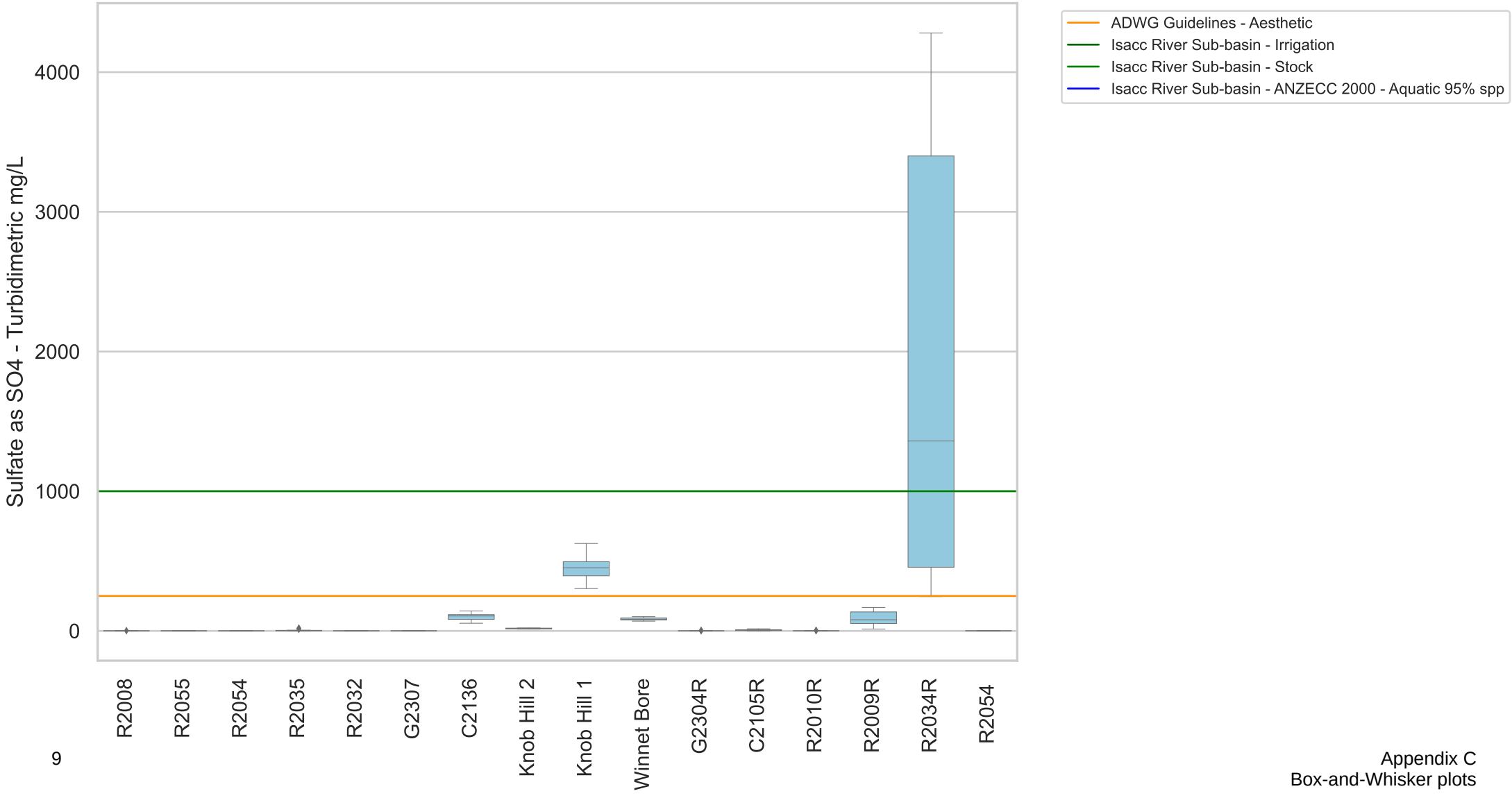
Appendix C
Box-and-Whisker plots



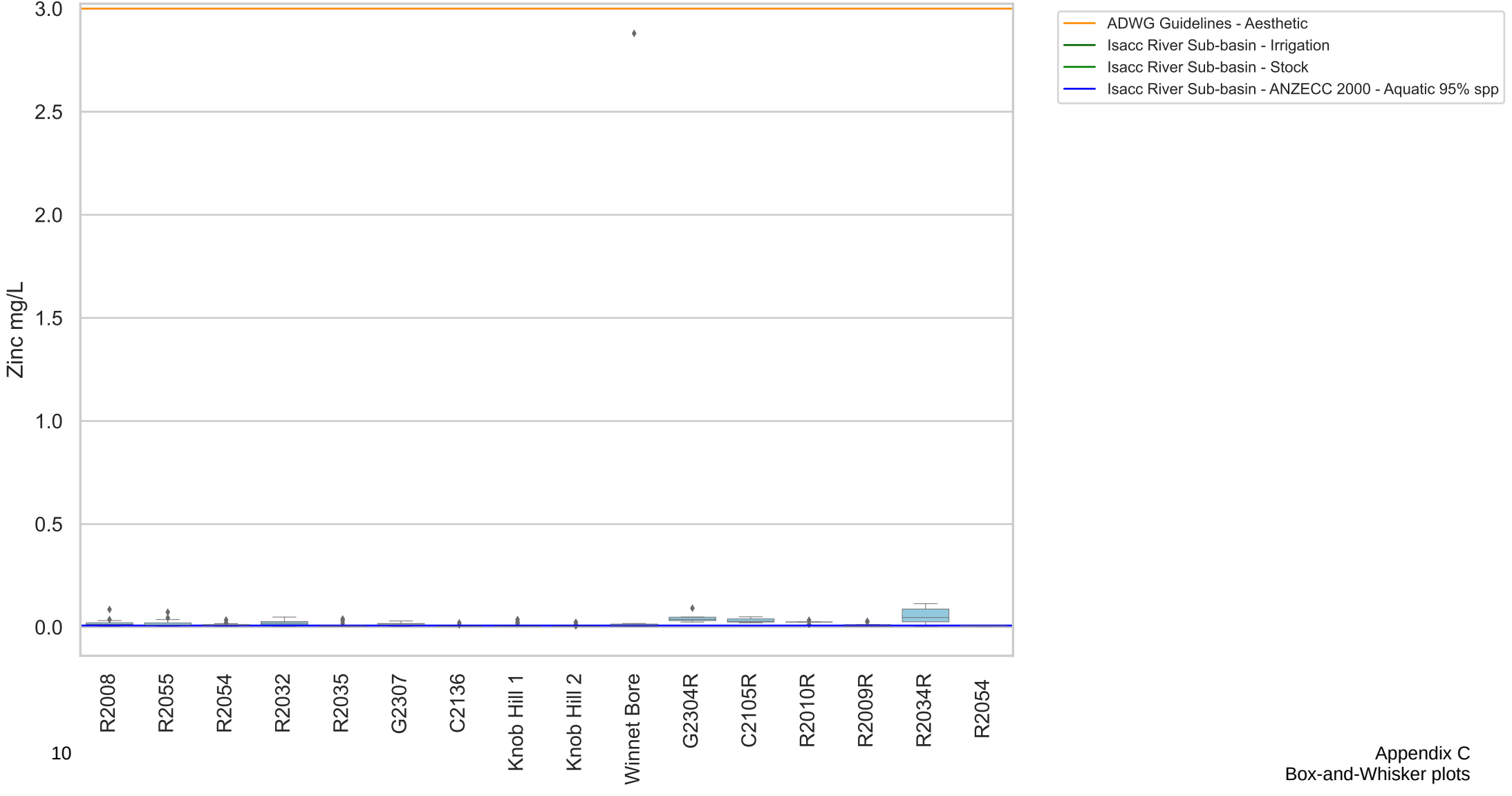
Appendix C
Box-and-Whisker plots



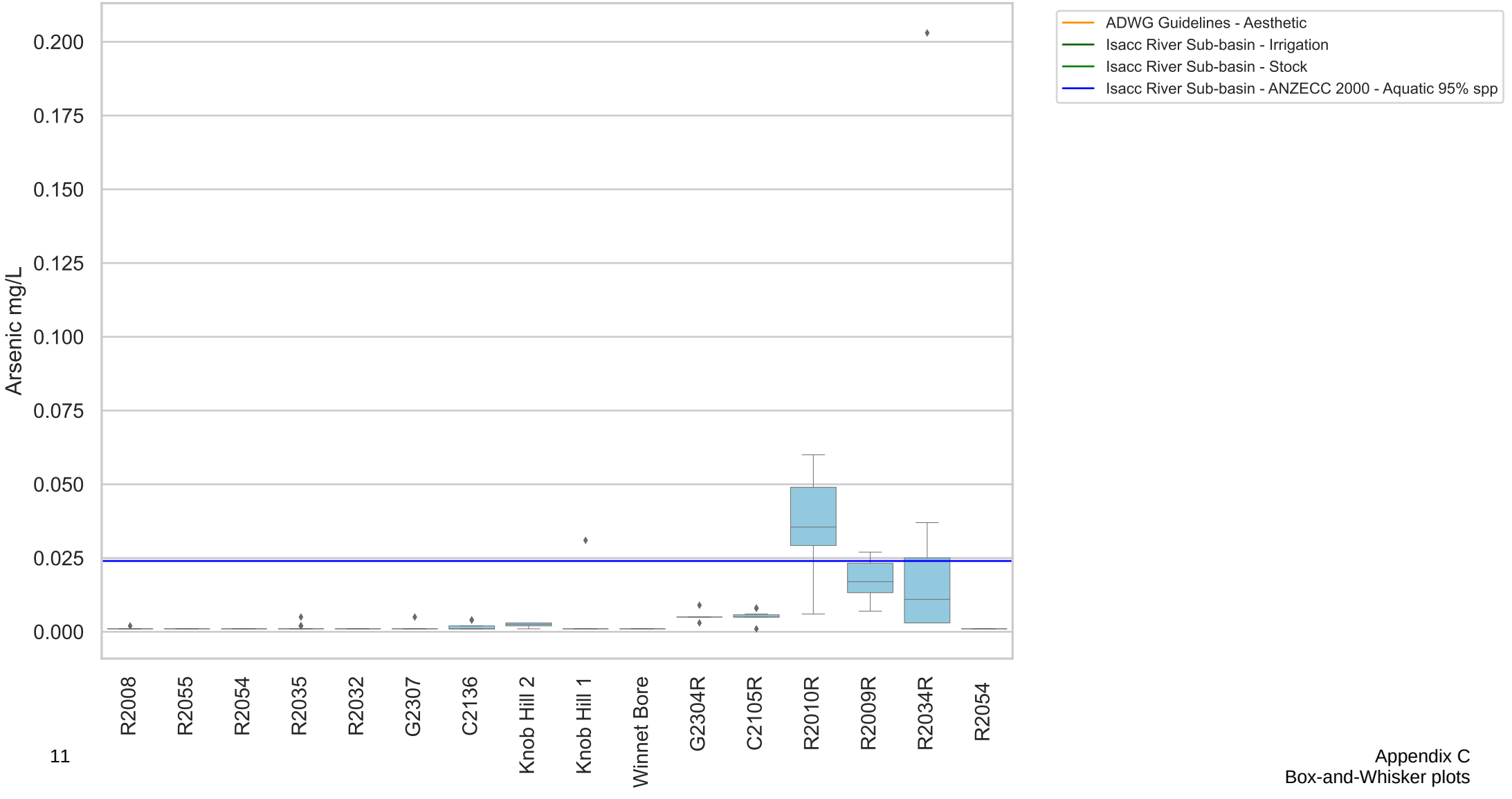
Appendix C
Box-and-Whisker plots



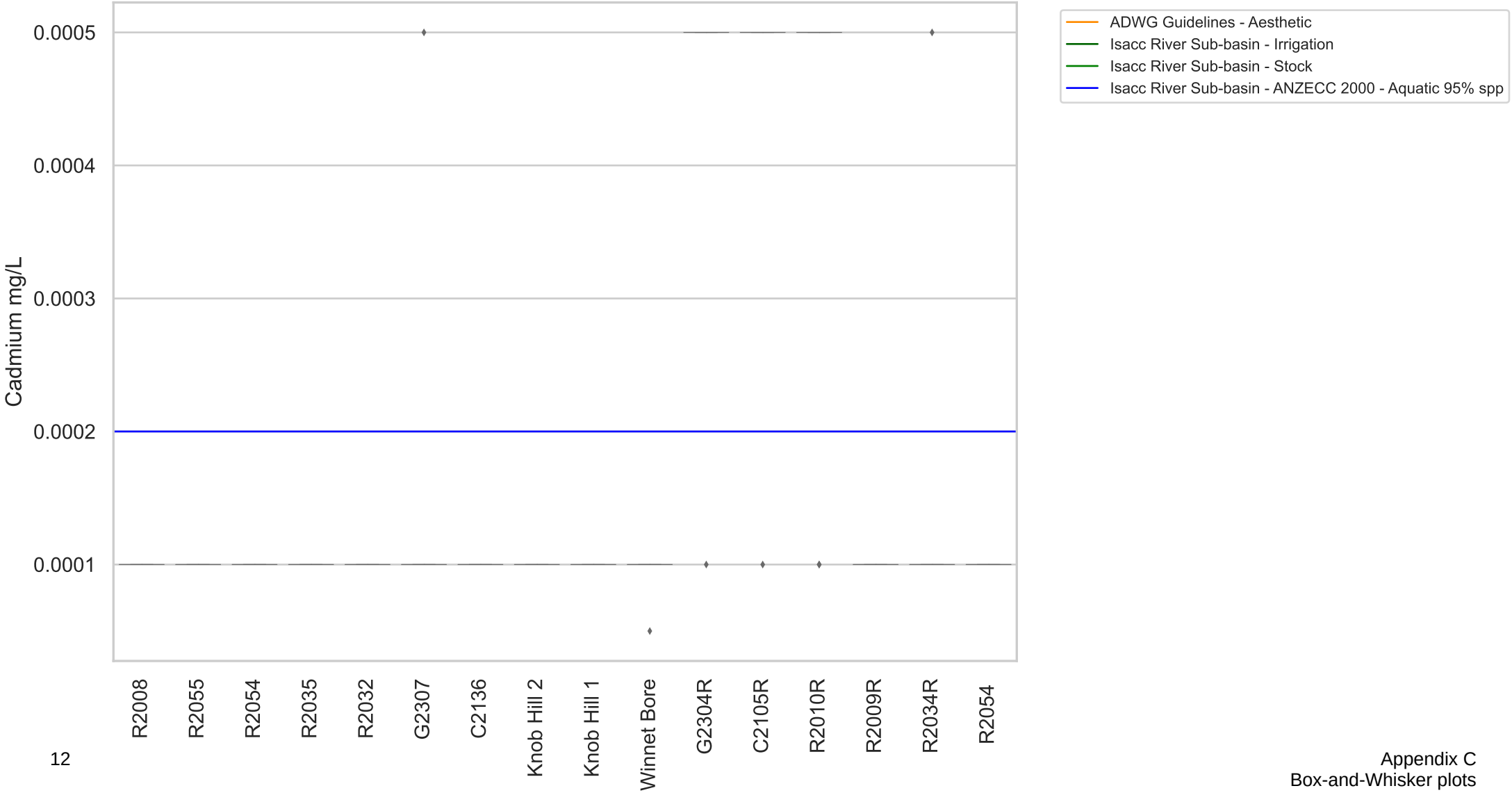
Appendix C
Box-and-Whisker plots

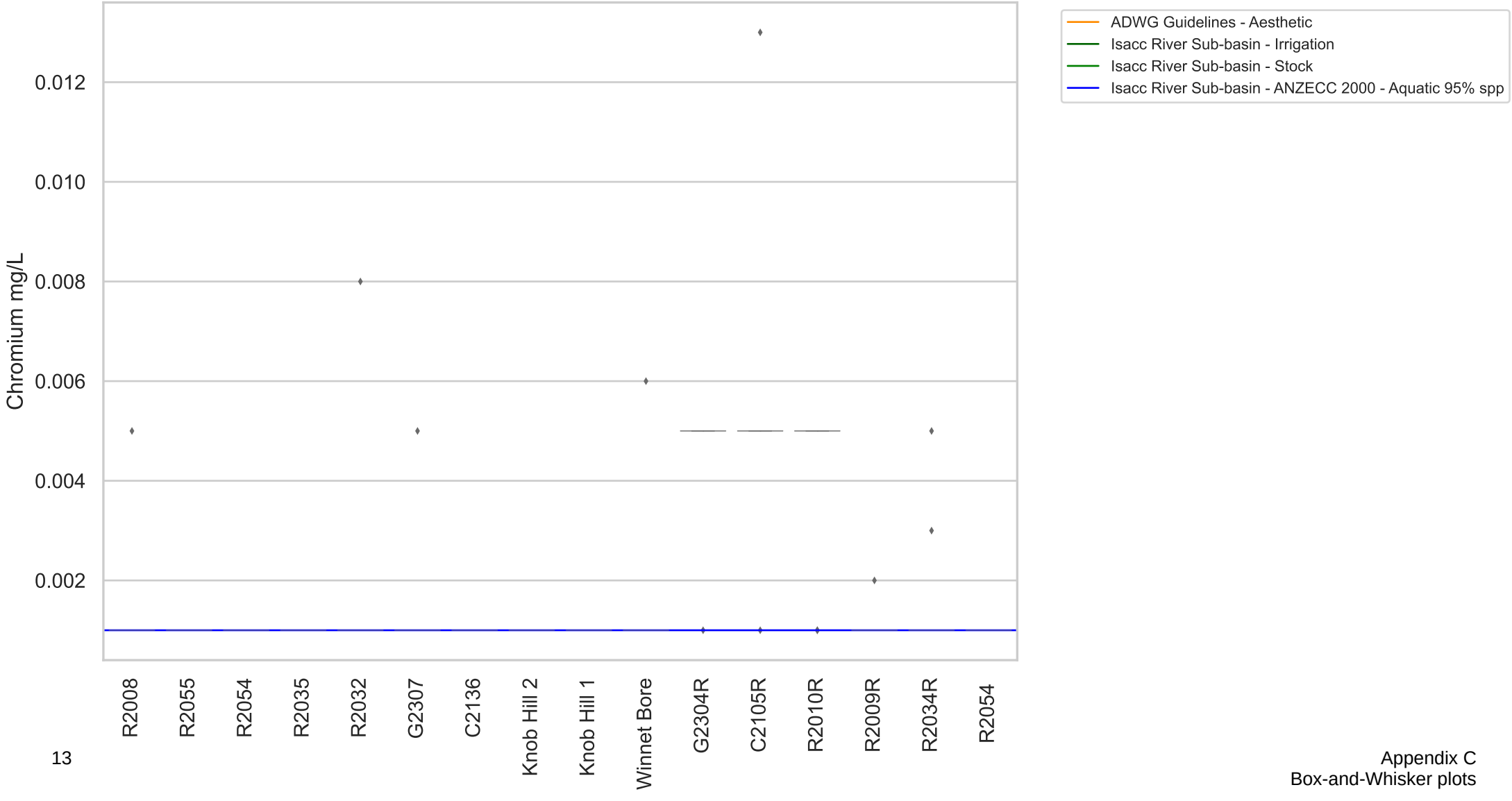


Appendix C
Box-and-Whisker plots

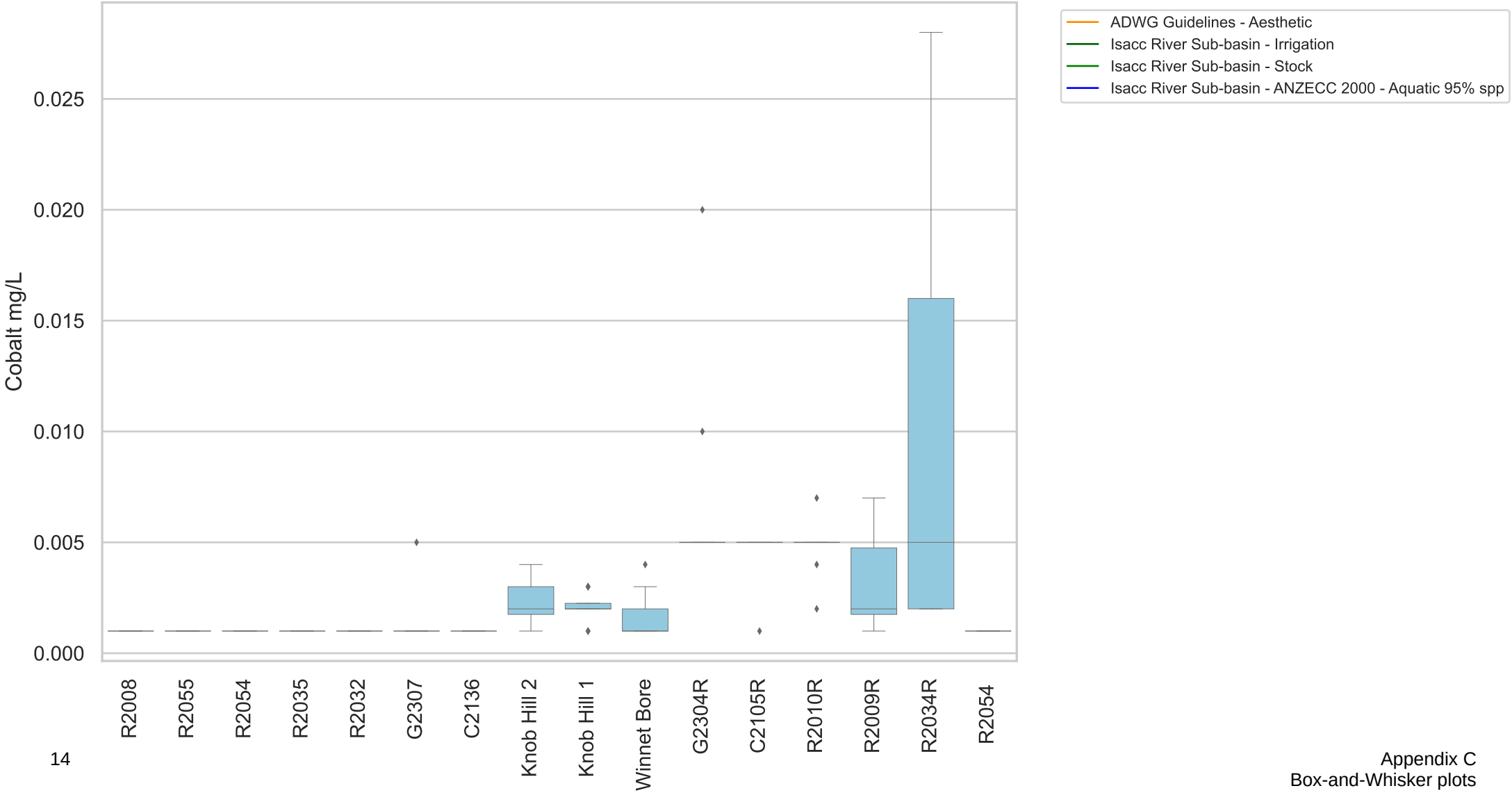


Appendix C
Box-and-Whisker plots

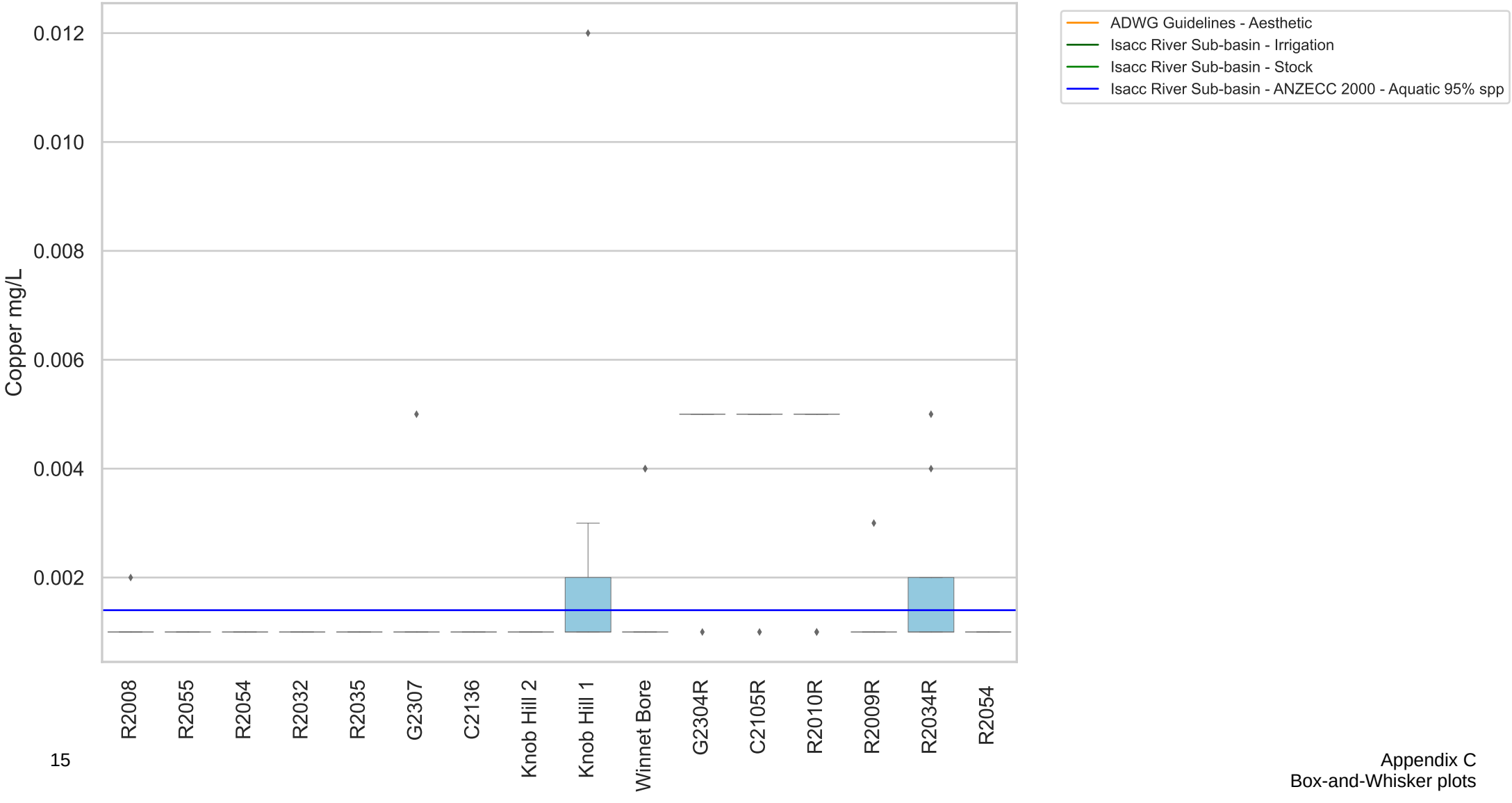

ADWG Guidelines - Aesthetic
Isacc River Sub-basin - Irrigation
Isacc River Sub-basin - Stock
Isacc River Sub-basin - ANZECC 2000 - Aquatic 95% spp
Cadmium mg/L
0.0005
0.0004
0.0003
0.0002
0.0001
R2008
R2055
R2054
R2035
R2032
G2307
C2136
Knob Hill 2
Knob Hill 1
Winnet Bore
G2304R
C2105R
R2010R
R2009R
R2034R
R2054



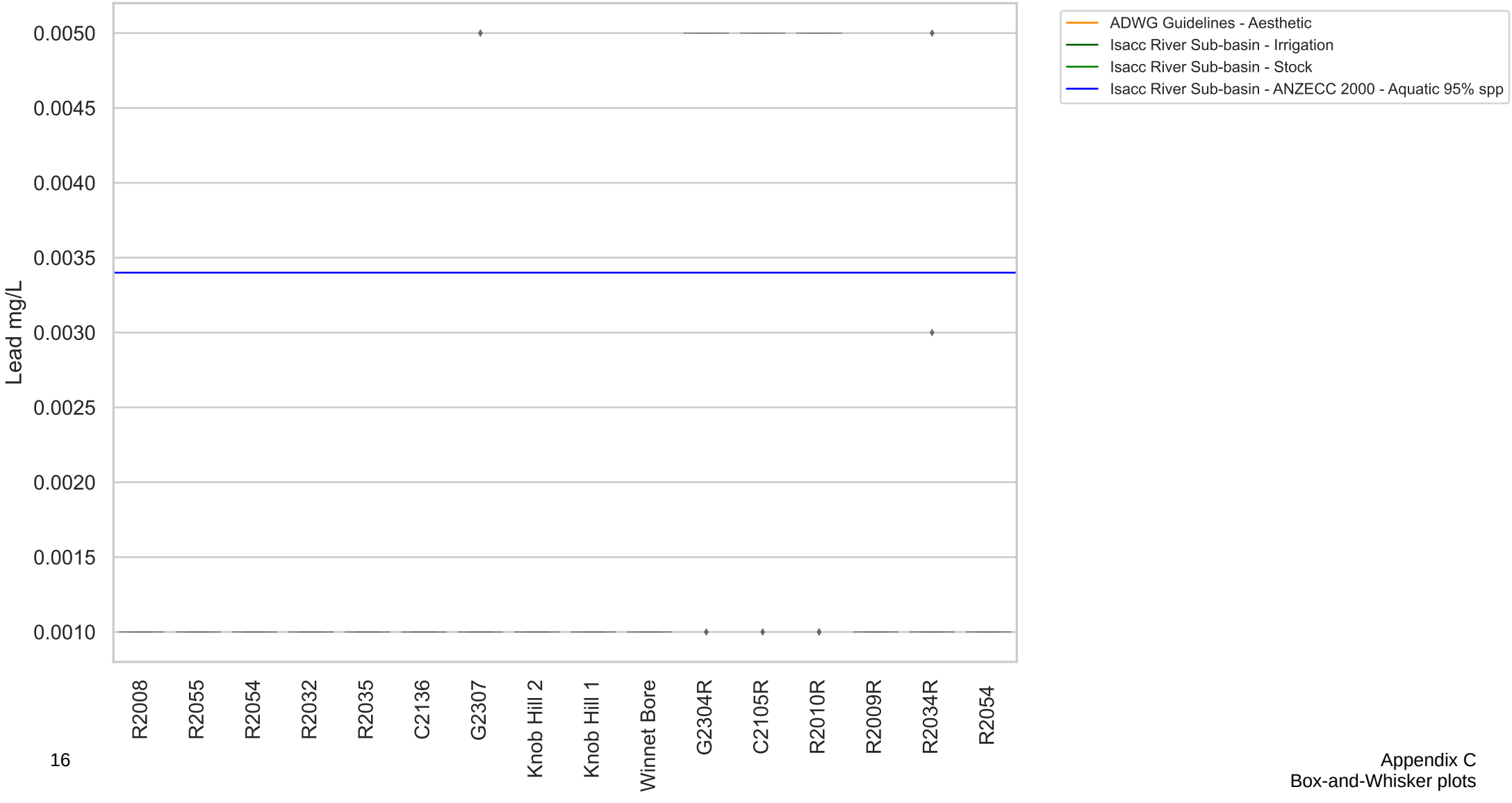
Appendix C
Box-and-Whisker plots



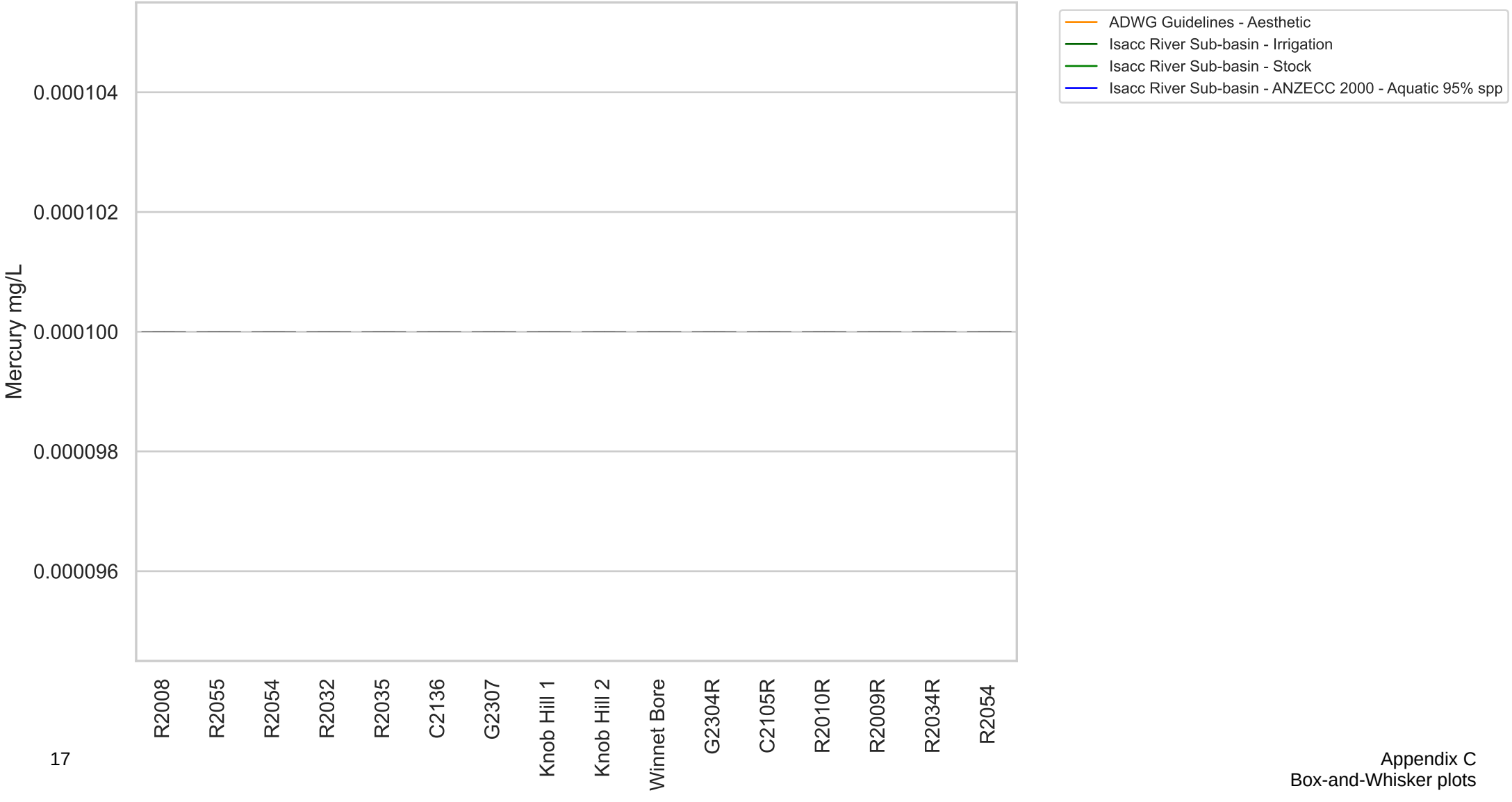
Appendix C
Box-and-Whisker plots

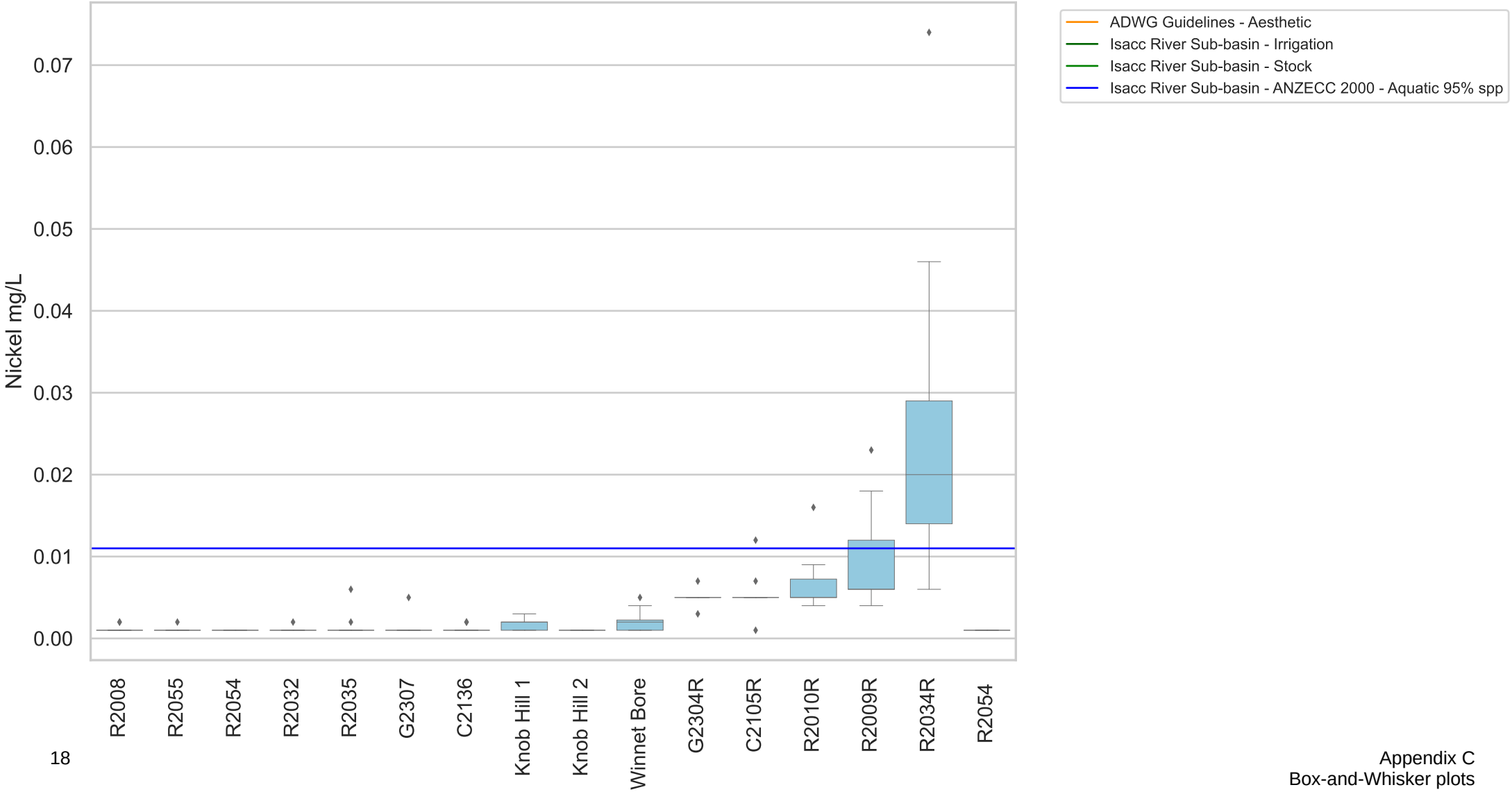


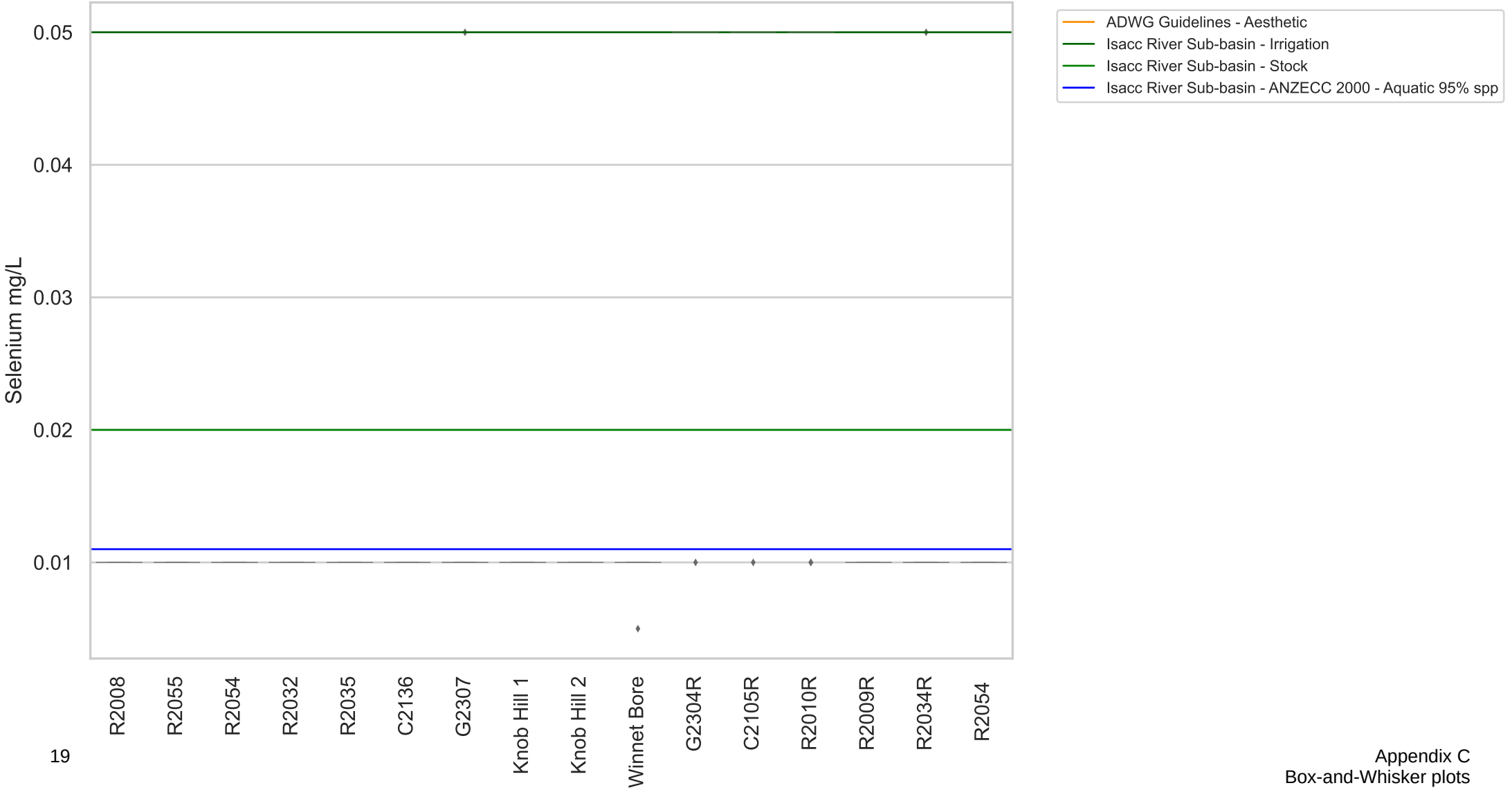
Appendix C
Box-and-Whisker plots



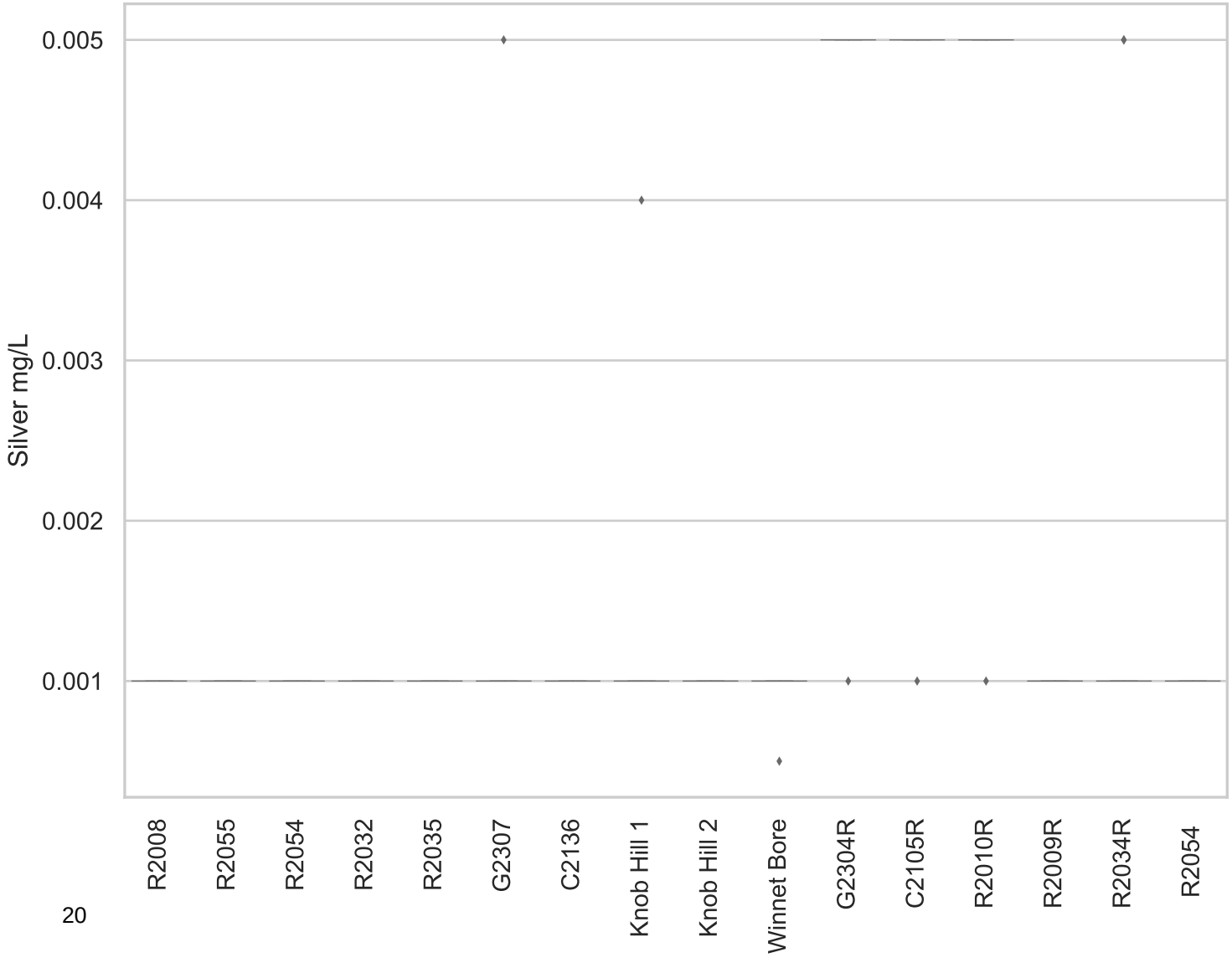
Appendix C
Box-and-Whisker plots


ADWG Guidelines - Aesthetic
Isacc River Sub-basin - Irrigation
Isacc River Sub-basin - Stock
Isacc River Sub-basin - ANZECC 2000 - Aquatic 95% spp
Mercury mg/L
0.000104
0.000102
0.000100
0.000098
0.000096
R2008
R2055
R2054
R2032
R2035
C2136
G2307
Knob Hill 1
Knob Hill 2
Winnet Bore
G2304R
C2105R
R2010R
R2009R
R2034R
R2054


ADWG Guidelines - Aesthetic
Isacc River Sub-basin - Irrigation
Isacc River Sub-basin - Stock
Isacc River Sub-basin - ANZECC 2000 - Aquatic 95% spp
Nickel mg/L
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
R2008
R2055
R2054
R2032
R2035
G2307
C2136
Knob Hill 1
Knob Hill 2
Winnet Bore
G2304R
C2105R
R2010R
R2009R
R2034R
R2054



Appendix C
Box-and-Whisker plots

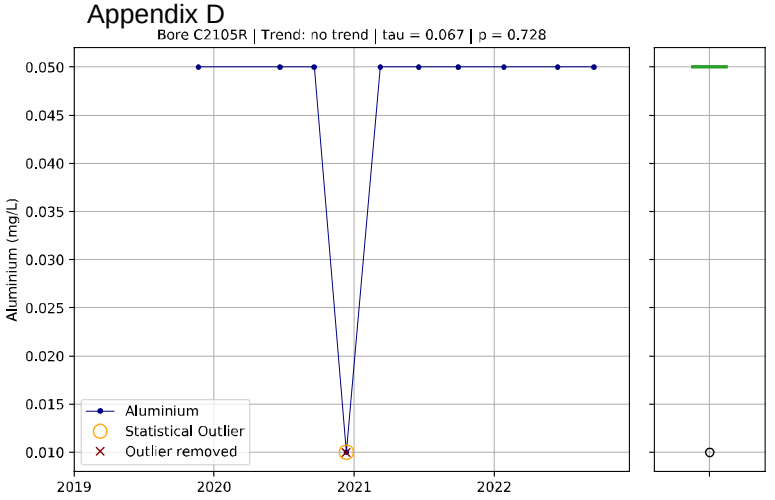


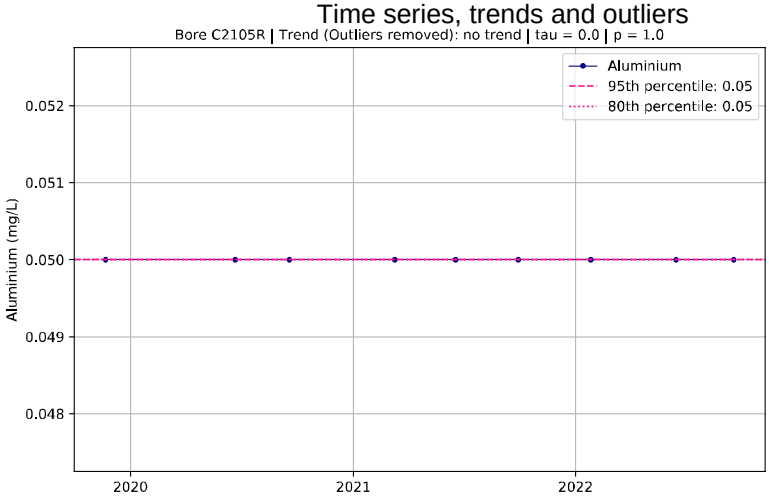
Appendix C
Box-and-Whisker plots

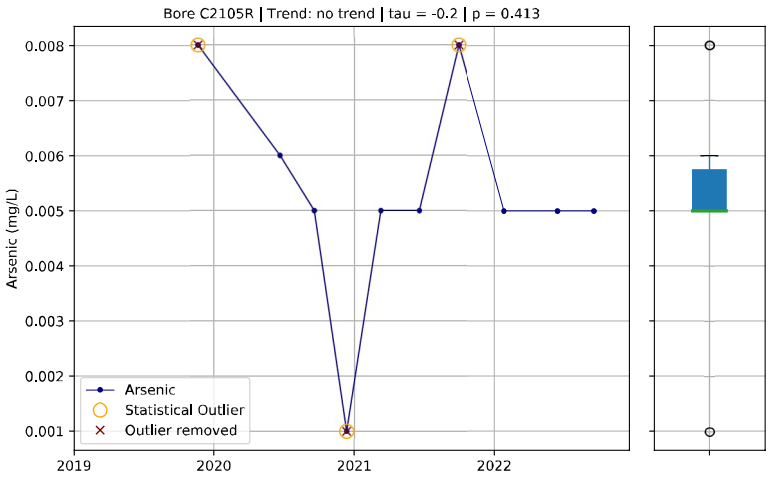
APPENDIX D

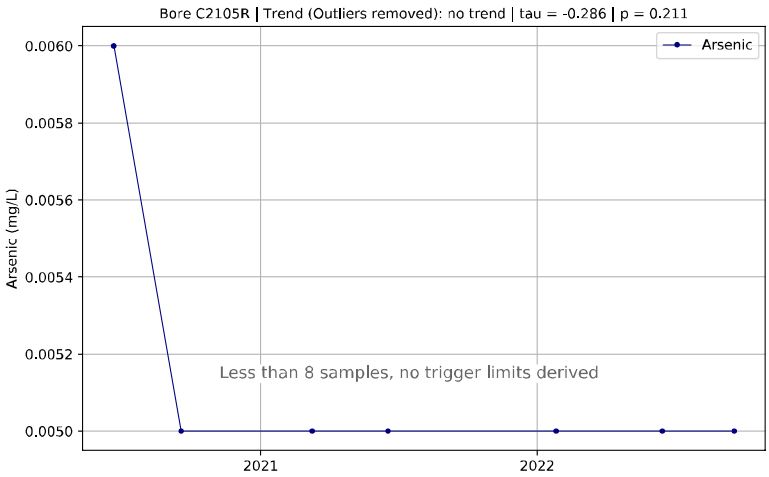
Timeseries with Outliers and Trends

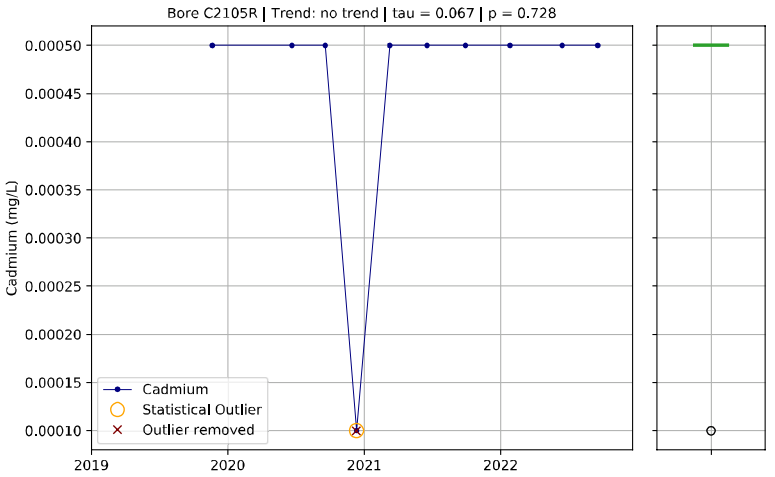
Time series, trends and outliers

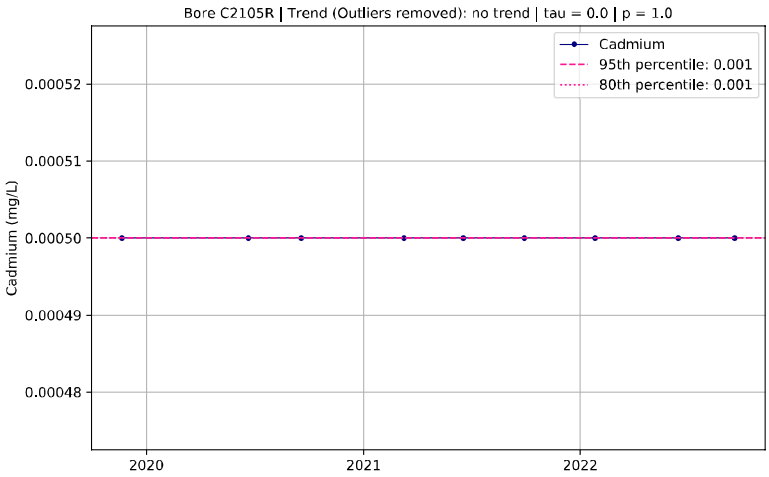


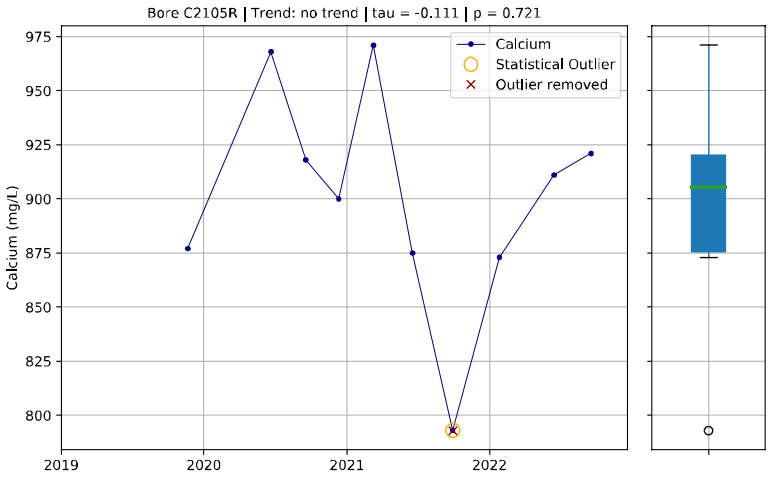


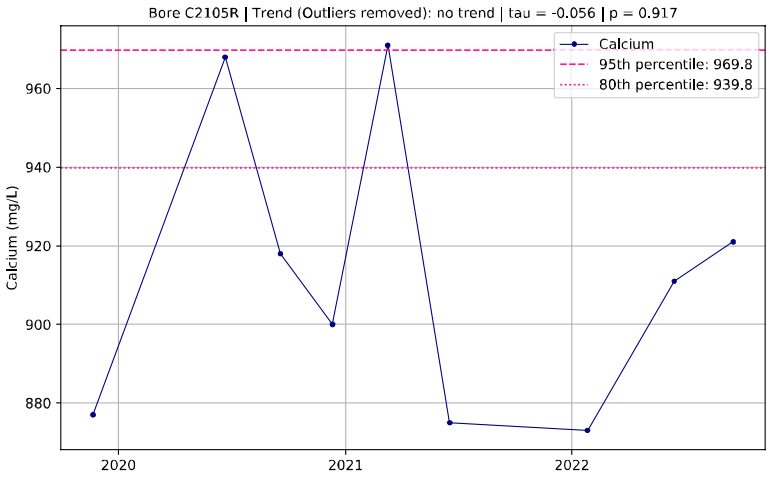


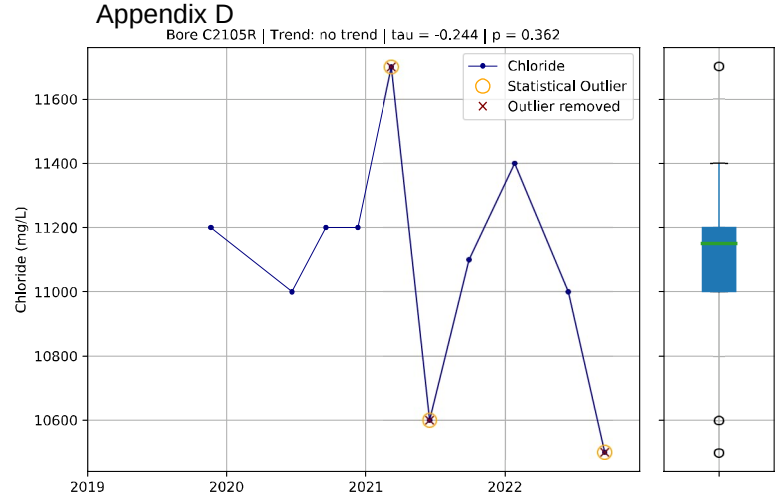


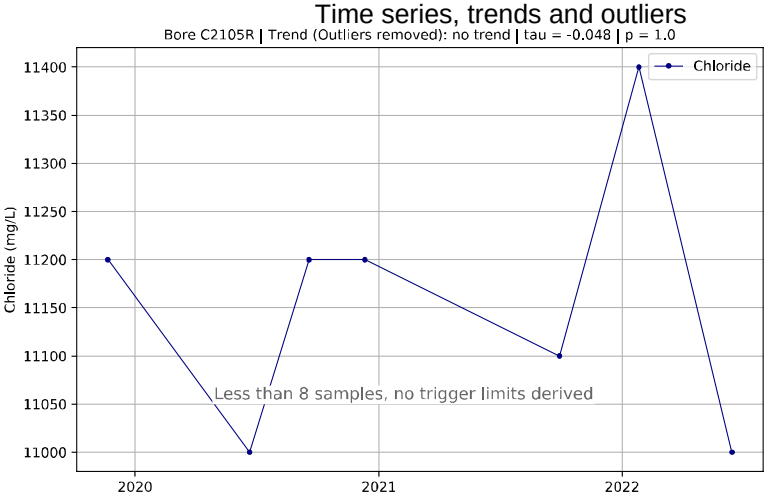


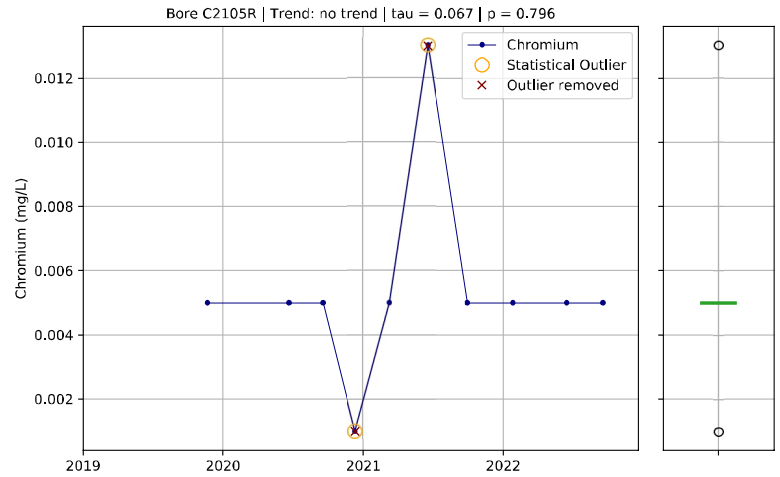


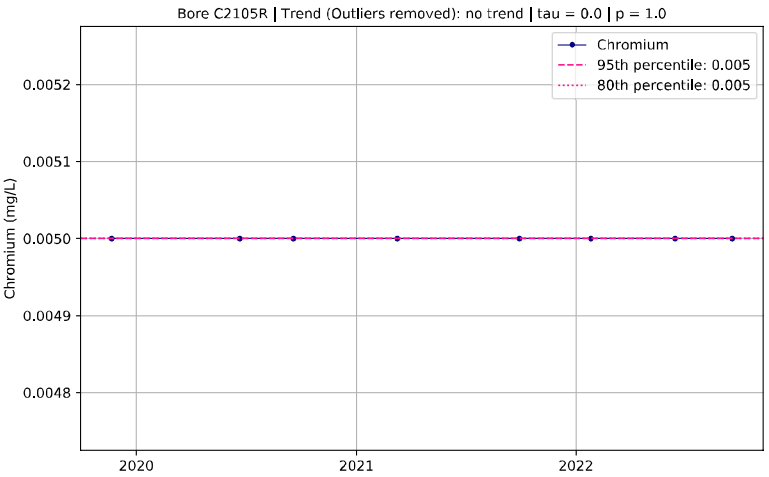


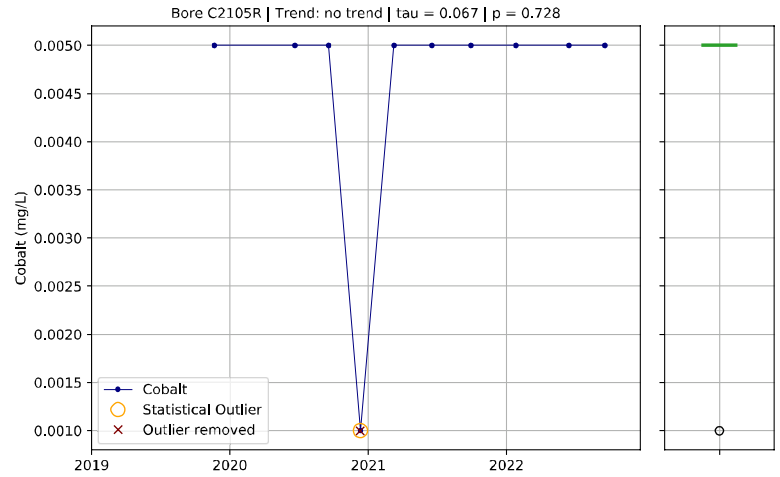


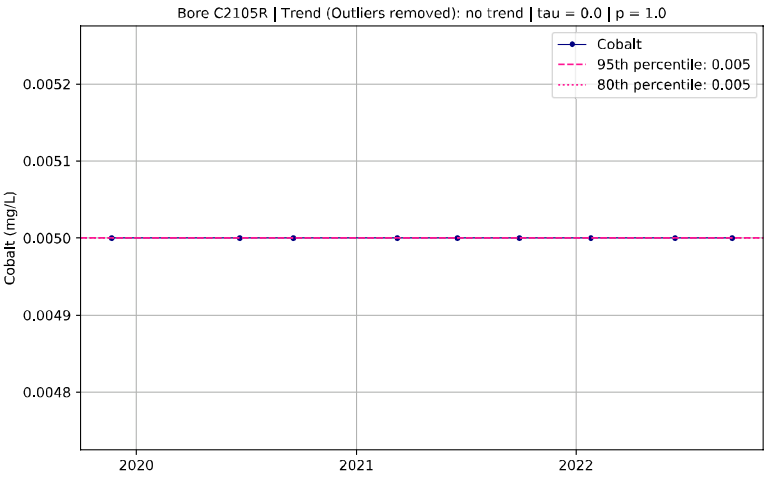

Bore C2105R | Trend: no trend | tau = -0.244 | p = 0.362
Chloride
Statistical Outlier
Outlier removed
Chloride (mg/L)
11600
11400
11200
11000
10800
10600
2019
2020
2021
2022

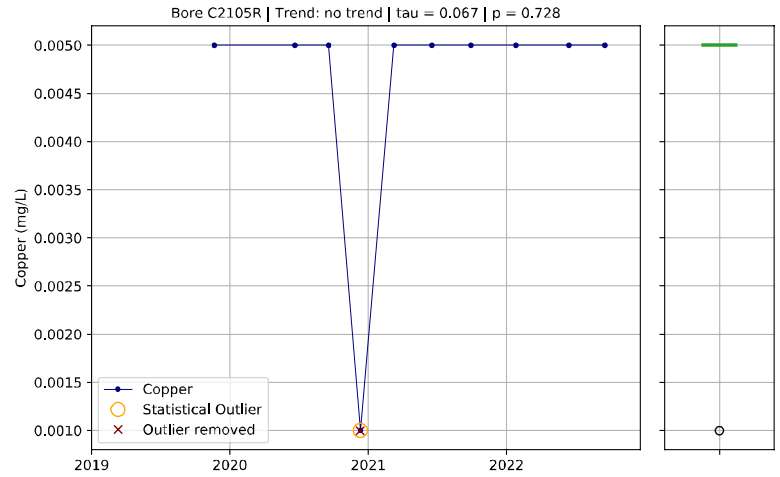

Bore C2105R | Trend (Outliers removed): no trend | tau = -0.048 | p = 1.0
Chloride
Chloride (mg/L)
11400
11350
11300
11250
11200
11150
11100
11050
11000
Less than 8 samples, no trigger limits derived
2020
2021
2022

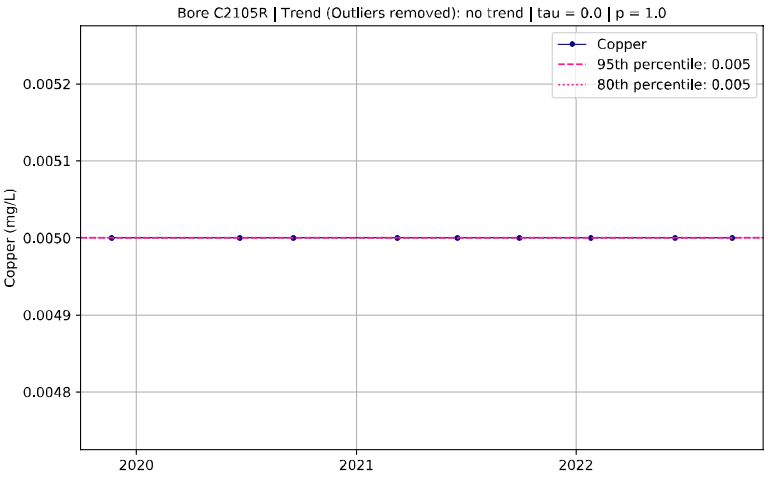

Bore C2105R | Trend: no trend | tau = 0.067 | p = 0.796
Chromium
Statistical Outlier
Outlier removed
Chromium (mg/L)
0.012
0.010
0.008
0.006
0.004
0.002
2019
2020
2021
2022

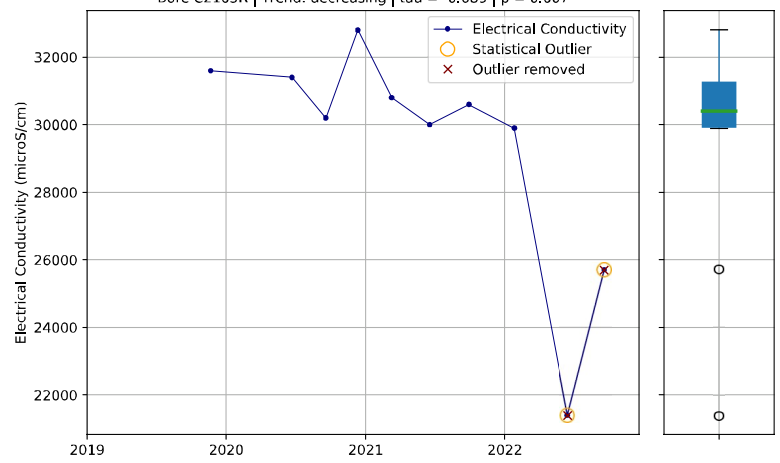

Bore C2105R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Chromium
95th percentile: 0.005
80th percentile: 0.005
Chromium (mg/L)
0.0052
0.0051
0.0050
0.0049
0.0048
2020
2021
2022

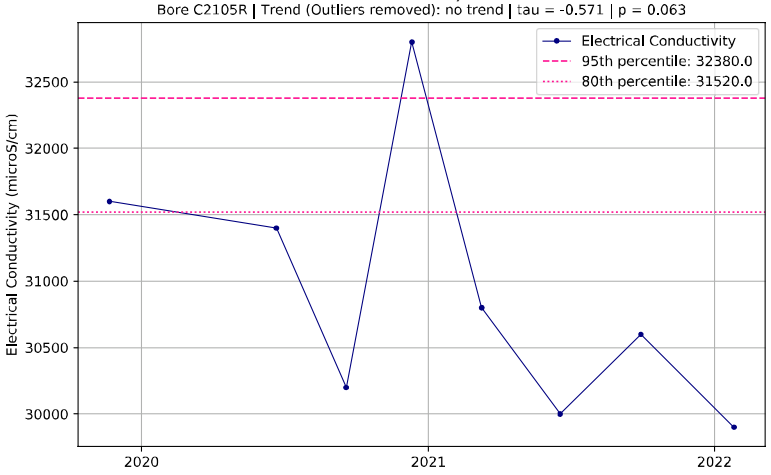

Bore C2105R | Trend: no trend | tau = 0.067 | p = 0.728
Cobalt
Statistical Outlier
Outlier removed
Cobalt (mg/L)
0.0050
0.0045
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
2019
2020
2021
2022

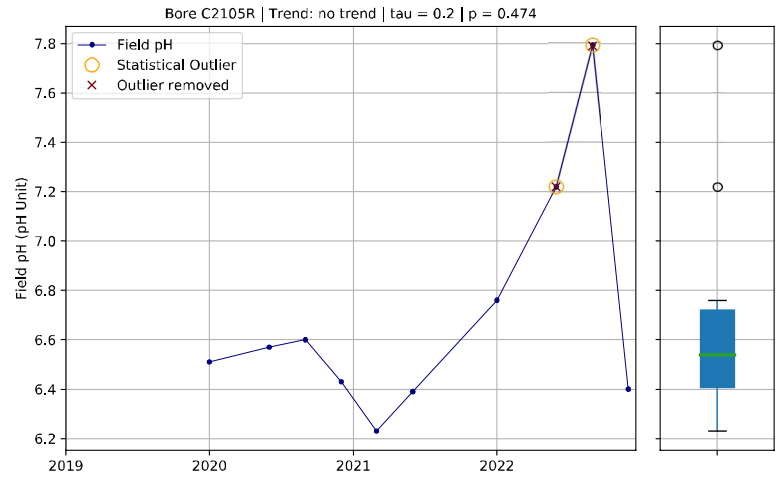

Bore C2105R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Cobalt
95th percentile: 0.005
80th percentile: 0.005
Cobalt (mg/L)
0.0052
0.0051
0.0050
0.0049
0.0048
2020
2021
2022

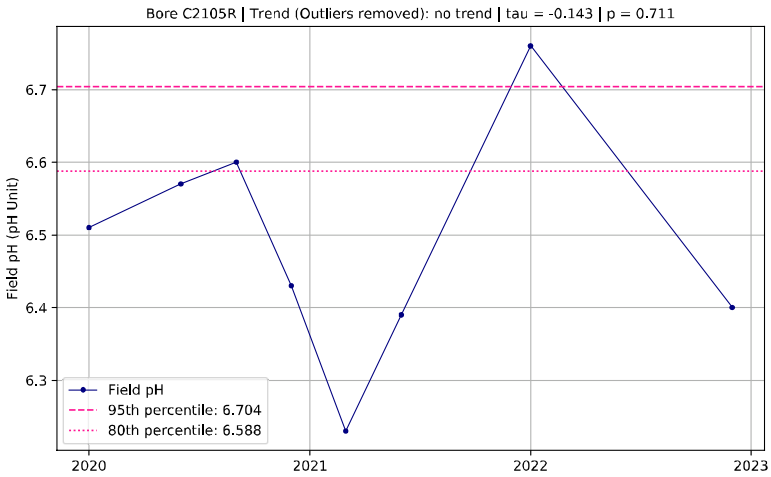

Bore C2105R | Trend: no trend | tau = 0.067 | p = 0.728
Copper
Statistical Outlier
Outlier removed
Copper (mg/L)
0.0050
0.0045
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
2019
2020
2021
2022

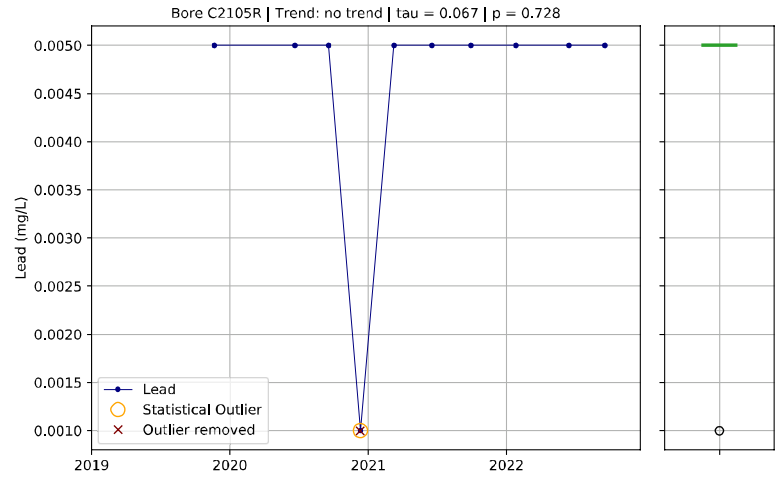

Bore C2105R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Copper
95th percentile: 0.005
80th percentile: 0.005
Copper (mg/L)
0.0052
0.0051
0.0050
0.0049
0.0048
2020
2021
2022

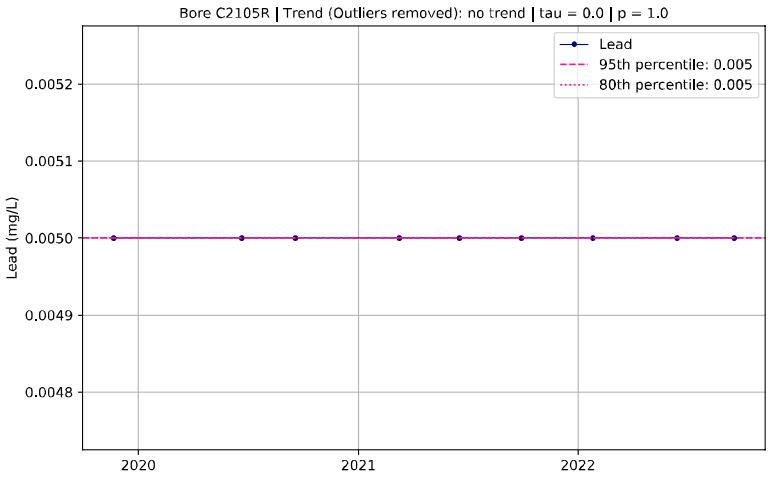

Bore C2105R | Trend: decreasing | tau = -0.689 | p = 0.007
Electrical Conductivity
Statistical Outlier
Outlier removed
Electrical Conductivity (microS/cm)

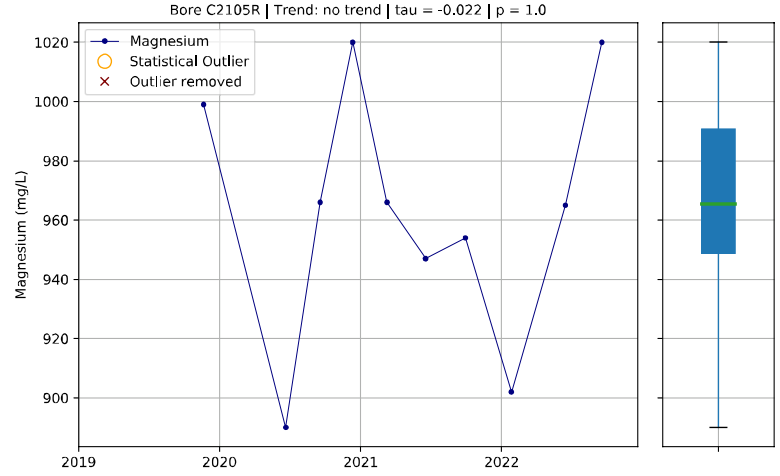

Bore C2105R | Trend (Outliers removed): no trend | tau = -0.571 | p = 0.063
Electrical Conductivity
95th percentile: 32380.0
80th percentile: 31520.0
Electrical Conductivity (microS/cm)

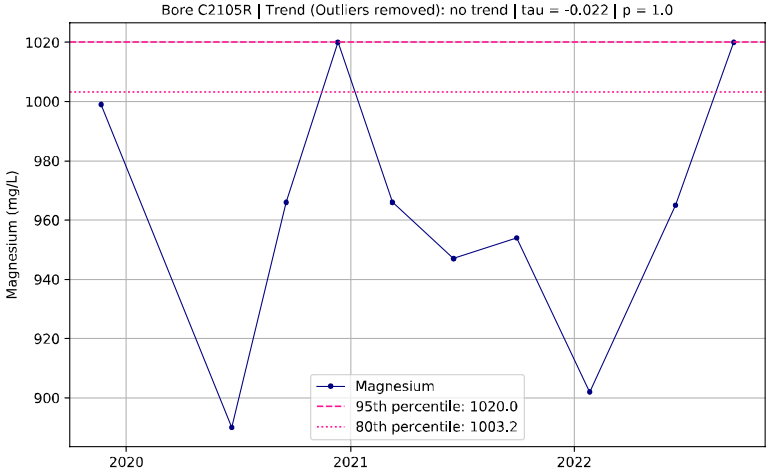

Bore C2105R | Trend: no trend | tau = 0.2 | p = 0.474
Field pH
Statistical Outlier
Outlier removed
Field pH (pH Unit)

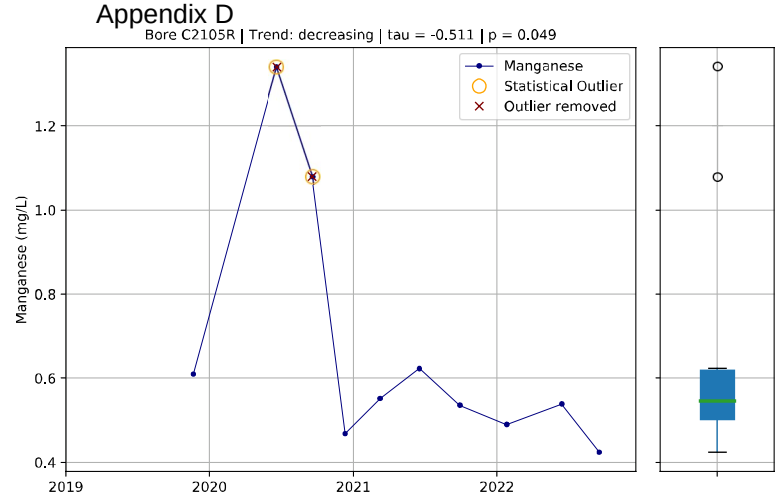

Bore C2105R | Trend (Outliers removed): no trend | tau = -0.143 | p = 0.711
Field pH
95th percentile: 6.704
80th percentile: 6.588
Field pH (pH Unit)

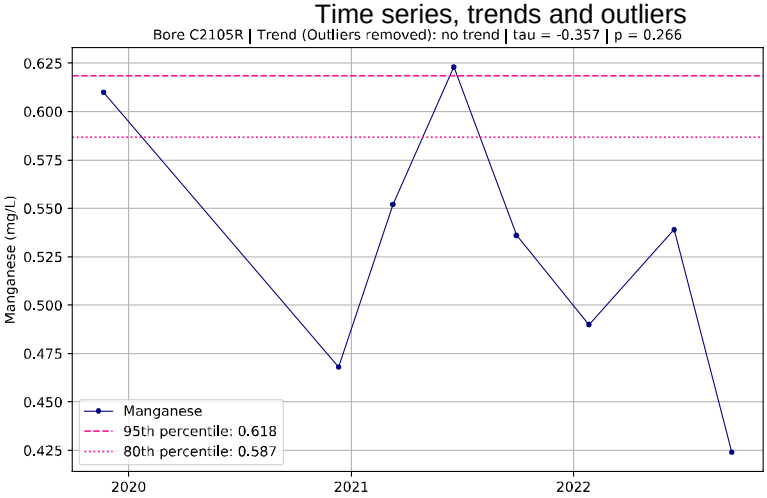

Bore C2105R | Trend: no trend | tau = 0.067 | p = 0.728
Lead
Statistical Outlier
Outlier removed
Lead (mg/L)

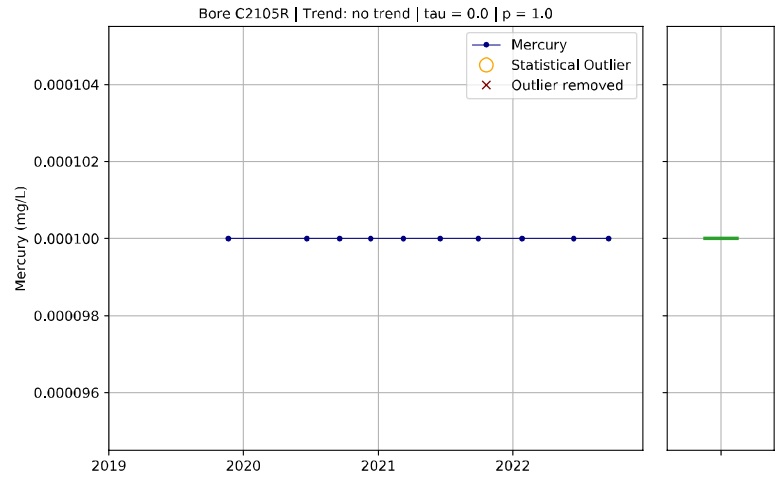

Bore C2105R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Lead
95th percentile: 0.005
80th percentile: 0.005
Lead (mg/L)

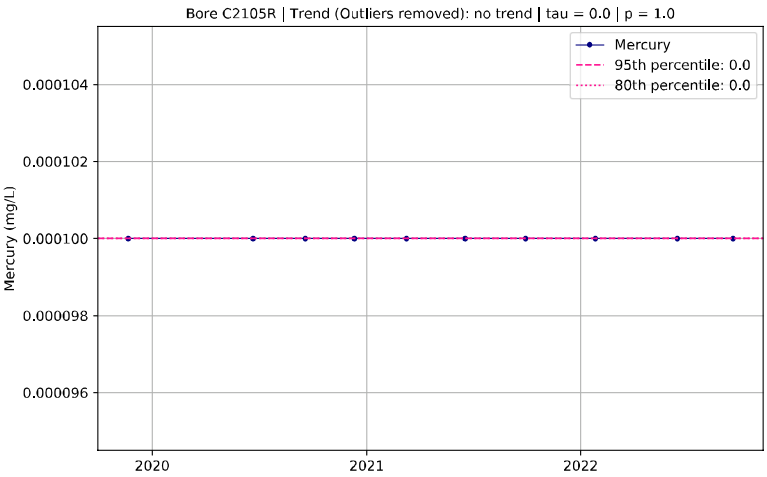

Bore C2105R | Trend: no trend | tau = -0.022 | p = 1.0
Magnesium
Statistical Outlier
Outlier removed
Magnesium (mg/L)

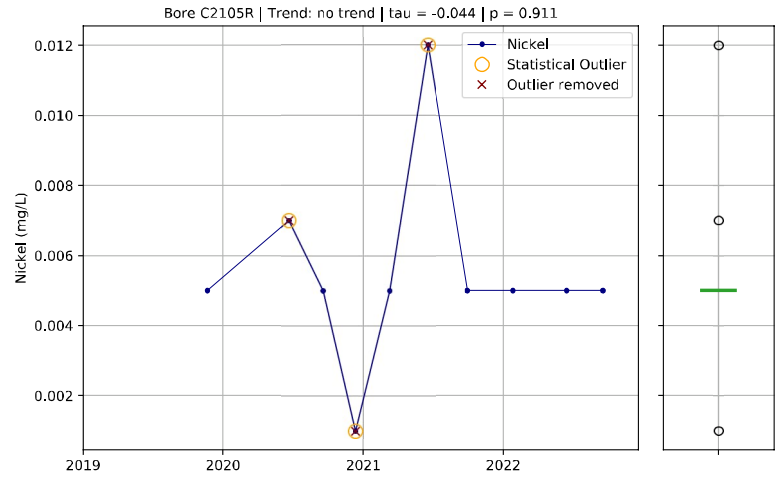

Bore C2105R | Trend (Outliers removed): no trend | tau = -0.022 | p = 1.0
Magnesium
95th percentile: 1020.0
80th percentile: 1003.2
Magnesium (mg/L)

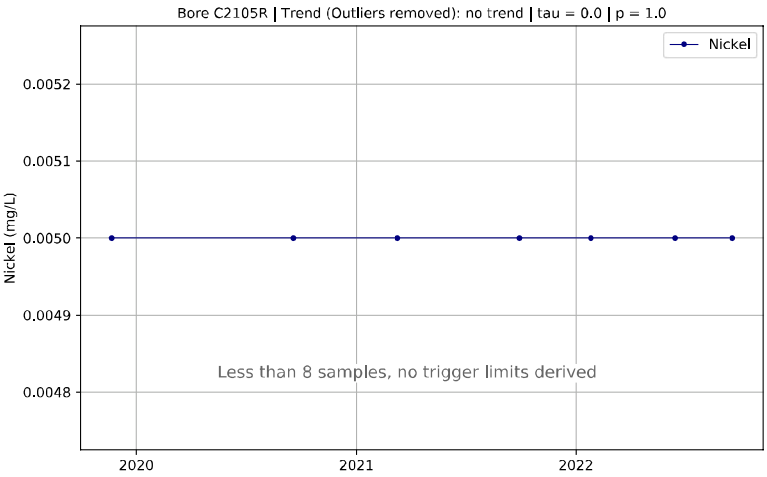

Bore C2105R | Trend: decreasing | tau = -0.511 | p = 0.049
Manganese
Statistical Outlier
Outlier removed
Manganese (mg/L)
2019
2020
2021
2022

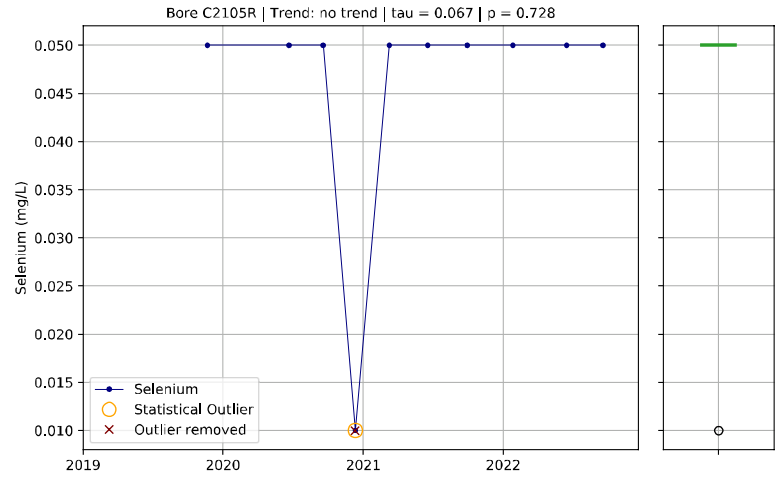

Bore C2105R | Trend (Outliers removed): no trend | tau = -0.357 | p = 0.266
Manganese (mg/L)
Manganese
95th percentile: 0.618
80th percentile: 0.587
2020
2021
2022

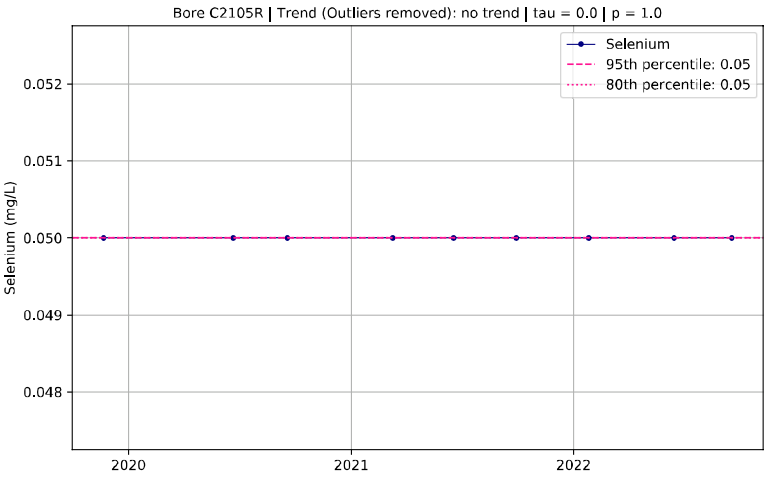

Bore C2105R | Trend: no trend | tau = 0.0 | p = 1.0
Mercury
Statistical Outlier
Outlier removed
Mercury (mg/L)
2019
2020
2021
2022

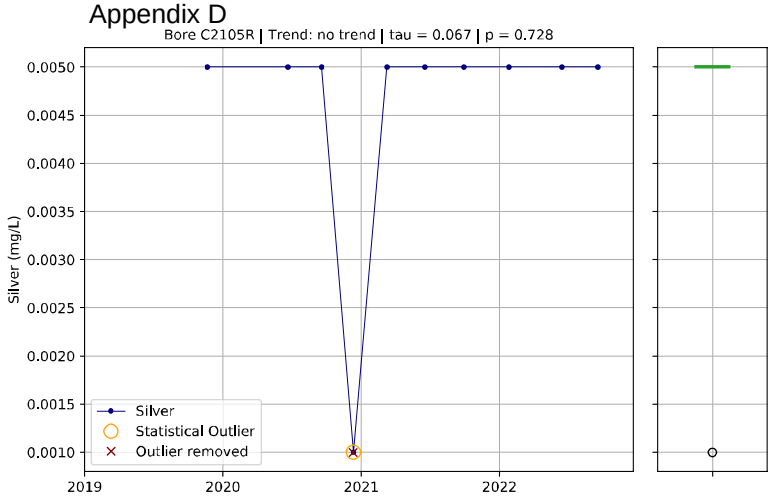

Bore C2105R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Mercury
95th percentile: 0.0
80th percentile: 0.0
Mercury (mg/L)
2020
2021
2022

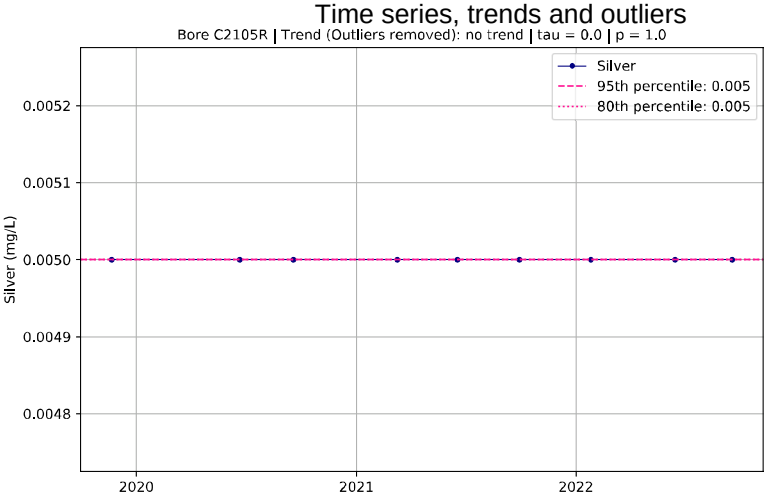

Bore C2105R | Trend: no trend | tau = -0.044 | p = 0.911
Nickel
Statistical Outlier
Outlier removed
Nickel (mg/L)
2019
2020
2021
2022

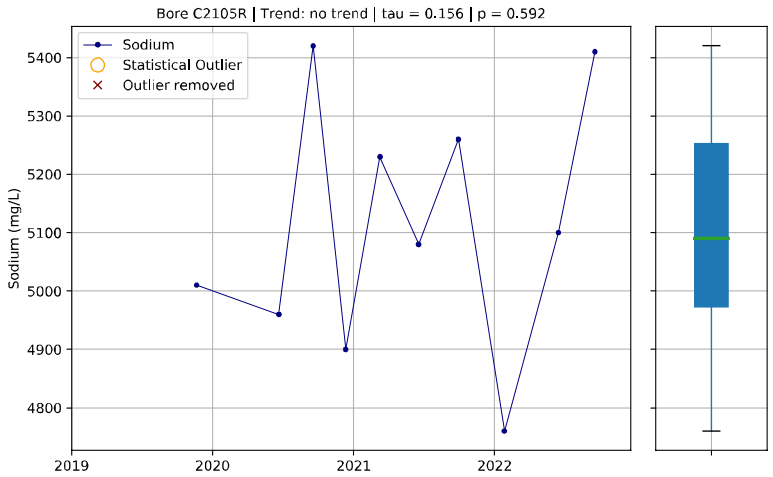

Bore C2105R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Nickel
Nickel (mg/L)
Less than 8 samples, no trigger limits derived
2020
2021
2022

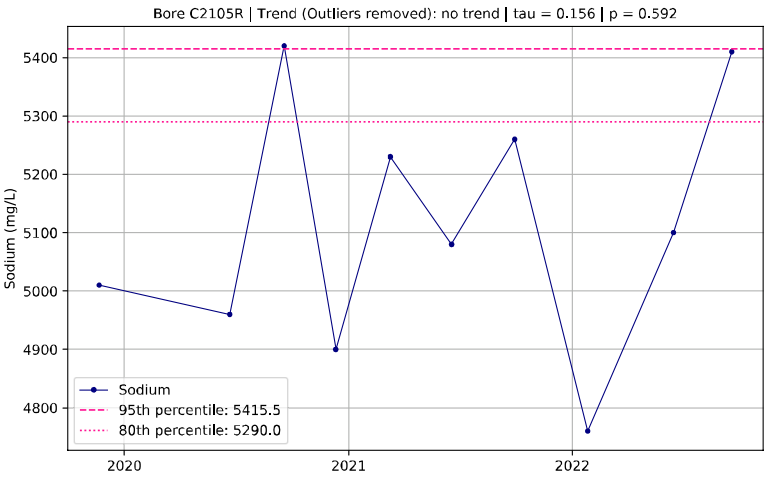

Bore C2105R | Trend: no trend | tau = 0.067 | p = 0.728
Selenium
Statistical Outlier
Outlier removed
Selenium (mg/L)
2019
2020
2021
2022

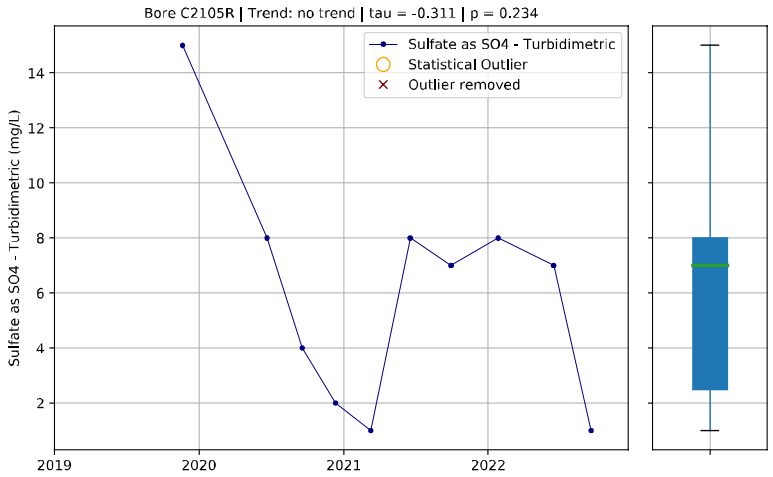

Bore C2105R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Selenium
95th percentile: 0.05
80th percentile: 0.05
Selenium (mg/L)
2020
2021
2022

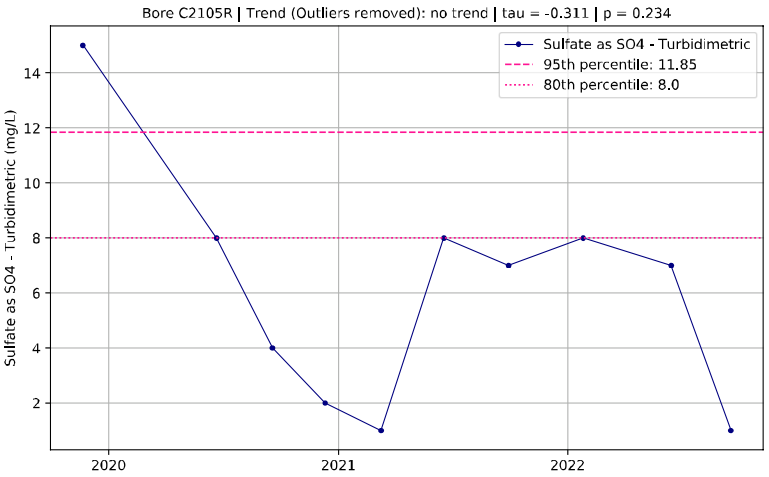

Bore C2105R | Trend: no trend | tau = 0.067 | p = 0.728
Silver (mg/L)
Silver
Statistical Outlier
Outlier removed

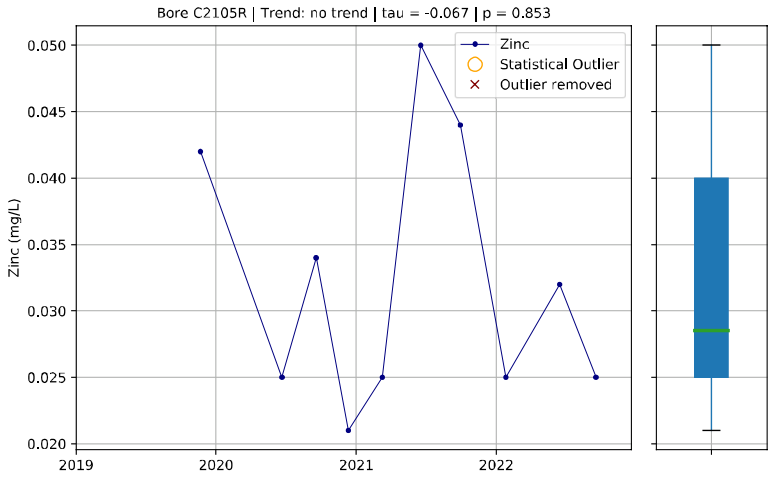

Bore C2105R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Silver (mg/L)
Silver
95th percentile: 0.005
80th percentile: 0.005

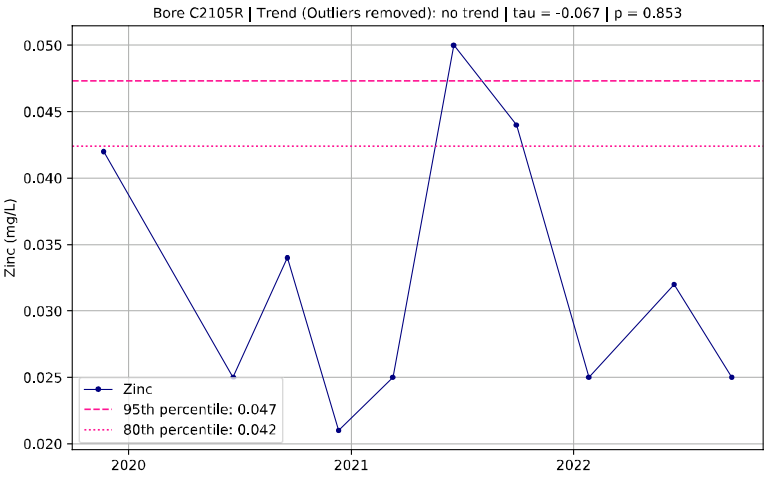

Bore C2105R | Trend: no trend | tau = 0.156 | p = 0.592
Sodium (mg/L)
Sodium
Statistical Outlier
Outlier removed

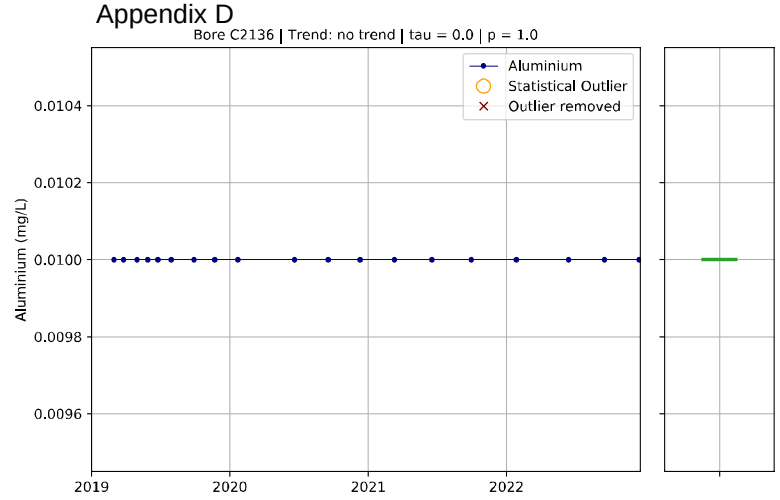

Bore C2105R | Trend (Outliers removed): no trend | tau = 0.156 | p = 0.592
Sodium (mg/L)
Sodium
95th percentile: 5415.5
80th percentile: 5290.0

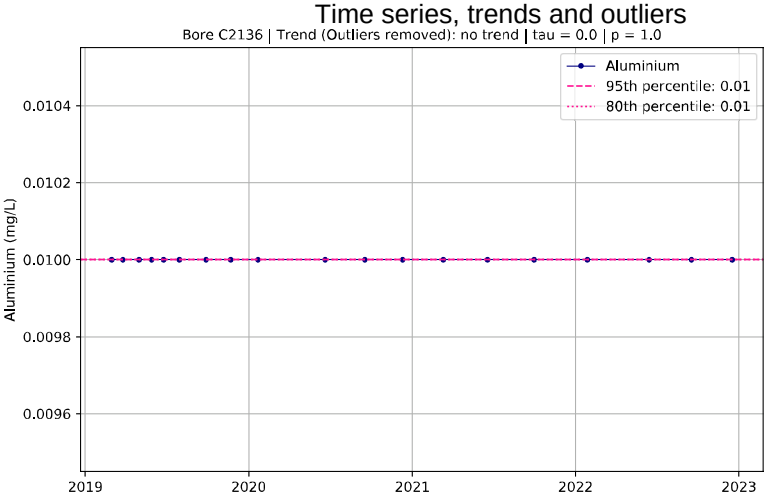

Bore C2105R | Trend: no trend | tau = -0.311 | p = 0.234
Sulfate as SO4 - Turbidimetric (mg/L)
Sulfate as SO4 - Turbidimetric
Statistical Outlier
Outlier removed

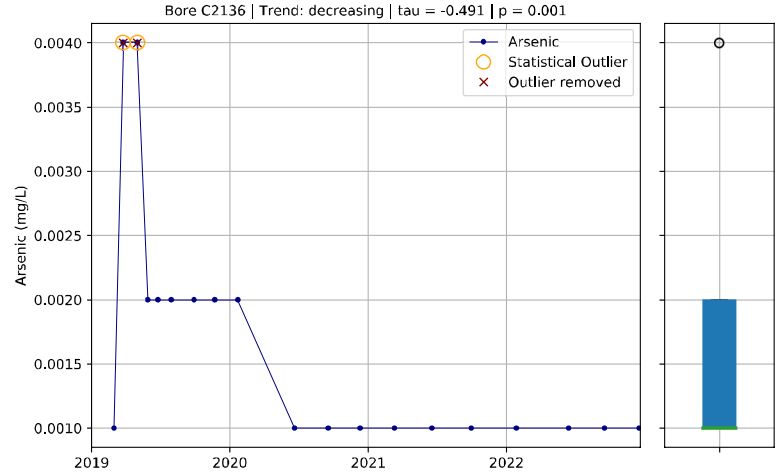

Bore C2105R | Trend (Outliers removed): no trend | tau = -0.311 | p = 0.234
Sulfate as SO4 - Turbidimetric (mg/L)
Sulfate as SO4 - Turbidimetric
95th percentile: 11.85
80th percentile: 8.0

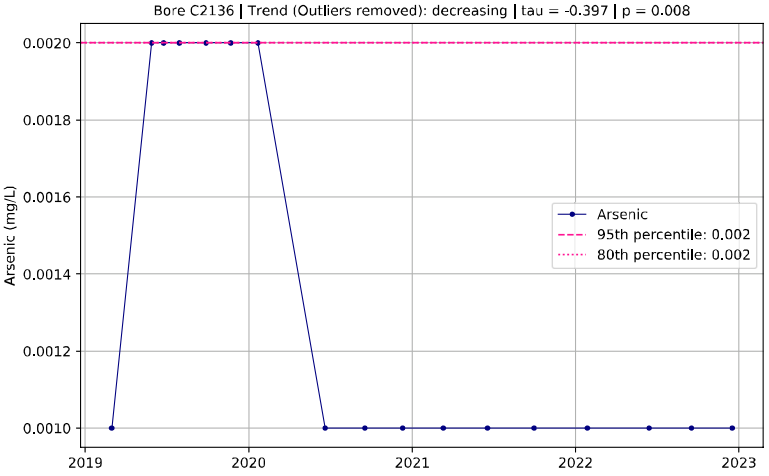

Bore C2105R | Trend: no trend | tau = -0.067 | p = 0.853
Zinc (mg/L)
Zinc
Statistical Outlier
Outlier removed

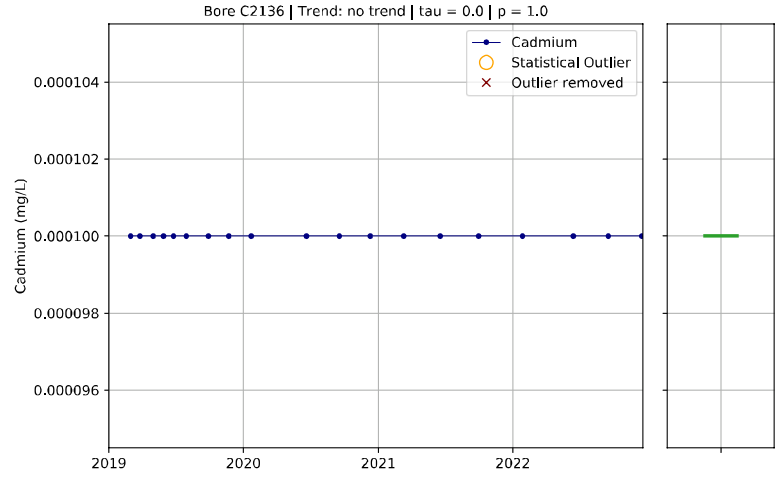

Bore C2105R | Trend (Outliers removed): no trend | tau = -0.067 | p = 0.853
Zinc (mg/L)
Zinc
95th percentile: 0.047
80th percentile: 0.042

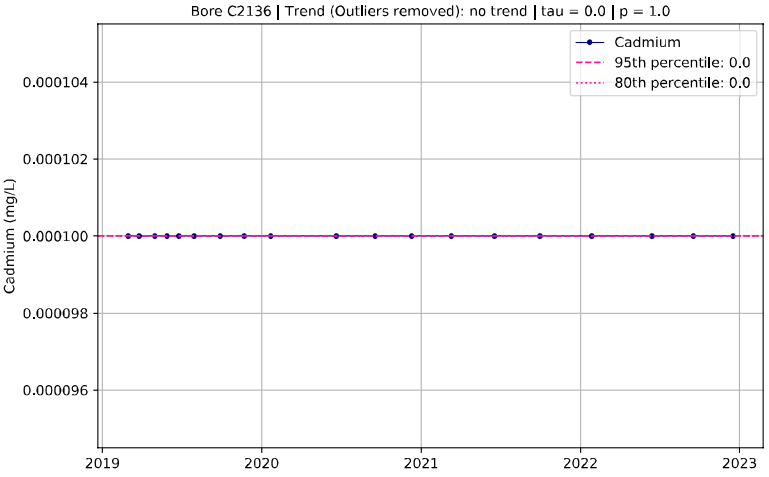

Bore C2136 | Trend: no trend | tau = 0.0 | p = 1.0
Aluminium
Statistical Outlier
Outlier removed
Aluminium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2019
2020
2021
2022

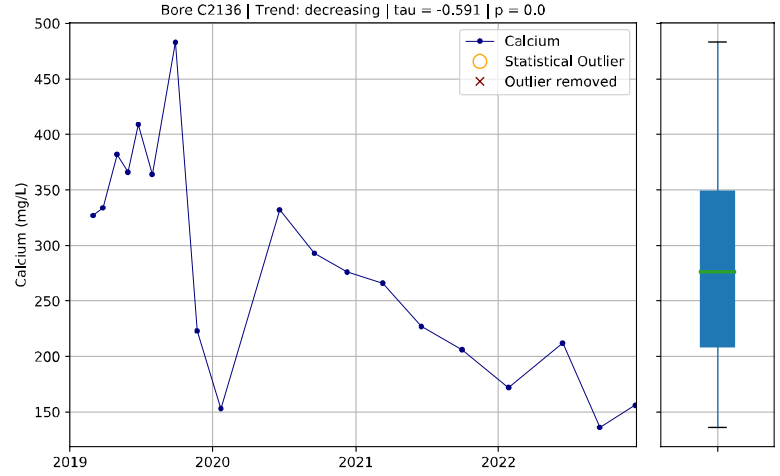

Bore C2136 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Aluminium
95th percentile: 0.01
80th percentile: 0.01
Aluminium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2019
2020
2021
2022
2023

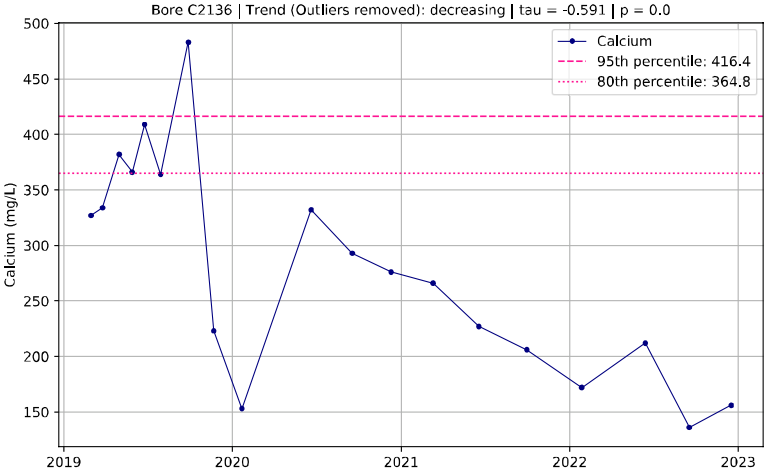

Bore C2136 | Trend: decreasing | tau = -0.491 | p = 0.001
Arsenic
Statistical Outlier
Outlier removed
Arsenic (mg/L)
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
2019
2020
2021
2022

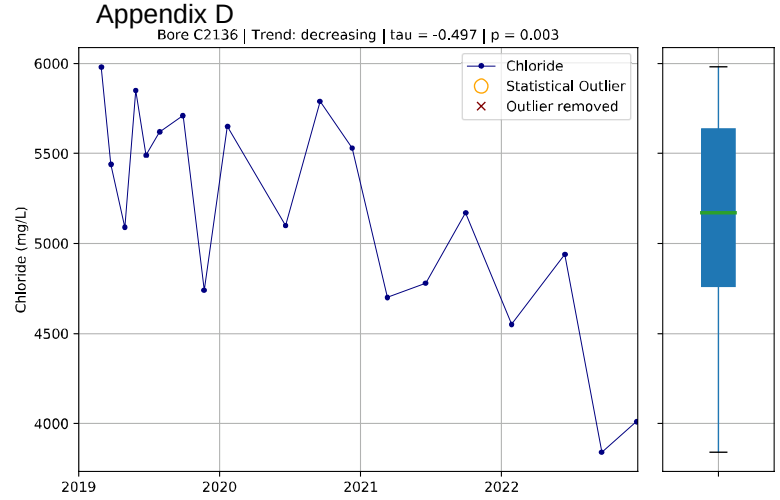

Bore C2136 | Trend (Outliers removed): decreasing | tau = -0.397 | p = 0.008
Arsenic
95th percentile: 0.002
80th percentile: 0.002
Arsenic (mg/L)
0.0020
0.0018
0.0016
0.0014
0.0012
0.0010
2019
2020
2021
2022
2023

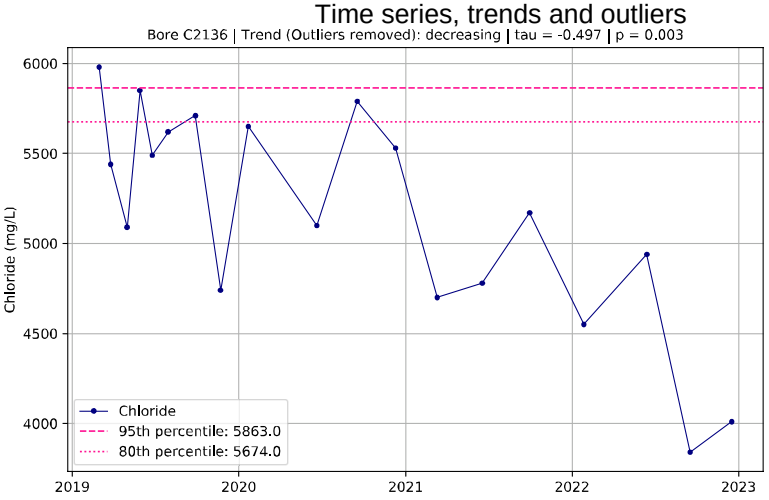

Bore C2136 | Trend: no trend | tau = 0.0 | p = 1.0
Cadmium
Statistical Outlier
Outlier removed
Cadmium (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022

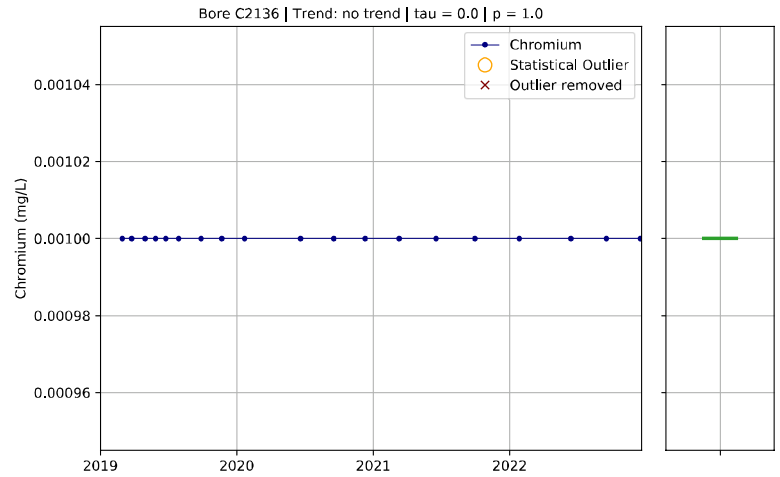

Bore C2136 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Cadmium
95th percentile: 0.0
80th percentile: 0.0
Cadmium (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022
2023

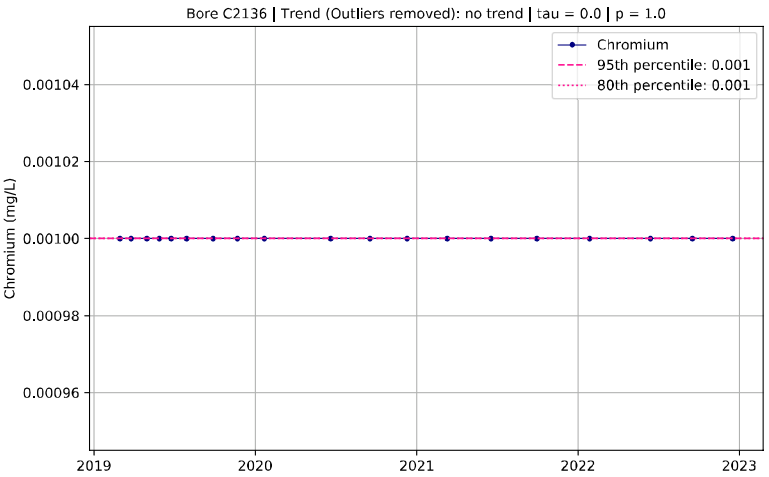

Bore C2136 | Trend: decreasing | tau = -0.591 | p = 0.0
Calcium
Statistical Outlier
Outlier removed
Calcium (mg/L)
500
450
400
350
300
250
200
150
2019
2020
2021
2022

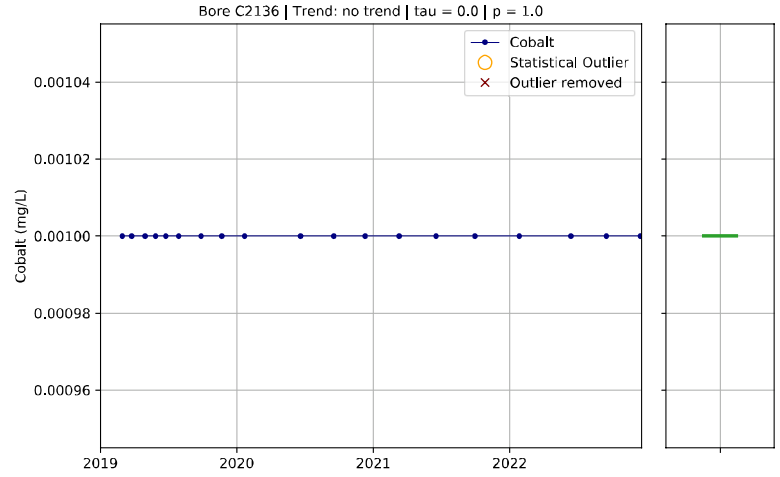

Bore C2136 | Trend (Outliers removed): decreasing | tau = -0.591 | p = 0.0
Calcium
95th percentile: 416.4
80th percentile: 364.8
Calcium (mg/L)
500
450
400
350
300
250
200
150
2019
2020
2021
2022
2023

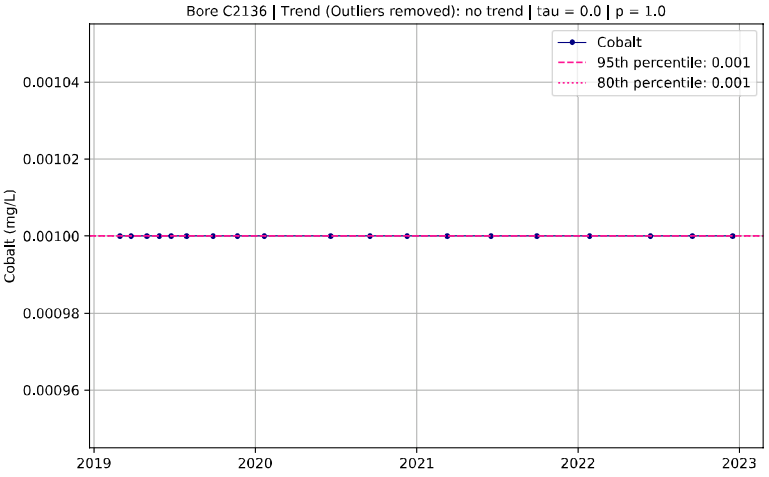

Bore C2136 | Trend: decreasing | tau = -0.497 | p = 0.003
Chloride
Statistical Outlier
Outlier removed
Chloride (mg/L)
6000
5500
5000
4500
4000
2019
2020
2021
2022

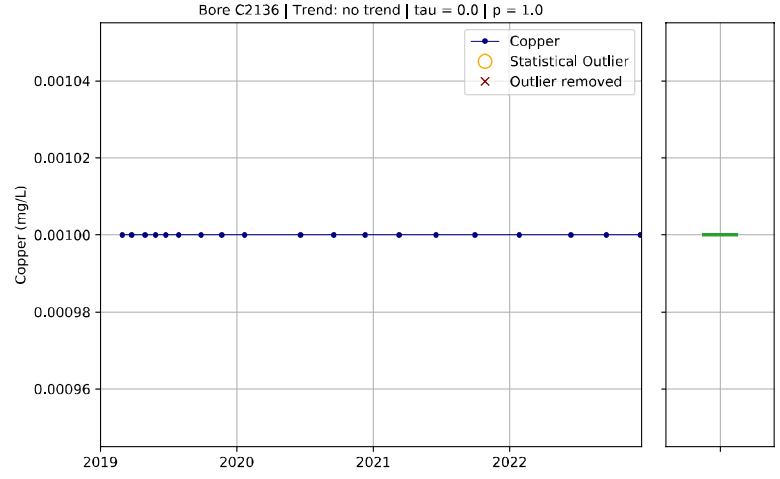

Bore C2136 | Trend (Outliers removed): decreasing | tau = -0.497 | p = 0.003
Chloride
95th percentile: 5863.0
80th percentile: 5674.0
Chloride (mg/L)
6000
5500
5000
4500
4000
2019
2020
2021
2022
2023

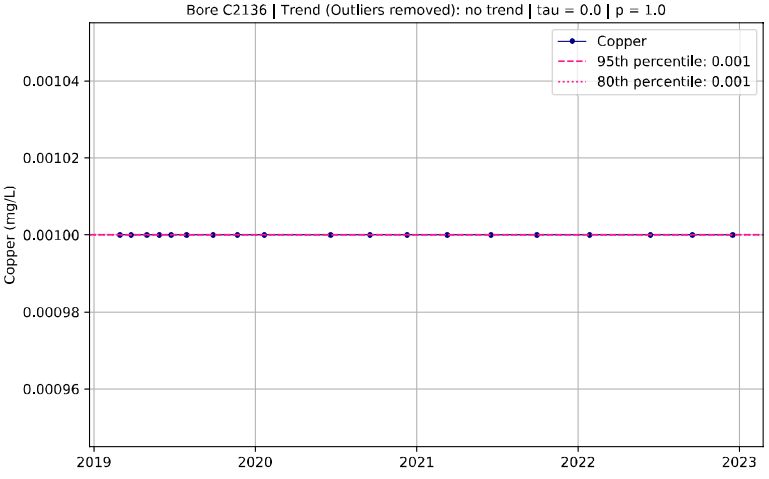

Bore C2136 | Trend: no trend | tau = 0.0 | p = 1.0
Chromium
Statistical Outlier
Outlier removed
Chromium (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022

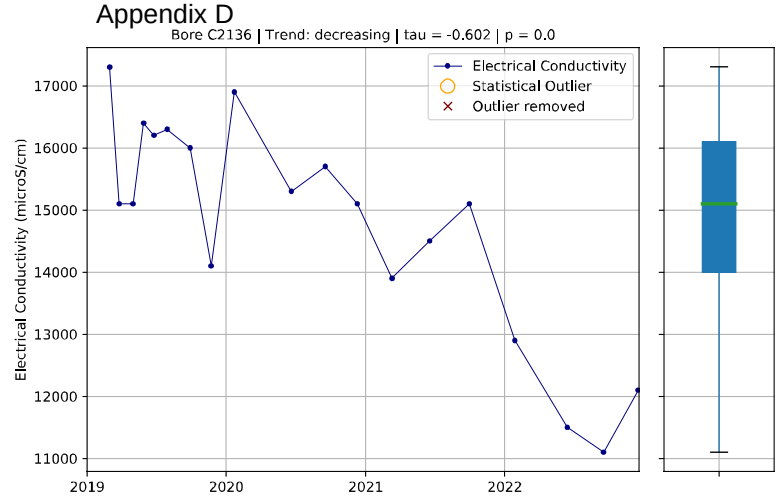

Bore C2136 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Chromium
95th percentile: 0.001
80th percentile: 0.001
Chromium (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022
2023

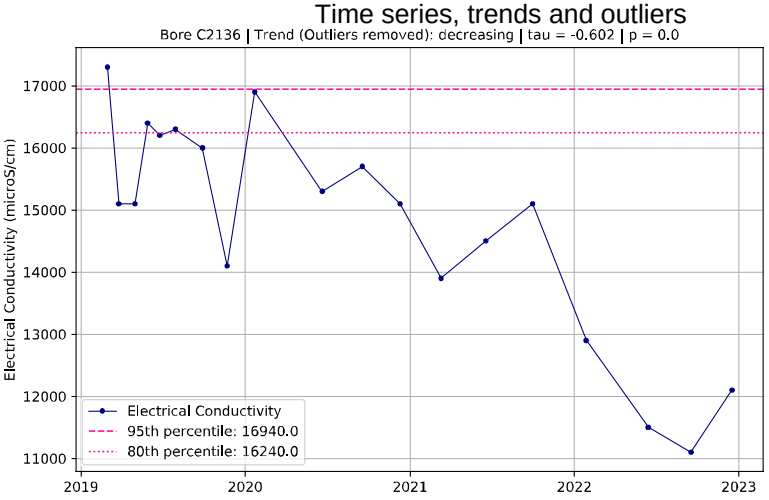

Bore C2136 | Trend: no trend | tau = 0.0 | p = 1.0
Cobalt
Statistical Outlier
Outlier removed
Cobalt (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022

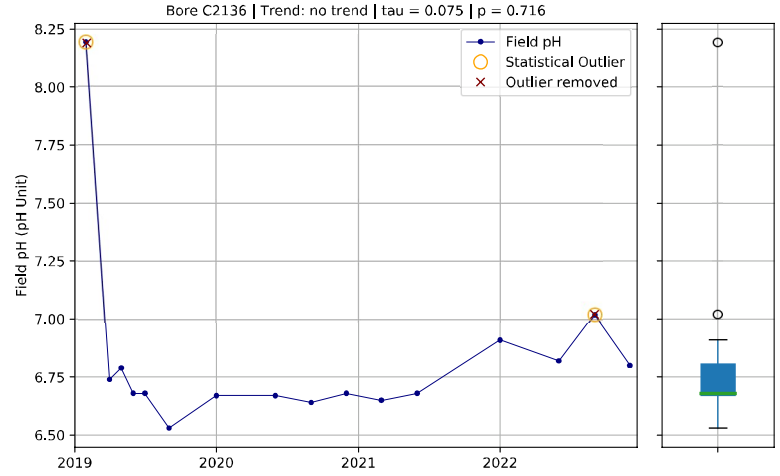

Bore C2136 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Cobalt
95th percentile: 0.001
80th percentile: 0.001
Cobalt (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022
2023

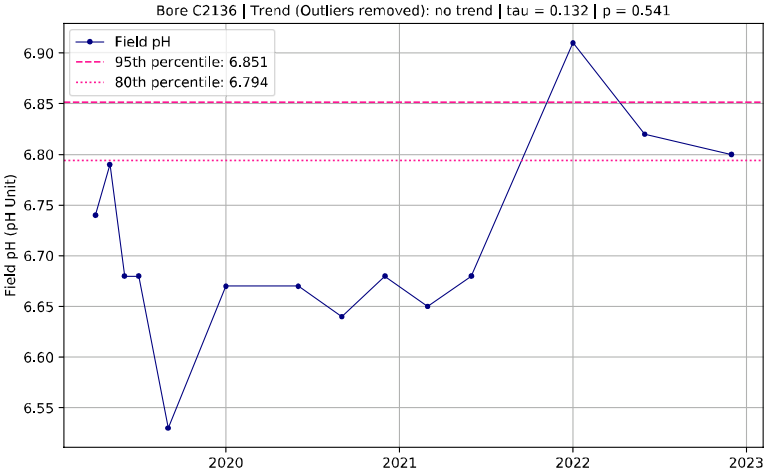

Bore C2136 | Trend: no trend | tau = 0.0 | p = 1.0
Copper
Statistical Outlier
Outlier removed
Copper (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022

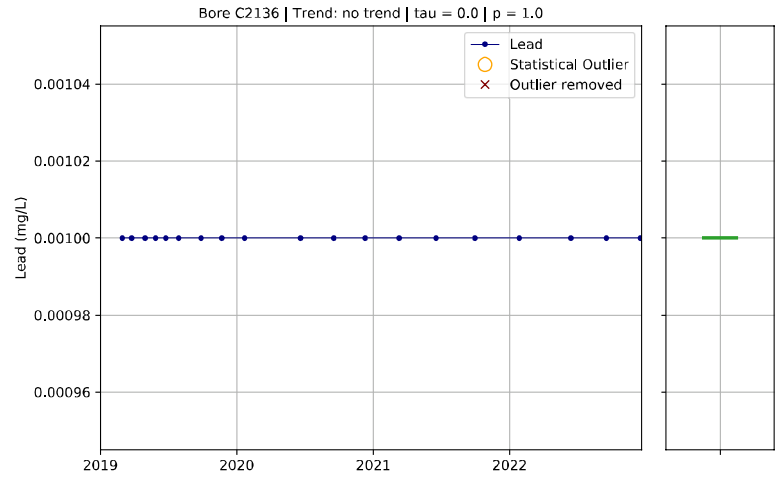

Bore C2136 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Copper
95th percentile: 0.001
80th percentile: 0.001
Copper (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022
2023

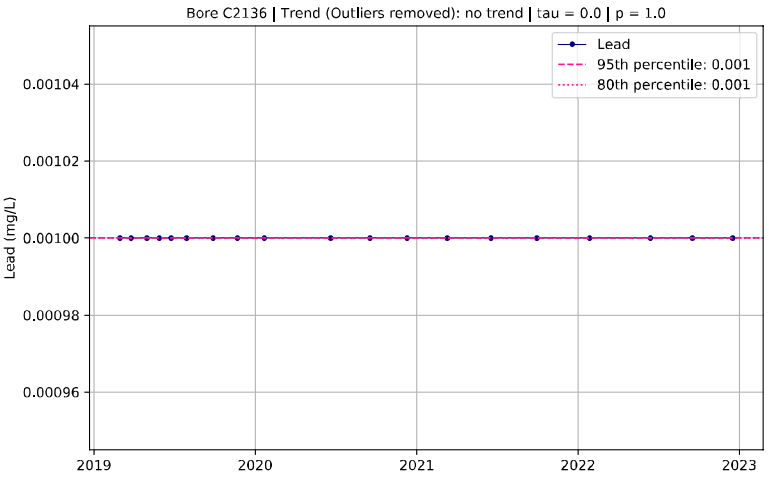

Bore C2136 | Trend: decreasing | tau = -0.602 | p = 0.0
Electrical Conductivity
Statistical Outlier
Outlier removed
Electrical Conductivity (microS/cm)

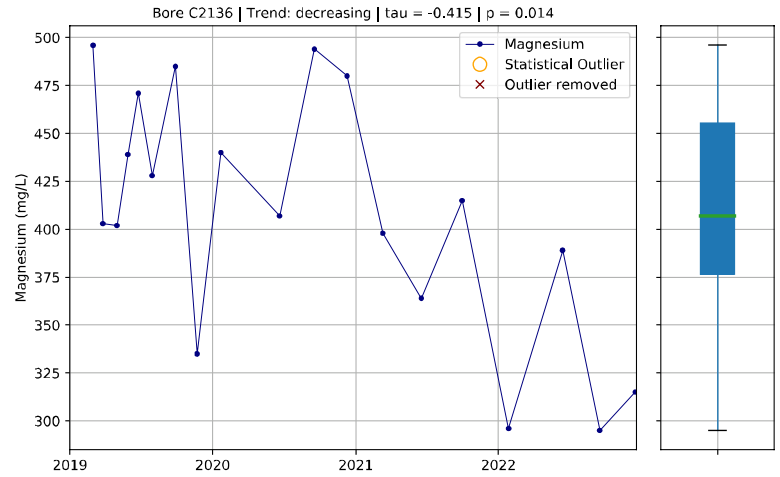

Bore C2136 | Trend (Outliers removed): decreasing | tau = -0.602 | p = 0.0
Electrical Conductivity
95th percentile: 16940.0
80th percentile: 16240.0
Electrical Conductivity (microS/cm)

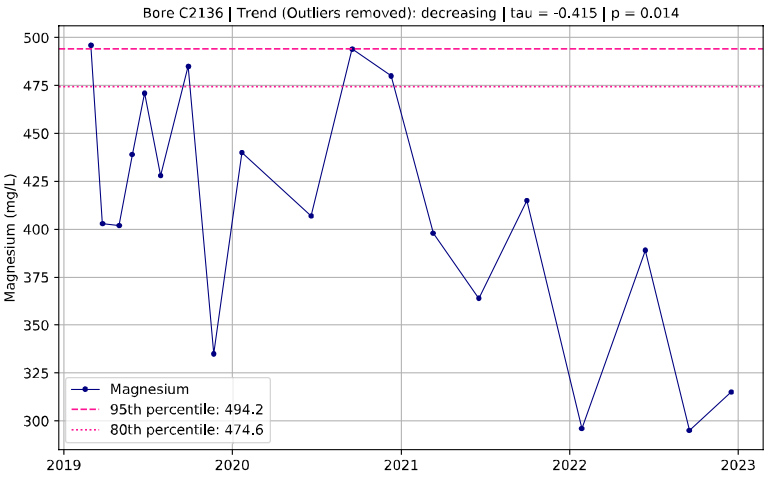

Bore C2136 | Trend: no trend | tau = 0.075 | p = 0.716
Field pH
Statistical Outlier
Outlier removed
Field pH (pH Unit)

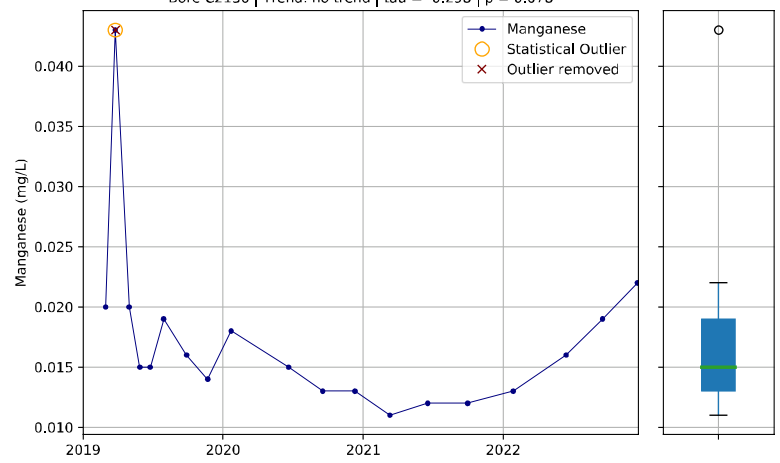

Bore C2136 | Trend (Outliers removed): no trend | tau = 0.132 | p = 0.541
Field pH
95th percentile: 6.851
80th percentile: 6.794
Field pH (pH Unit)

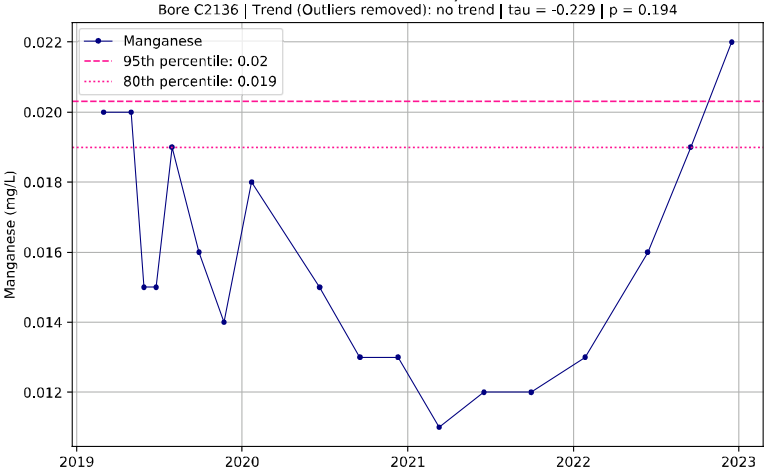

Bore C2136 | Trend: no trend | tau = 0.0 | p = 1.0
Lead
Statistical Outlier
Outlier removed
Lead (mg/L)

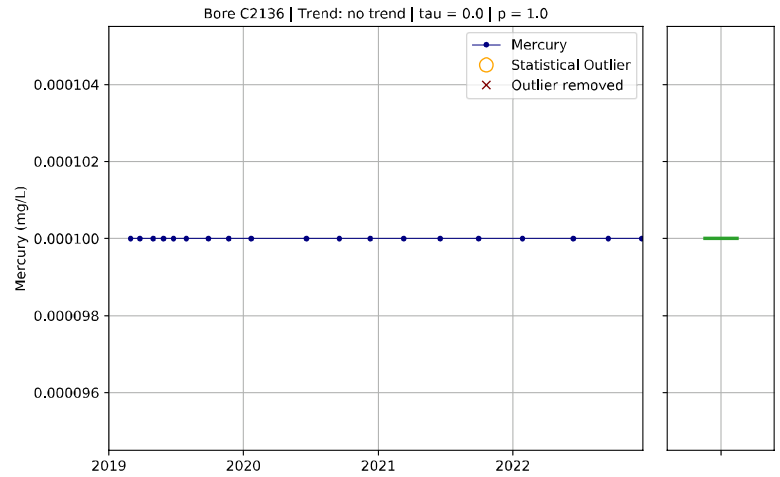

Bore C2136 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Lead
95th percentile: 0.001
80th percentile: 0.001
Lead (mg/L)

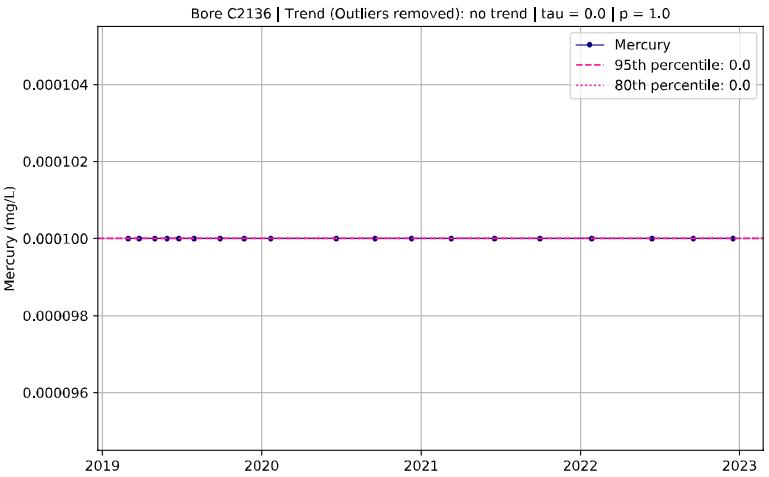

Bore C2136 | Trend: decreasing | tau = -0.415 | p = 0.014
Magnesium
Statistical Outlier
Outlier removed
Magnesium (mg/L)

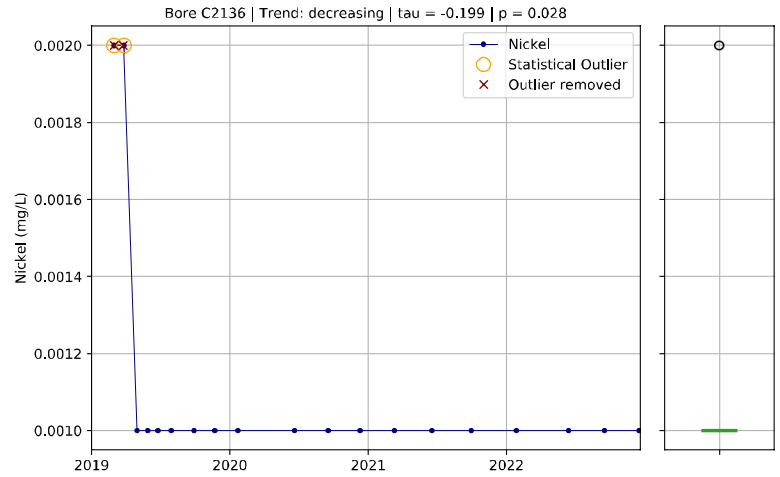

Bore C2136 | Trend (Outliers removed): decreasing | tau = -0.415 | p = 0.014
Magnesium
95th percentile: 494.2
80th percentile: 474.6
Magnesium (mg/L)

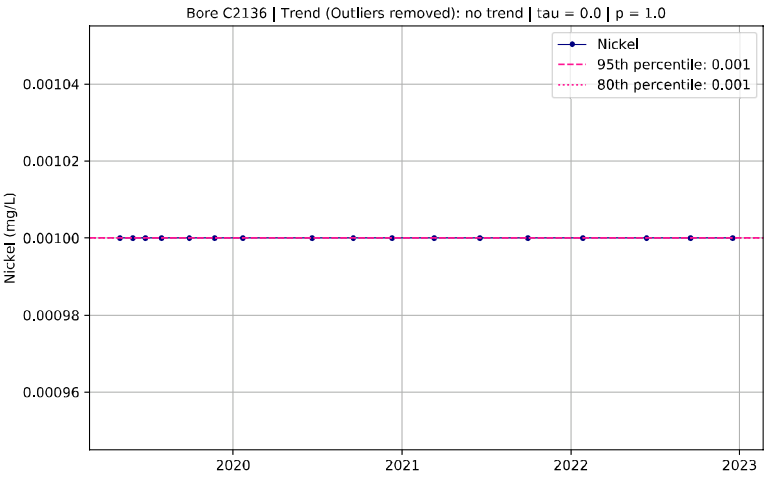

Bore C2136 | Trend: no trend | tau = -0.298 | p = 0.078
Manganese
Statistical Outlier
Outlier removed
Manganese (mg/L)
0.040
0.035
0.030
0.025
0.020
0.015
0.010
2019
2020
2021
2022

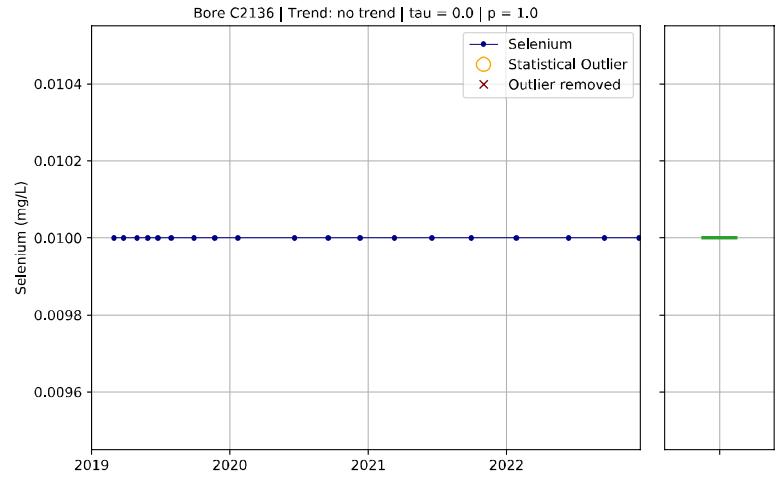

Bore C2136 | Trend (Outliers removed): no trend | tau = -0.229 | p = 0.194
Manganese
95th percentile: 0.02
80th percentile: 0.019
Manganese (mg/L)
0.022
0.020
0.018
0.016
0.014
0.012
2019
2020
2021
2022
2023

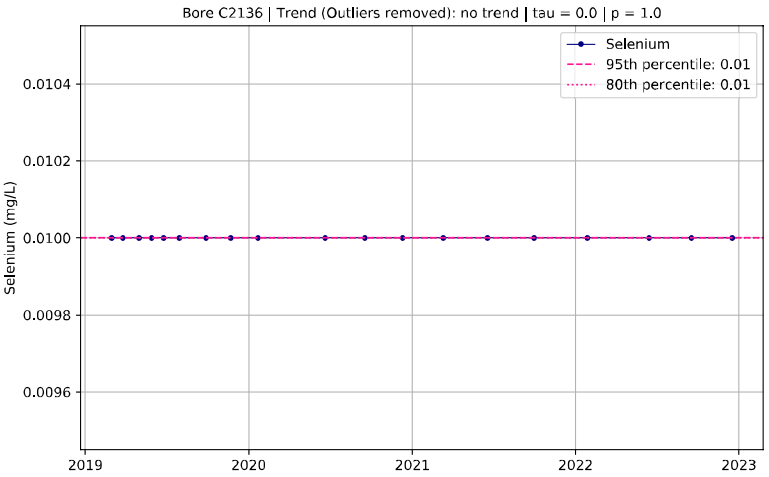

Bore C2136 | Trend: no trend | tau = 0.0 | p = 1.0
Mercury
Statistical Outlier
Outlier removed
Mercury (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022

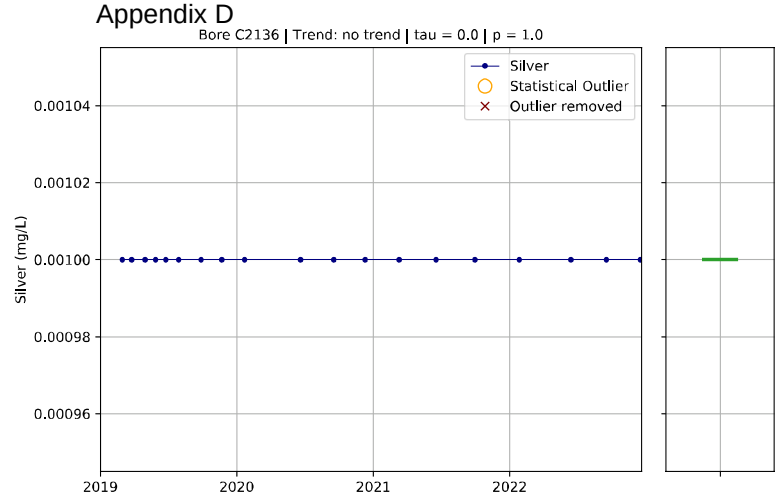

Bore C2136 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Mercury
95th percentile: 0.0
80th percentile: 0.0
Mercury (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022
2023

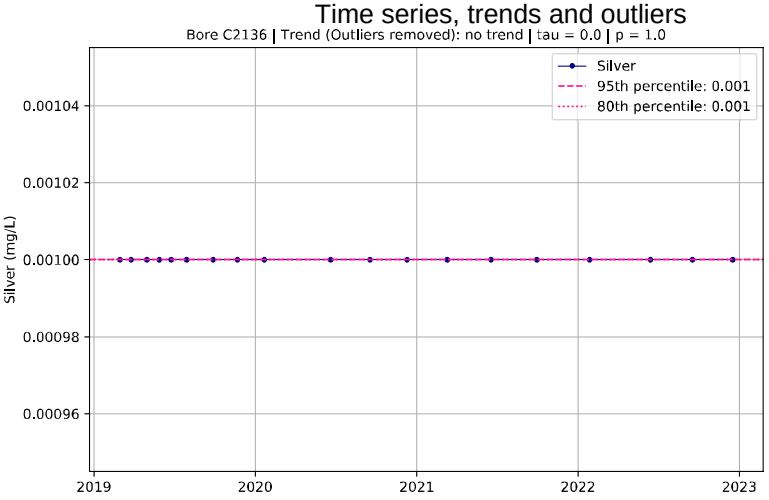

Bore C2136 | Trend: decreasing | tau = -0.199 | p = 0.028
Nickel
Statistical Outlier
Outlier removed
Nickel (mg/L)
0.0020
0.0018
0.0016
0.0014
0.0012
0.0010
2019
2020
2021
2022

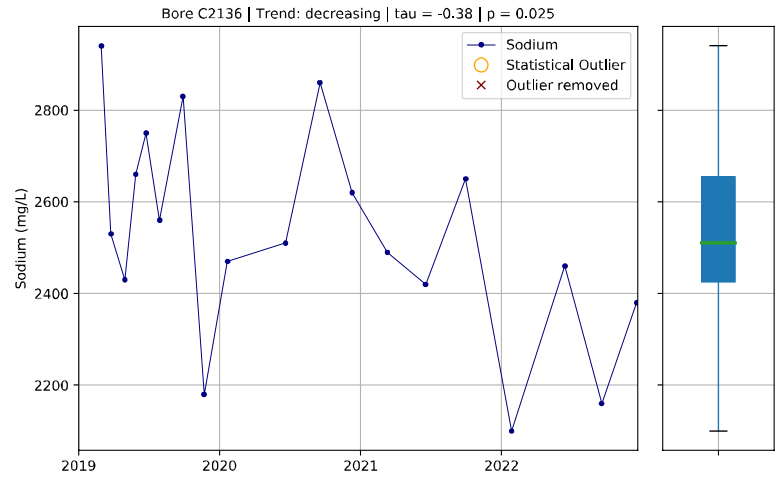

Bore C2136 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Nickel
95th percentile: 0.001
80th percentile: 0.001
Nickel (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2020
2021
2022
2023

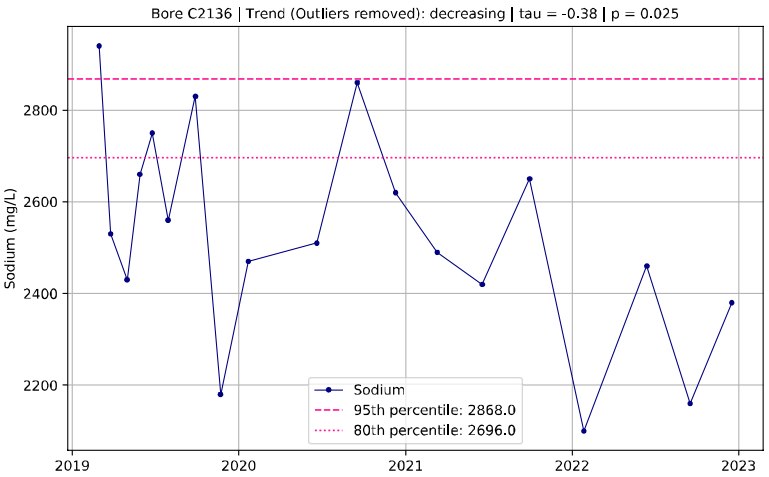

Bore C2136 | Trend: no trend | tau = 0.0 | p = 1.0
Selenium
Statistical Outlier
Outlier removed
Selenium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2019
2020
2021
2022

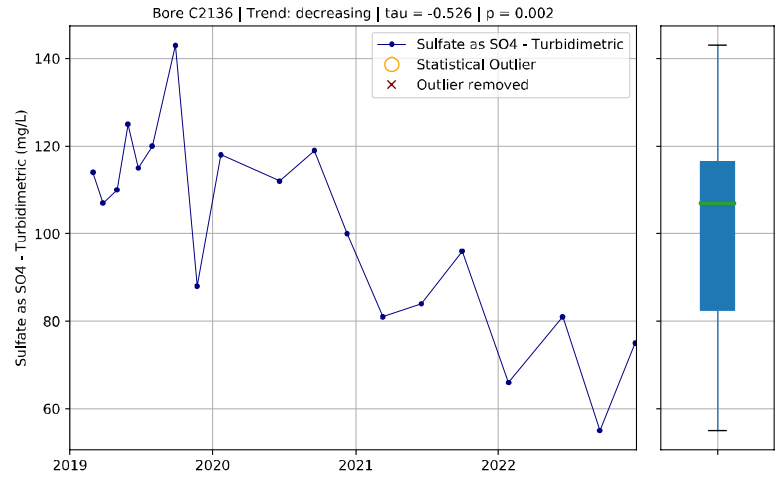

Bore C2136 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Selenium
95th percentile: 0.01
80th percentile: 0.01
Selenium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2019
2020
2021
2022
2023

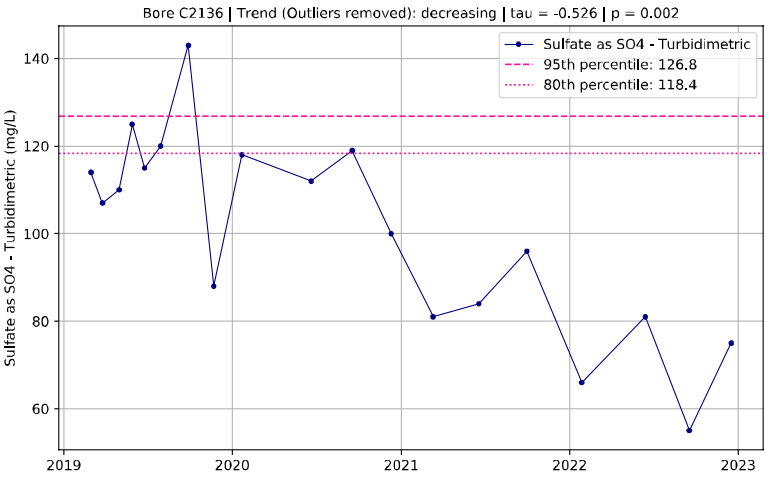

Bore C2136 | Trend: no trend | tau = 0.0 | p = 1.0
Silver
Statistical Outlier
Outlier removed
Silver (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022

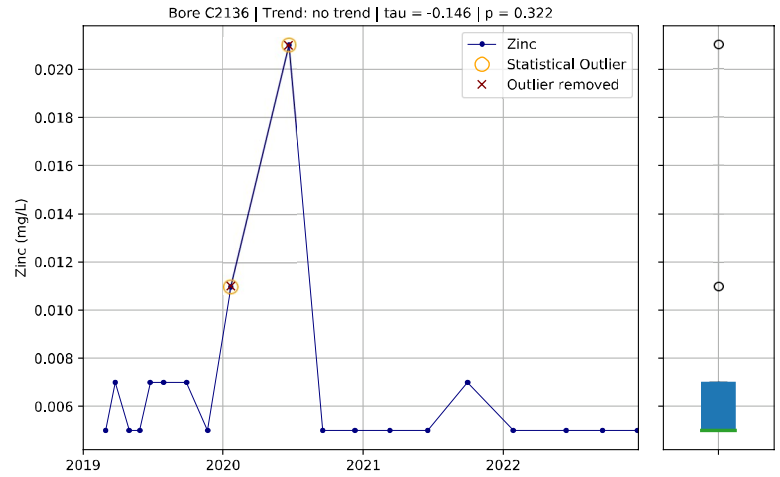

Bore C2136 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Silver
95th percentile: 0.001
80th percentile: 0.001
Silver (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022
2023

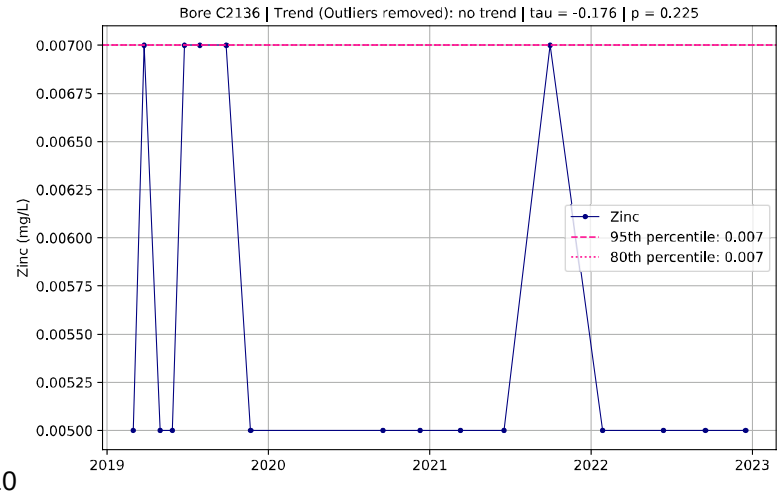

Bore C2136 | Trend: decreasing | tau = -0.38 | p = 0.025
Sodium
Statistical Outlier
Outlier removed
Sodium (mg/L)
2800
2600
2400
2200
2019
2020
2021
2022

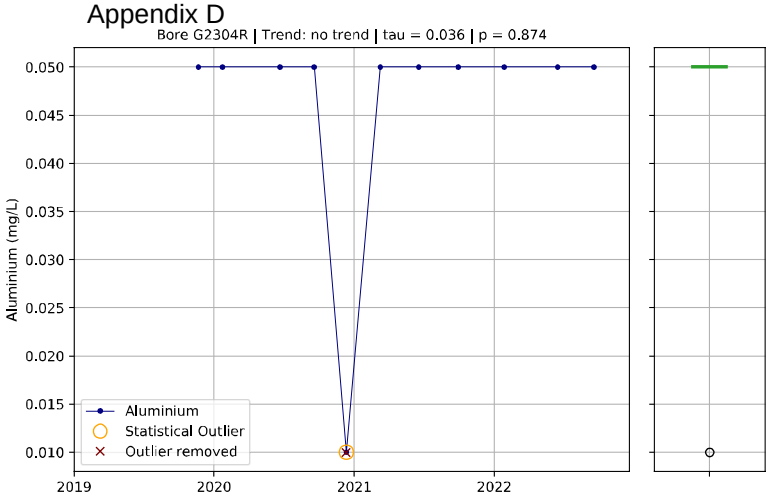

Bore C2136 | Trend (Outliers removed): decreasing | tau = -0.38 | p = 0.025
Sodium
95th percentile: 2868.0
80th percentile: 2696.0
Sodium (mg/L)
2800
2600
2400
2200
2019
2020
2021
2022
2023

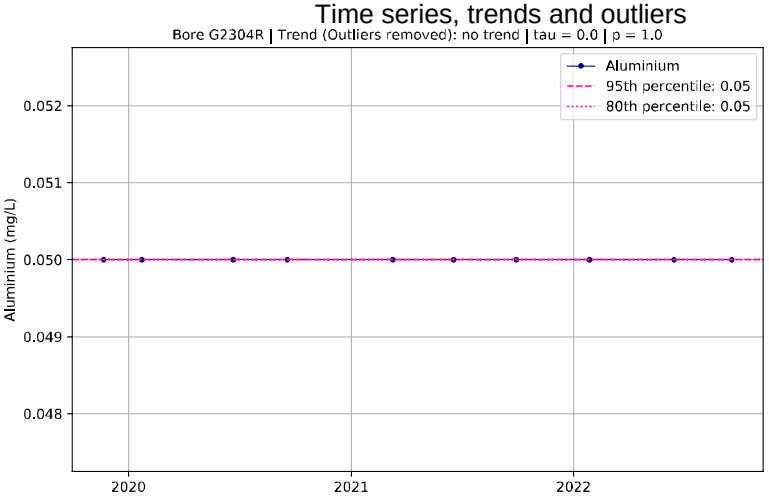

Bore C2136 | Trend: decreasing | tau = -0.526 | p = 0.002
Sulfate as SO4 - Turbidimetric
Statistical Outlier
Outlier removed
Sulfate as SO4 - Turbidimetric (mg/L)
140
120
100
80
60
2019
2020
2021
2022

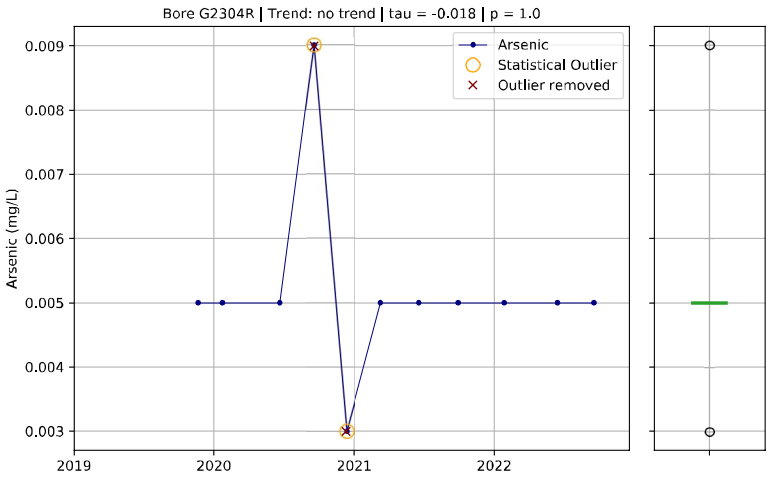

Bore C2136 | Trend (Outliers removed): decreasing | tau = -0.526 | p = 0.002
Sulfate as SO4 - Turbidimetric
95th percentile: 126.8
80th percentile: 118.4
Sulfate as SO4 - Turbidimetric (mg/L)
140
120
100
80
60
2019
2020
2021
2022
2023

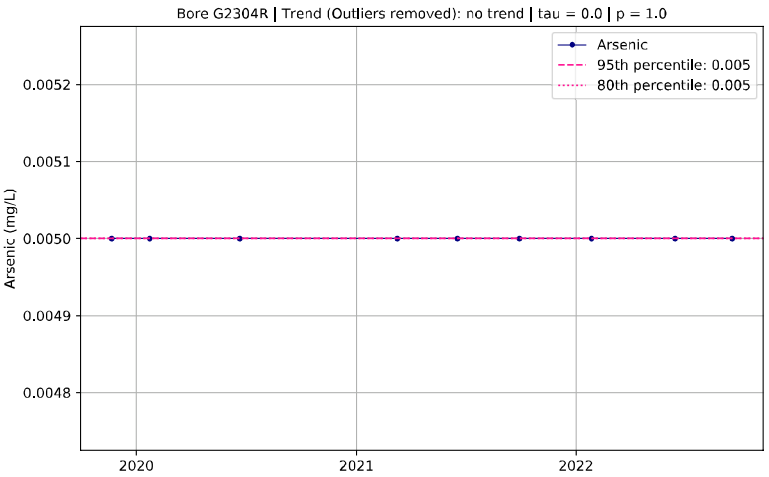

Bore C2136 | Trend: no trend | tau = -0.146 | p = 0.322
Zinc
Statistical Outlier
Outlier removed
Zinc (mg/L)
0.020
0.018
0.016
0.014
0.012
0.010
0.008
0.006
2019
2020
2021
2022

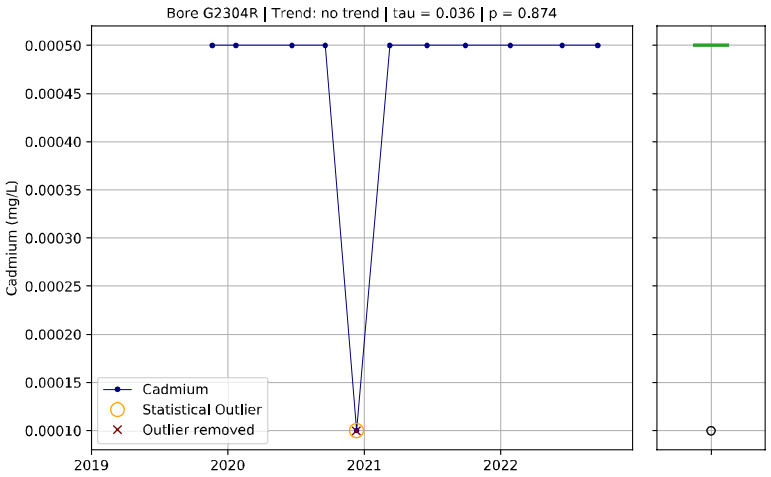

Bore C2136 | Trend (Outliers removed): no trend | tau = -0.176 | p = 0.225
Zinc
95th percentile: 0.007
80th percentile: 0.007
Zinc (mg/L)
0.00700
0.00675
0.00650
0.00625
0.00600
0.00575
0.00550
0.00525
0.00500
2019
2020
2021
2022
2023

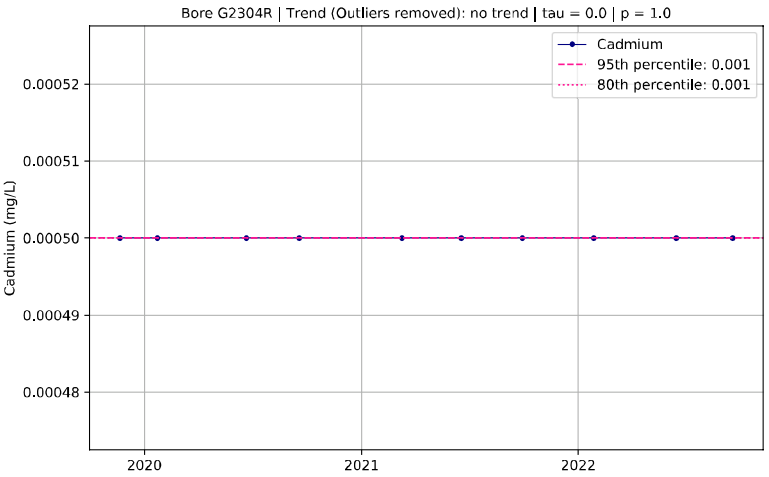

Bore G2304R | Trend: no trend | tau = 0.036 | p = 0.874
Aluminium (mg/L)
Aluminium
Statistical Outlier
Outlier removed

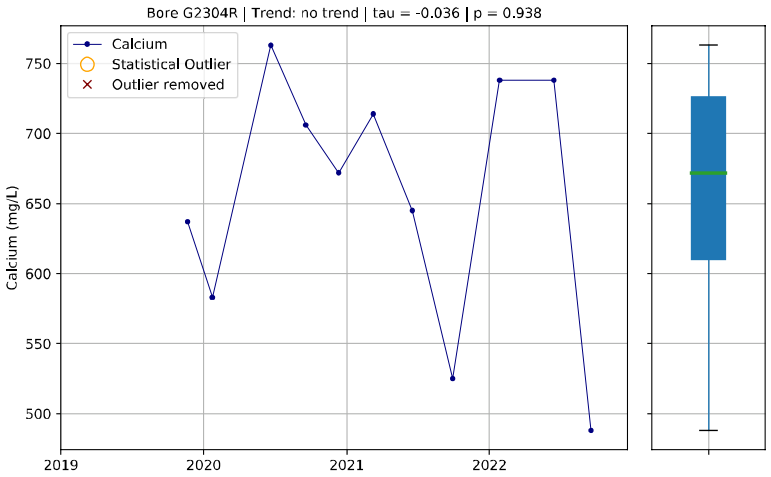

Bore G2304R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Aluminium (mg/L)
Aluminium
95th percentile: 0.05
80th percentile: 0.05

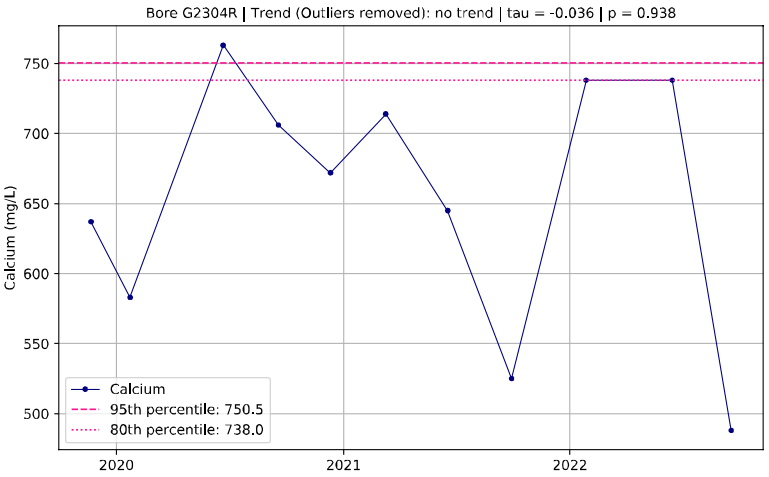

Bore G2304R | Trend: no trend | tau = -0.018 | p = 1.0
Arsenic (mg/L)
Arsenic
Statistical Outlier
Outlier removed

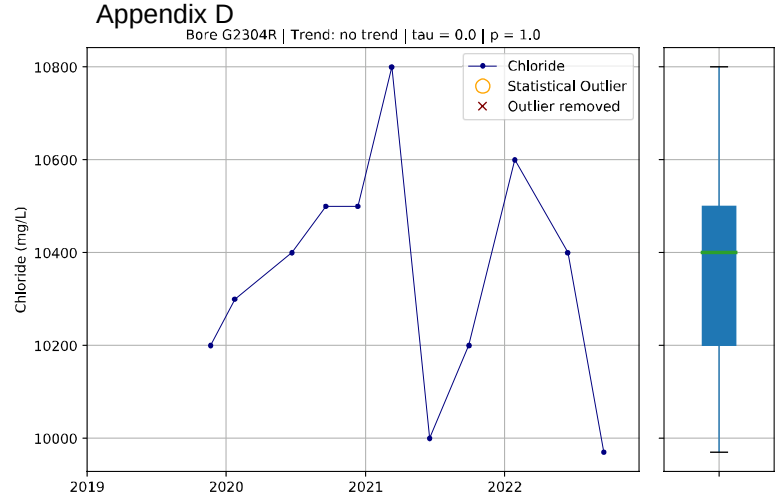

Bore G2304R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Arsenic (mg/L)
Arsenic
95th percentile: 0.005
80th percentile: 0.005

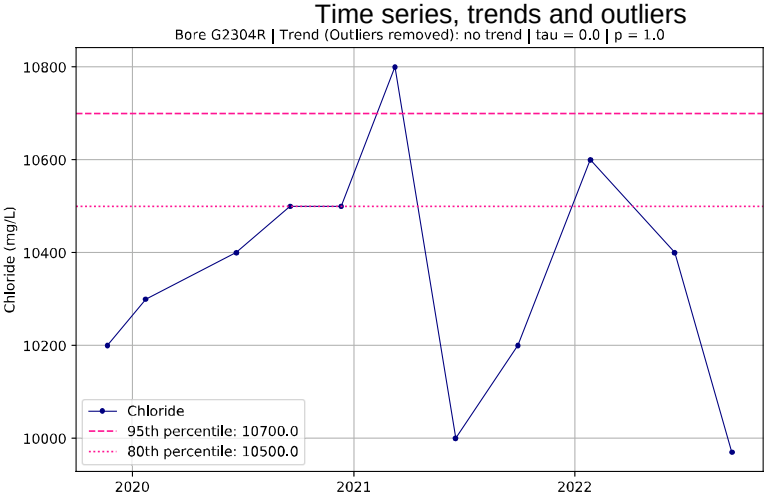

Bore G2304R | Trend: no trend | tau = 0.036 | p = 0.874
Cadmium (mg/L)
Cadmium
Statistical Outlier
Outlier removed

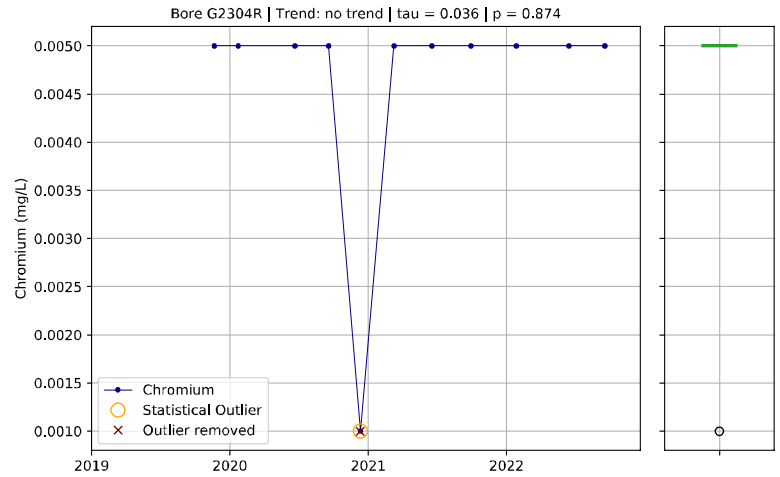

Bore G2304R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Cadmium (mg/L)
Cadmium
95th percentile: 0.001
80th percentile: 0.001

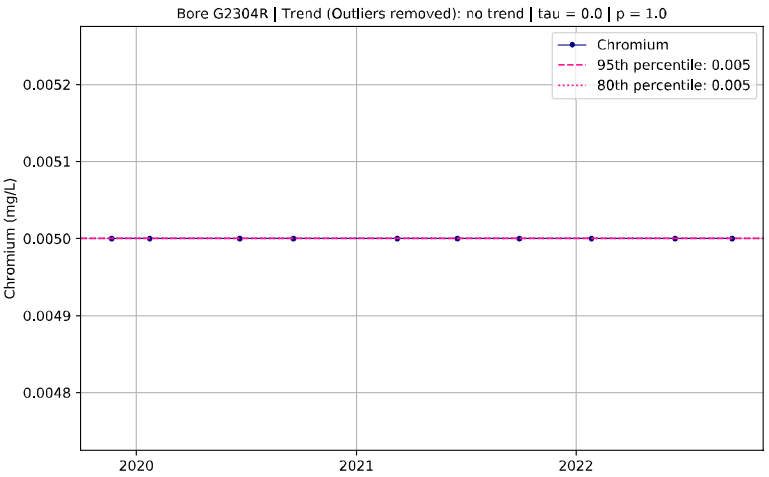

Bore G2304R | Trend: no trend | tau = -0.036 | p = 0.938
Calcium (mg/L)
Calcium
Statistical Outlier
Outlier removed

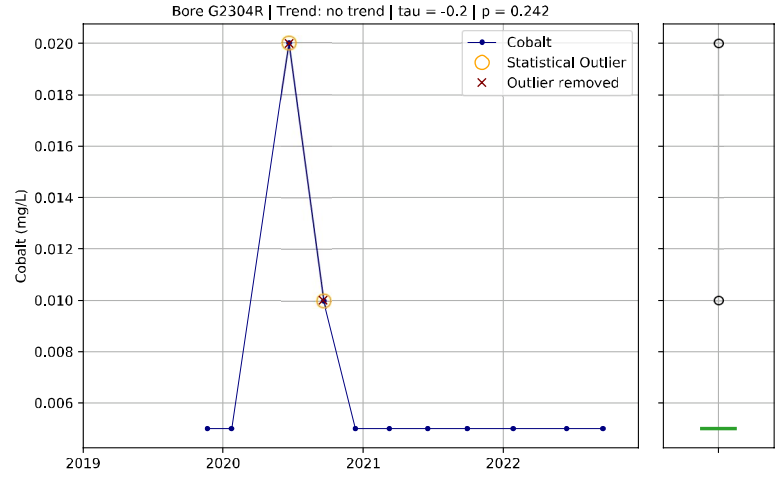

Bore G2304R | Trend (Outliers removed): no trend | tau = -0.036 | p = 0.938
Calcium (mg/L)
Calcium
95th percentile: 750.5
80th percentile: 738.0

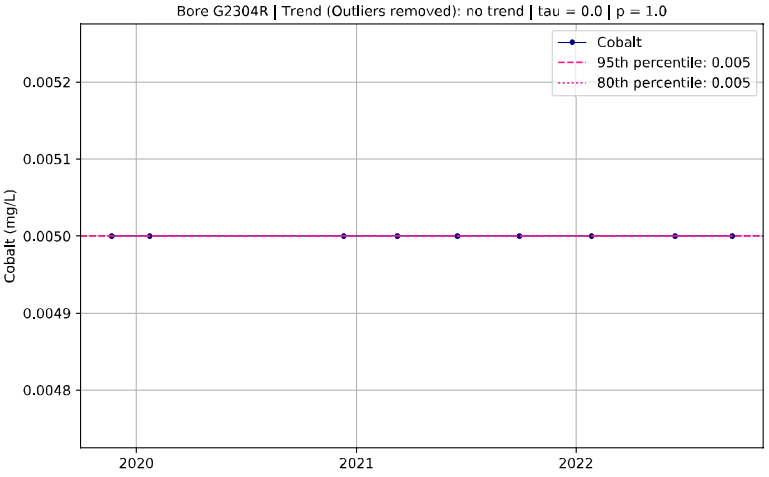

Bore G2304R | Trend: no trend | tau = 0.0 | p = 1.0
Chloride
Statistical Outlier
Outlier removed
Chloride (mg/L)
10800
10600
10400
10200
10000
2019
2020
2021
2022

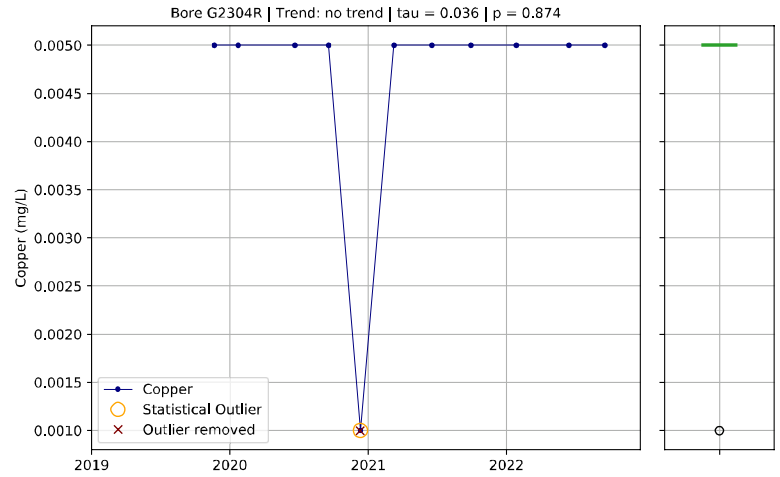

Bore G2304R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Chloride (mg/L)
Chloride
95th percentile: 10700.0
80th percentile: 10500.0
10800
10600
10400
10200
10000
2020
2021
2022

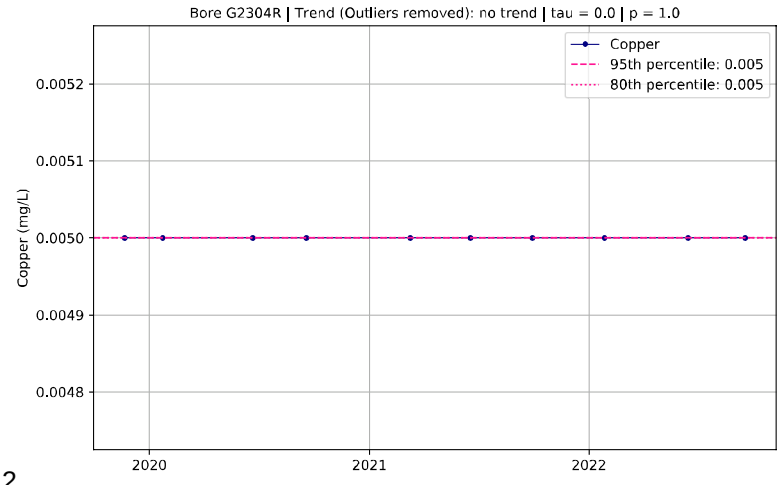

Bore G2304R | Trend: no trend | tau = 0.036 | p = 0.874
Chromium (mg/L)
Chromium
Statistical Outlier
Outlier removed
0.0050
0.0045
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
2019
2020
2021
2022

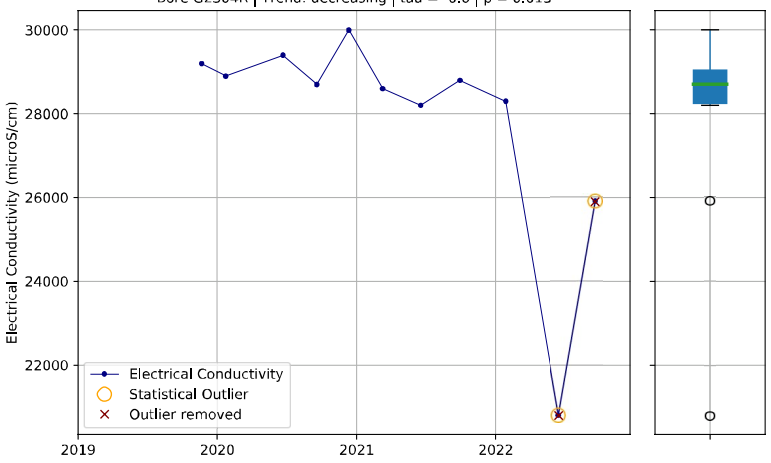

Bore G2304R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Chromium (mg/L)
Chromium
95th percentile: 0.005
80th percentile: 0.005
0.0052
0.0051
0.0050
0.0049
0.0048
2020
2021
2022

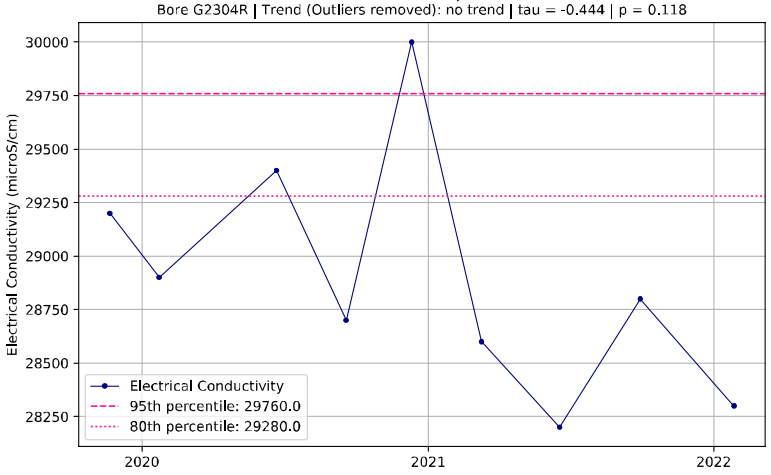

Bore G2304R | Trend: no trend | tau = -0.2 | p = 0.242
Cobalt (mg/L)
Cobalt
Statistical Outlier
Outlier removed
0.020
0.018
0.016
0.014
0.012
0.010
0.008
0.006
2019
2020
2021
2022

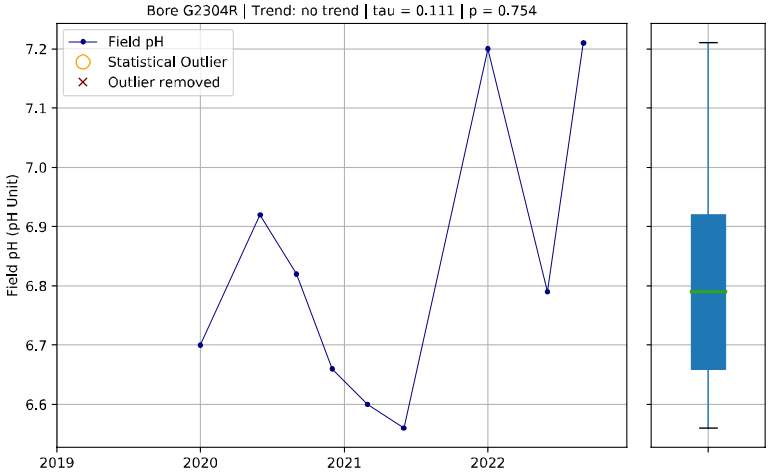

Bore G2304R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Cobalt (mg/L)
Cobalt
95th percentile: 0.005
80th percentile: 0.005
0.0052
0.0051
0.0050
0.0049
0.0048
2020
2021
2022

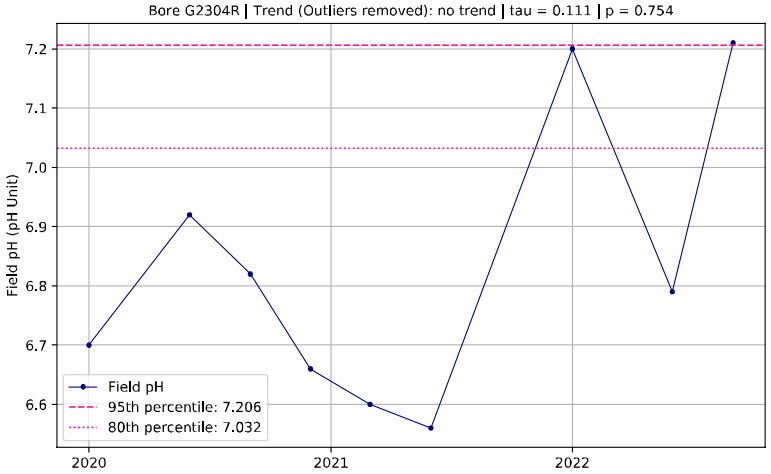

Bore G2304R | Trend: no trend | tau = 0.036 | p = 0.874
Copper (mg/L)
Copper
Statistical Outlier
Outlier removed
0.0050
0.0045
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
2019
2020
2021
2022

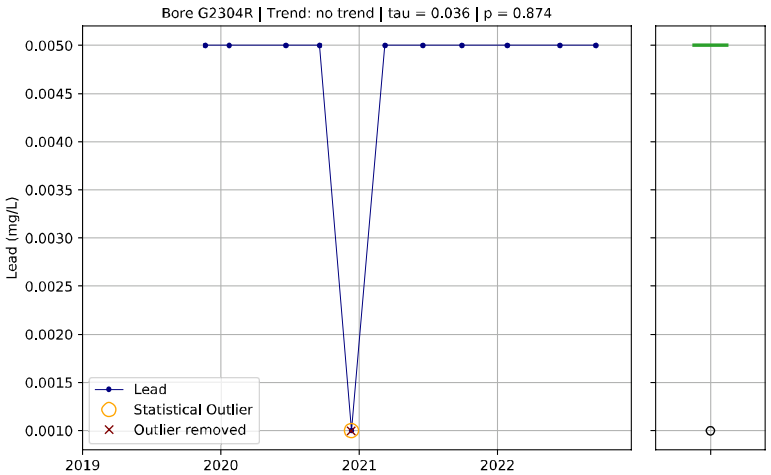

Bore G2304R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Copper (mg/L)
Copper
95th percentile: 0.005
80th percentile: 0.005
0.0052
0.0051
0.0050
0.0049
0.0048
2020
2021
2022

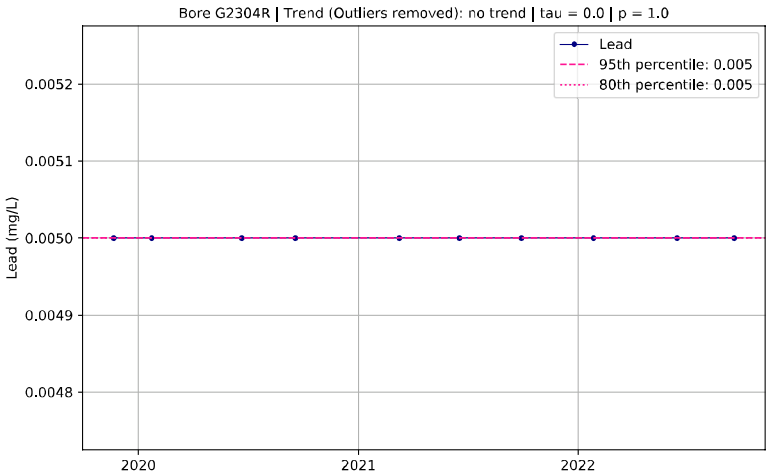

Bore G2304R | Trend: decreasing | tau = -0.6 | p = 0.013
Electrical Conductivity (microS/cm)
Electrical Conductivity
Statistical Outlier
Outlier removed

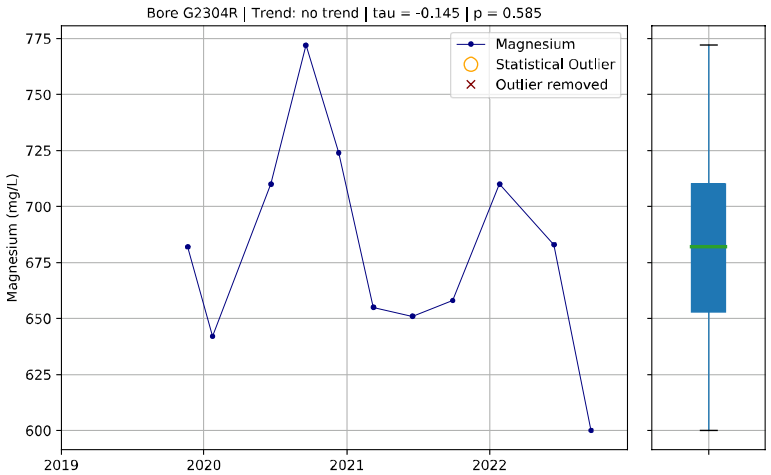

Bore G2304R | Trend (Outliers removed): no trend | tau = -0.444 | p = 0.118
Electrical Conductivity (microS/cm)
Electrical Conductivity
95th percentile: 29760.0
80th percentile: 29280.0

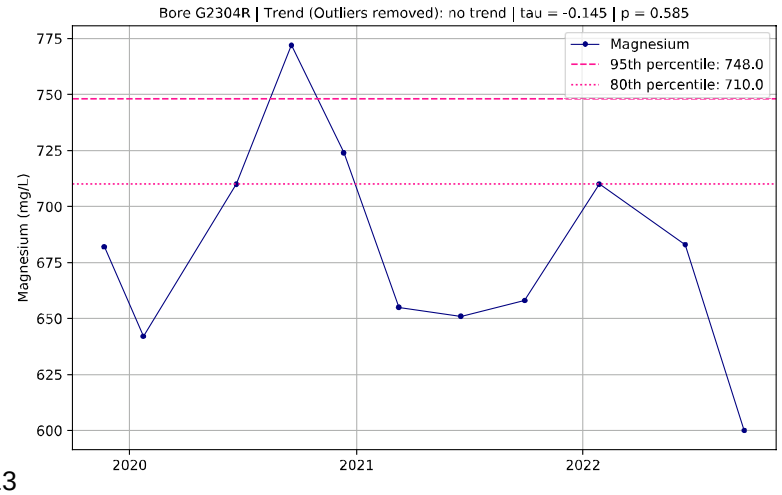

Bore G2304R | Trend: no trend | tau = 0.111 | p = 0.754
Field pH (pH Unit)
Field pH
Statistical Outlier
Outlier removed

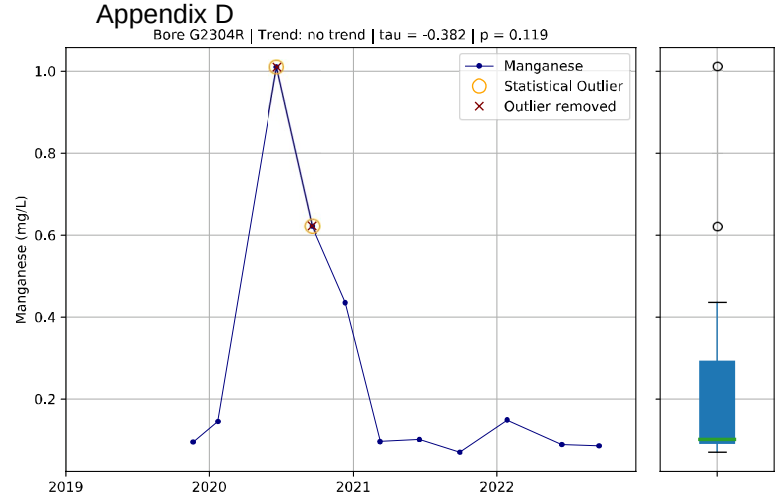

Bore G2304R | Trend (Outliers removed): no trend | tau = 0.111 | p = 0.754
Field pH (pH Unit)
Field pH
95th percentile: 7.206
80th percentile: 7.032

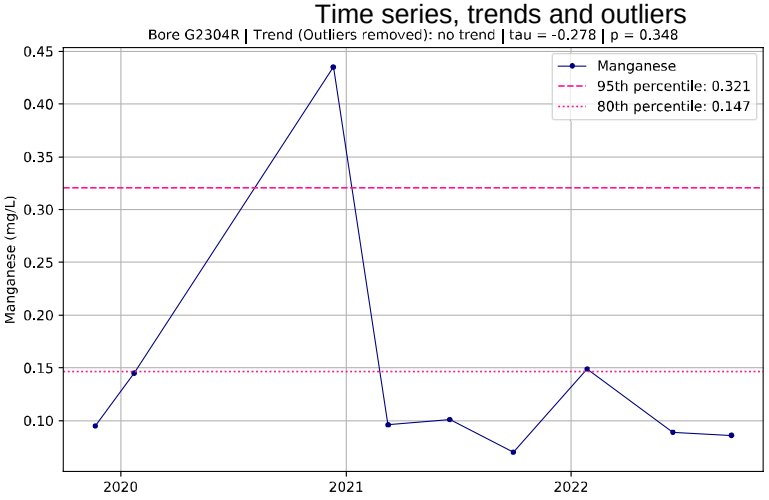

Bore G2304R | Trend: no trend | tau = 0.036 | p = 0.874
Lead (mg/L)
Lead
Statistical Outlier
Outlier removed

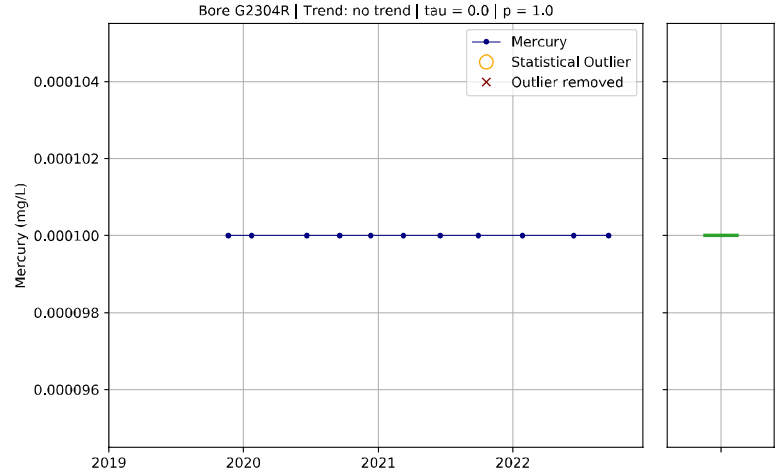

Bore G2304R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Lead (mg/L)
Lead
95th percentile: 0.005
80th percentile: 0.005

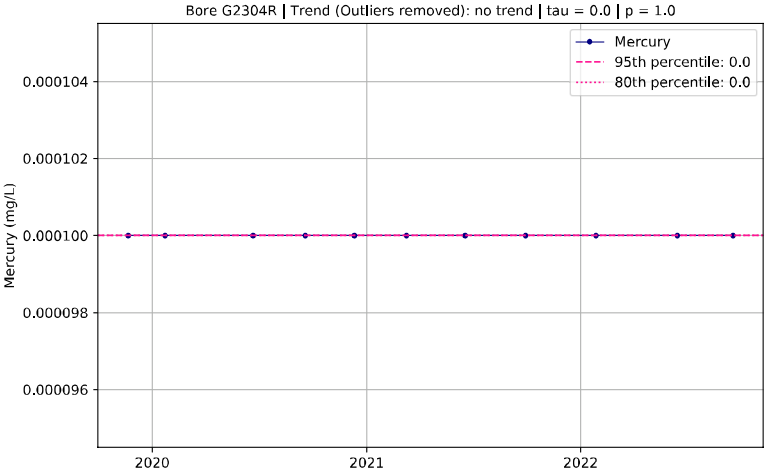

Bore G2304R | Trend: no trend | tau = -0.145 | p = 0.585
Magnesium (mg/L)
Magnesium
Statistical Outlier
Outlier removed

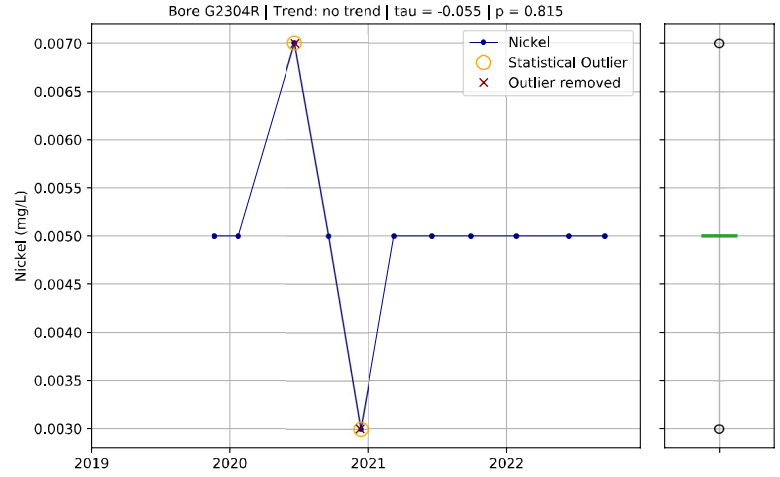

Bore G2304R | Trend (Outliers removed): no trend | tau = -0.145 | p = 0.585
Magnesium (mg/L)
Magnesium
95th percentile: 748.0
80th percentile: 710.0

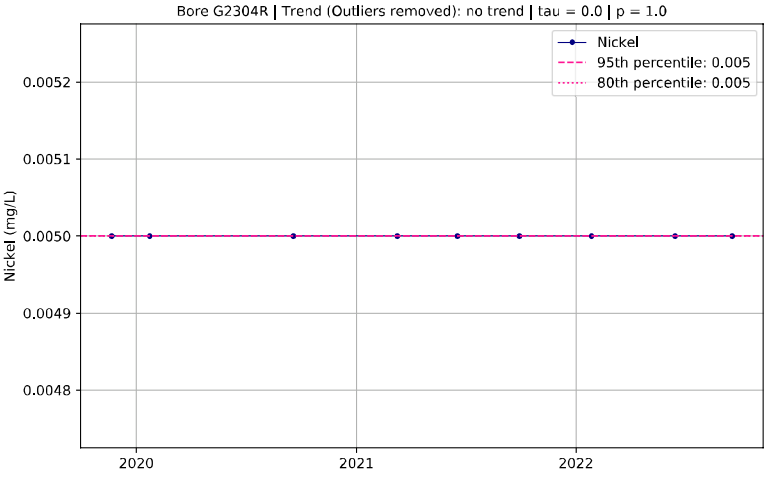

Bore G2304R | Trend: no trend | tau = -0.382 | p = 0.119
Manganese
Statistical Outlier
Outlier removed
Manganese (mg/L)
1.0
0.8
0.6
0.4
0.2
2019
2020
2021
2022

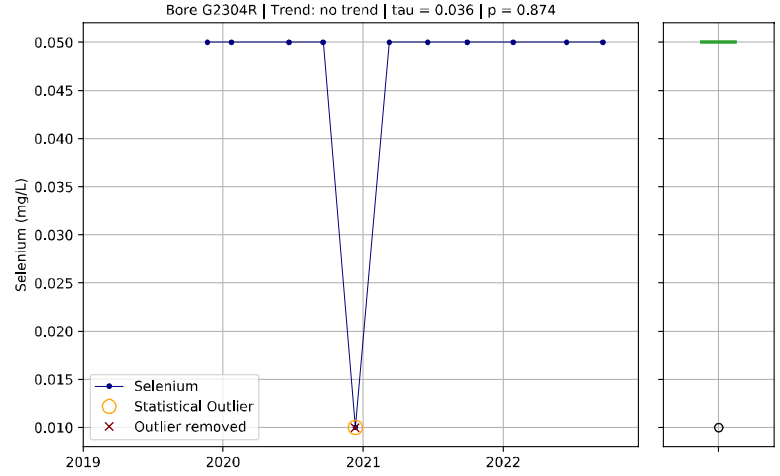

Bore G2304R | Trend (Outliers removed): no trend | tau = -0.278 | p = 0.348
Manganese
95th percentile: 0.321
80th percentile: 0.147
Manganese (mg/L)
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
2020
2021
2022

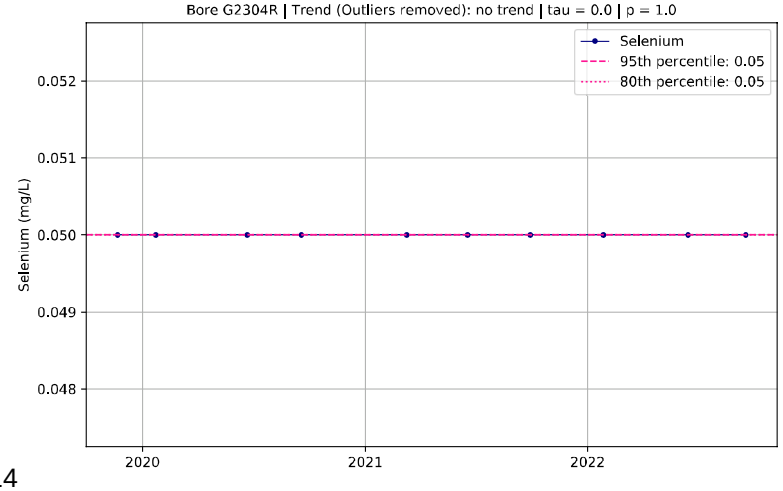

Bore G2304R | Trend: no trend | tau = 0.0 | p = 1.0
Mercury
Statistical Outlier
Outlier removed
Mercury (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022

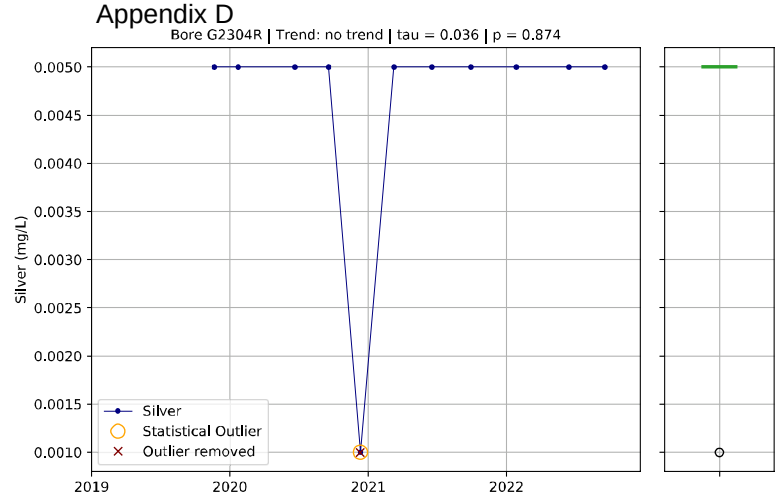

Bore G2304R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Mercury
95th percentile: 0.0
80th percentile: 0.0
Mercury (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2020
2021
2022

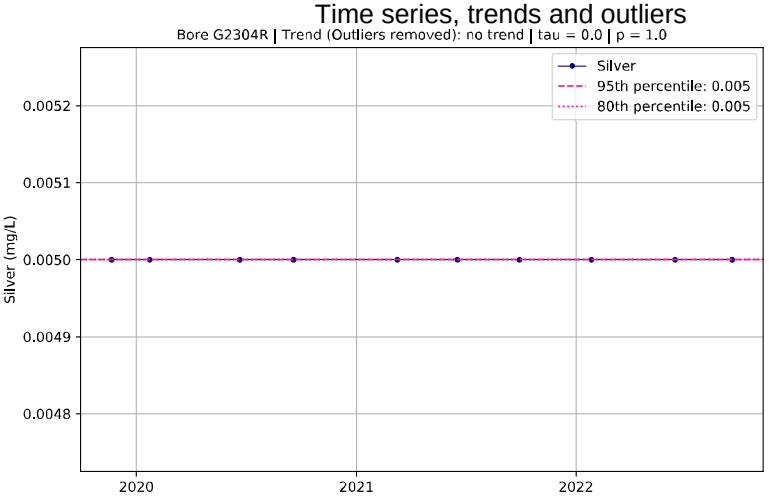

Bore G2304R | Trend: no trend | tau = -0.055 | p = 0.815
Nickel
Statistical Outlier
Outlier removed
Nickel (mg/L)
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
0.0030
2019
2020
2021
2022

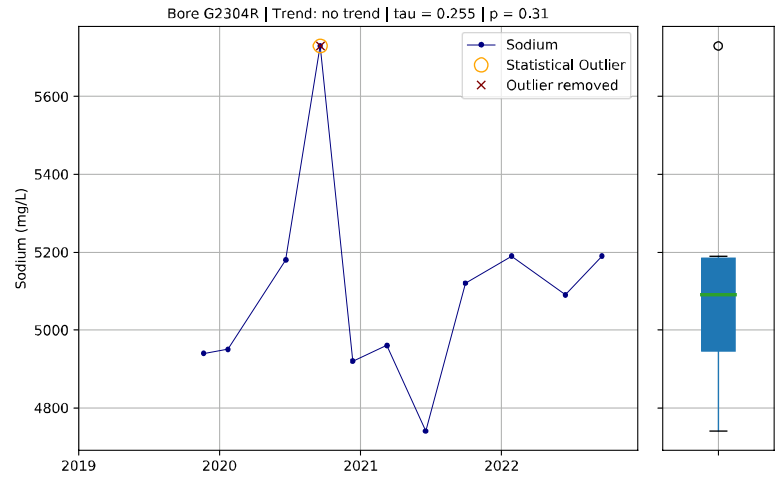

Bore G2304R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Nickel
95th percentile: 0.005
80th percentile: 0.005
Nickel (mg/L)
0.0052
0.0051
0.0050
0.0049
0.0048
2020
2021
2022

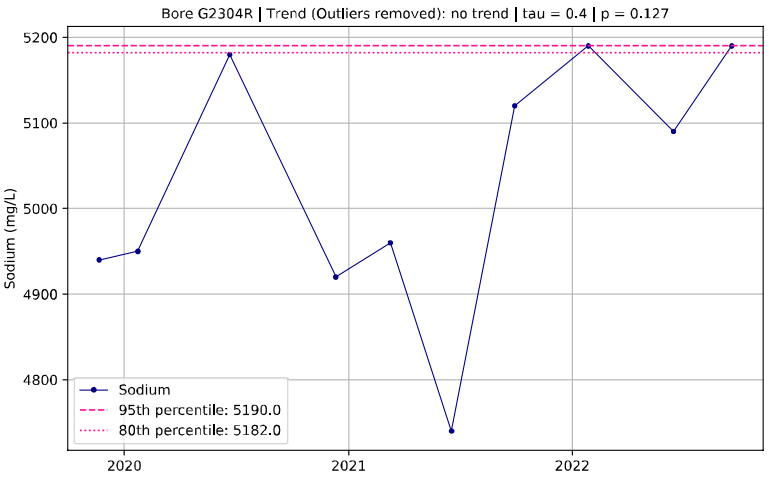

Bore G2304R | Trend: no trend | tau = 0.036 | p = 0.874
Selenium
Statistical Outlier
Outlier removed
Selenium (mg/L)
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
2019
2020
2021
2022

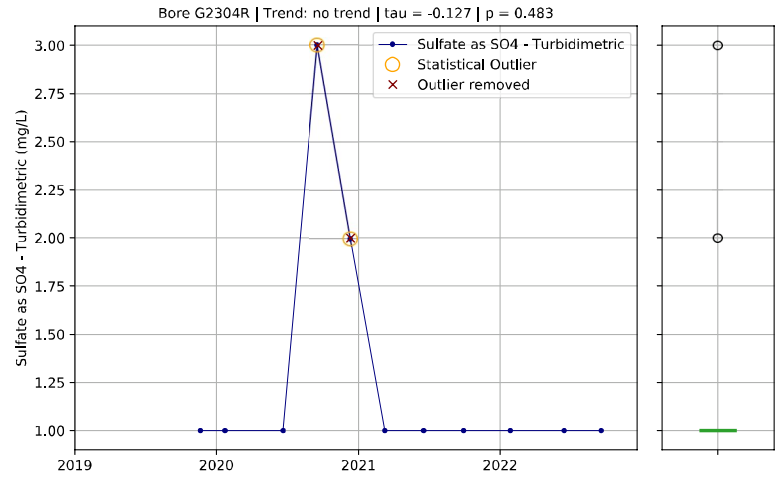

Bore G2304R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Selenium
95th percentile: 0.05
80th percentile: 0.05
Selenium (mg/L)
0.052
0.051
0.050
0.049
0.048
2020
2021
2022

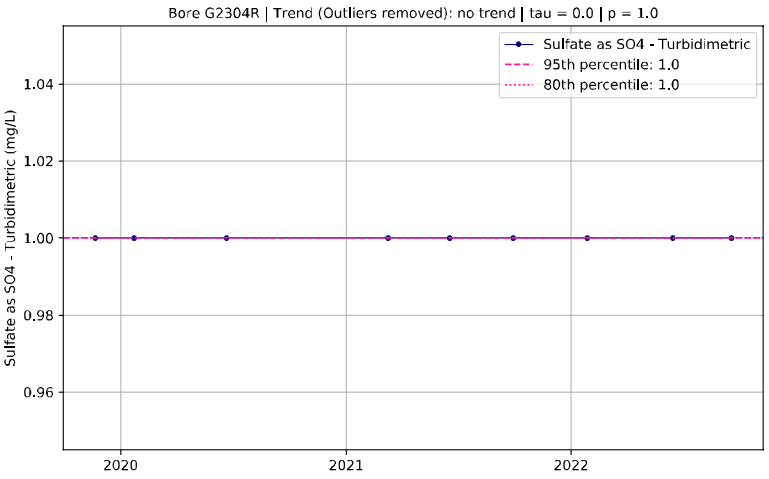

Bore G2304R | Trend: no trend | tau = 0.036 | p = 0.874
Silver (mg/L)
Silver
Statistical Outlier
Outlier removed

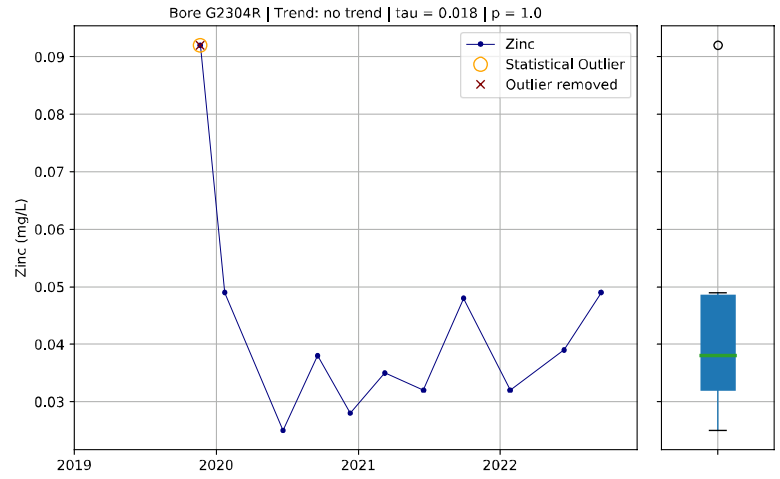

Bore G2304R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Silver (mg/L)
Silver
95th percentile: 0.005
80th percentile: 0.005

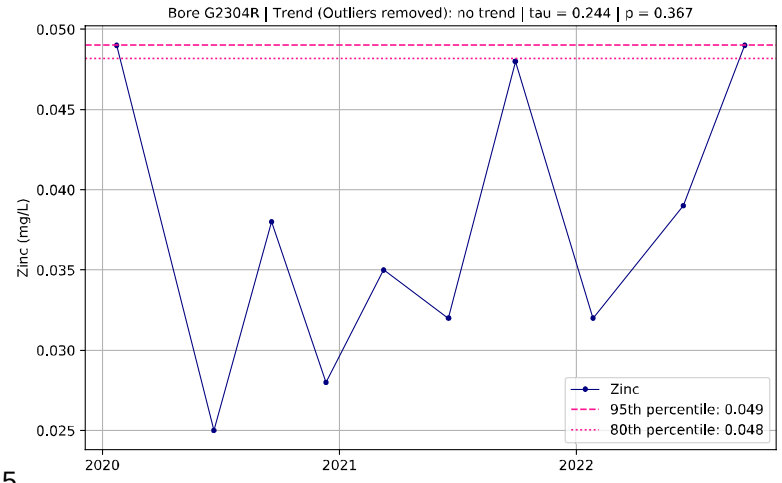

Bore G2304R | Trend: no trend | tau = 0.255 | p = 0.31
Sodium (mg/L)
Sodium
Statistical Outlier
Outlier removed

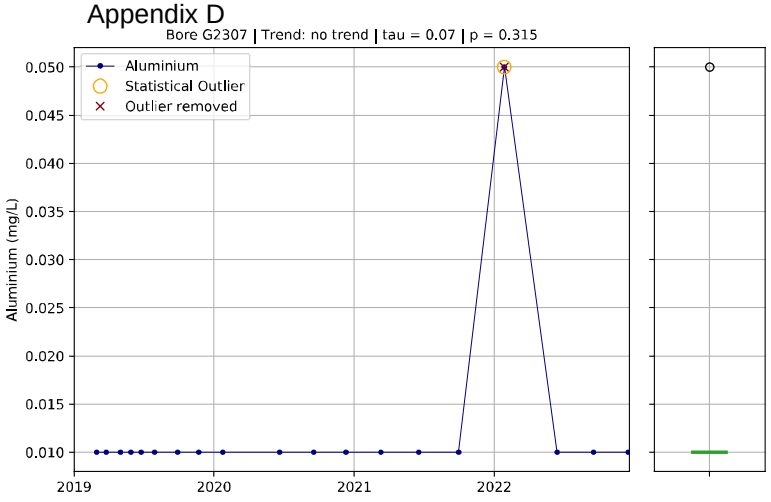

Bore G2304R | Trend (Outliers removed): no trend | tau = 0.4 | p = 0.127
Sodium (mg/L)
Sodium
95th percentile: 5190.0
80th percentile: 5182.0

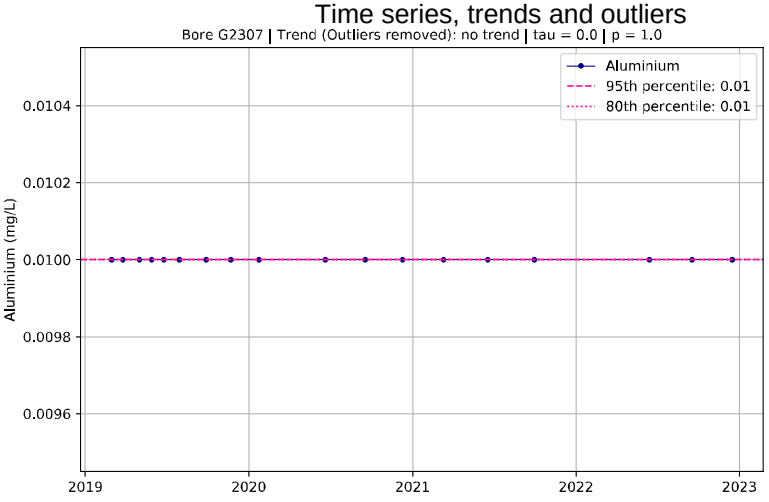

Bore G2304R | Trend: no trend | tau = -0.127 | p = 0.483
Sulfate as SO4 - Turbidimetric (mg/L)
Sulfate as SO4 - Turbidimetric
Statistical Outlier
Outlier removed

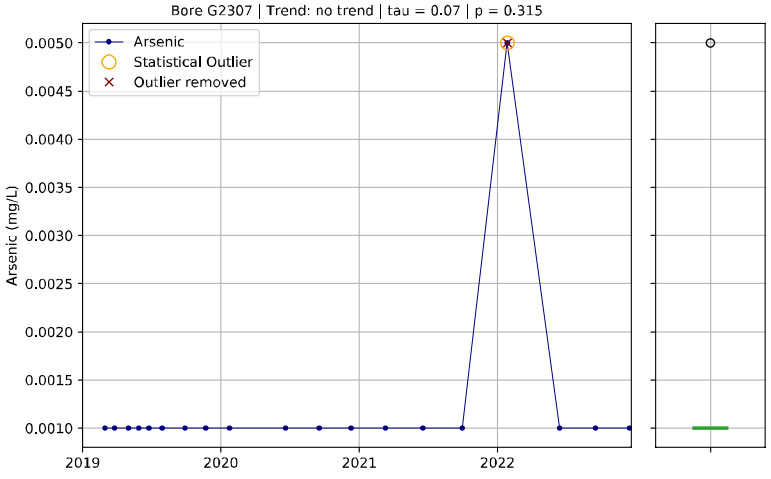

Bore G2304R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Sulfate as SO4 - Turbidimetric (mg/L)
Sulfate as SO4 - Turbidimetric
95th percentile: 1.0
80th percentile: 1.0

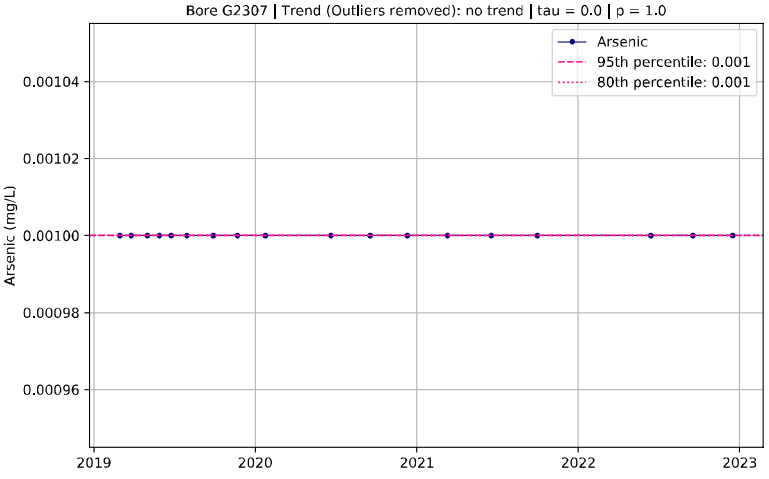

Bore G2304R | Trend: no trend | tau = 0.018 | p = 1.0
Zinc (mg/L)
Zinc
Statistical Outlier
Outlier removed

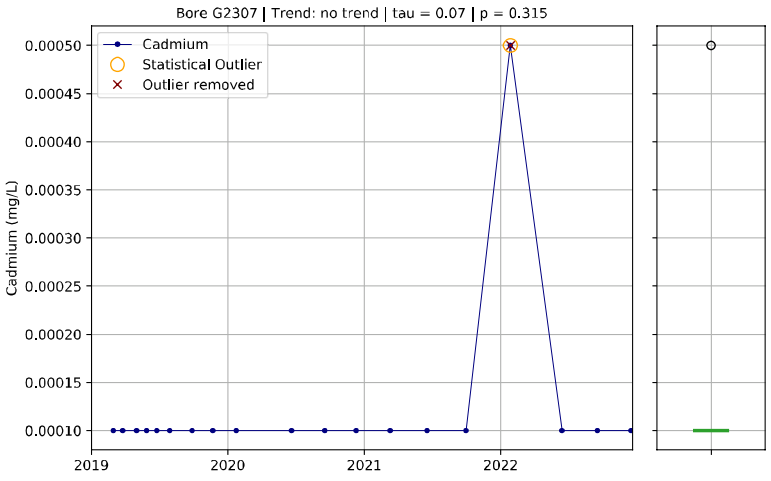

Bore G2304R | Trend (Outliers removed): no trend | tau = 0.244 | p = 0.367
Zinc (mg/L)
Zinc
95th percentile: 0.049
80th percentile: 0.048

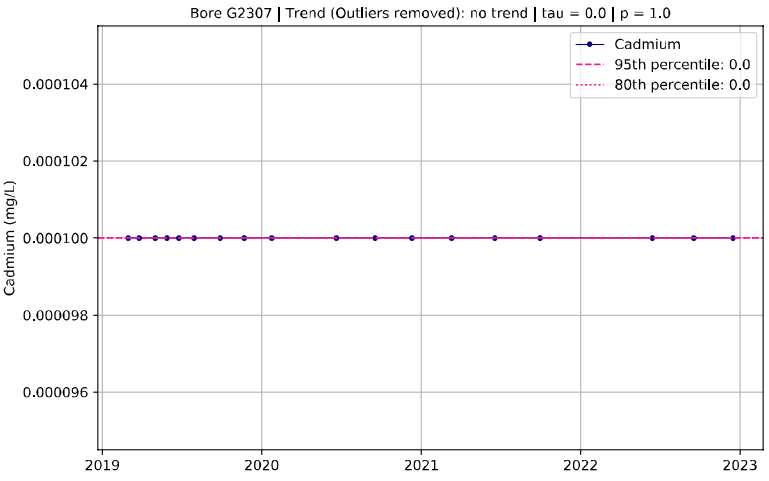

Bore G2307 | Trend: no trend | tau = 0.07 | p = 0.315
Aluminium
Statistical Outlier
Outlier removed
Aluminium (mg/L)

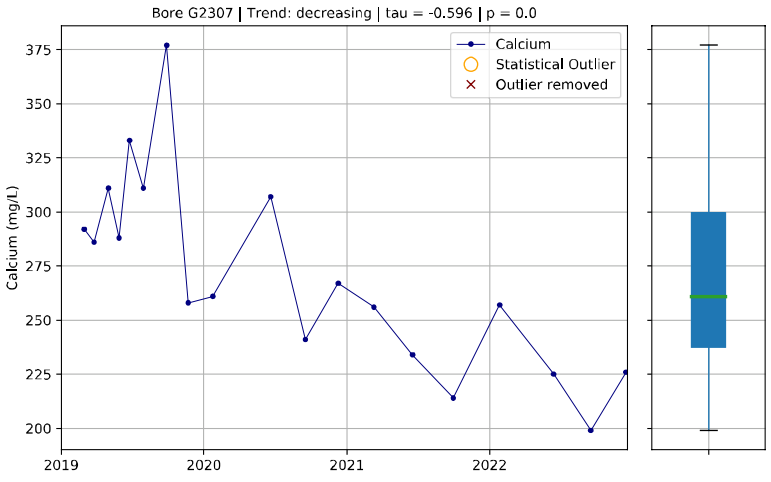

Bore G2307 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Aluminium
95th percentile: 0.01
80th percentile: 0.01
Aluminium (mg/L)

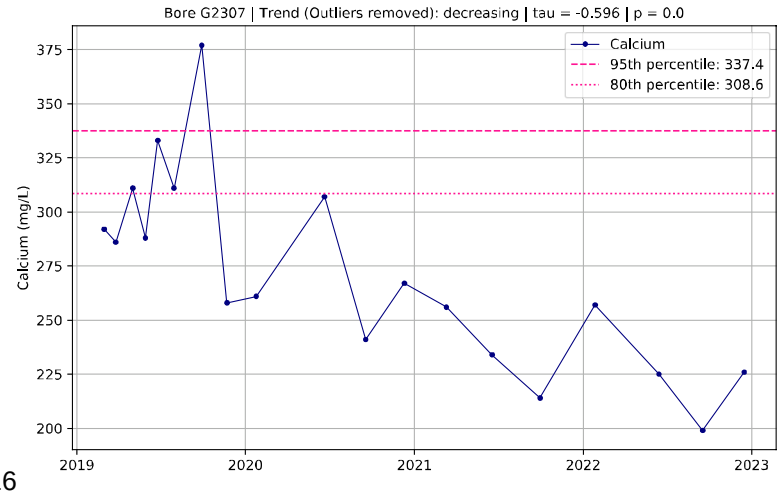

Bore G2307 | Trend: no trend | tau = 0.07 | p = 0.315
Arsenic
Statistical Outlier
Outlier removed
Arsenic (mg/L)

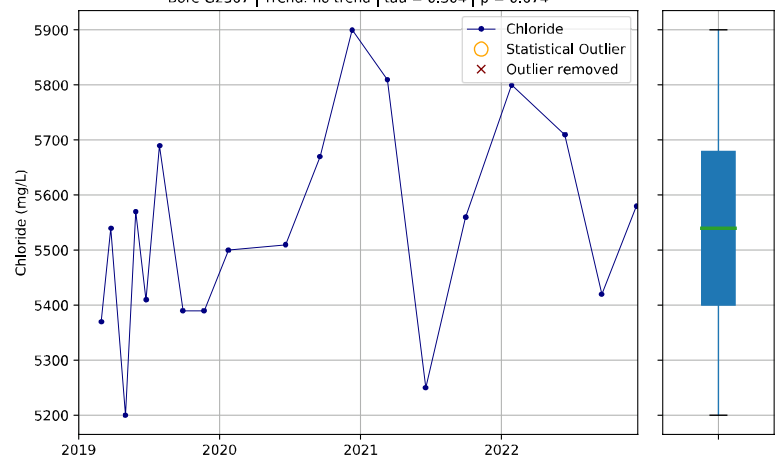

Bore G2307 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Arsenic
95th percentile: 0.001
80th percentile: 0.001
Arsenic (mg/L)

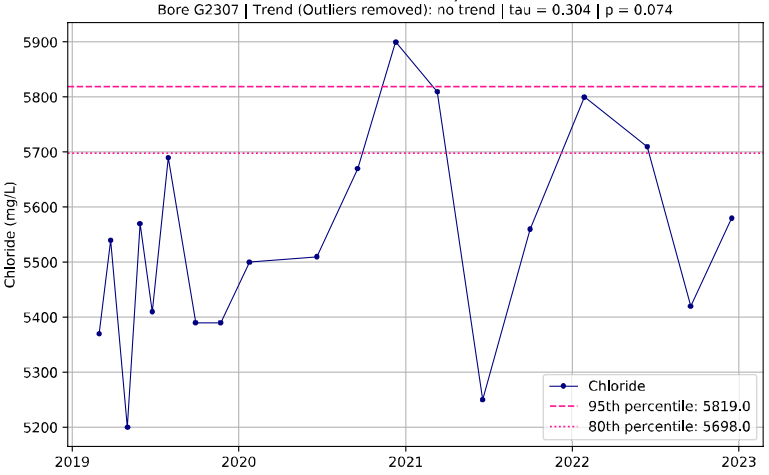

Bore G2307 | Trend: no trend | tau = 0.07 | p = 0.315
Cadmium
Statistical Outlier
Outlier removed
Cadmium (mg/L)

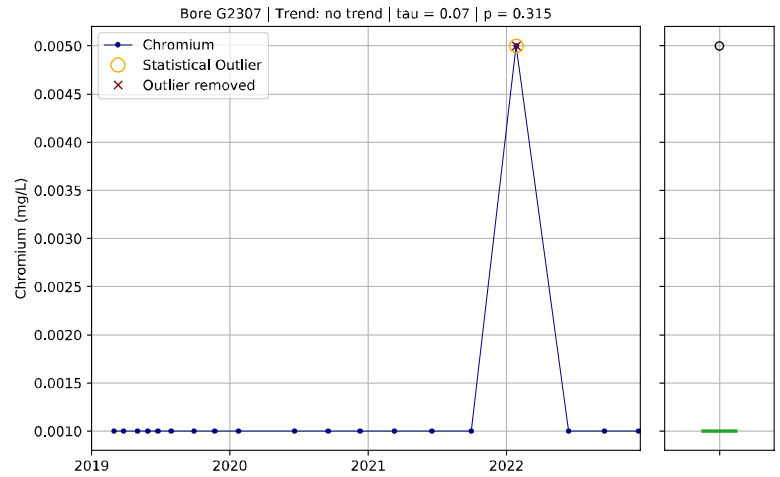

Bore G2307 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Cadmium
95th percentile: 0.0
80th percentile: 0.0
Cadmium (mg/L)

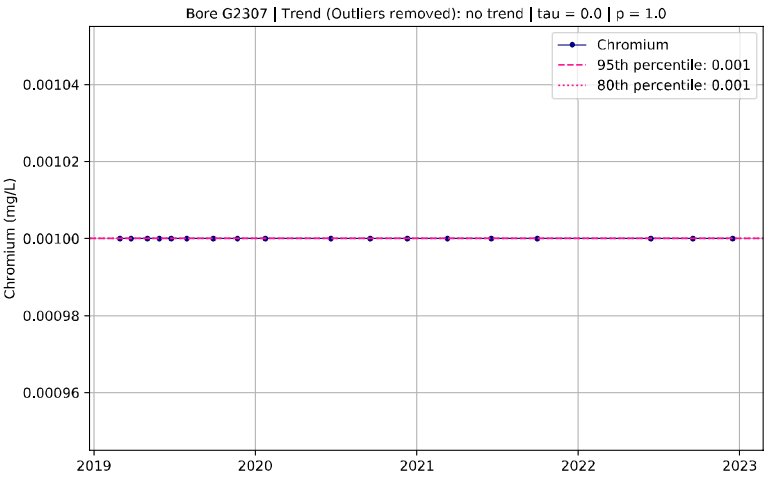

Bore G2307 | Trend: decreasing | tau = -0.596 | p = 0.0
Calcium
Statistical Outlier
Outlier removed
Calcium (mg/L)

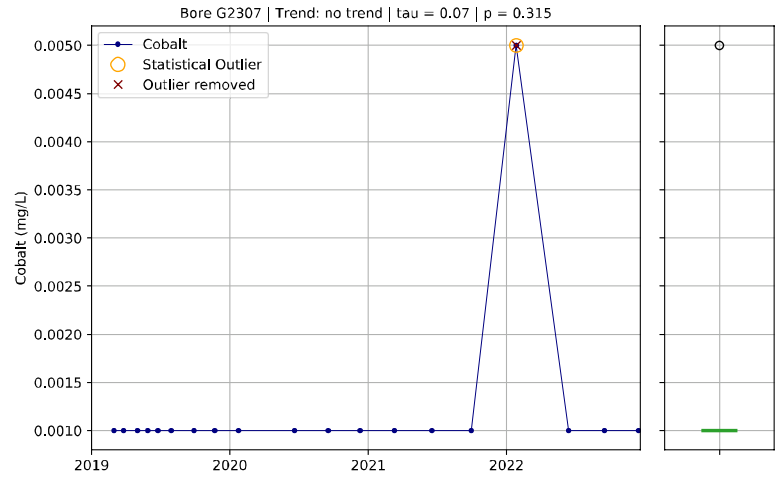

Bore G2307 | Trend (Outliers removed): decreasing | tau = -0.596 | p = 0.0
Calcium
95th percentile: 337.4
80th percentile: 308.6
Calcium (mg/L)

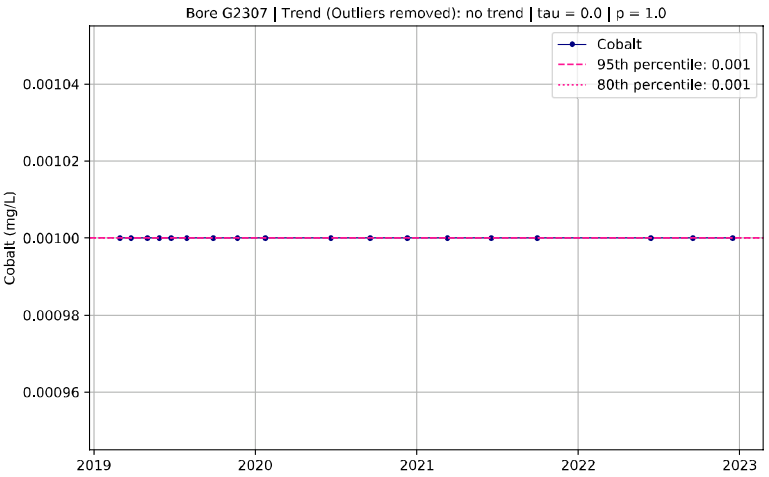

Bore G2307 | Trend: no trend | tau = 0.304 | p = 0.074
Chloride
Statistical Outlier
Outlier removed
Chloride (mg/L)

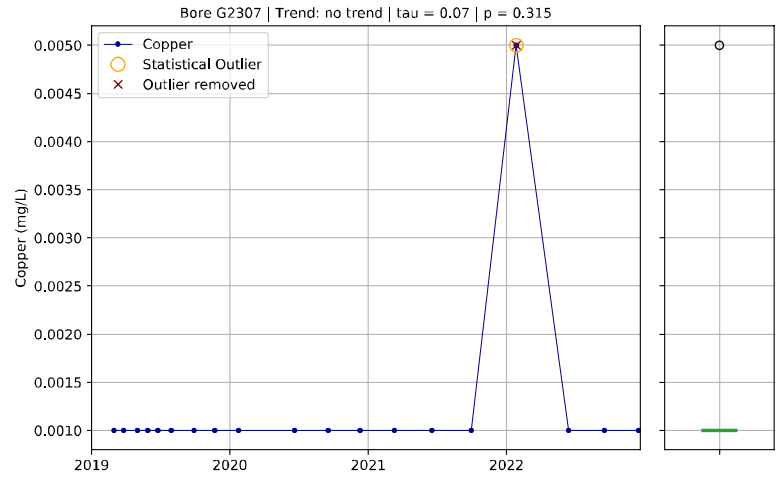

Bore G2307 | Trend (Outliers removed): no trend | tau = 0.304 | p = 0.074
Chloride
95th percentile: 5819.0
80th percentile: 5698.0
Chloride (mg/L)

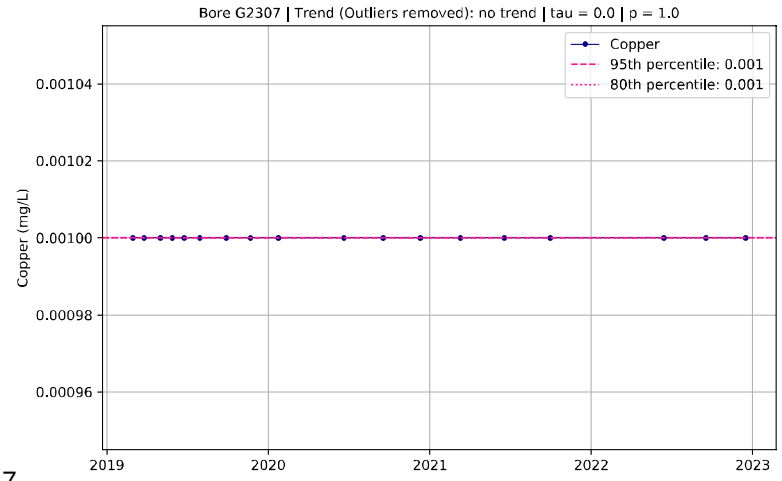

Bore G2307 | Trend: no trend | tau = 0.07 | p = 0.315
Chromium
Statistical Outlier
Outlier removed
Chromium (mg/L)

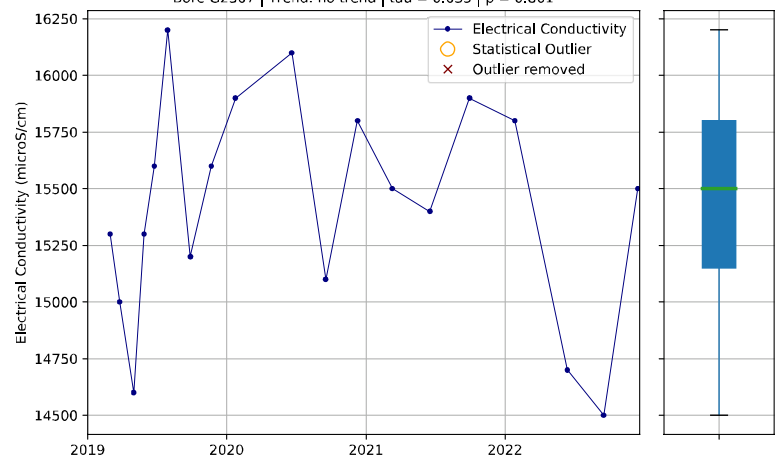

Bore G2307 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Chromium
95th percentile: 0.001
80th percentile: 0.001
Chromium (mg/L)

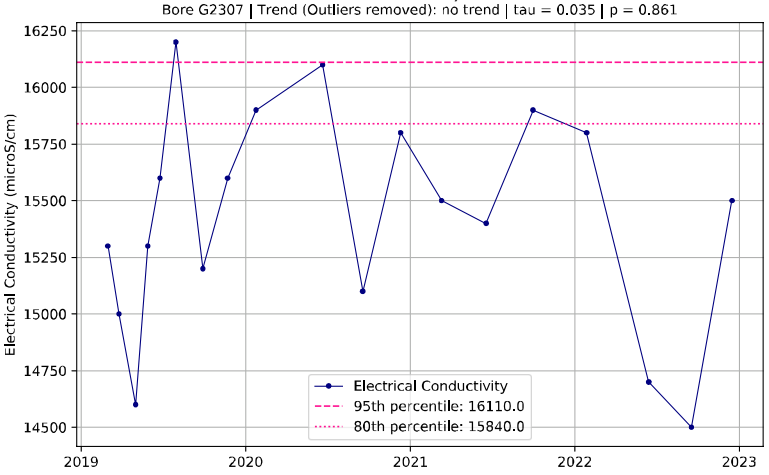

Bore G2307 | Trend: no trend | tau = 0.07 | p = 0.315
Cobalt
Statistical Outlier
Outlier removed
Cobalt (mg/L)

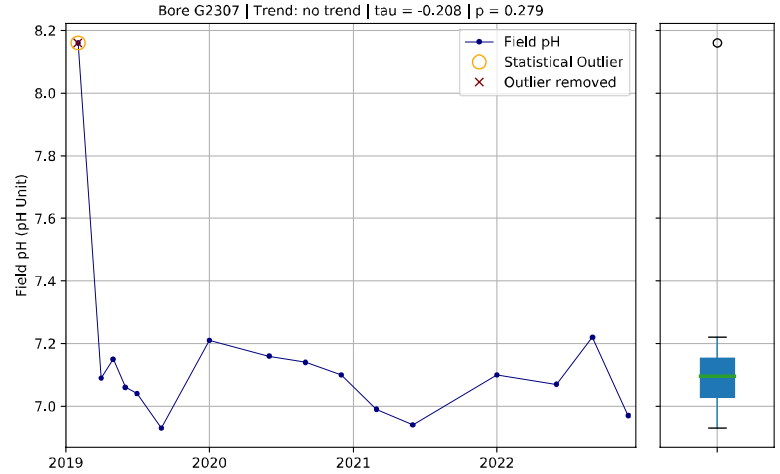

Bore G2307 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Cobalt
95th percentile: 0.001
80th percentile: 0.001
Cobalt (mg/L)

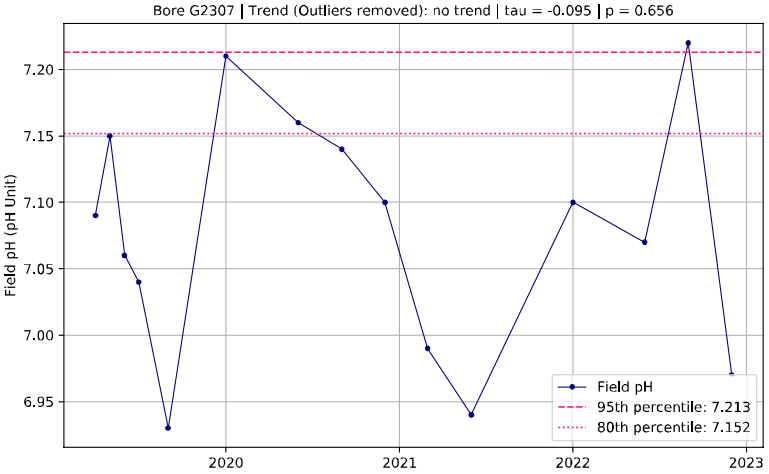

Bore G2307 | Trend: no trend | tau = 0.07 | p = 0.315
Copper
Statistical Outlier
Outlier removed
Copper (mg/L)

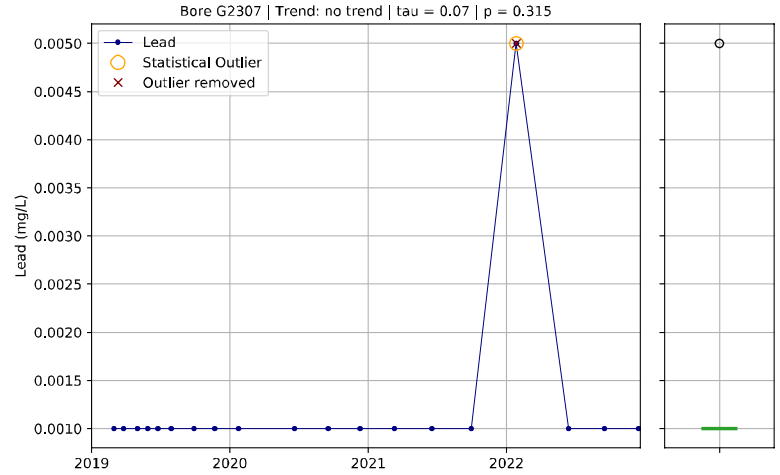

Bore G2307 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Copper
95th percentile: 0.001
80th percentile: 0.001
Copper (mg/L)

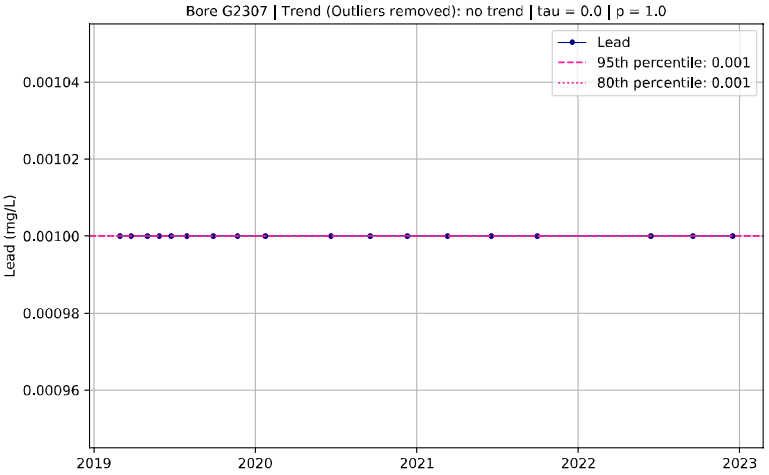

Bore G2307 | Trend: no trend | tau = 0.035 | p = 0.861
Electrical Conductivity
Statistical Outlier
Outlier removed
Electrical Conductivity (microS/cm)

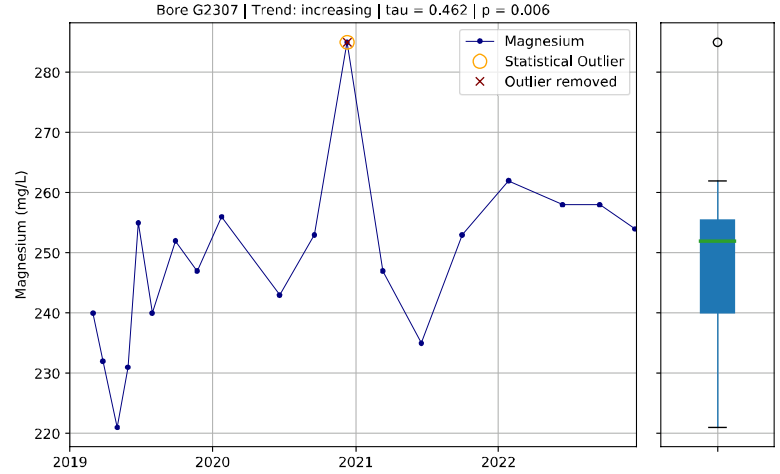

Bore G2307 | Trend (Outliers removed): no trend | tau = 0.035 | p = 0.861
Electrical Conductivity
95th percentile: 16110.0
80th percentile: 15840.0
Electrical Conductivity (microS/cm)

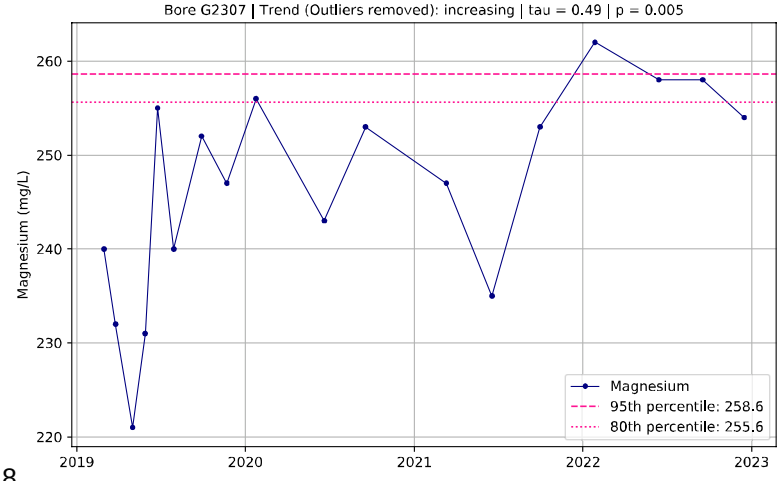

Bore G2307 | Trend: no trend | tau = -0.208 | p = 0.279
Field pH
Statistical Outlier
Outlier removed
Field pH (pH Unit)

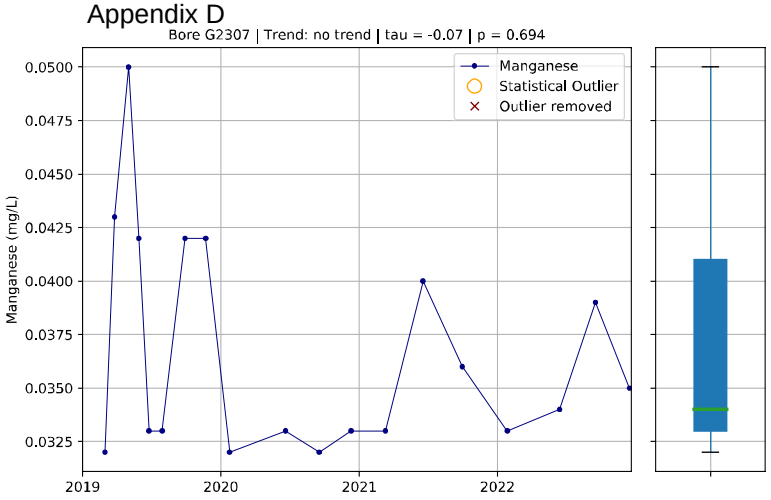

Bore G2307 | Trend (Outliers removed): no trend | tau = -0.095 | p = 0.656
Field pH
95th percentile: 7.213
80th percentile: 7.152
Field pH (pH Unit)

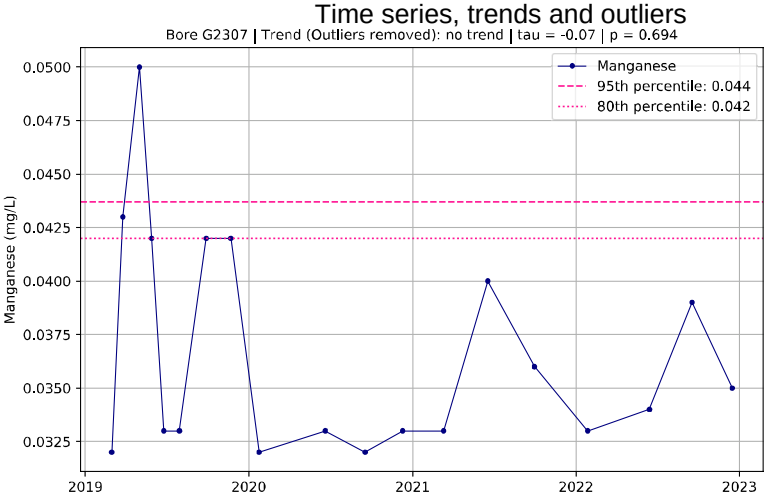

Bore G2307 | Trend: no trend | tau = 0.07 | p = 0.315
Lead
Statistical Outlier
Outlier removed
Lead (mg/L)

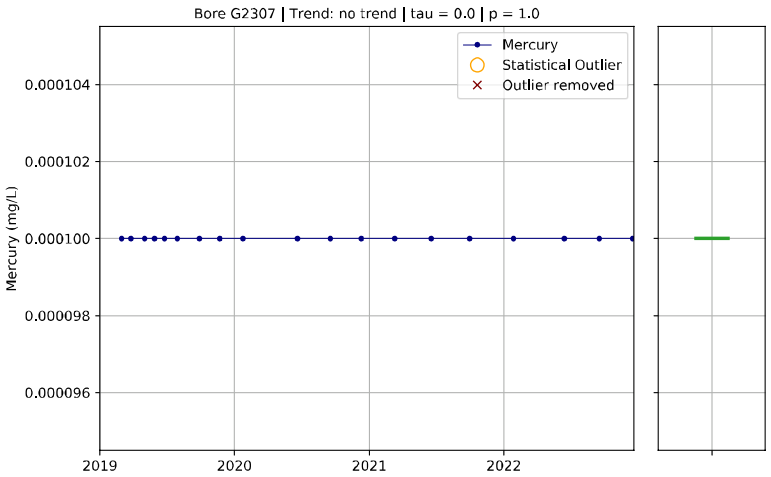

Bore G2307 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Lead
95th percentile: 0.001
80th percentile: 0.001
Lead (mg/L)

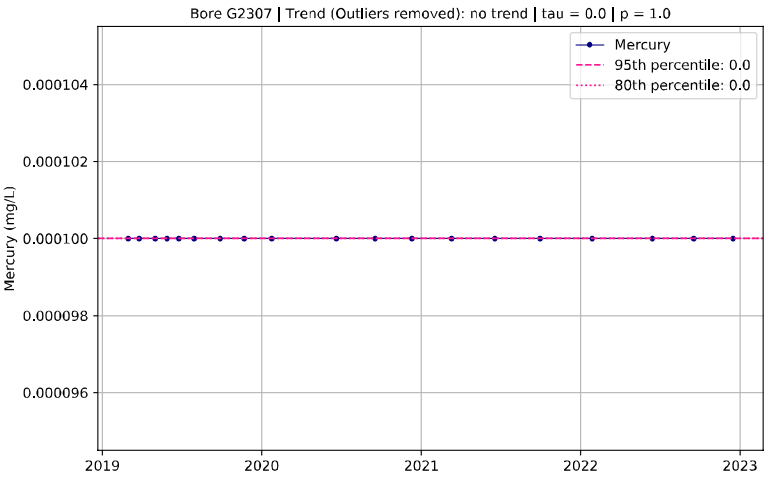

Bore G2307 | Trend: increasing | tau = 0.462 | p = 0.006
Magnesium
Statistical Outlier
Outlier removed
Magnesium (mg/L)

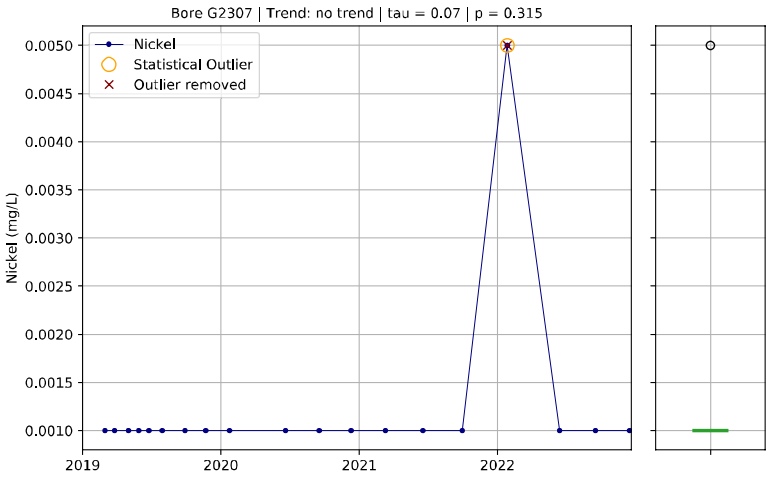

Bore G2307 | Trend (Outliers removed): increasing | tau = 0.49 | p = 0.005
Magnesium
95th percentile: 258.6
80th percentile: 255.6
Magnesium (mg/L)

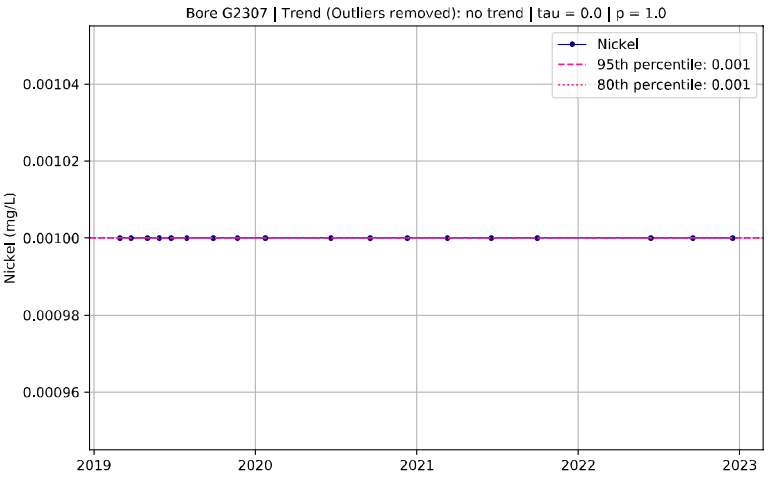

Bore G2307 | Trend: no trend | tau = -0.07 | p = 0.694
Manganese
Statistical Outlier
Outlier removed
Manganese (mg/L)
0.0500
0.0475
0.0450
0.0425
0.0400
0.0375
0.0350
0.0325
2019
2020
2021
2022

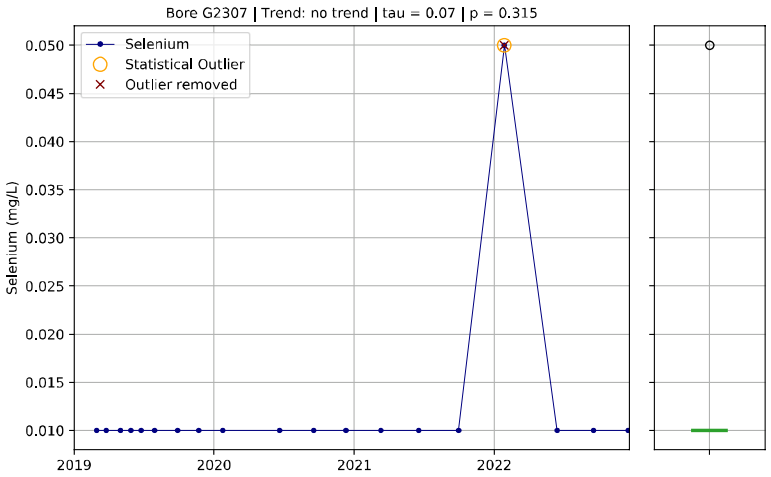

Bore G2307 | Trend (Outliers removed): no trend | tau = -0.07 | p = 0.694
Manganese
95th percentile: 0.044
80th percentile: 0.042
Manganese (mg/L)
0.0500
0.0475
0.0450
0.0425
0.0400
0.0375
0.0350
0.0325
2019
2020
2021
2022
2023

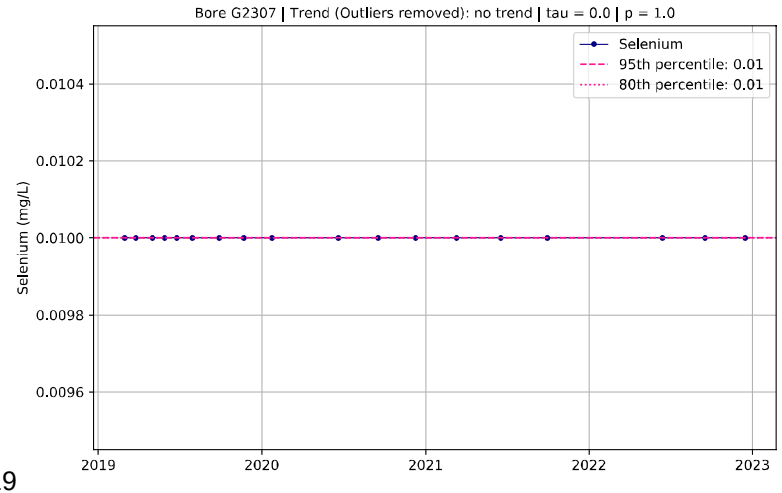

Bore G2307 | Trend: no trend | tau = 0.0 | p = 1.0
Mercury
Statistical Outlier
Outlier removed
Mercury (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022


Bore G2307 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Mercury
95th percentile: 0.0
80th percentile: 0.0
Mercury (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022
2023

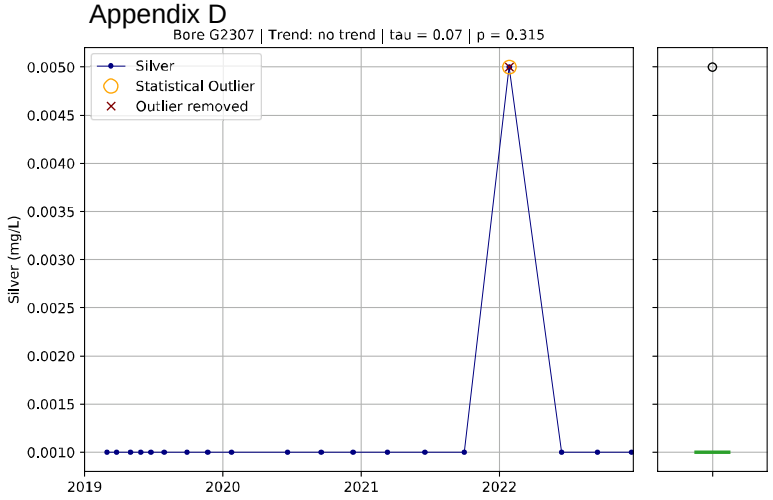

Bore G2307 | Trend: no trend | tau = 0.07 | p = 0.315
Nickel
Statistical Outlier
Outlier removed
Nickel (mg/L)
0.0050
0.0045
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
2019
2020
2021
2022

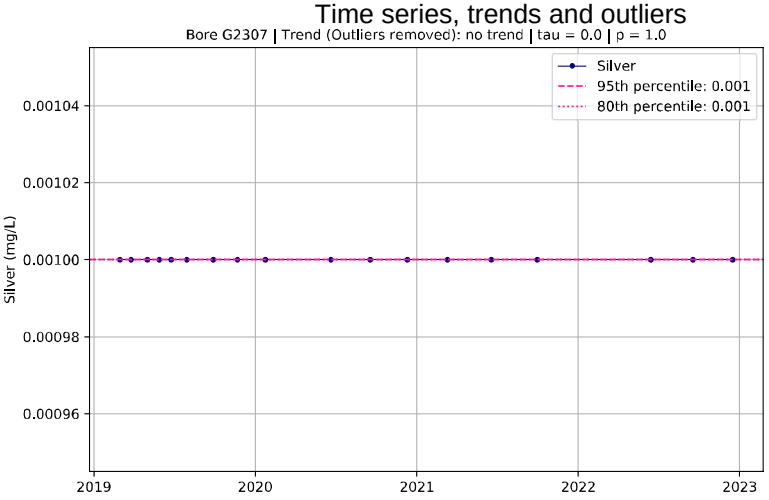

Bore G2307 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Nickel
95th percentile: 0.001
80th percentile: 0.001
Nickel (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022
2023

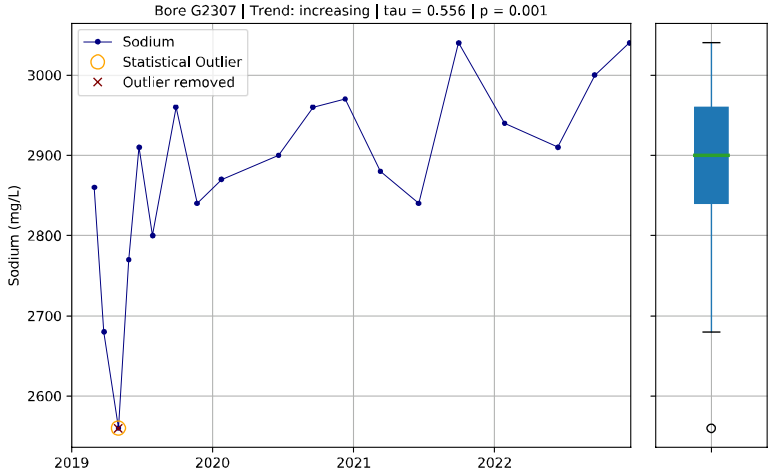

Bore G2307 | Trend: no trend | tau = 0.07 | p = 0.315
Selenium
Statistical Outlier
Outlier removed
Selenium (mg/L)
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
2019
2020
2021
2022

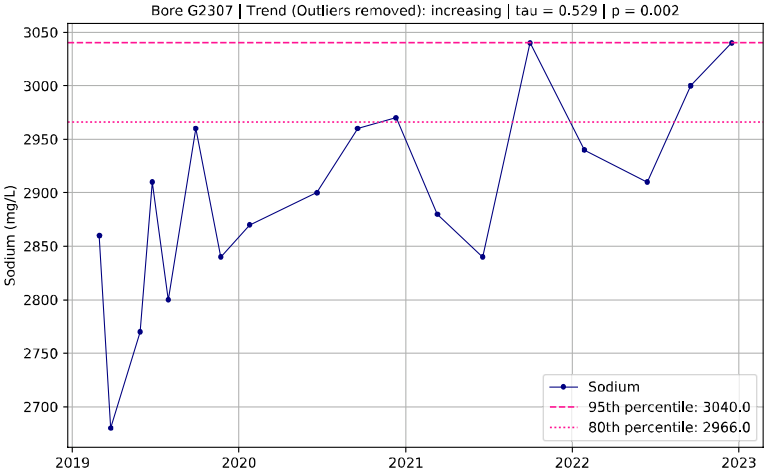

Bore G2307 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Selenium
95th percentile: 0.01
80th percentile: 0.01
Selenium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2019
2020
2021
2022
2023

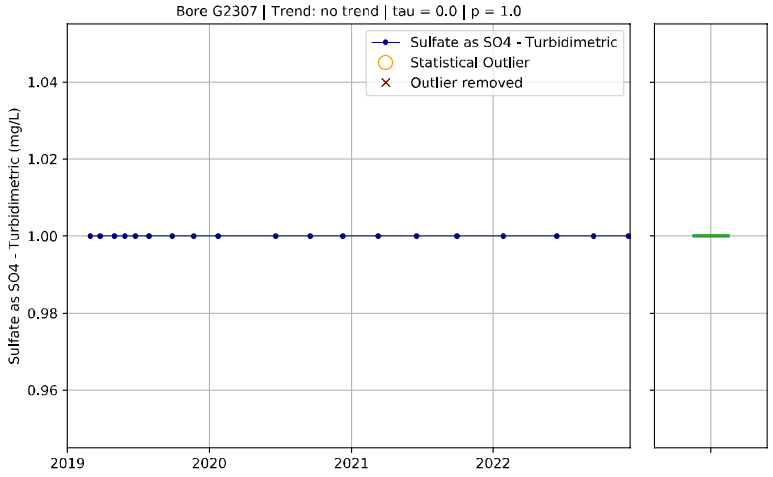
Time series, trends and outliers

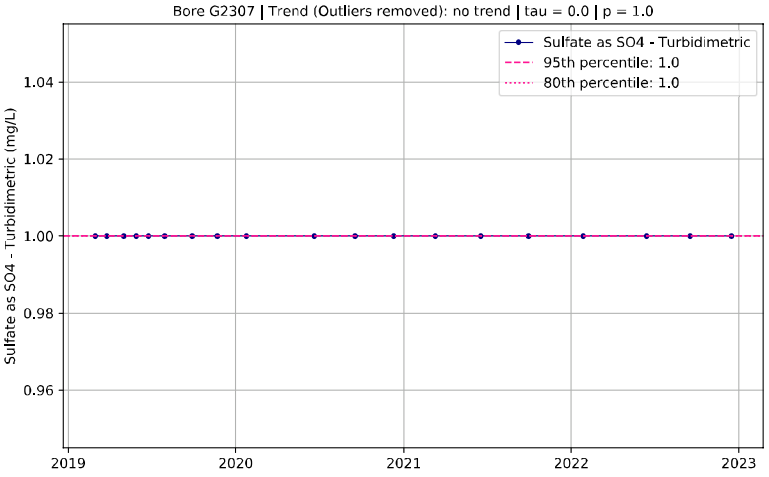


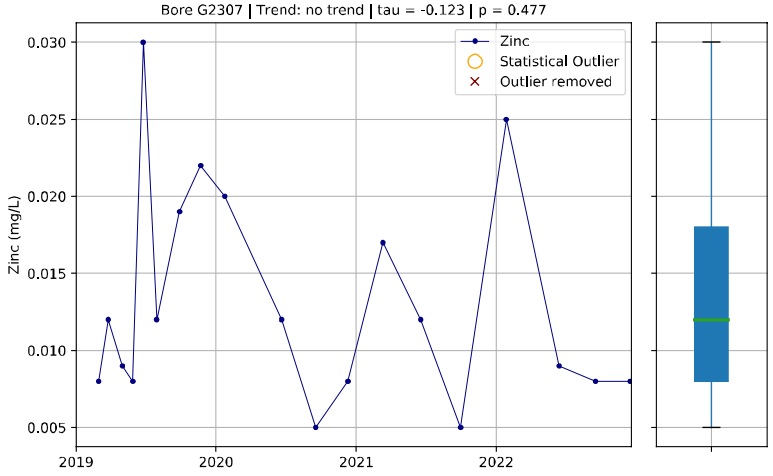


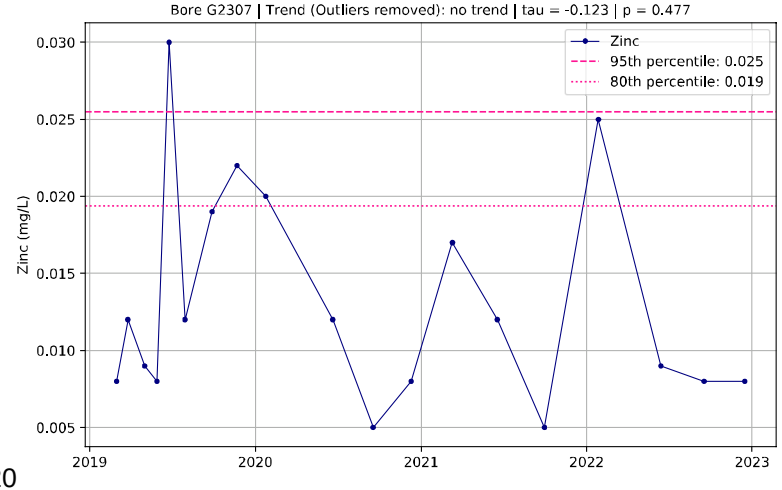


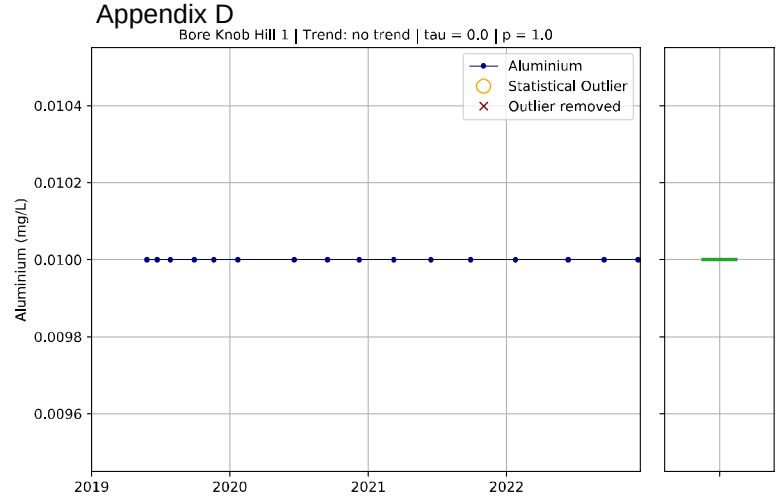


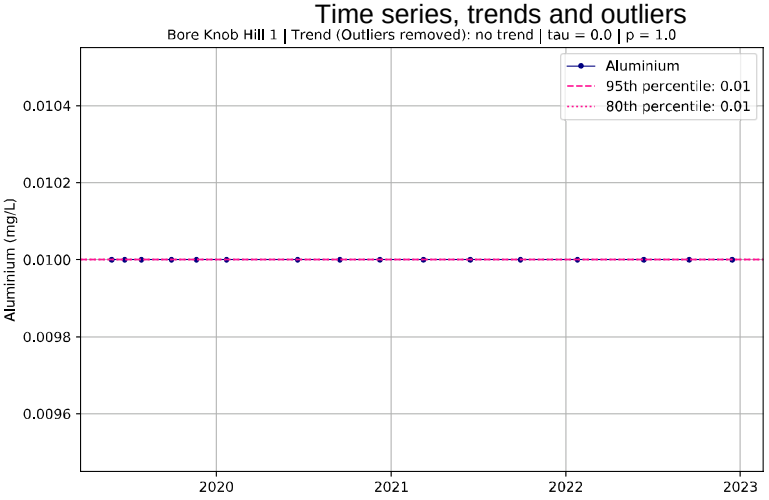


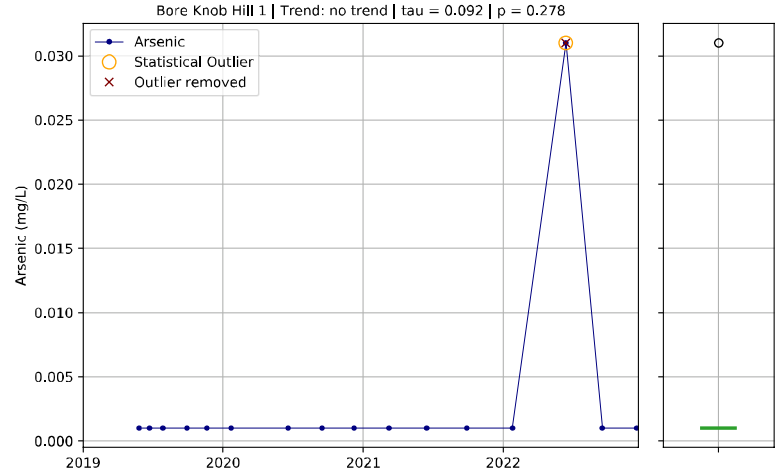


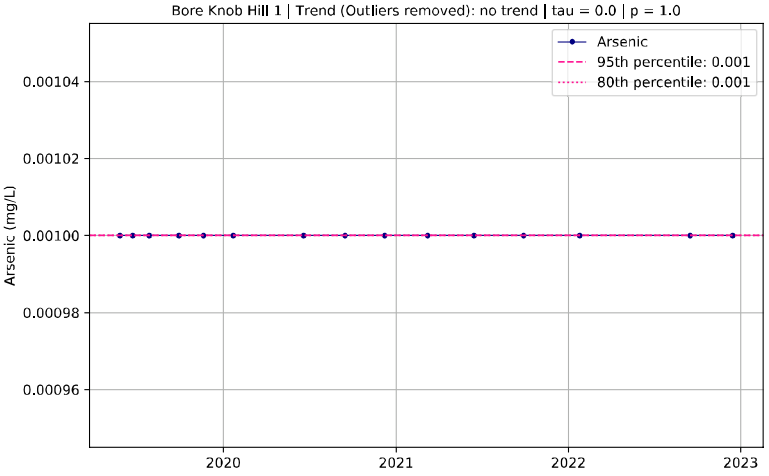


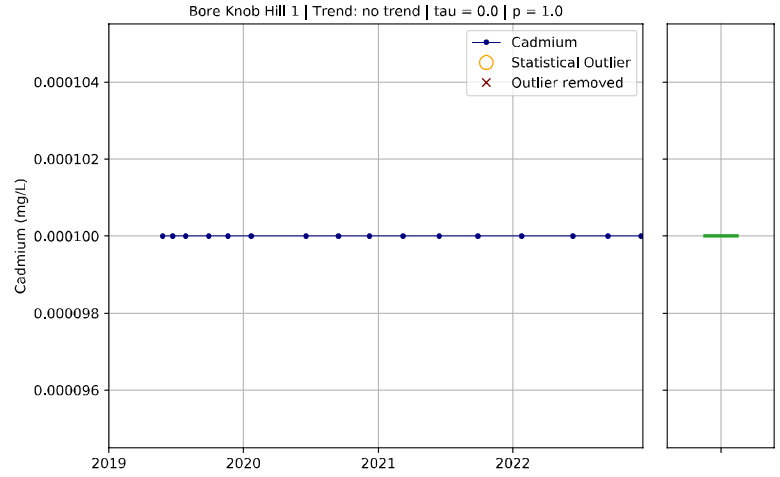


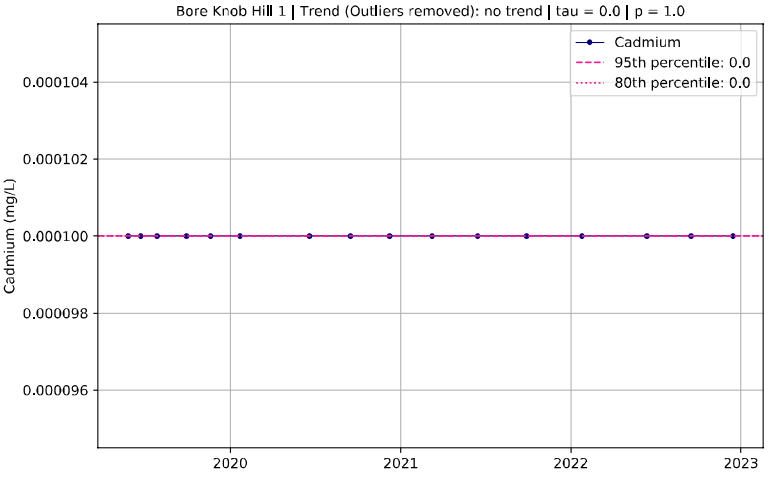

Bore Knob Hill 1 | Trend: no trend | tau = 0.0 | p = 1.0
Aluminium
Statistical Outlier
Outlier removed
Aluminium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2019
2020
2021
2022

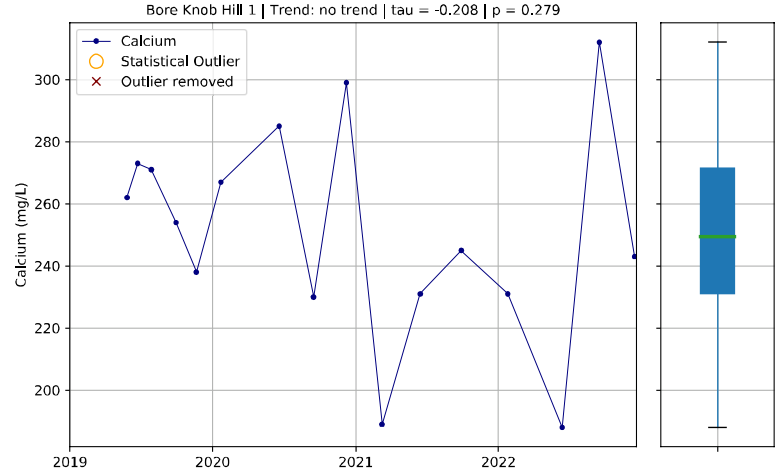

Bore Knob Hill 1 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Aluminium
95th percentile: 0.01
80th percentile: 0.01
Aluminium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2020
2021
2022
2023

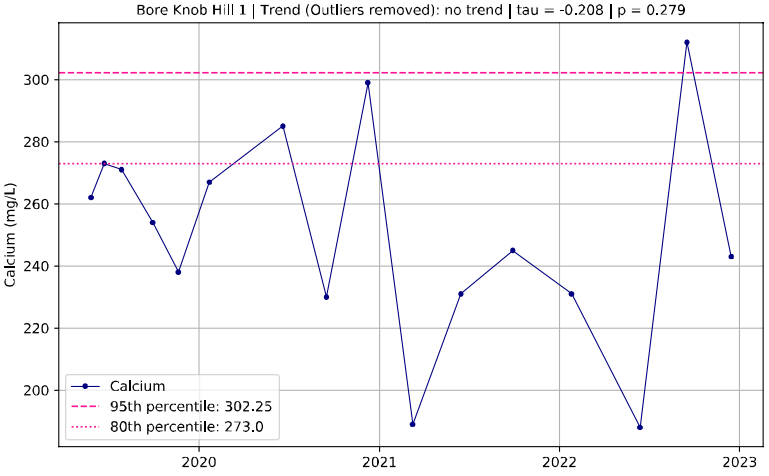

Bore Knob Hill 1 | Trend: no trend | tau = 0.092 | p = 0.278
Arsenic
Statistical Outlier
Outlier removed
Arsenic (mg/L)
0.030
0.025
0.020
0.015
0.010
0.005
0.000
2019
2020
2021
2022

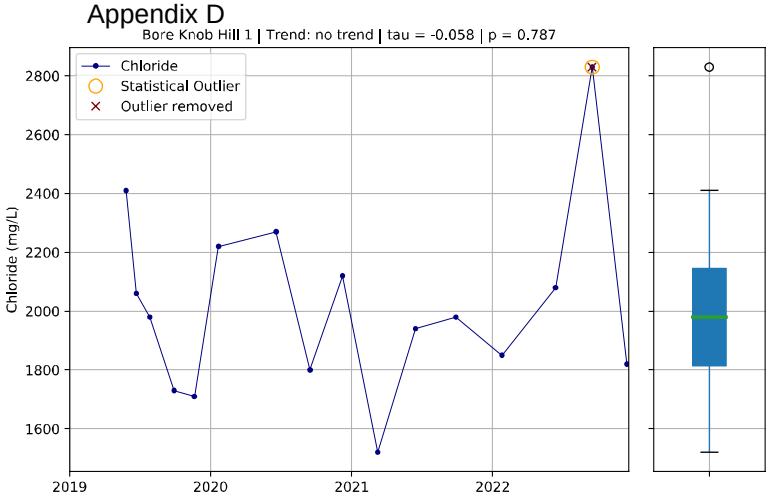

Bore Knob Hill 1 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Arsenic
95th percentile: 0.001
80th percentile: 0.001
Arsenic (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2020
2021
2022
2023

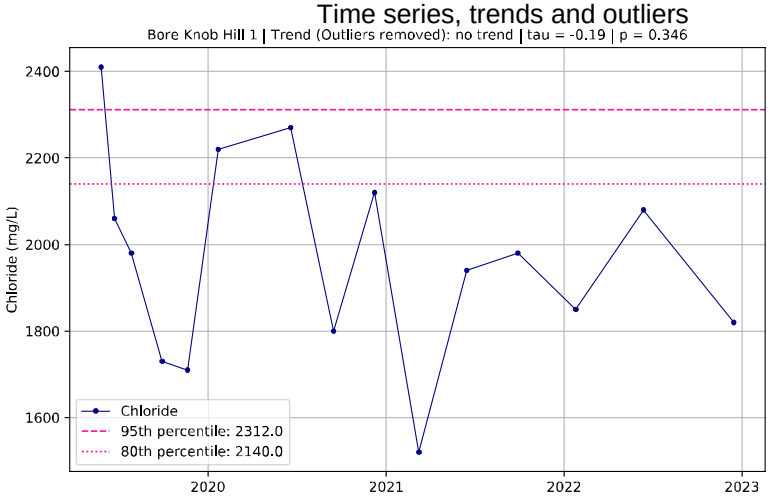

Bore Knob Hill 1 | Trend: no trend | tau = 0.0 | p = 1.0
Cadmium
Statistical Outlier
Outlier removed
Cadmium (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022

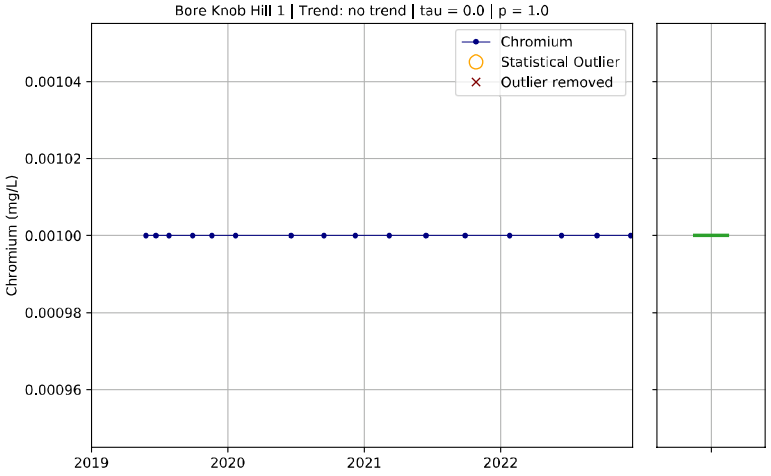

Bore Knob Hill 1 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Cadmium
95th percentile: 0.0
80th percentile: 0.0
Cadmium (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2020
2021
2022
2023

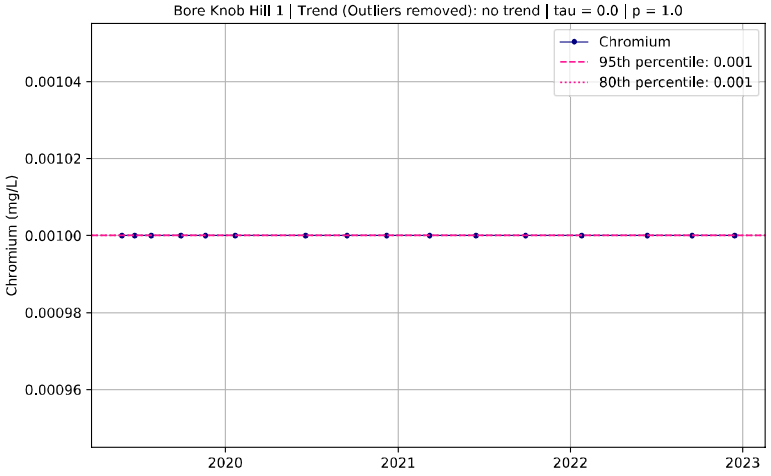

Bore Knob Hill 1 | Trend: no trend | tau = -0.208 | p = 0.279
Calcium
Statistical Outlier
Outlier removed
Calcium (mg/L)
300
280
260
240
220
200
2019
2020
2021
2022

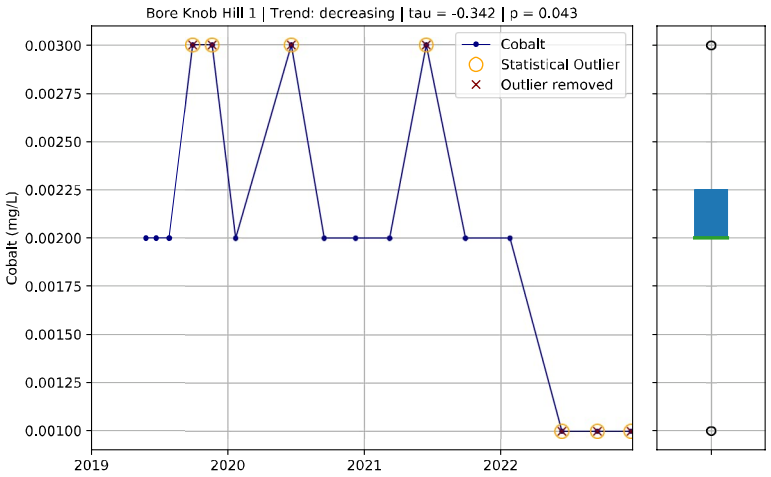

Bore Knob Hill 1 | Trend (Outliers removed): no trend | tau = -0.208 | p = 0.279
Calcium
95th percentile: 302.25
80th percentile: 273.0
Calcium (mg/L)
300
280
260
240
220
200
2020
2021
2022
2023

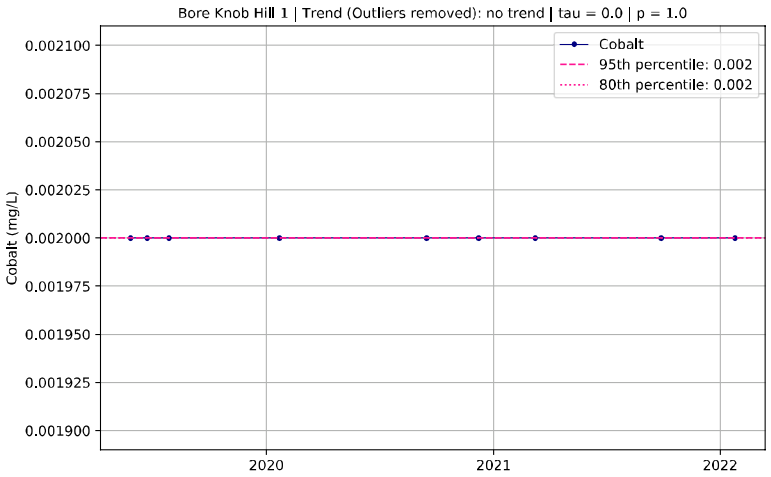

Bore Knob Hill 1 | Trend: no trend | tau = -0.058 | p = 0.787
Chloride
Statistical Outlier
Outlier removed
Chloride (mg/L)

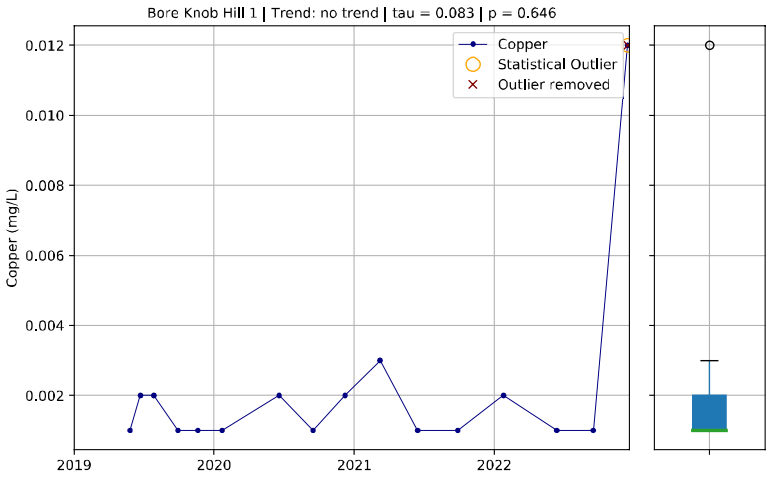

Bore Knob Hill 1 | Trend (Outliers removed): no trend | tau = -0.19 | p = 0.346
Chloride
95th percentile: 2312.0
80th percentile: 2140.0
Chloride (mg/L)

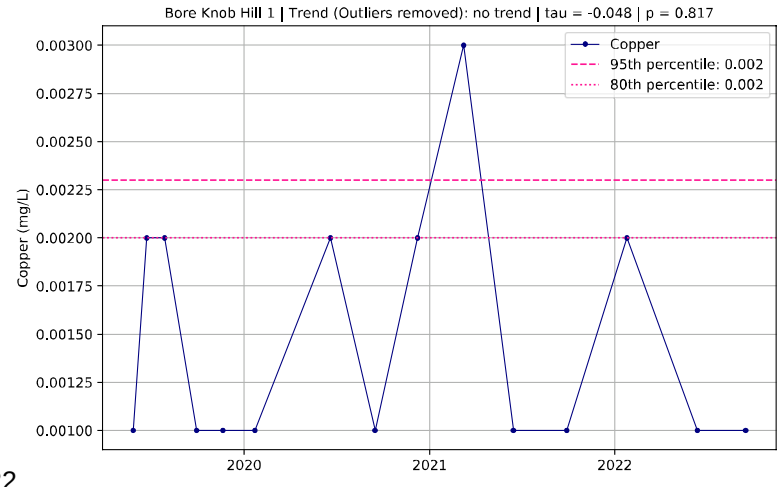

Bore Knob Hill 1 | Trend: no trend | tau = 0.0 | p = 1.0
Chromium
Statistical Outlier
Outlier removed
Chromium (mg/L)

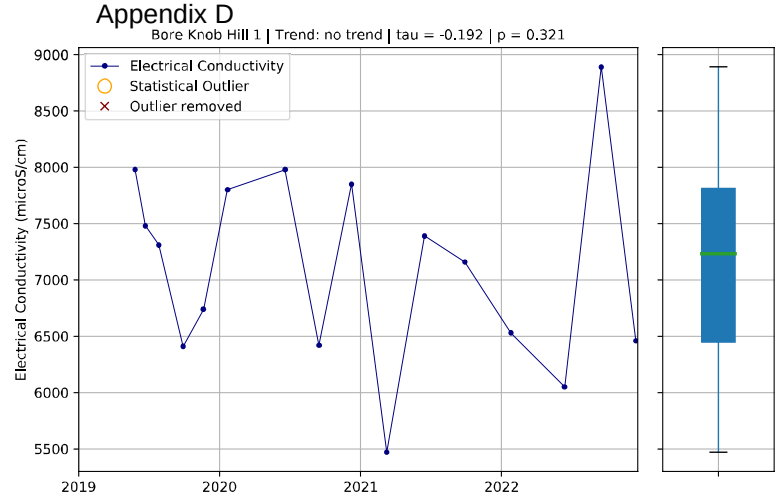

Bore Knob Hill 1 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Chromium
95th percentile: 0.001
80th percentile: 0.001
Chromium (mg/L)

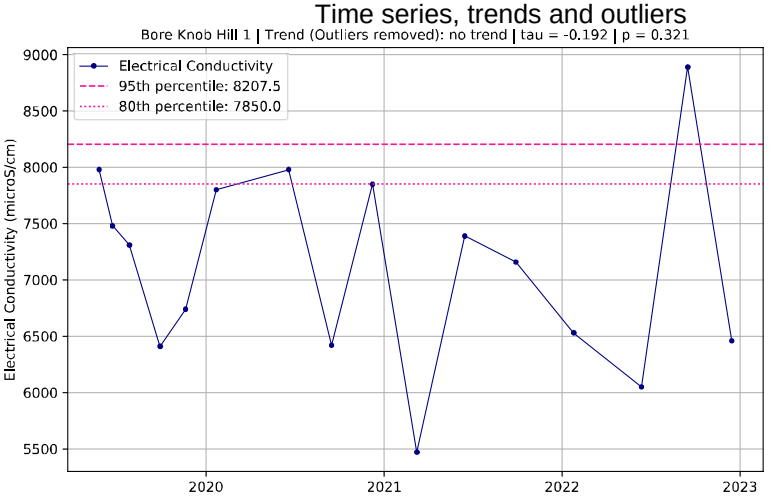

Bore Knob Hill 1 | Trend: decreasing | tau = -0.342 | p = 0.043
Cobalt
Statistical Outlier
Outlier removed
Cobalt (mg/L)

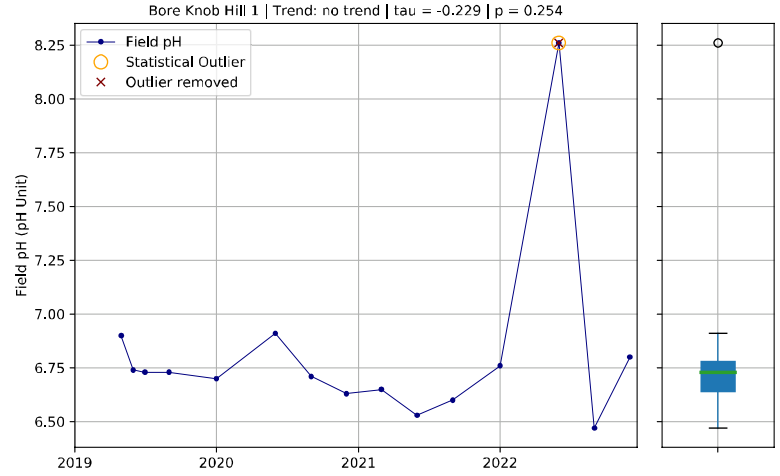

Bore Knob Hill 1 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Cobalt
95th percentile: 0.002
80th percentile: 0.002
Cobalt (mg/L)

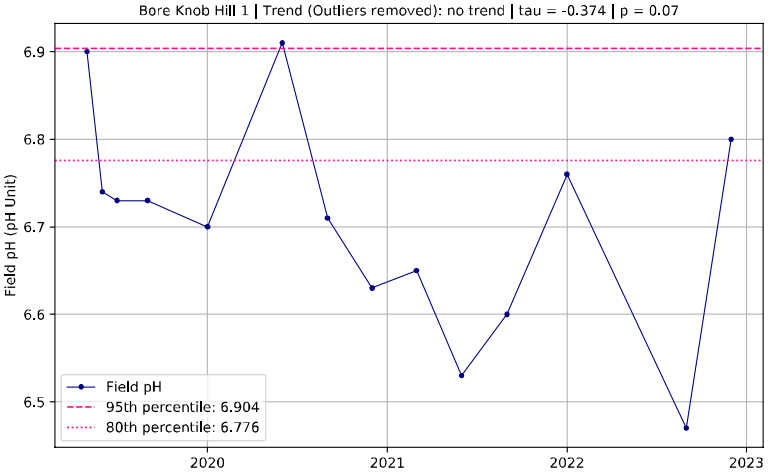

Bore Knob Hill 1 | Trend: no trend | tau = 0.083 | p = 0.646
Copper
Statistical Outlier
Outlier removed
Copper (mg/L)

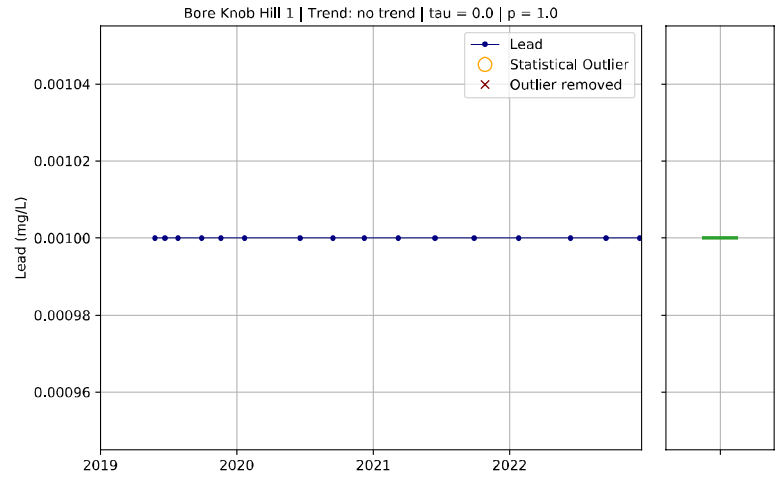

Bore Knob Hill 1 | Trend (Outliers removed): no trend | tau = -0.048 | p = 0.817
Copper
95th percentile: 0.002
80th percentile: 0.002
Copper (mg/L)

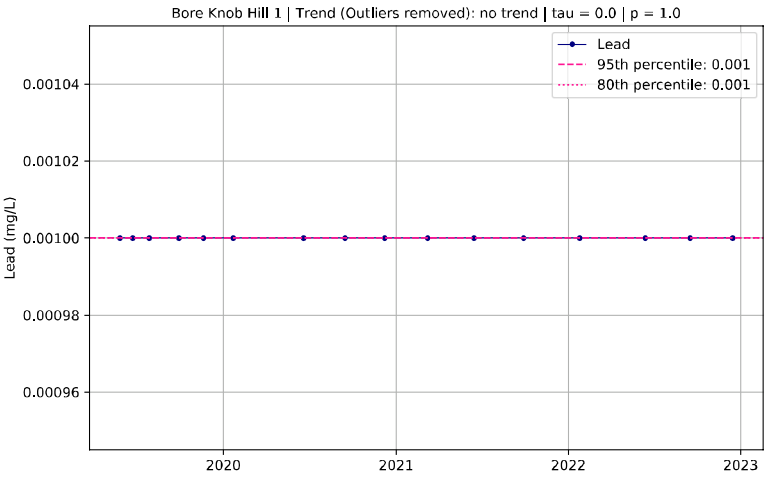

Bore Knob Hill 1 | Trend: no trend | tau = -0.192 | p = 0.321
Electrical Conductivity
Statistical Outlier
Outlier removed
Electrical Conductivity (microS/cm)

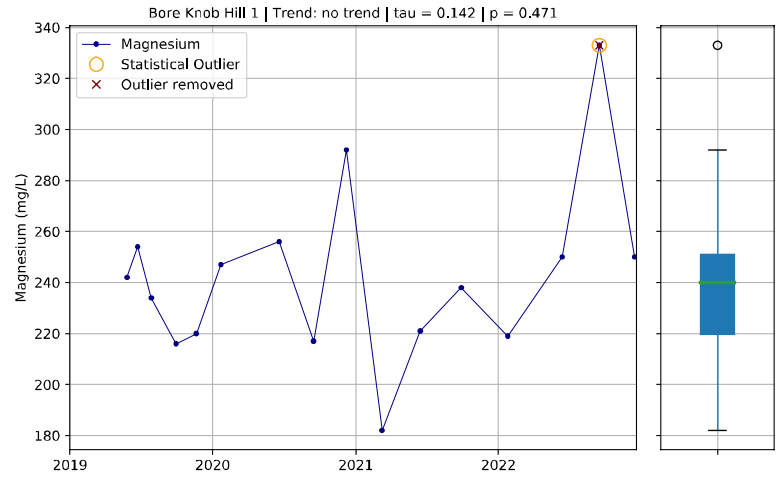

Bore Knob Hill 1 | Trend (Outliers removed): no trend | tau = -0.192 | p = 0.321
Electrical Conductivity
95th percentile: 8207.5
80th percentile: 7850.0
Electrical Conductivity (microS/cm)

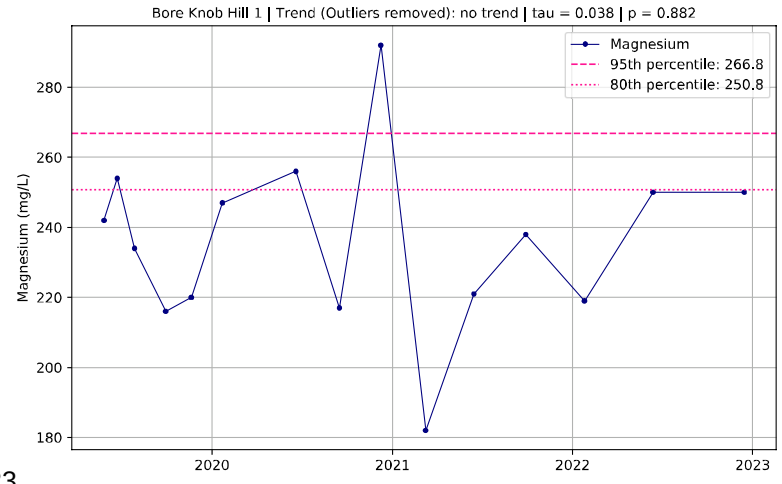

Bore Knob Hill 1 | Trend: no trend | tau = -0.229 | p = 0.254
Field pH
Statistical Outlier
Outlier removed
Field pH (pH Unit)

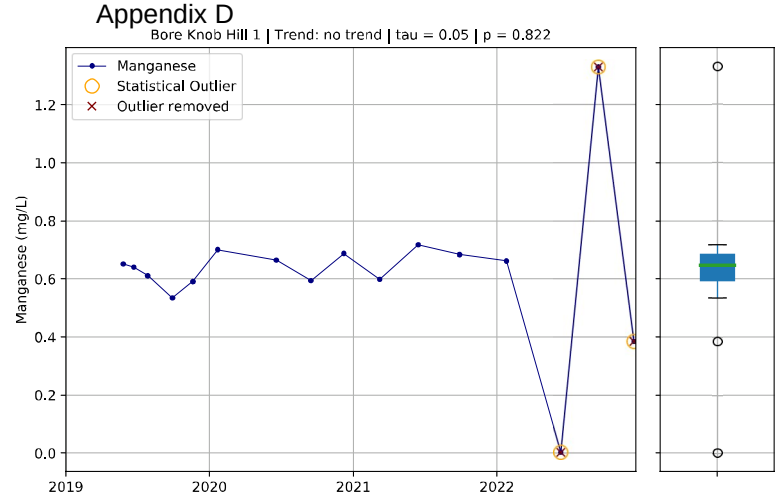

Bore Knob Hill 1 | Trend (Outliers removed): no trend | tau = -0.374 | p = 0.07
Field pH
95th percentile: 6.904
80th percentile: 6.776
Field pH (pH Unit)

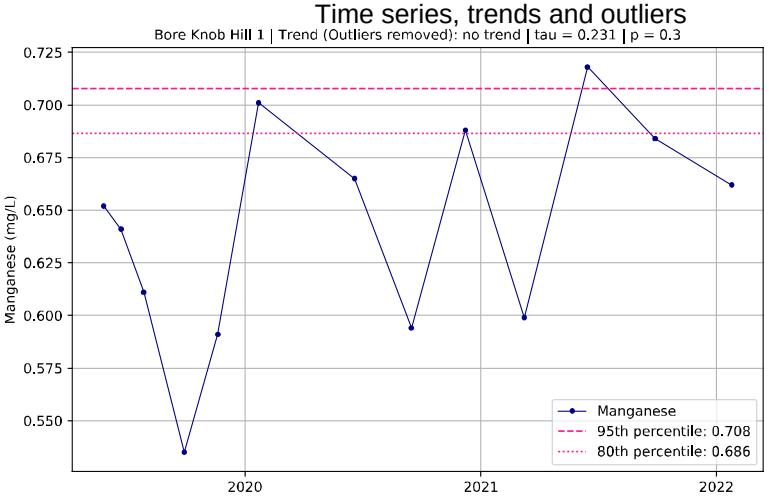

Bore Knob Hill 1 | Trend: no trend | tau = 0.0 | p = 1.0
Lead
Statistical Outlier
Outlier removed
Lead (mg/L)

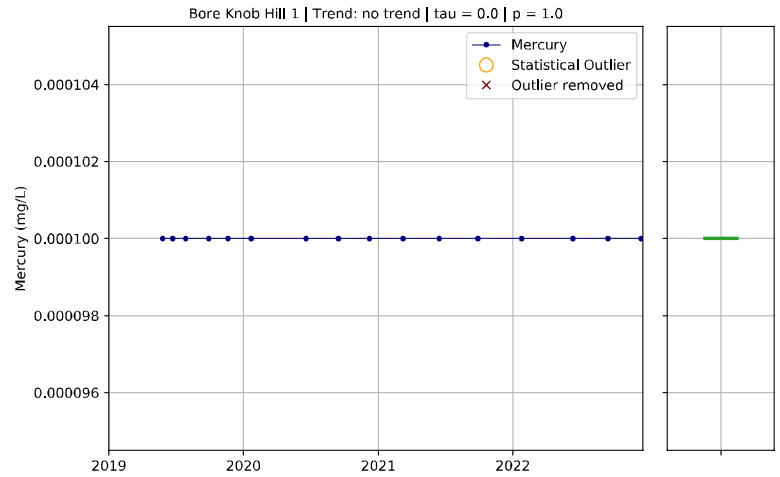

Bore Knob Hill 1 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Lead
95th percentile: 0.001
80th percentile: 0.001
Lead (mg/L)

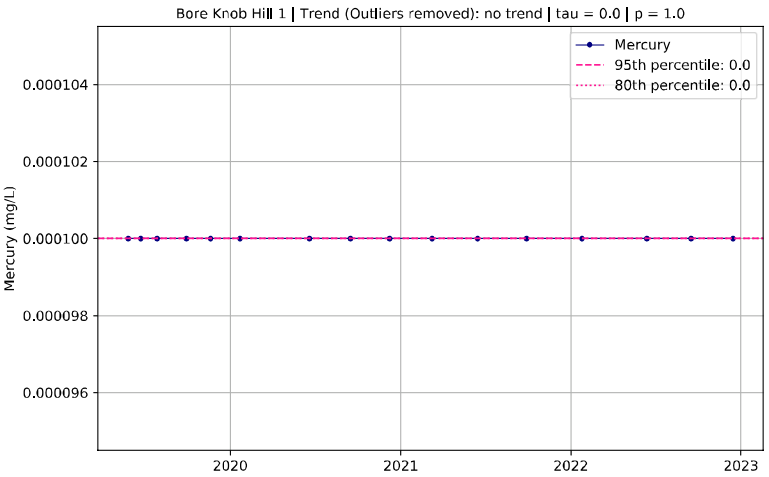

Bore Knob Hill 1 | Trend: no trend | tau = 0.142 | p = 0.471
Magnesium
Statistical Outlier
Outlier removed
Magnesium (mg/L)

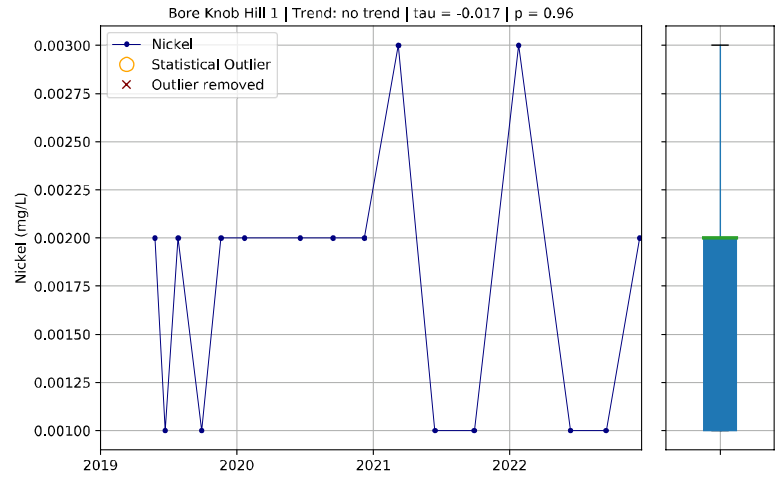

Bore Knob Hill 1 | Trend (Outliers removed): no trend | tau = 0.038 | p = 0.882
Magnesium
95th percentile: 266.8
80th percentile: 250.8
Magnesium (mg/L)

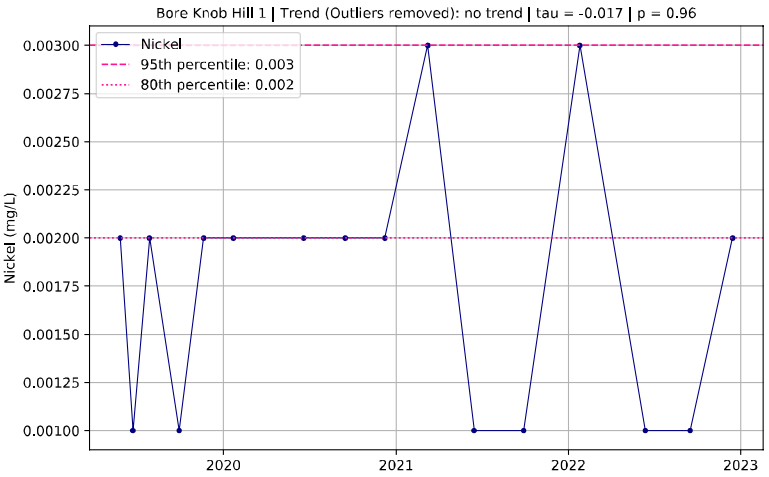

Bore Knob Hill 1 | Trend: no trend | tau = 0.05 | p = 0.822
Manganese
Statistical Outlier
Outlier removed
Manganese (mg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
2019
2020
2021
2022

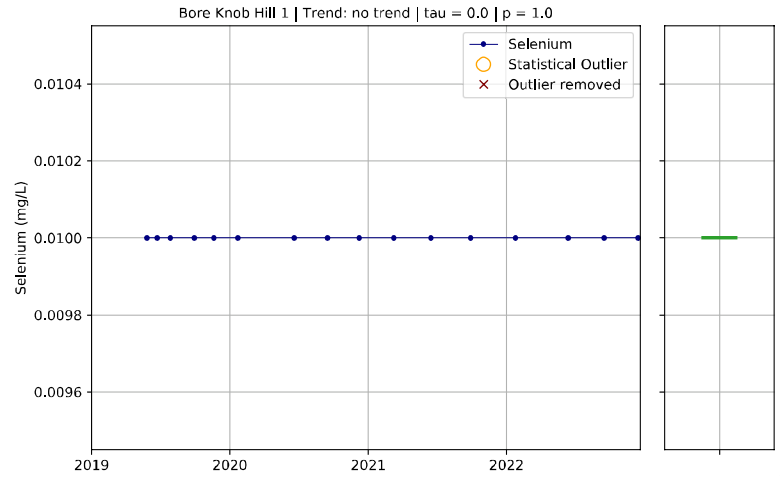

Bore Knob Hill 1 | Trend (Outliers removed): no trend | tau = 0.231 | p = 0.3
Manganese (mg/L)
0.550
0.575
0.600
0.625
0.650
0.675
0.700
0.725
Manganese
95th percentile: 0.708
80th percentile: 0.686
2020
2021
2022

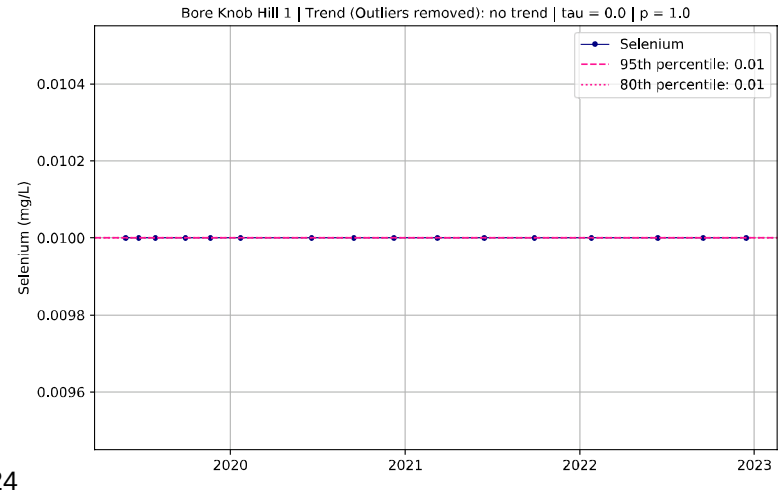

Bore Knob Hill 1 | Trend: no trend | tau = 0.0 | p = 1.0
Mercury
Statistical Outlier
Outlier removed
Mercury (mg/L)
0.000096
0.000098
0.000100
0.000102
0.000104
2019
2020
2021
2022

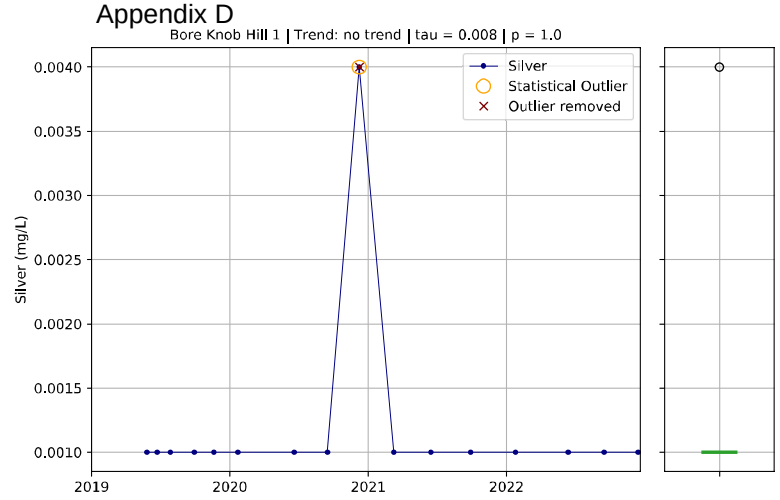

Bore Knob Hill 1 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Mercury
95th percentile: 0.0
80th percentile: 0.0
Mercury (mg/L)
0.000096
0.000098
0.000100
0.000102
0.000104
2020
2021
2022
2023

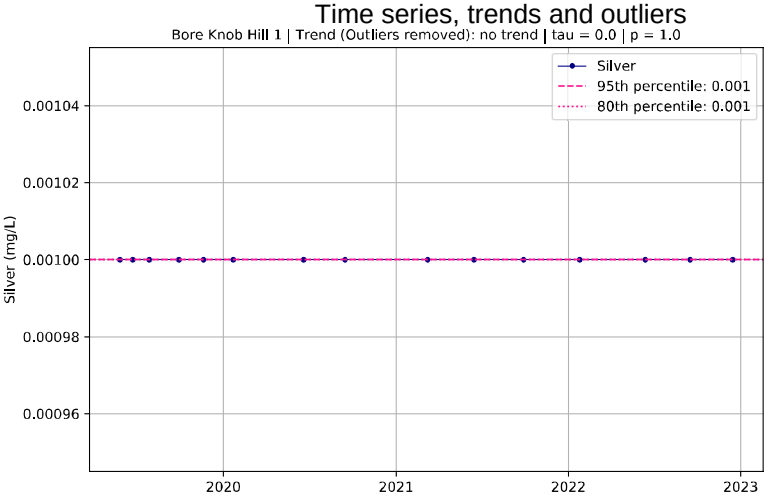

Bore Knob Hill 1 | Trend: no trend | tau = -0.017 | p = 0.96
Nickel
Statistical Outlier
Outlier removed
Nickel (mg/L)
0.00100
0.00125
0.00150
0.00175
0.00200
0.00225
0.00250
0.00275
0.00300
2019
2020
2021
2022

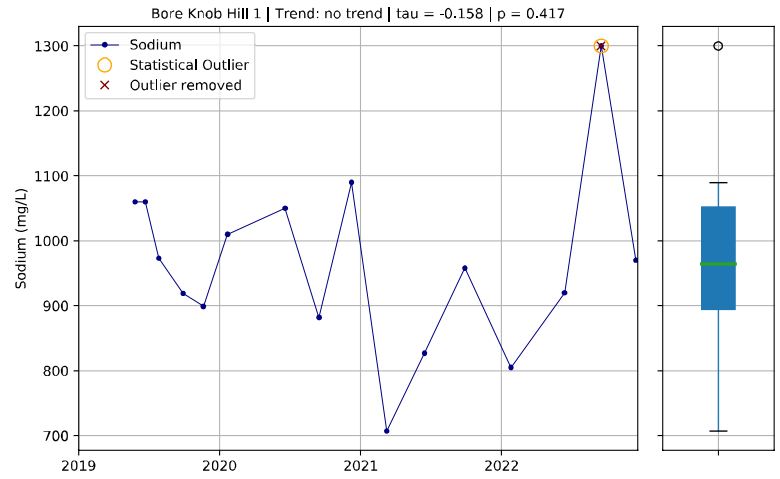

Bore Knob Hill 1 | Trend (Outliers removed): no trend | tau = -0.017 | p = 0.96
Nickel
95th percentile: 0.003
80th percentile: 0.002
Nickel (mg/L)
0.00100
0.00125
0.00150
0.00175
0.00200
0.00225
0.00250
0.00275
0.00300
2020
2021
2022
2023

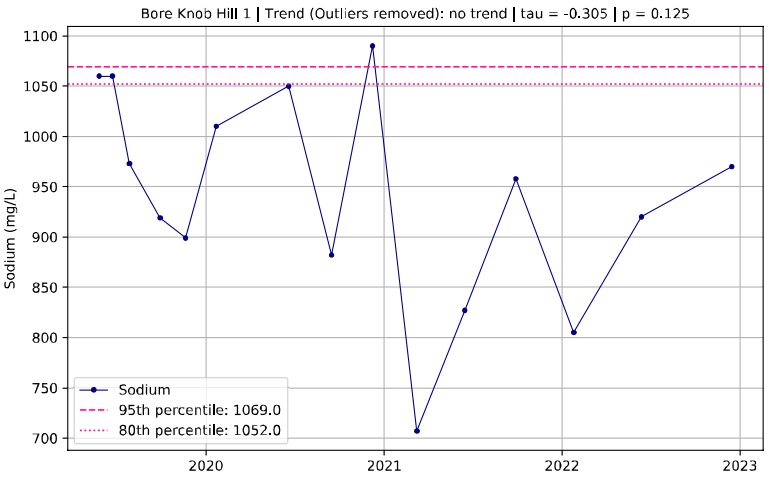

Bore Knob Hill 1 | Trend: no trend | tau = 0.0 | p = 1.0
Selenium
Statistical Outlier
Outlier removed
Selenium (mg/L)
0.0096
0.0098
0.0100
0.0102
0.0104
2019
2020
2021
2022

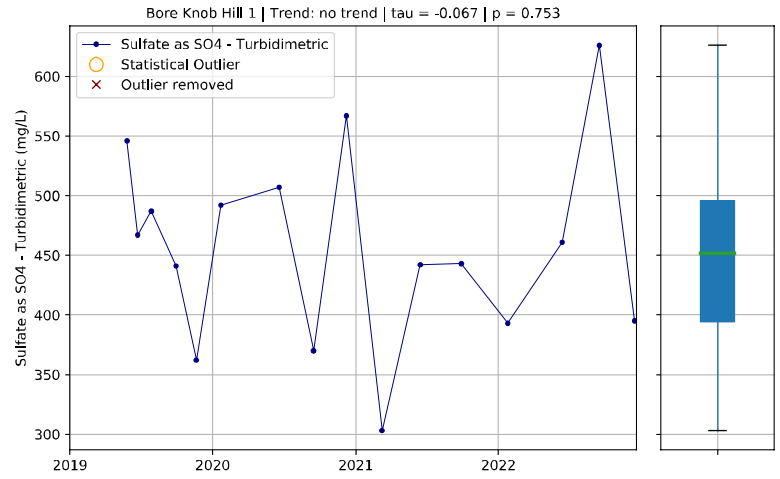

Bore Knob Hill 1 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Selenium
95th percentile: 0.01
80th percentile: 0.01
Selenium (mg/L)
0.0096
0.0098
0.0100
0.0102
0.0104
2020
2021
2022
2023

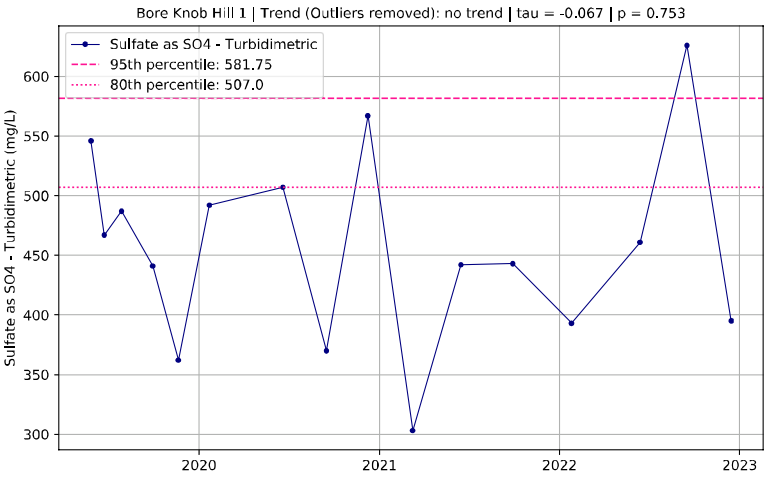

Bore Knob Hill 1 | Trend: no trend | tau = 0.008 | p = 1.0
Silver
Statistical Outlier
Outlier removed
Silver (mg/L)
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
2019
2020
2021
2022

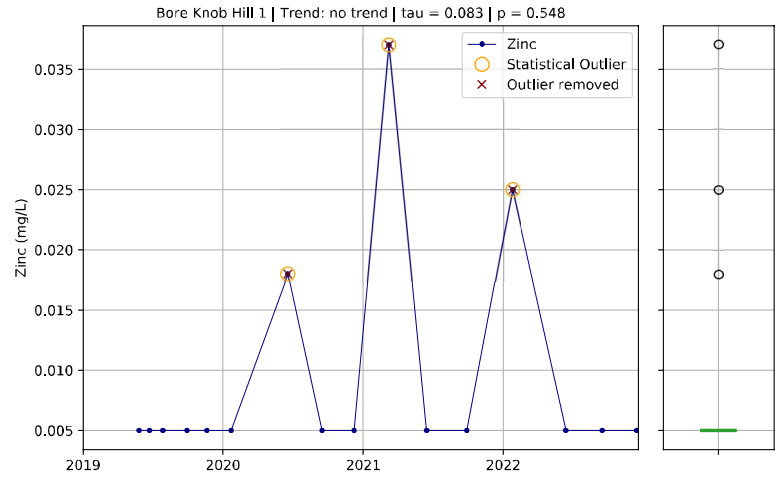

Bore Knob Hill 1 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Silver
95th percentile: 0.001
80th percentile: 0.001
Silver (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2020
2021
2022
2023

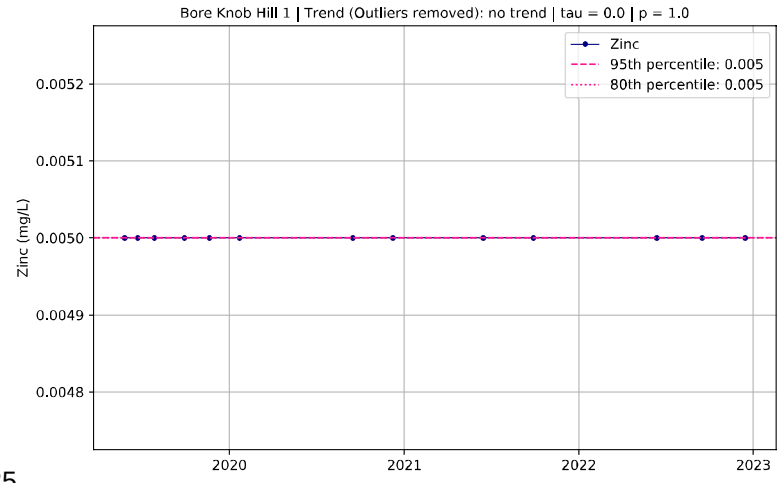

Bore Knob Hill 1 | Trend: no trend | tau = -0.158 | p = 0.417
Sodium
Statistical Outlier
Outlier removed
Sodium (mg/L)
1300
1200
1100
1000
900
800
700
2019
2020
2021
2022

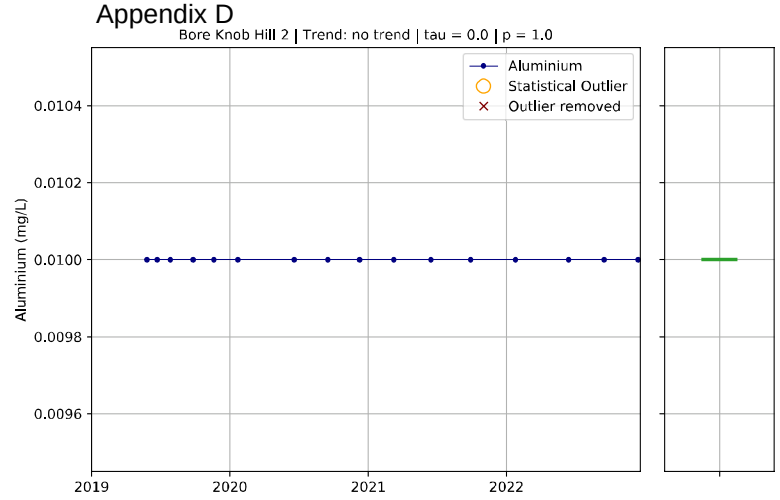

Bore Knob Hill 1 | Trend (Outliers removed): no trend | tau = -0.305 | p = 0.125
Sodium
95th percentile: 1069.0
80th percentile: 1052.0
Sodium (mg/L)
1100
1050
1000
950
900
850
800
750
700
2020
2021
2022
2023

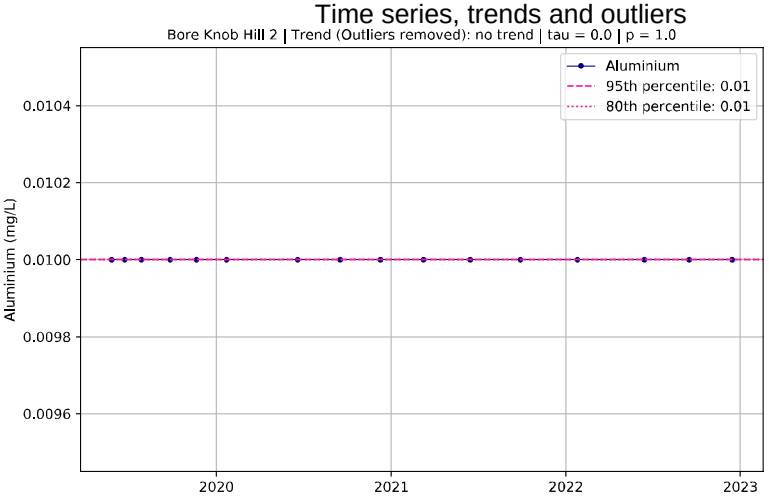

Bore Knob Hill 1 | Trend: no trend | tau = -0.067 | p = 0.753
Sulfate as SO4 - Turbidimetric
Statistical Outlier
Outlier removed
Sulfate as SO4 - Turbidimetric (mg/L)
600
550
500
450
400
350
300
2019
2020
2021
2022

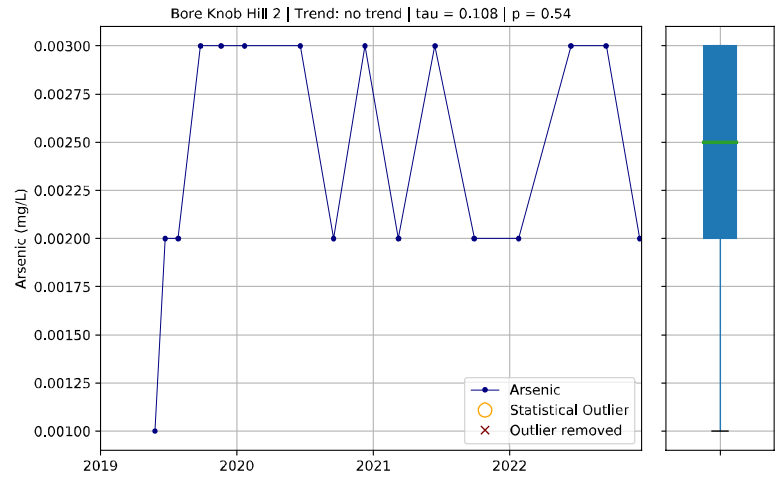

Bore Knob Hill 1 | Trend (Outliers removed): no trend | tau = -0.067 | p = 0.753
Sulfate as SO4 - Turbidimetric
95th percentile: 581.75
80th percentile: 507.0
Sulfate as SO4 - Turbidimetric (mg/L)
600
550
500
450
400
350
300
2020
2021
2022
2023

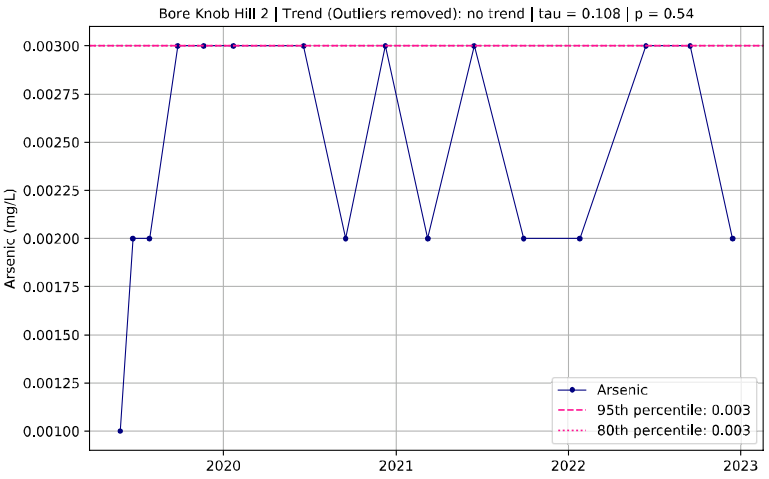

Bore Knob Hill 1 | Trend: no trend | tau = 0.083 | p = 0.548
Zinc
Statistical Outlier
Outlier removed
Zinc (mg/L)
0.035
0.030
0.025
0.020
0.015
0.010
0.005
2019
2020
2021
2022

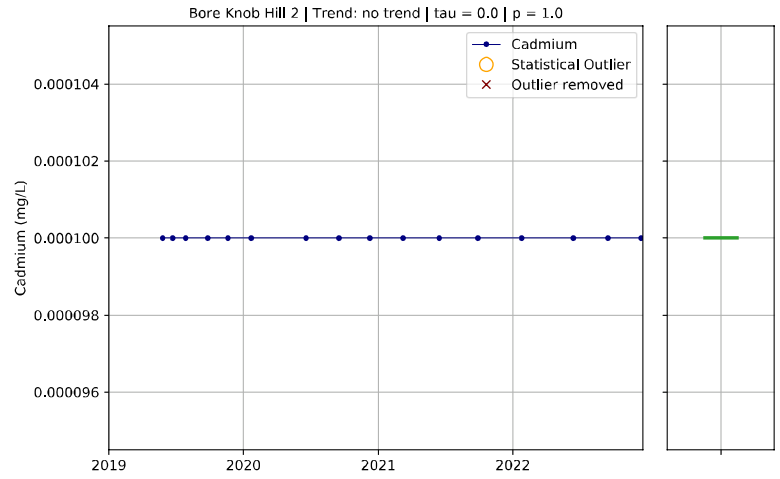

Bore Knob Hill 1 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Zinc
95th percentile: 0.005
80th percentile: 0.005
Zinc (mg/L)
0.0052
0.0051
0.0050
0.0049
0.0048
2020
2021
2022
2023

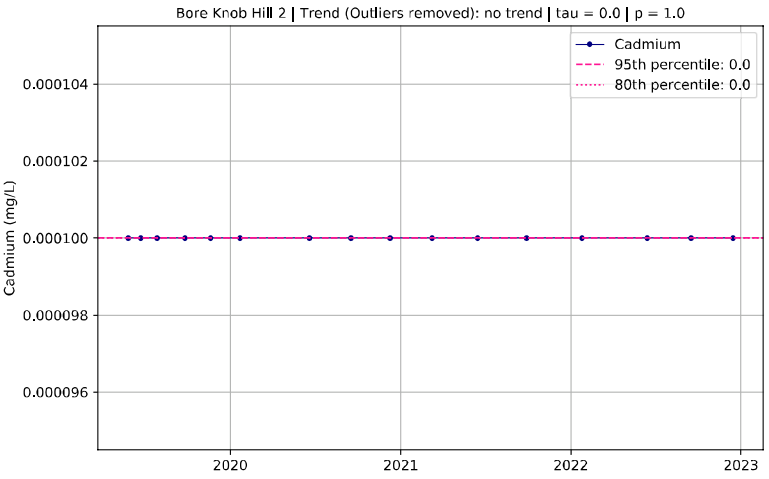

Bore Knob Hill 2 | Trend: no trend | tau = 0.0 | p = 1.0
Aluminium
Statistical Outlier
Outlier removed
Aluminium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2019
2020
2021
2022

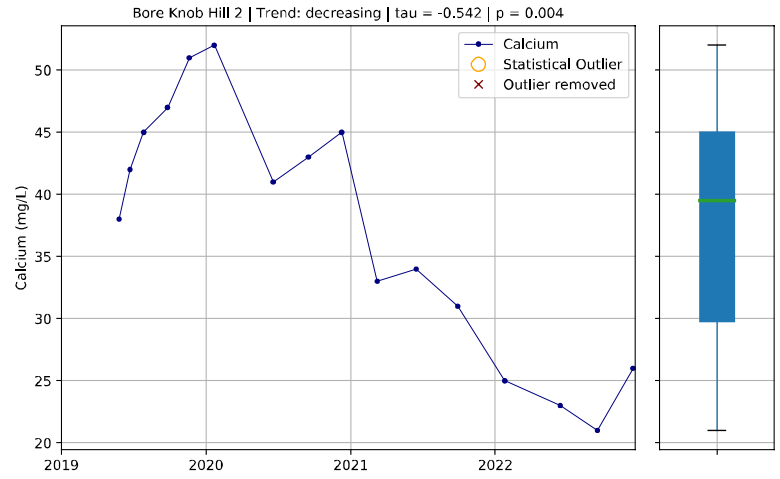

Bore Knob Hill 2 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Aluminium
95th percentile: 0.01
80th percentile: 0.01
Aluminium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2020
2021
2022
2023

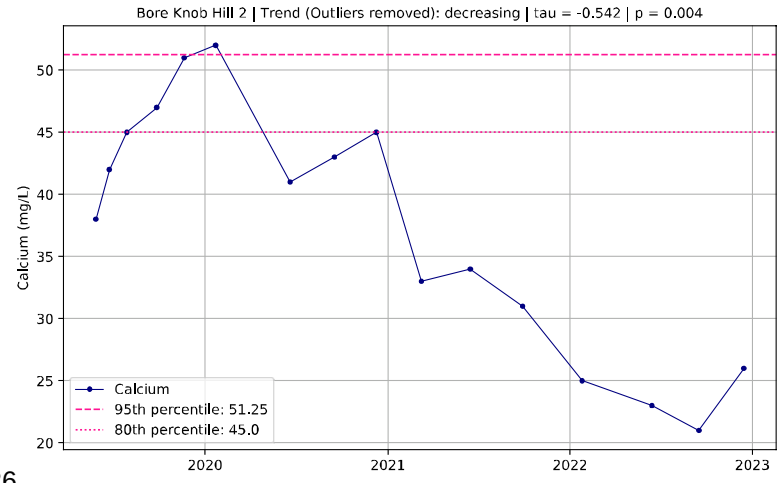

Bore Knob Hill 2 | Trend: no trend | tau = 0.108 | p = 0.54
Arsenic
Statistical Outlier
Outlier removed
Arsenic (mg/L)
0.00300
0.00275
0.00250
0.00225
0.00200
0.00175
0.00150
0.00125
0.00100
2019
2020
2021
2022

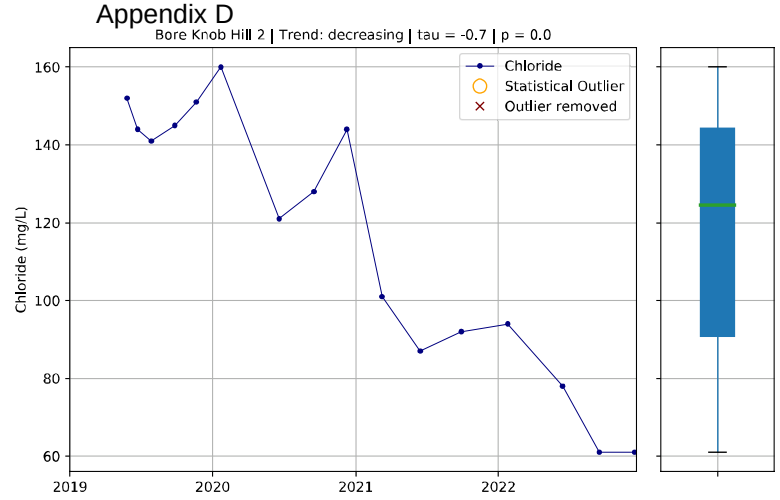

Bore Knob Hill 2 | Trend (Outliers removed): no trend | tau = 0.108 | p = 0.54
Arsenic
95th percentile: 0.003
80th percentile: 0.003
Arsenic (mg/L)
0.00300
0.00275
0.00250
0.00225
0.00200
0.00175
0.00150
0.00125
0.00100
2020
2021
2022
2023

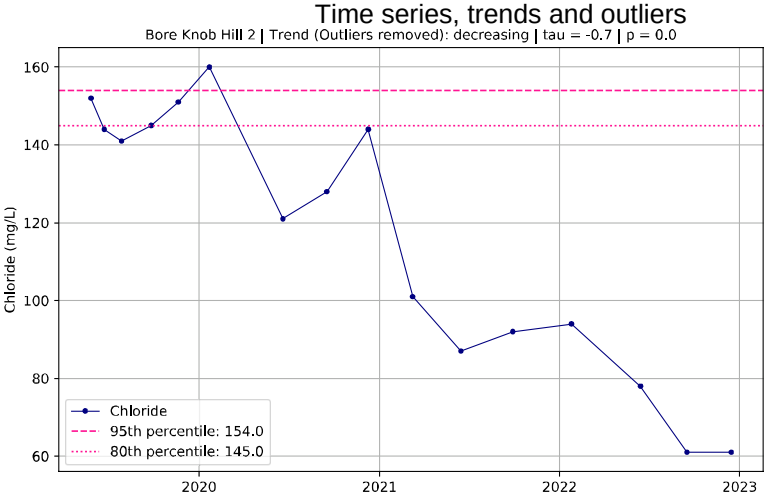

Bore Knob Hill 2 | Trend: no trend | tau = 0.0 | p = 1.0
Cadmium
Statistical Outlier
Outlier removed
Cadmium (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022

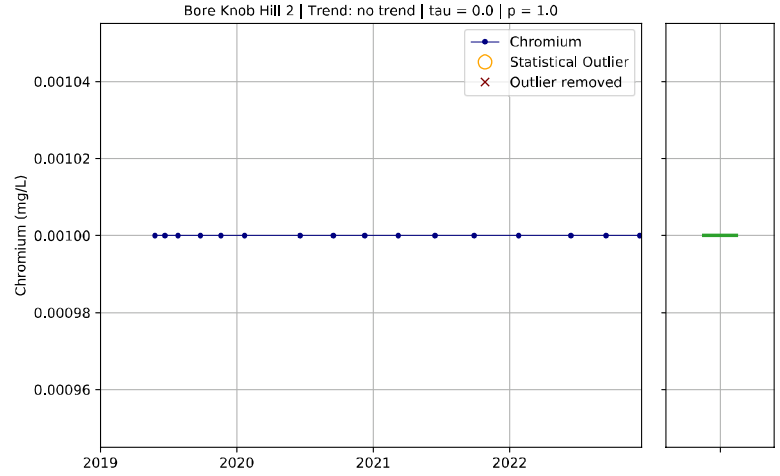

Bore Knob Hill 2 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Cadmium
95th percentile: 0.0
80th percentile: 0.0
Cadmium (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2020
2021
2022
2023

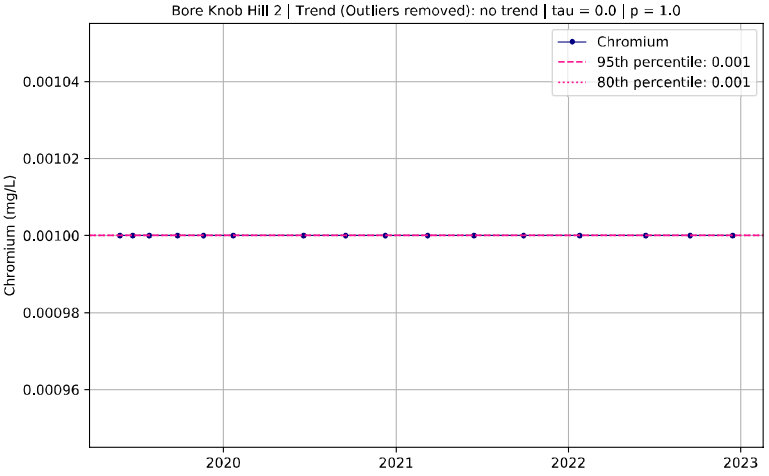

Bore Knob Hill 2 | Trend: decreasing | tau = -0.542 | p = 0.004
Calcium
Statistical Outlier
Outlier removed
Calcium (mg/L)
50
45
40
35
30
25
20
2019
2020
2021
2022

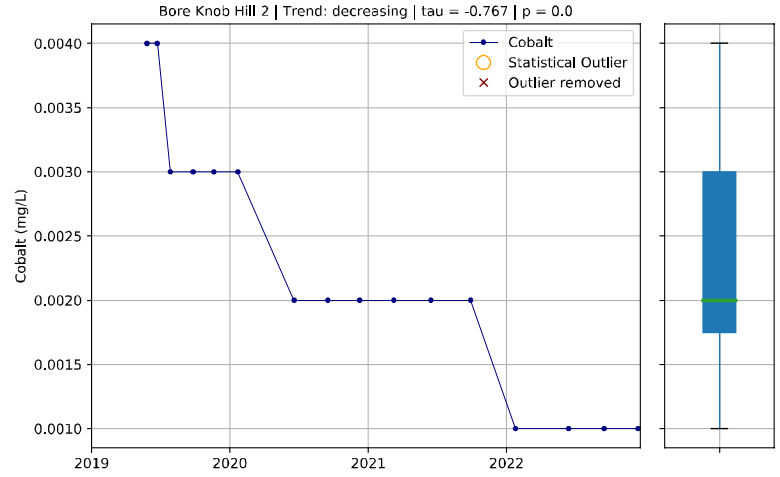

Bore Knob Hill 2 | Trend (Outliers removed): decreasing | tau = -0.542 | p = 0.004
Calcium
95th percentile: 51.25
80th percentile: 45.0
Calcium (mg/L)
50
45
40
35
30
25
20
2020
2021
2022
2023

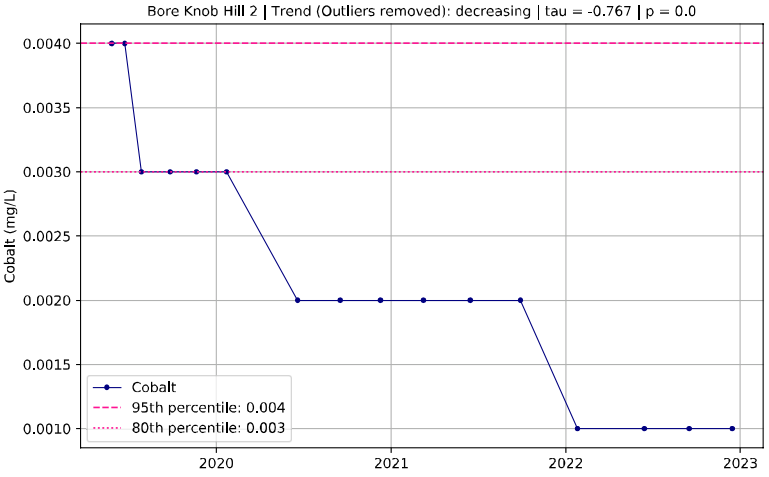

Bore Knob Hill 2 | Trend: decreasing | tau = -0.7 | p = 0.0
Chloride
Statistical Outlier
Outlier removed
Chloride (mg/L)
160
140
120
100
80
60
2019
2020
2021
2022

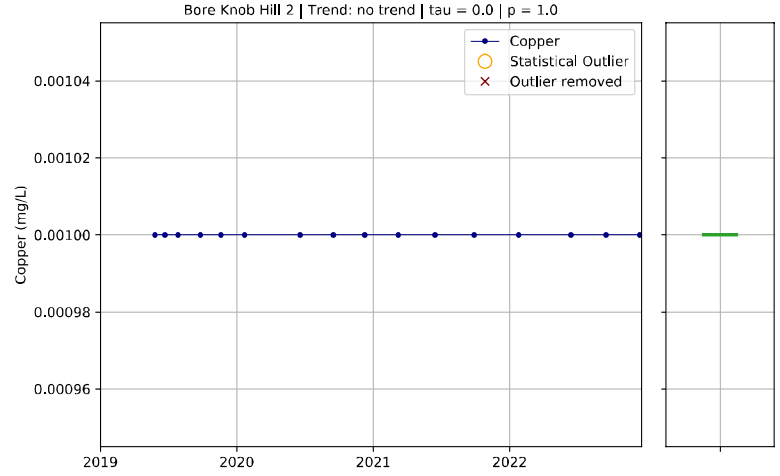

Bore Knob Hill 2 | Trend (Outliers removed): decreasing | tau = -0.7 | p = 0.0
Chloride (mg/L)
160
140
120
100
80
60
Chloride
95th percentile: 154.0
80th percentile: 145.0
2020
2021
2022
2023

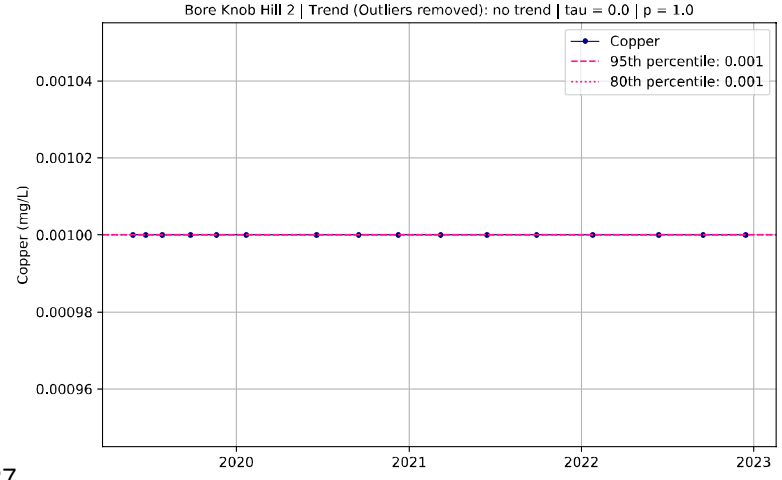

Bore Knob Hill 2 | Trend: no trend | tau = 0.0 | p = 1.0
Chromium
Statistical Outlier
Outlier removed
Chromium (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022

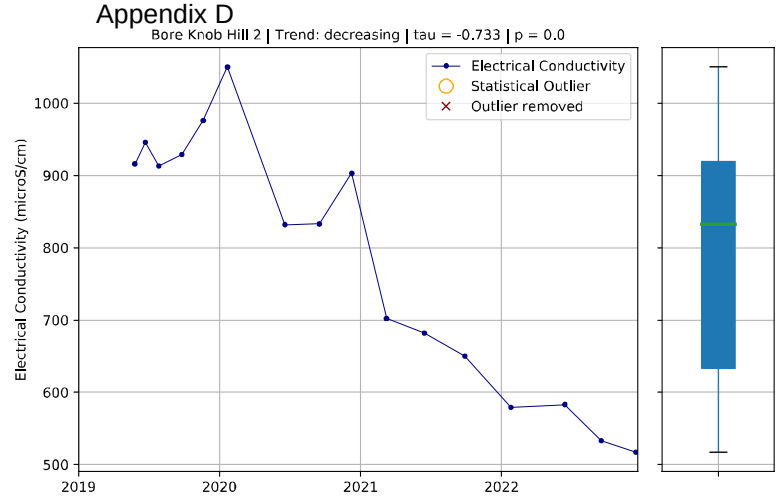

Bore Knob Hill 2 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Chromium (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
Chromium
95th percentile: 0.001
80th percentile: 0.001
2020
2021
2022
2023

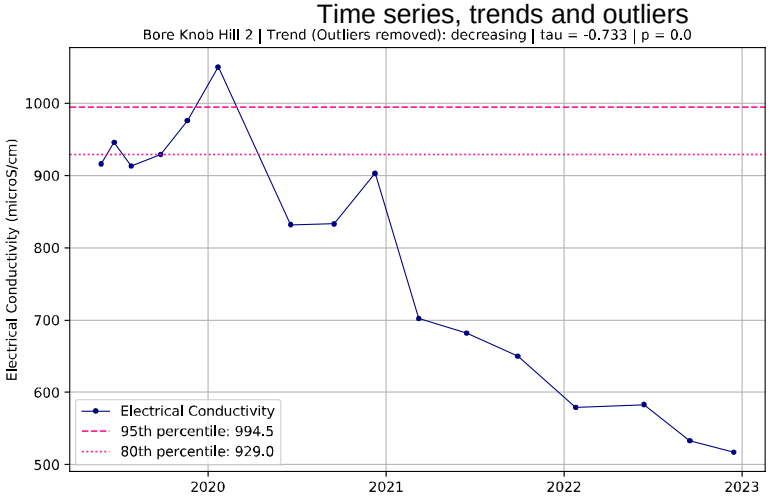

Bore Knob Hill 2 | Trend: decreasing | tau = -0.767 | p = 0.0
Cobalt
Statistical Outlier
Outlier removed
Cobalt (mg/L)
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
2019
2020
2021
2022

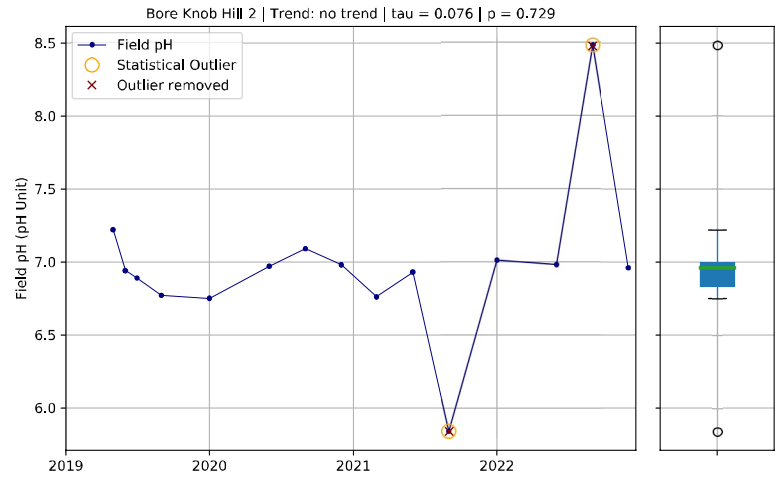

Bore Knob Hill 2 | Trend (Outliers removed): decreasing | tau = -0.767 | p = 0.0
Cobalt (mg/L)
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
Cobalt
95th percentile: 0.004
80th percentile: 0.003
2020
2021
2022
2023

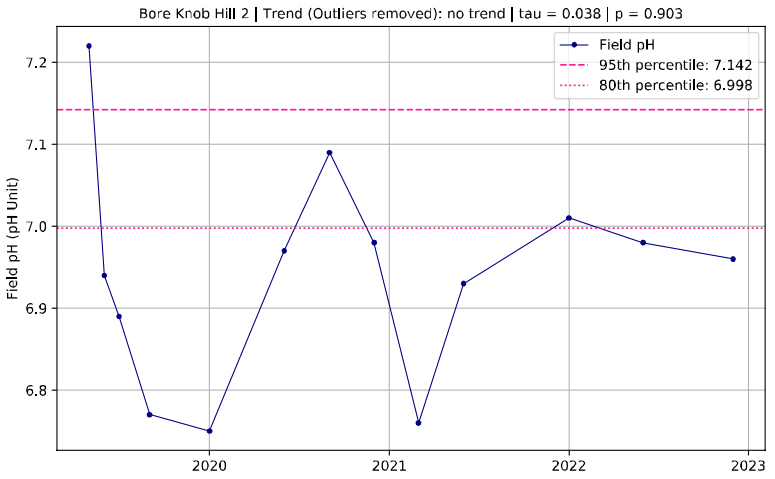

Bore Knob Hill 2 | Trend: no trend | tau = 0.0 | p = 1.0
Copper
Statistical Outlier
Outlier removed
Copper (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022

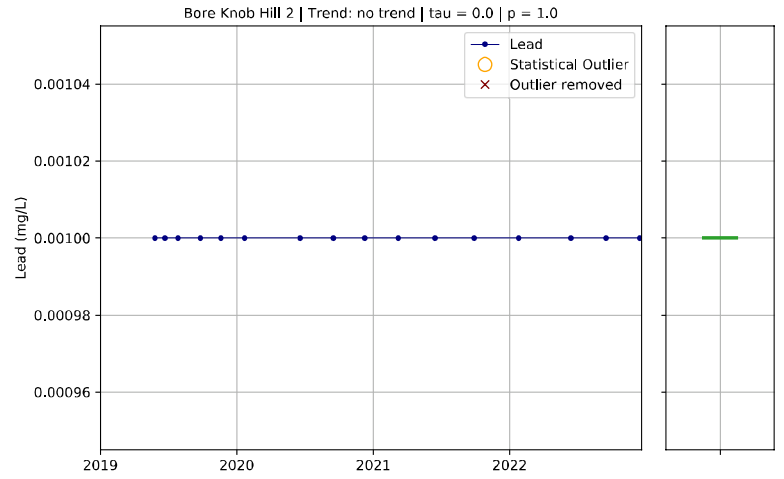

Bore Knob Hill 2 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Copper (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
Copper
95th percentile: 0.001
80th percentile: 0.001
2020
2021
2022
2023

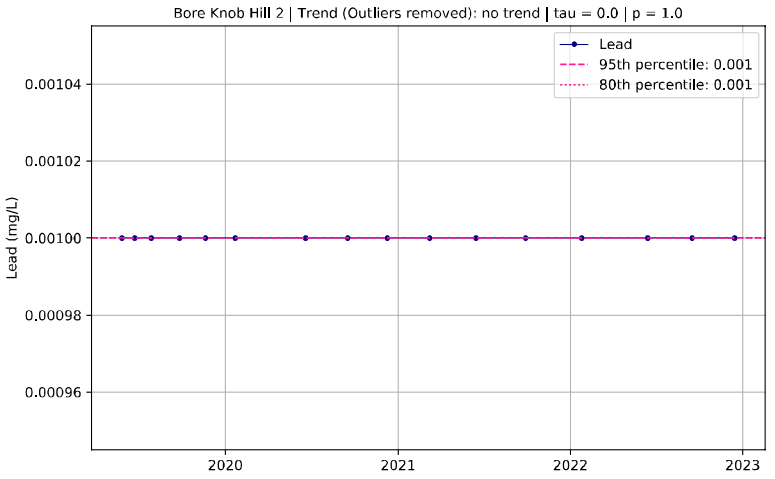

Bore Knob Hill 2 | Trend: decreasing | tau = -0.733 | p = 0.0
Electrical Conductivity
Statistical Outlier
Outlier removed
Electrical Conductivity (microS/cm)

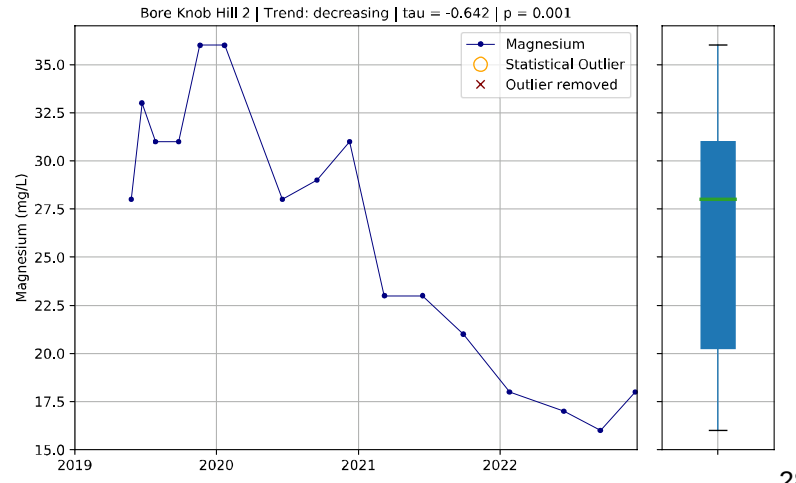

Bore Knob Hill 2 | Trend (Outliers removed): decreasing | tau = -0.733 | p = 0.0
Electrical Conductivity
95th percentile: 994.5
80th percentile: 929.0
Electrical Conductivity (microS/cm)

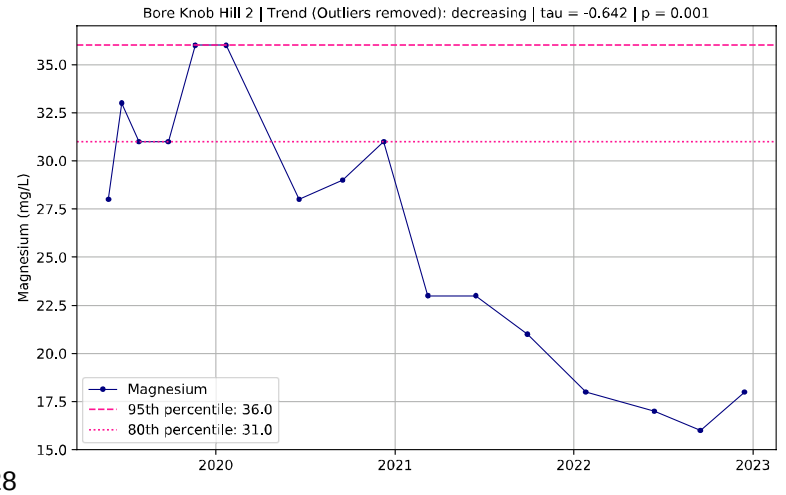

Bore Knob Hill 2 | Trend: no trend | tau = 0.076 | p = 0.729
Field pH
Statistical Outlier
Outlier removed
Field pH (pH Unit)

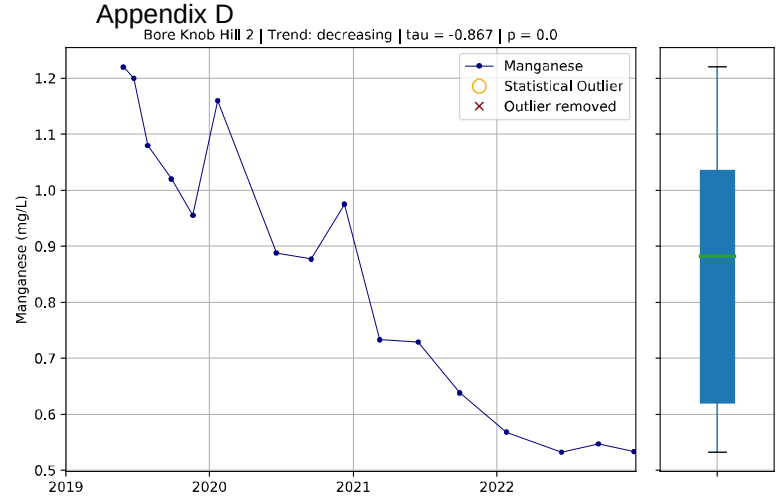

Bore Knob Hill 2 | Trend (Outliers removed): no trend | tau = 0.038 | p = 0.903
Field pH
95th percentile: 7.142
80th percentile: 6.998
Field pH (pH Unit)

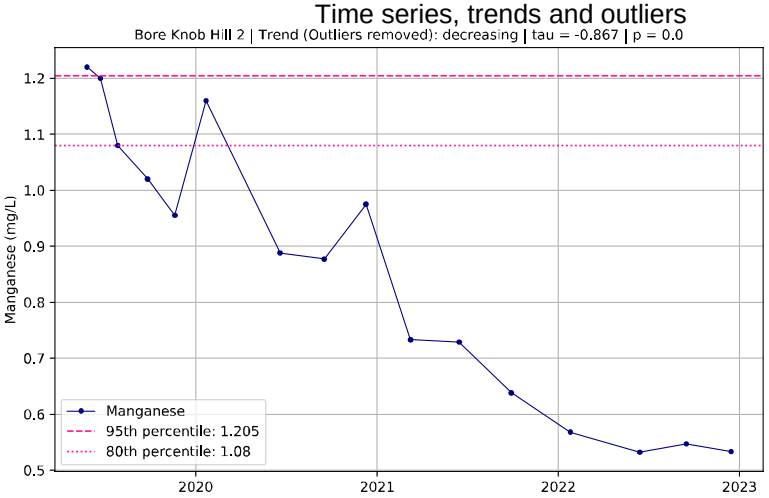

Bore Knob Hill 2 | Trend: no trend | tau = 0.0 | p = 1.0
Lead
Statistical Outlier
Outlier removed
Lead (mg/L)

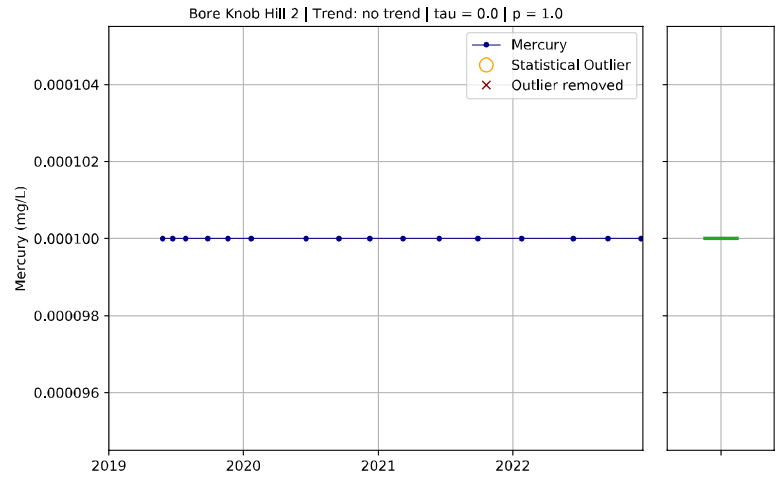

Bore Knob Hill 2 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Lead
95th percentile: 0.001
80th percentile: 0.001
Lead (mg/L)

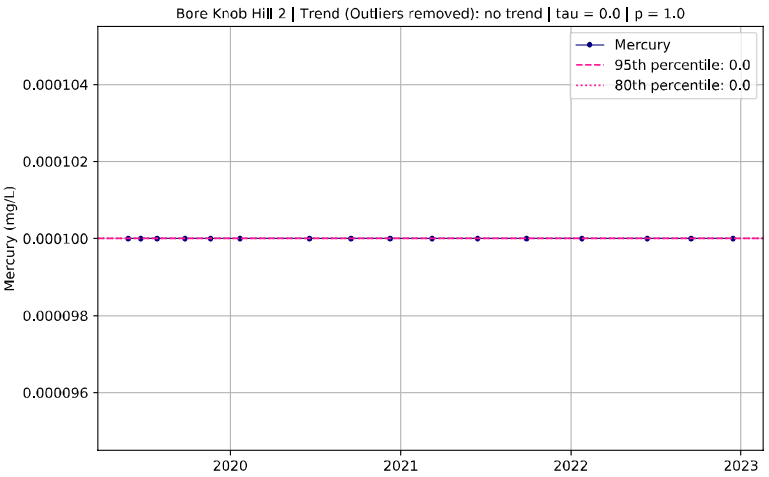

Bore Knob Hill 2 | Trend: decreasing | tau = -0.642 | p = 0.001
Magnesium
Statistical Outlier
Outlier removed
Magnesium (mg/L)

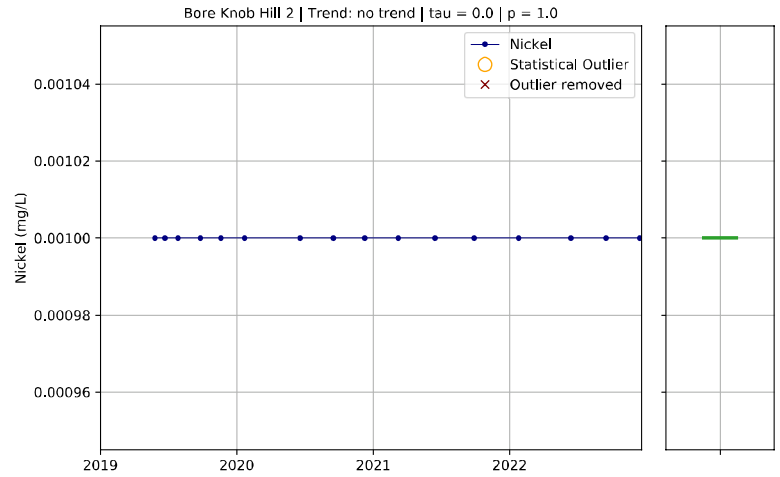

Bore Knob Hill 2 | Trend (Outliers removed): decreasing | tau = -0.642 | p = 0.001
Magnesium
95th percentile: 36.0
80th percentile: 31.0
Magnesium (mg/L)

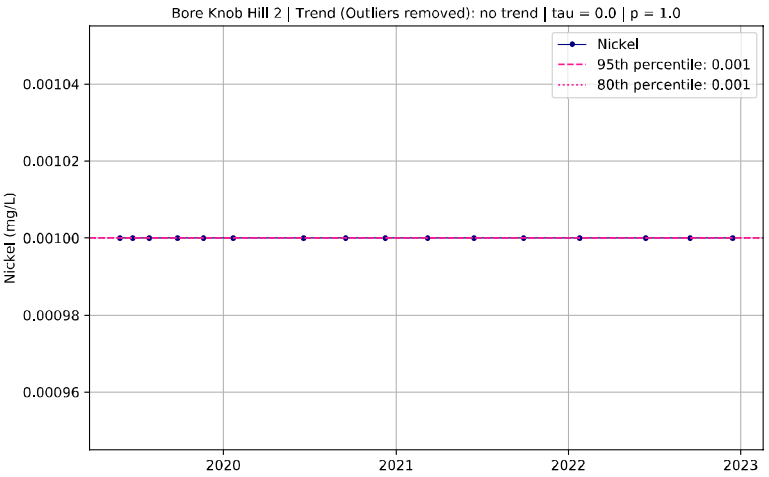

Bore Knob Hill 2 | Trend: decreasing | tau = -0.867 | p = 0.0
Manganese
Statistical Outlier
Outlier removed
Manganese (mg/L)
2019
2020
2021
2022

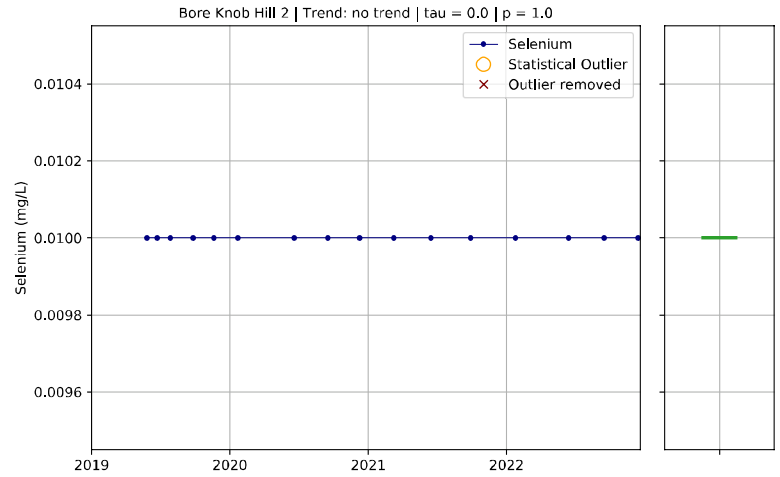

Bore Knob Hill 2 | Trend (Outliers removed): decreasing | tau = -0.867 | p = 0.0
Manganese
95th percentile: 1.205
80th percentile: 1.08
Manganese (mg/L)
2020
2021
2022
2023

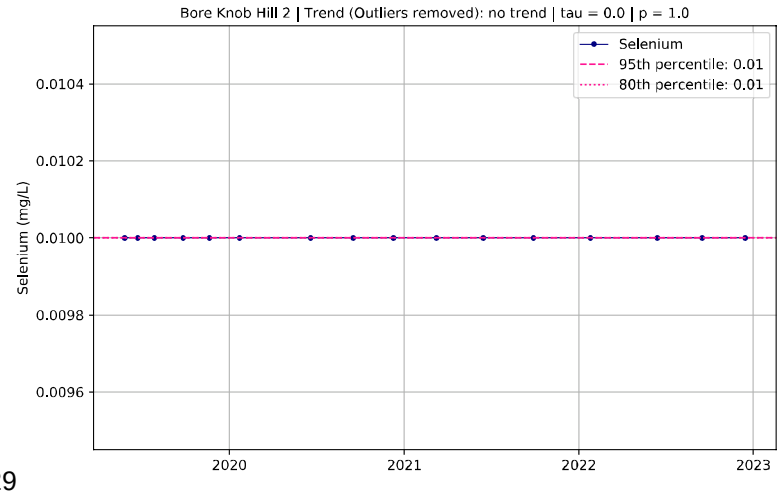

Bore Knob Hill 2 | Trend: no trend | tau = 0.0 | p = 1.0
Mercury
Statistical Outlier
Outlier removed
Mercury (mg/L)
2019
2020
2021
2022

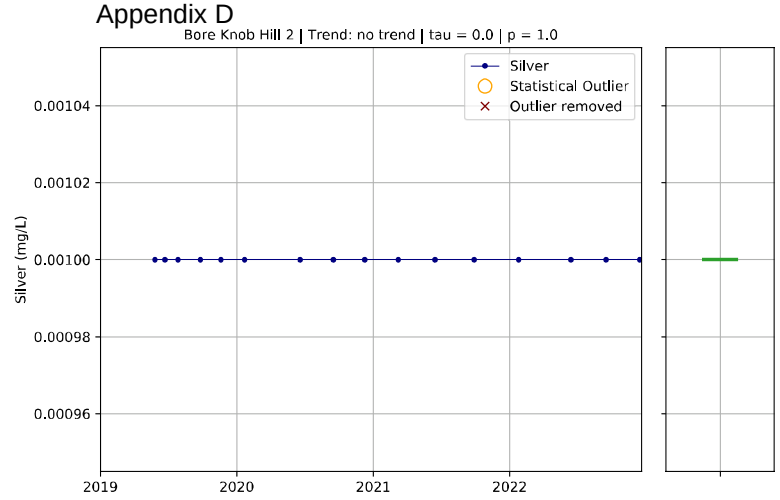

Bore Knob Hill 2 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Mercury
95th percentile: 0.0
80th percentile: 0.0
Mercury (mg/L)
2020
2021
2022
2023

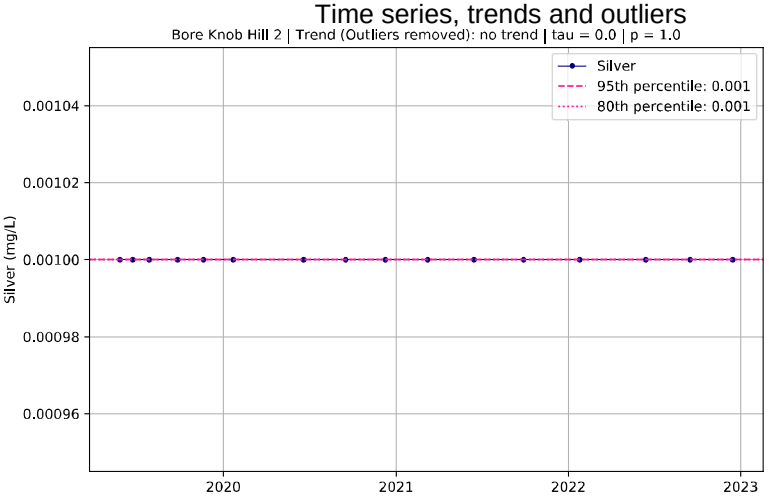

Bore Knob Hill 2 | Trend: no trend | tau = 0.0 | p = 1.0
Nickel
Statistical Outlier
Outlier removed
Nickel (mg/L)
2019
2020
2021
2022

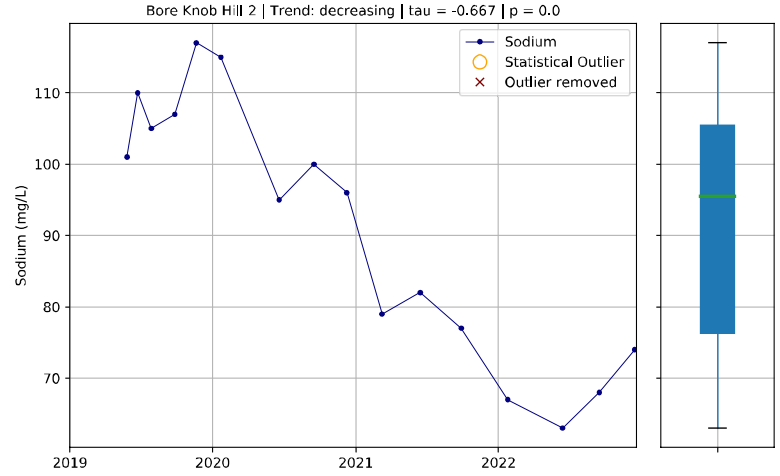

Bore Knob Hill 2 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Nickel
95th percentile: 0.001
80th percentile: 0.001
Nickel (mg/L)
2020
2021
2022
2023

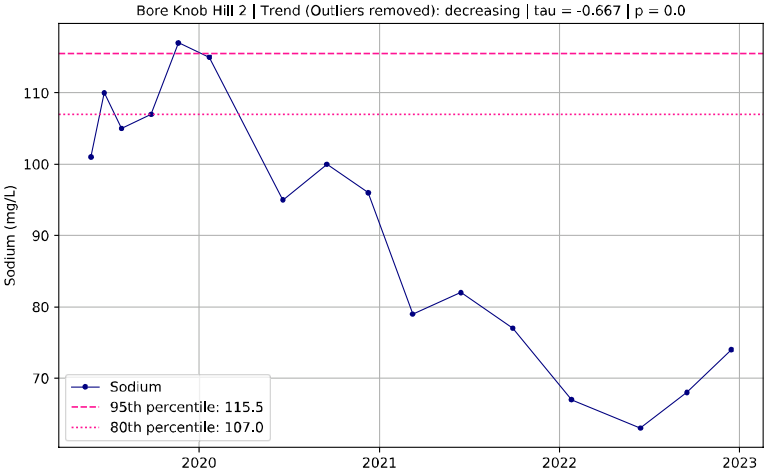

Bore Knob Hill 2 | Trend: no trend | tau = 0.0 | p = 1.0
Selenium
Statistical Outlier
Outlier removed
Selenium (mg/L)
2019
2020
2021
2022

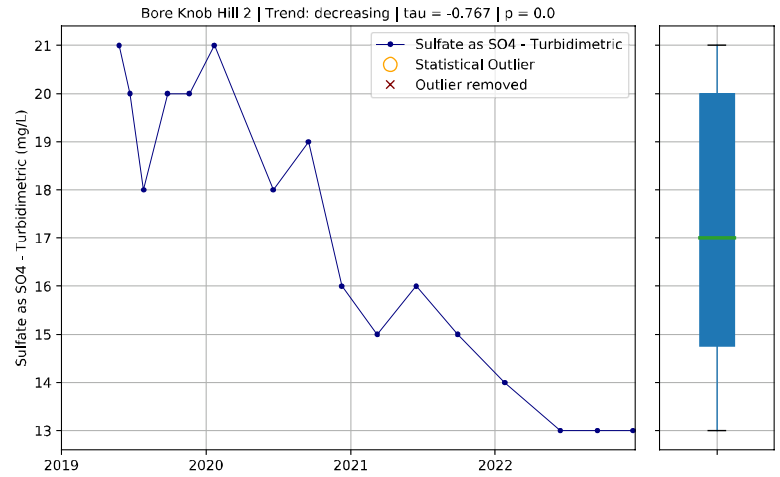

Bore Knob Hill 2 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Selenium
95th percentile: 0.01
80th percentile: 0.01
Selenium (mg/L)
2020
2021
2022
2023

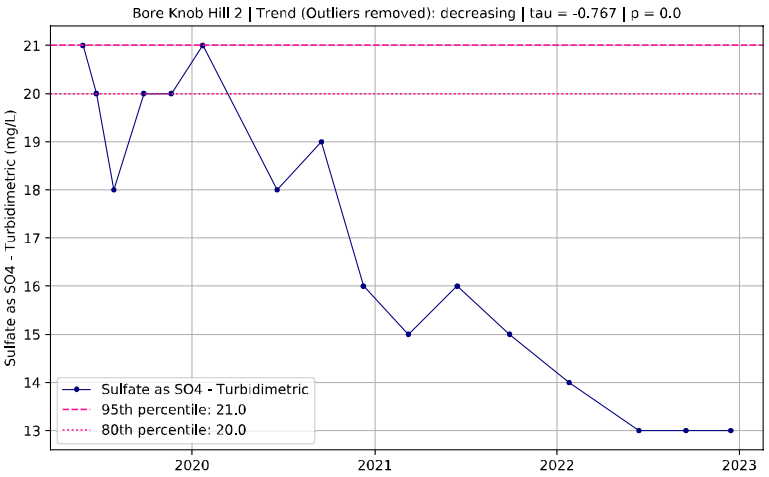

Bore Knob Hill 2 | Trend: no trend | tau = 0.0 | p = 1.0
Silver
Statistical Outlier
Outlier removed
Silver (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022


Bore Knob Hill 2 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Silver
95th percentile: 0.001
80th percentile: 0.001
Silver (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2020
2021
2022
2023

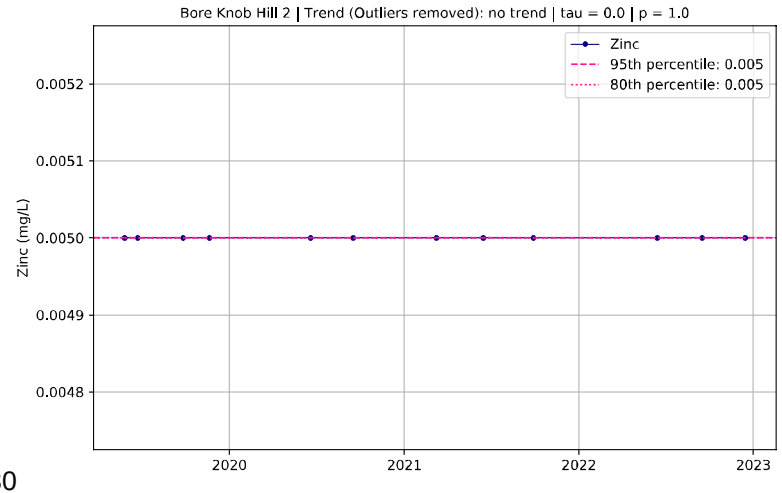

Bore Knob Hill 2 | Trend: decreasing | tau = -0.667 | p = 0.0
Sodium
Statistical Outlier
Outlier removed
Sodium (mg/L)
110
100
90
80
70
2019
2020
2021
2022

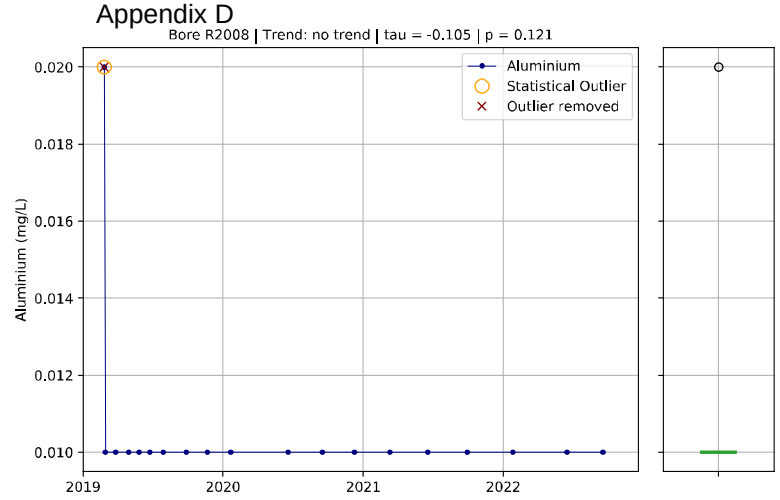

Bore Knob Hill 2 | Trend (Outliers removed): decreasing | tau = -0.667 | p = 0.0
Sodium
95th percentile: 115.5
80th percentile: 107.0
Sodium (mg/L)
110
100
90
80
70
2020
2021
2022
2023

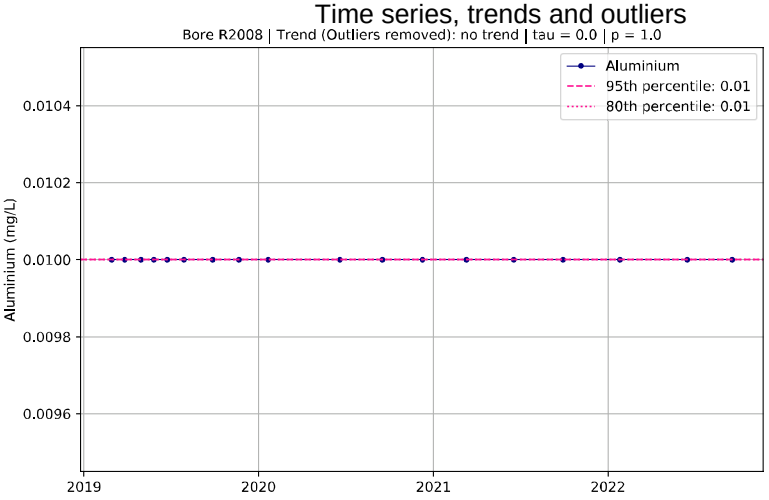

Bore Knob Hill 2 | Trend: decreasing | tau = -0.767 | p = 0.0
Sulfate as SO4 - Turbidimetric
Statistical Outlier
Outlier removed
Sulfate as SO4 - Turbidimetric (mg/L)
21
20
19
18
17
16
15
14
13
2019
2020
2021
2022

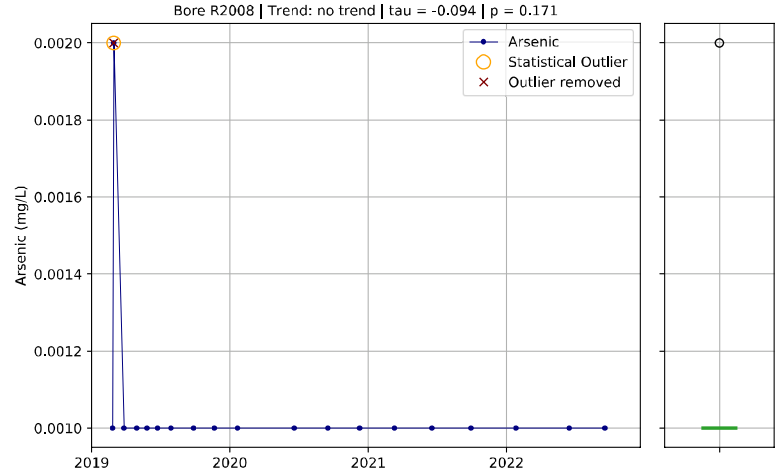

Bore Knob Hill 2 | Trend (Outliers removed): decreasing | tau = -0.767 | p = 0.0
Sulfate as SO4 - Turbidimetric
95th percentile: 21.0
80th percentile: 20.0
Sulfate as SO4 - Turbidimetric (mg/L)
21
20
19
18
17
16
15
14
13
2020
2021
2022
2023

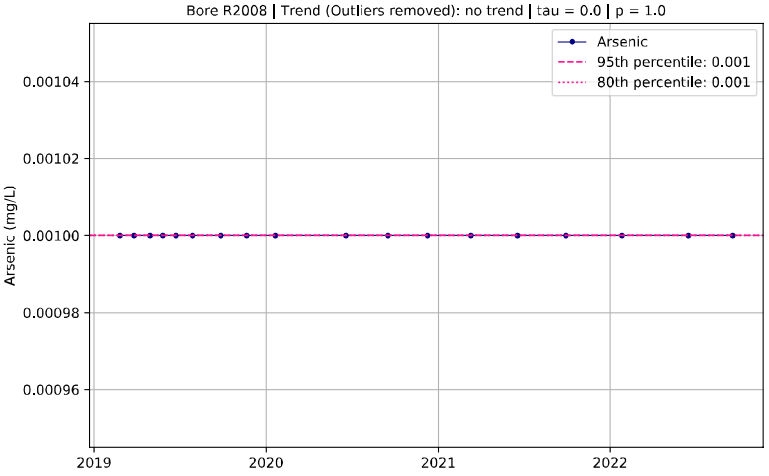
Bore Knob Hill 2 | Trend: no trend | tau = -0.067 | p = 0.676
Zinc
Statistical Outlier
Outlier removed
Zinc (mg/L)
0.0225
0.0200
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
2019
2020
2021
2022

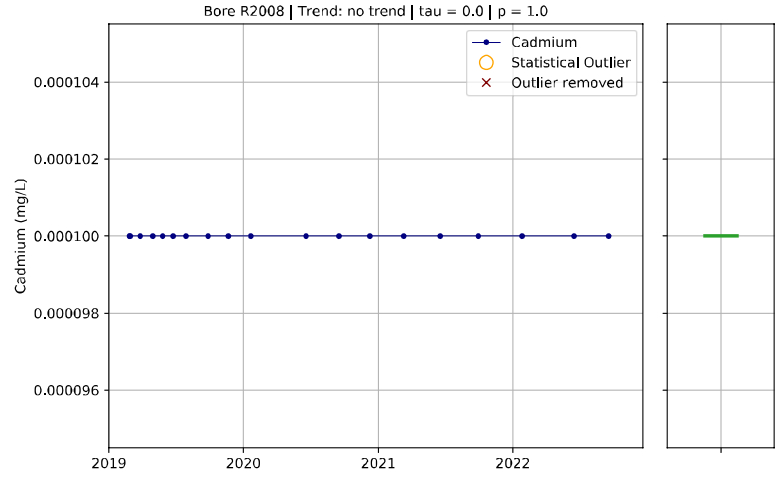

Bore Knob Hill 2 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Zinc
95th percentile: 0.005
80th percentile: 0.005
Zinc (mg/L)
0.0052
0.0051
0.0050
0.0049
0.0048
2020
2021
2022
2023

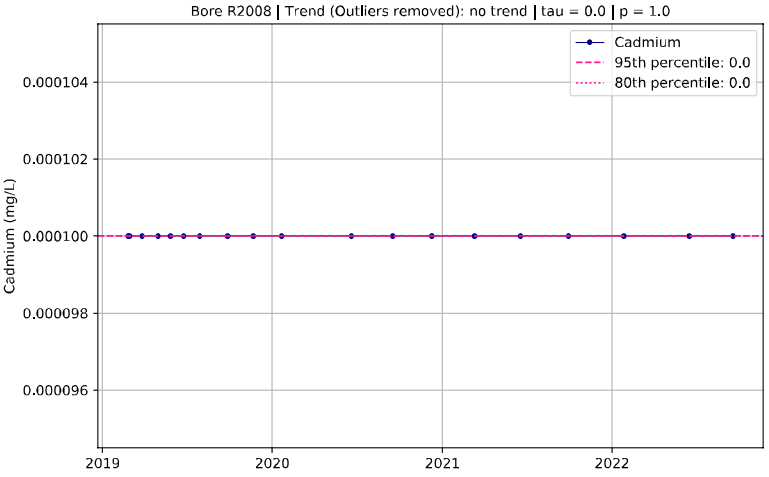

Bore R2008 | Trend: no trend | tau = -0.105 | p = 0.121
Aluminium
Statistical Outlier
Outlier removed
Aluminium (mg/L)
0.020
0.018
0.016
0.014
0.012
0.010
2019
2020
2021
2022

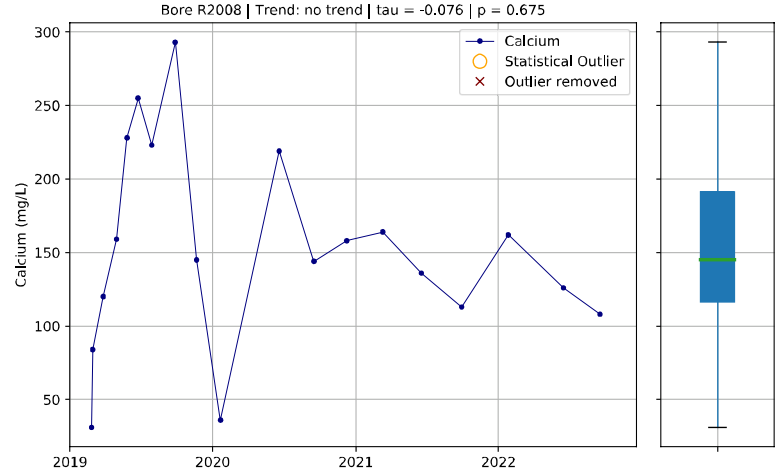

Bore R2008 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Aluminium
95th percentile: 0.01
80th percentile: 0.01
Aluminium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2019
2020
2021
2022

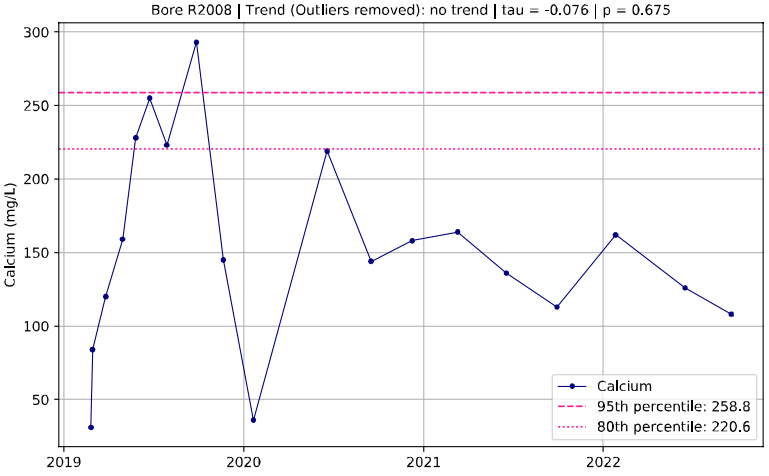

Bore R2008 | Trend: no trend | tau = -0.094 | p = 0.171
Arsenic
Statistical Outlier
Outlier removed
Arsenic (mg/L)
0.0020
0.0018
0.0016
0.0014
0.0012
0.0010
2019
2020
2021
2022


Bore R2008 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Arsenic
95th percentile: 0.001
80th percentile: 0.001
Arsenic (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022

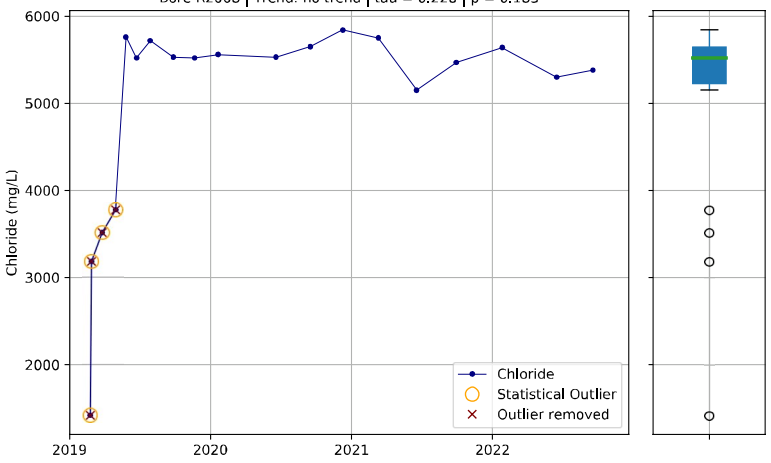

Bore R2008 | Trend: no trend | tau = 0.0 | p = 1.0
Cadmium
Statistical Outlier
Outlier removed
Cadmium (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022

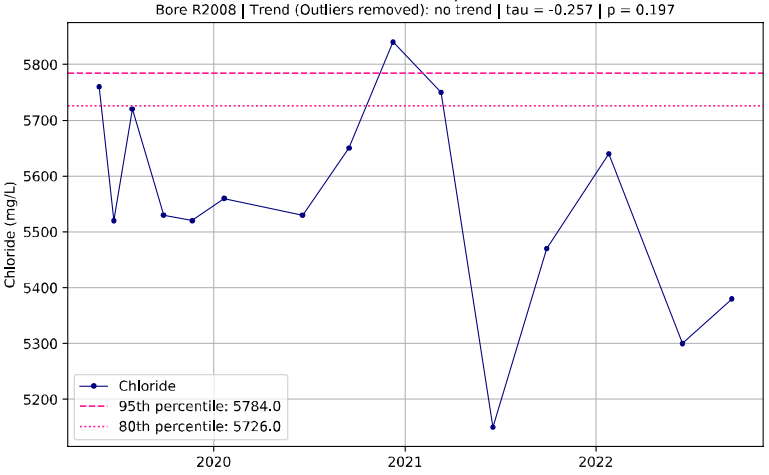

Bore R2008 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Cadmium
95th percentile: 0.0
80th percentile: 0.0
Cadmium (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022

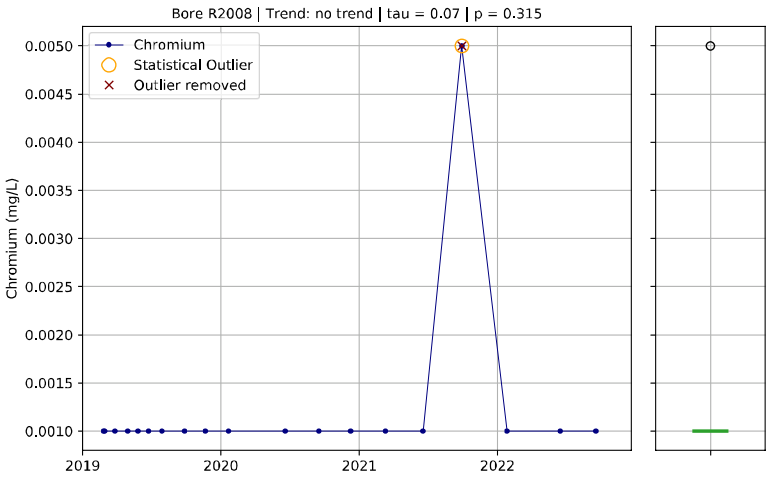

Bore R2008 | Trend: no trend | tau = -0.076 | p = 0.675
Calcium
Statistical Outlier
Outlier removed
Calcium (mg/L)
300
250
200
150
100
50
2019
2020
2021
2022

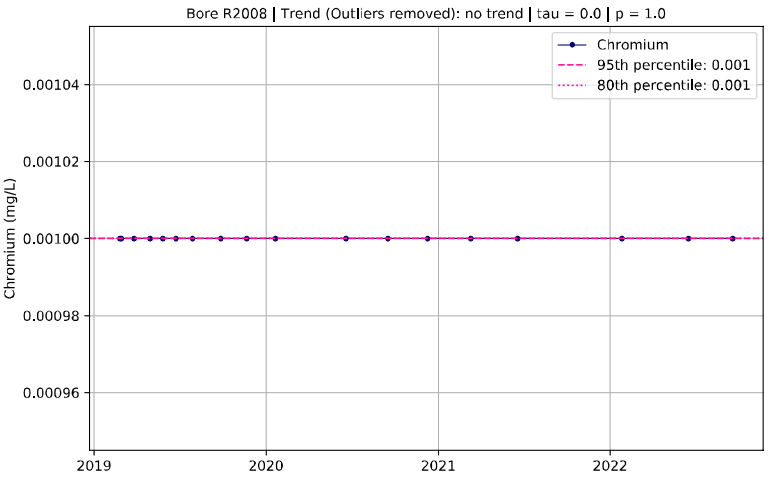

Bore R2008 | Trend (Outliers removed): no trend | tau = -0.076 | p = 0.675
Calcium
95th percentile: 258.8
80th percentile: 220.6
Calcium (mg/L)
300
250
200
150
100
50
2019
2020
2021
2022

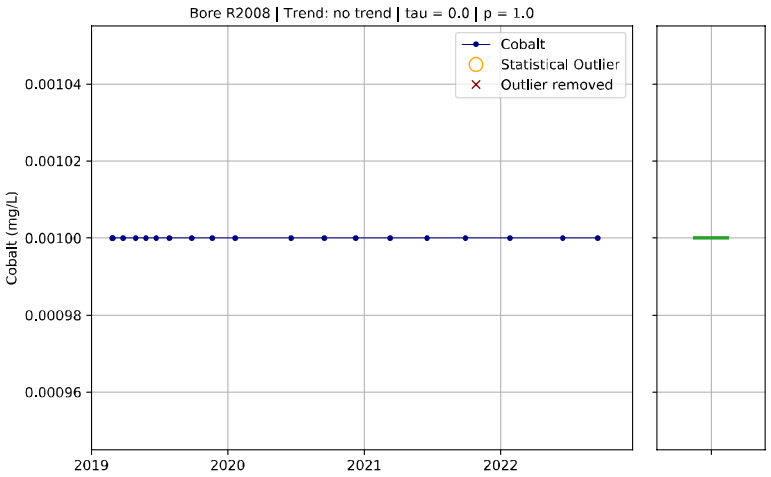
Time series, trends and outliers

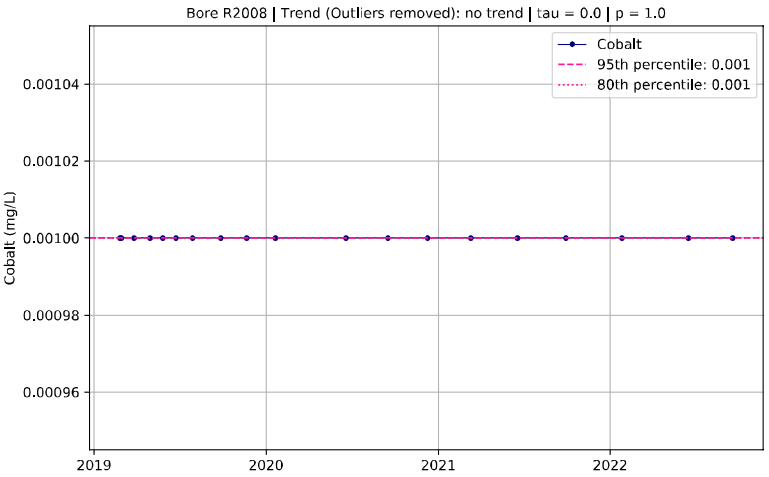


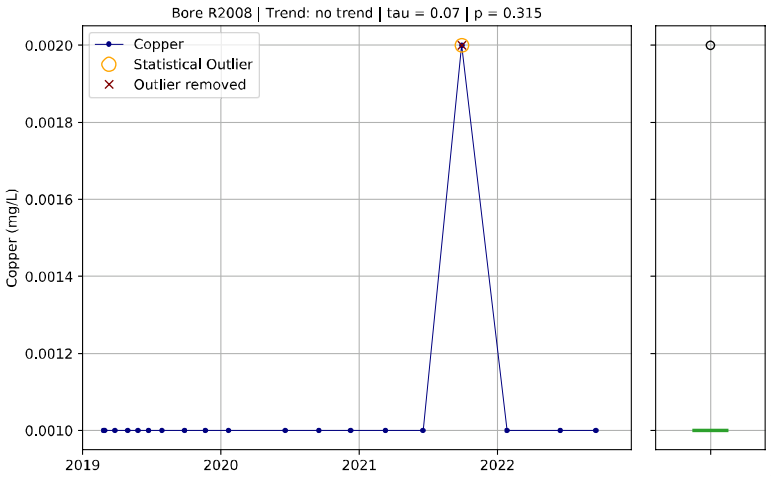


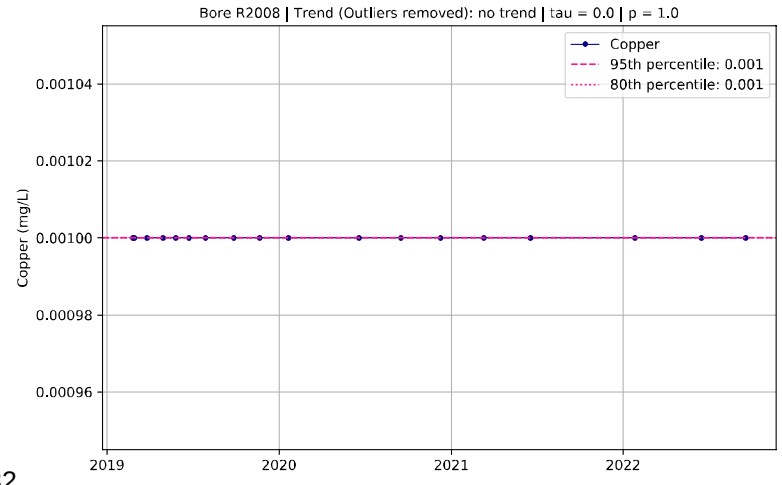


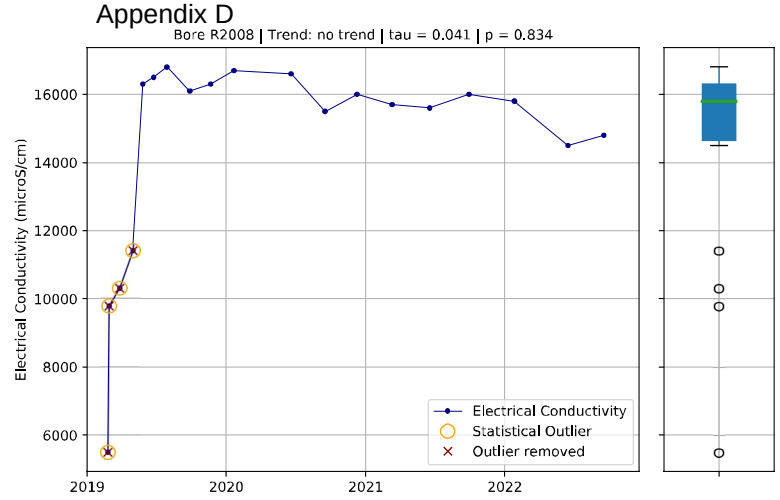


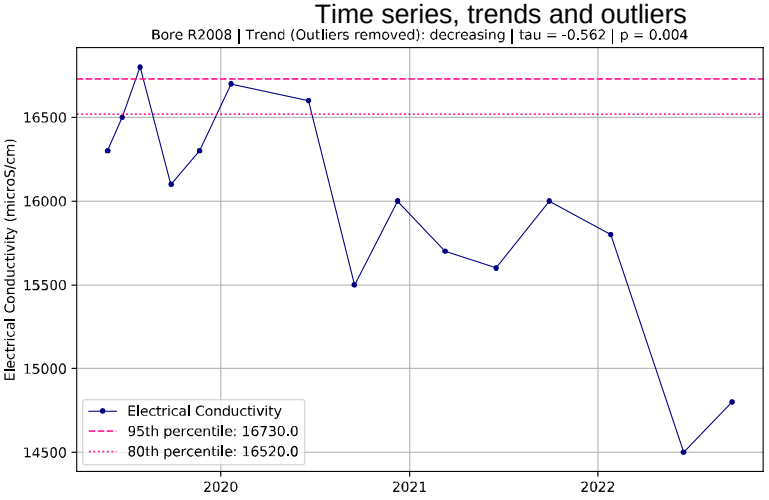


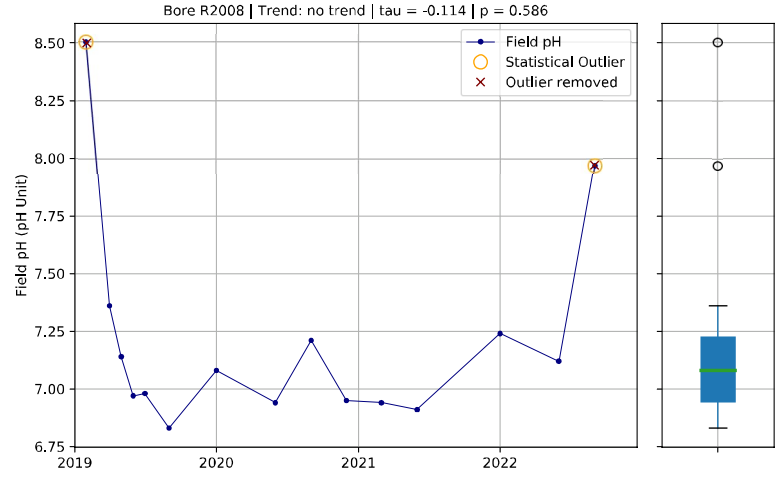


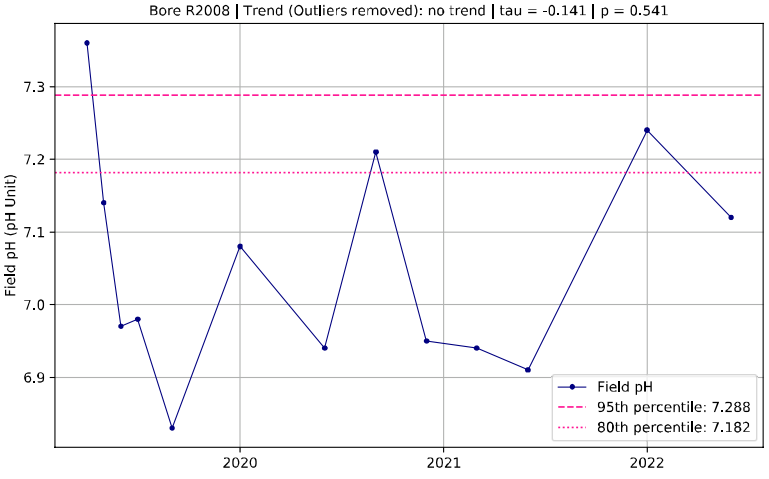


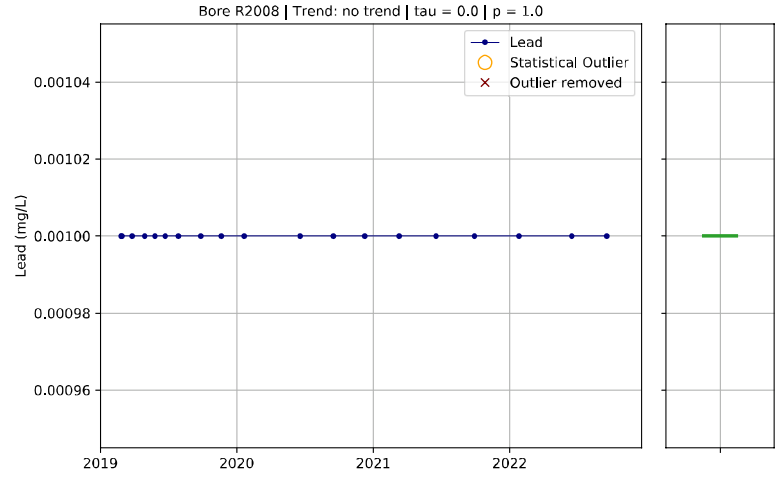


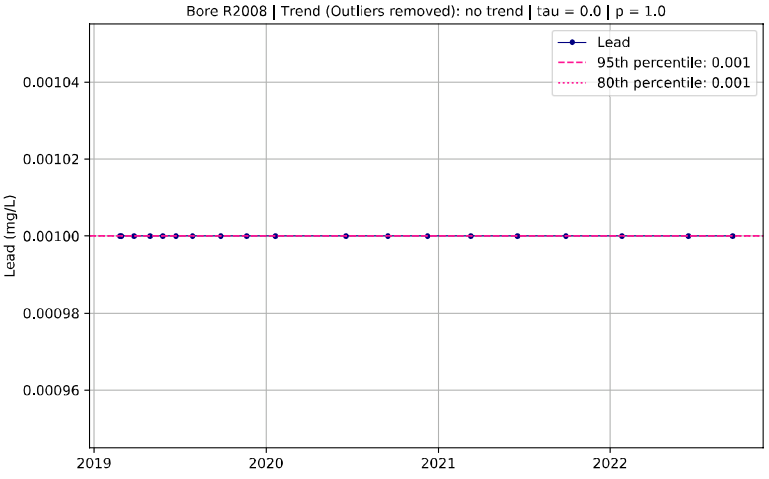

Bore R2008 | Trend: no trend | tau = 0.041 | p = 0.834
Electrical Conductivity (microS/cm)
Electrical Conductivity
Statistical Outlier
Outlier removed

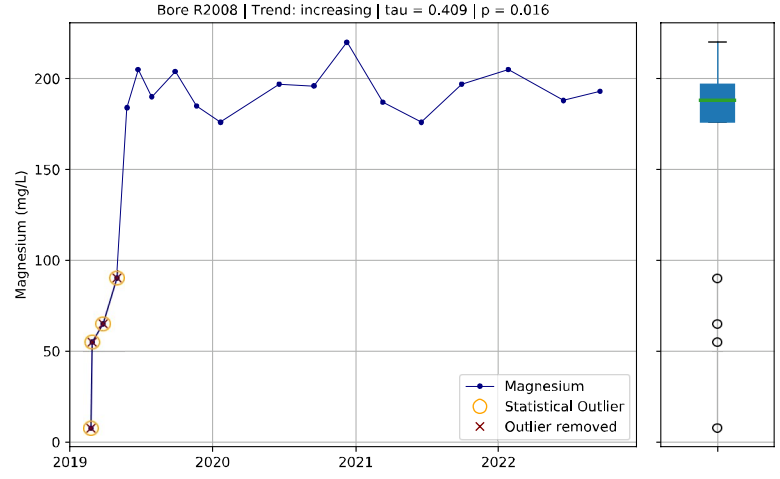

Bore R2008 | Trend (Outliers removed): decreasing | tau = -0.562 | p = 0.004
Electrical Conductivity (microS/cm)
Electrical Conductivity
95th percentile: 16730.0
80th percentile: 16520.0

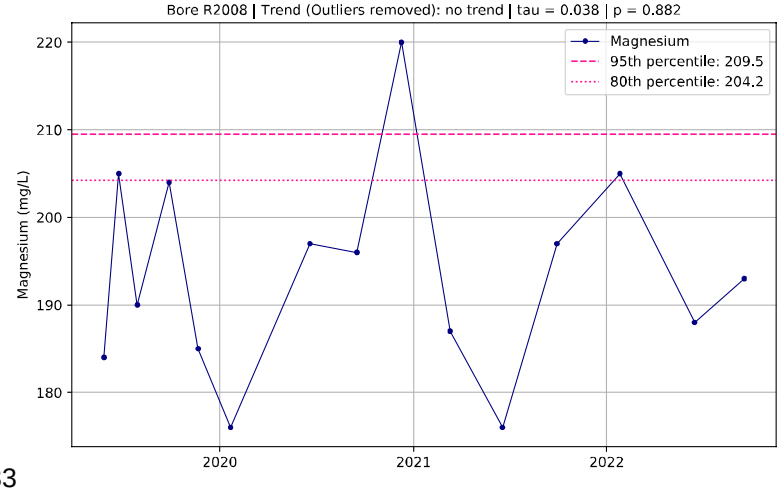

Bore R2008 | Trend: no trend | tau = -0.114 | p = 0.586
Field pH (pH Unit)
Field pH
Statistical Outlier
Outlier removed

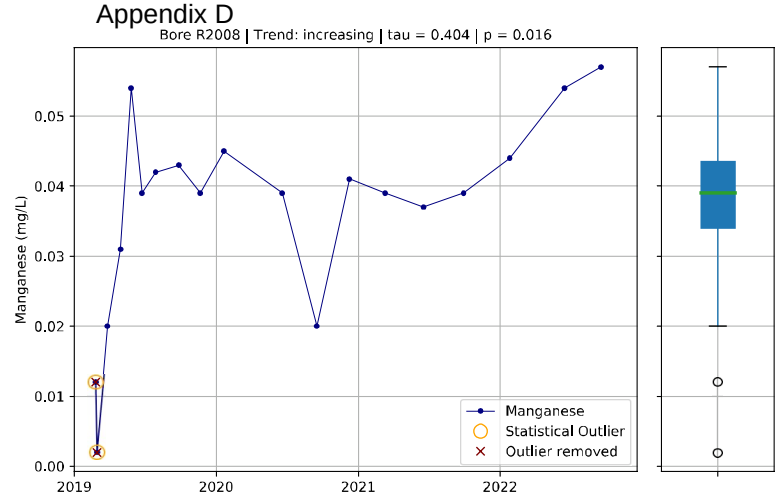

Bore R2008 | Trend (Outliers removed): no trend | tau = -0.141 | p = 0.541
Field pH (pH Unit)
Field pH
95th percentile: 7.288
80th percentile: 7.182

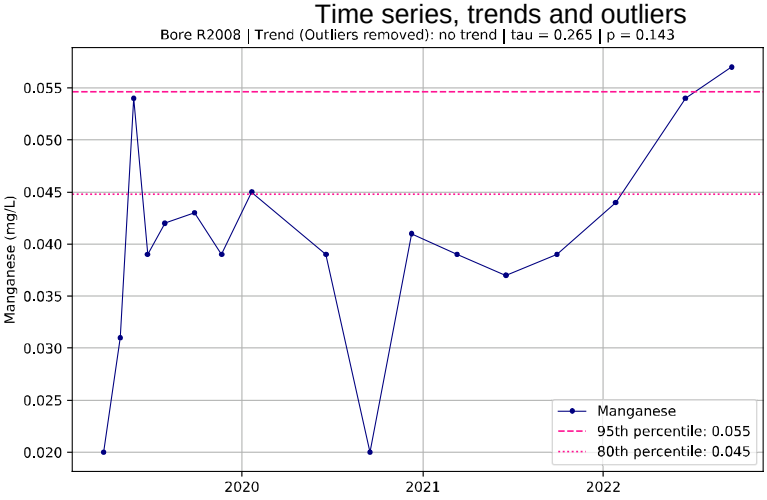

Bore R2008 | Trend: no trend | tau = 0.0 | p = 1.0
Lead (mg/L)
Lead
Statistical Outlier
Outlier removed

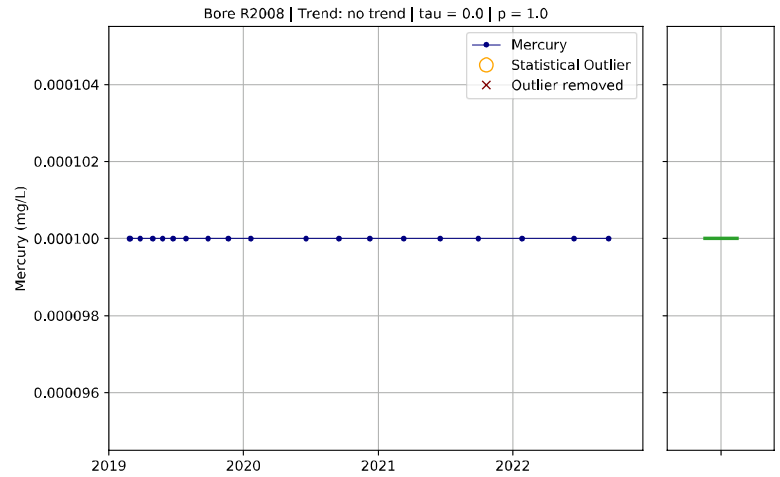

Bore R2008 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Lead (mg/L)
Lead
95th percentile: 0.001
80th percentile: 0.001

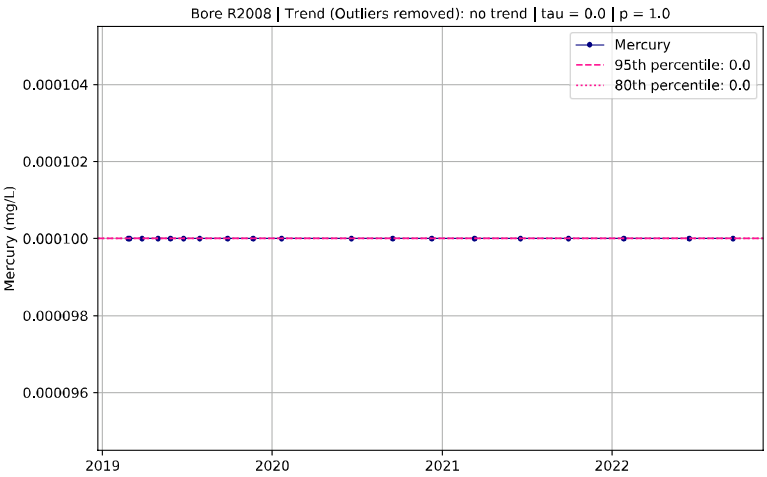

Bore R2008 | Trend: increasing | tau = 0.409 | p = 0.016
Magnesium (mg/L)
Magnesium
Statistical Outlier
Outlier removed

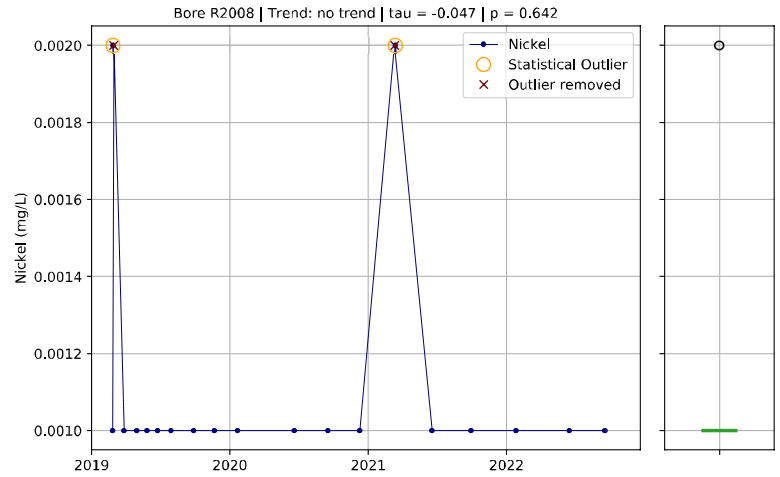

Bore R2008 | Trend (Outliers removed): no trend | tau = 0.038 | p = 0.882
Magnesium (mg/L)
Magnesium
95th percentile: 209.5
80th percentile: 204.2

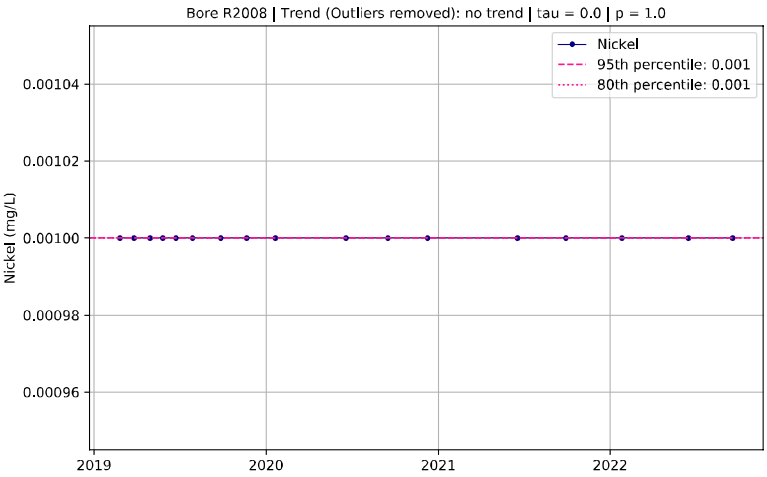

Bore R2008 | Trend: increasing | tau = 0.404 | p = 0.016
Manganese (mg/L)
Manganese
Statistical Outlier
Outlier removed

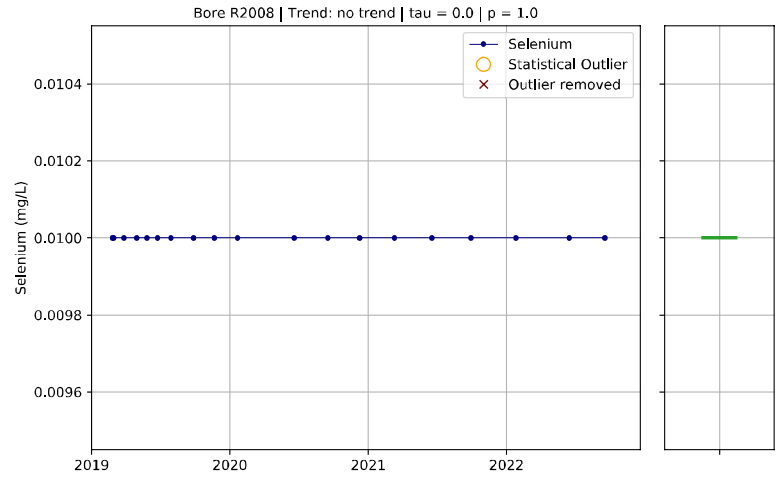

Bore R2008 | Trend (Outliers removed): no trend | tau = 0.265 | p = 0.143
Manganese (mg/L)
Manganese
95th percentile: 0.055
80th percentile: 0.045

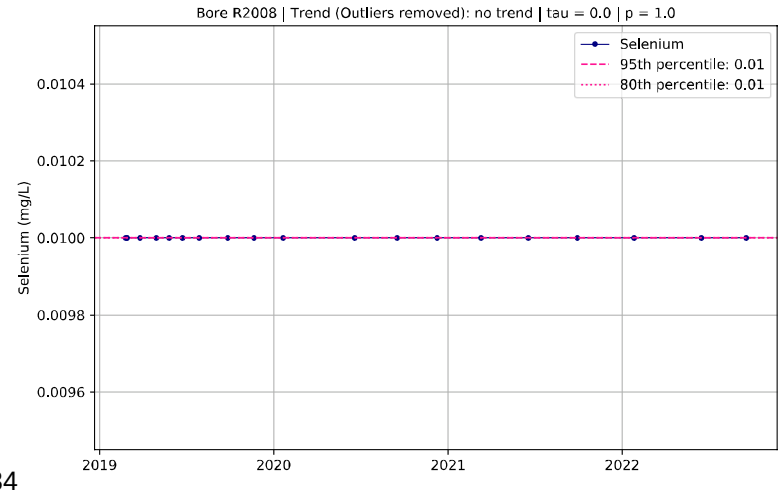

Bore R2008 | Trend: no trend | tau = 0.0 | p = 1.0
Mercury (mg/L)
Mercury
Statistical Outlier
Outlier removed


Bore R2008 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Mercury (mg/L)
Mercury
95th percentile: 0.0
80th percentile: 0.0

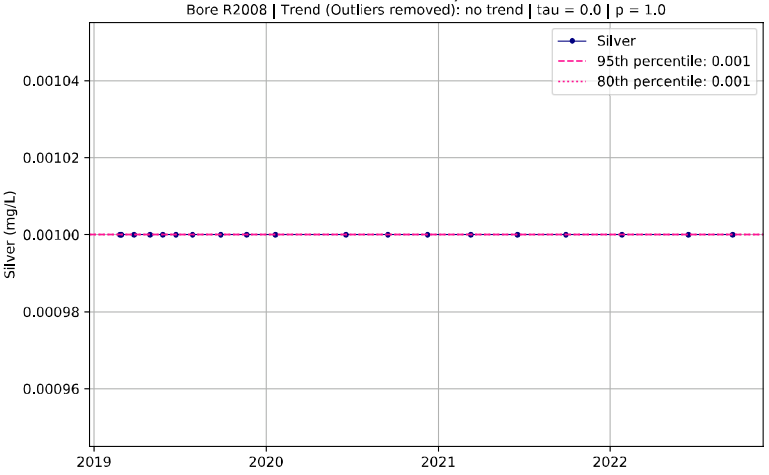

Bore R2008 | Trend: no trend | tau = -0.047 | p = 0.642
Nickel (mg/L)
Nickel
Statistical Outlier
Outlier removed

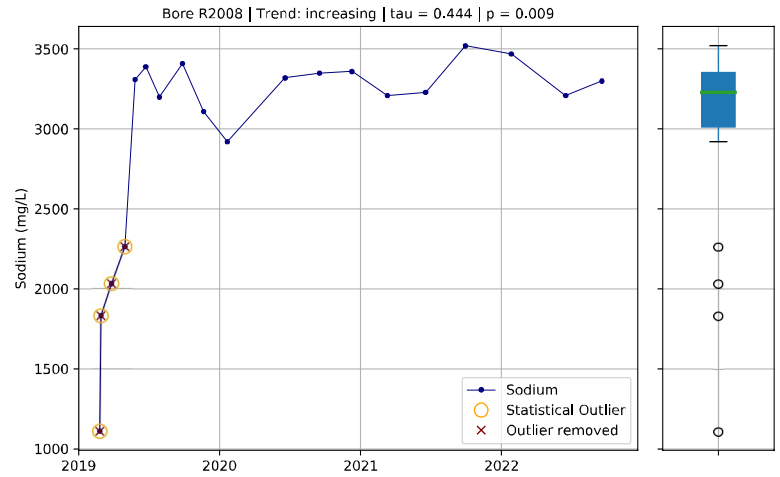

Bore R2008 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Nickel (mg/L)
Nickel
95th percentile: 0.001
80th percentile: 0.001

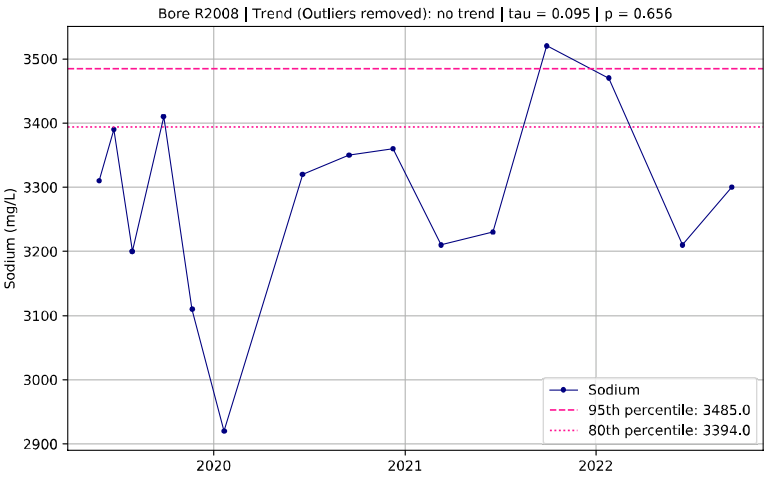

Bore R2008 | Trend: no trend | tau = 0.0 | p = 1.0
Selenium (mg/L)
Selenium
Statistical Outlier
Outlier removed

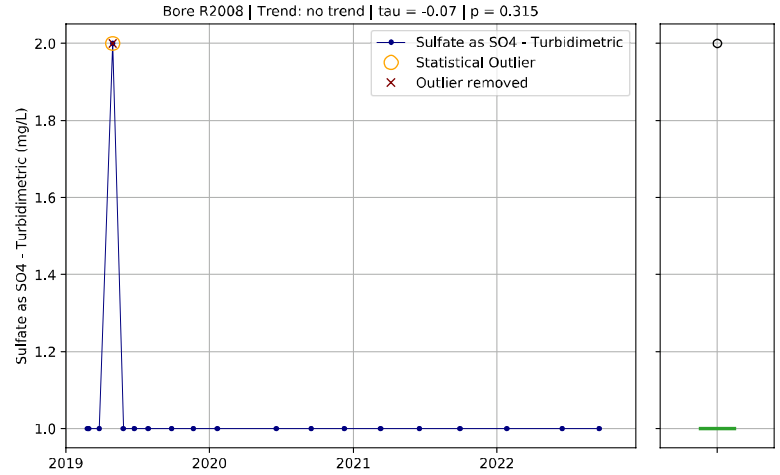

Bore R2008 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Selenium (mg/L)
Selenium
95th percentile: 0.01
80th percentile: 0.01

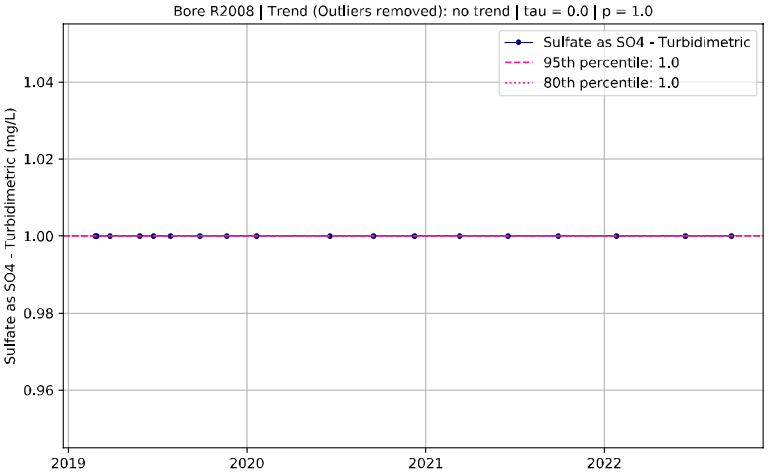
Bore R2008 | Trend: no trend | tau = 0.0 | p = 1.0
Silver
Statistical Outlier
Outlier removed
Silver (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022

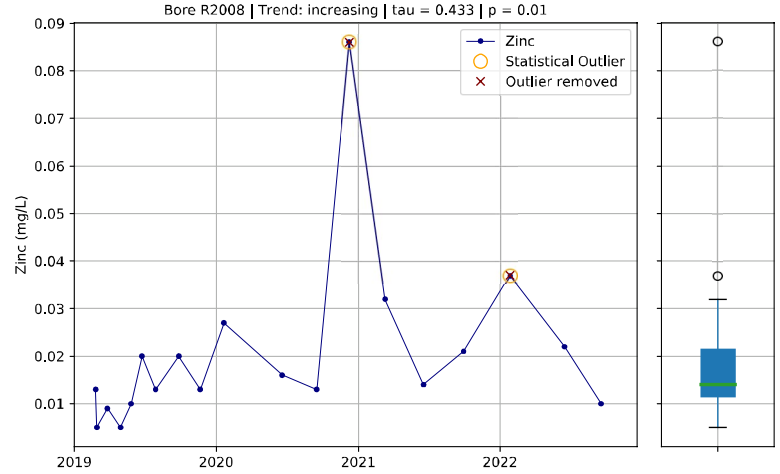

Bore R2008 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Silver
95th percentile: 0.001
80th percentile: 0.001
Silver (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022

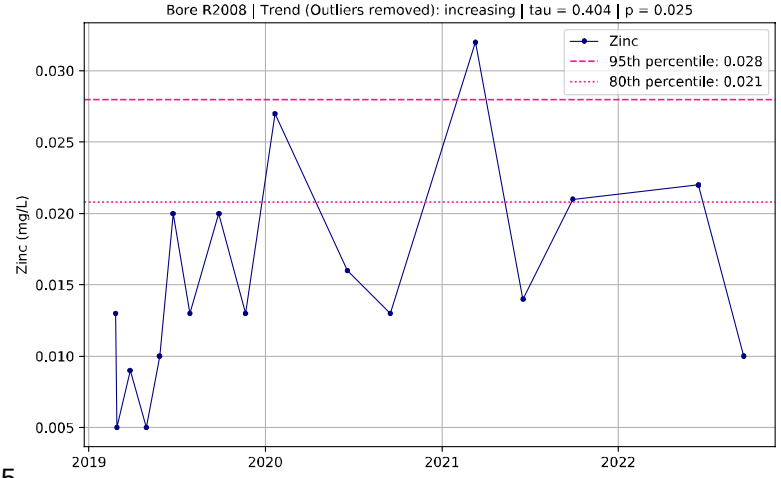

Bore R2008 | Trend: increasing | tau = 0.444 | p = 0.009
Sodium
Statistical Outlier
Outlier removed
Sodium (mg/L)
3500
3000
2500
2000
1500
1000
2019
2020
2021
2022


Bore R2008 | Trend (Outliers removed): no trend | tau = 0.095 | p = 0.656
Sodium
95th percentile: 3485.0
80th percentile: 3394.0
Sodium (mg/L)
3500
3400
3300
3200
3100
3000
2900
2020
2021
2022

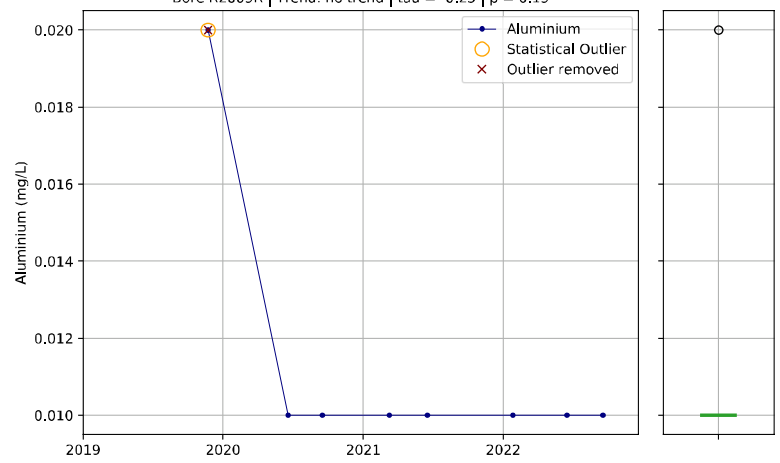

Bore R2008 | Trend: no trend | tau = -0.07 | p = 0.315
Sulfate as SO4 - Turbidimetric
Statistical Outlier
Outlier removed
Sulfate as SO4 - Turbidimetric (mg/L)
2.0
1.8
1.6
1.4
1.2
1.0
2019
2020
2021
2022


Bore R2008 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Sulfate as SO4 - Turbidimetric
95th percentile: 1.0
80th percentile: 1.0
Sulfate as SO4 - Turbidimetric (mg/L)
1.04
1.02
1.00
0.98
0.96
2019
2020
2021
2022

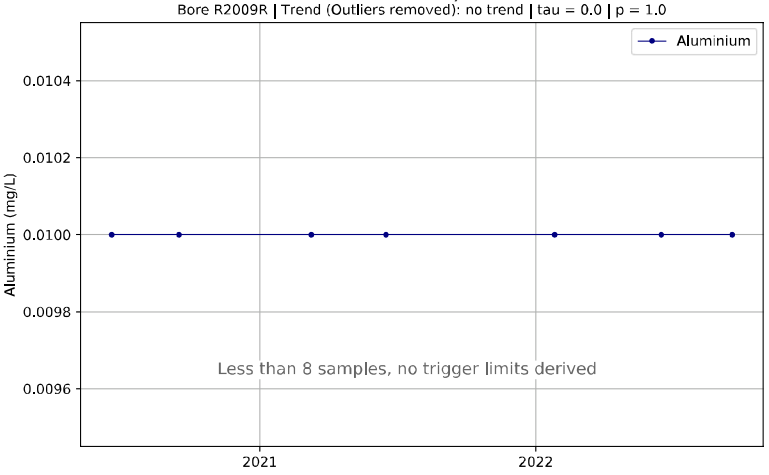

Bore R2008 | Trend: increasing | tau = 0.433 | p = 0.01
Zinc
Statistical Outlier
Outlier removed
Zinc (mg/L)
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
2019
2020
2021
2022


Bore R2008 | Trend (Outliers removed): increasing | tau = 0.404 | p = 0.025
Zinc
95th percentile: 0.028
80th percentile: 0.021
Zinc (mg/L)
0.030
0.025
0.020
0.015
0.010
0.005
2019
2020
2021
2022

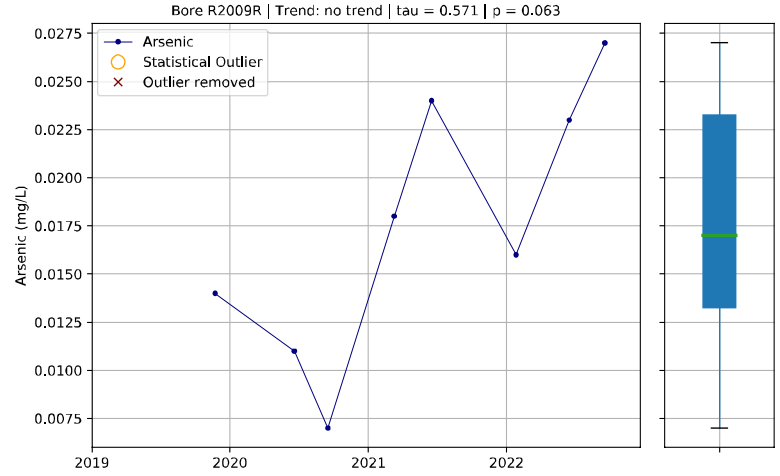
Bore R2009R | Trend: no trend | tau = -0.25 | p = 0.19



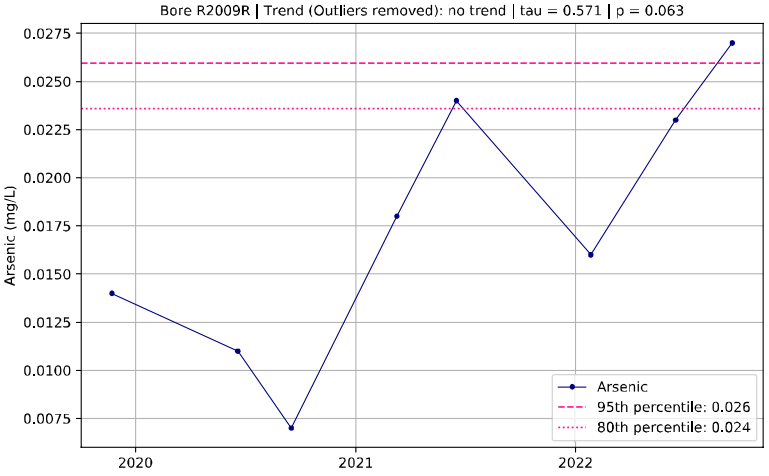
Bore R2009R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0



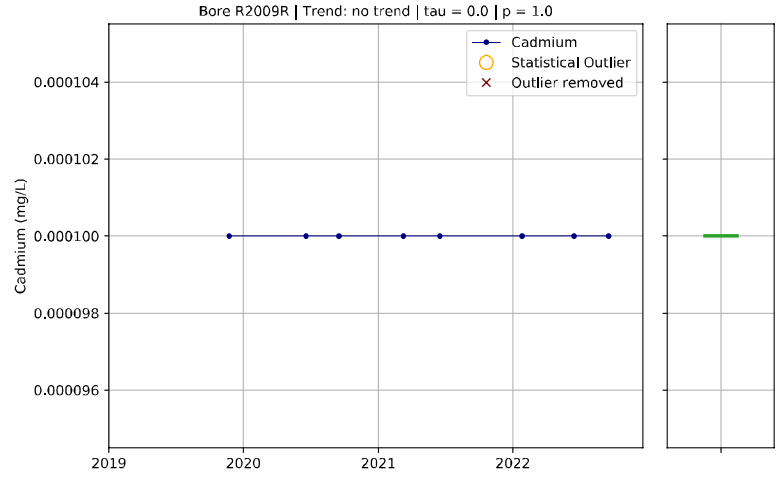
Bore R2009R | Trend: no trend | tau = 0.571 | p = 0.063



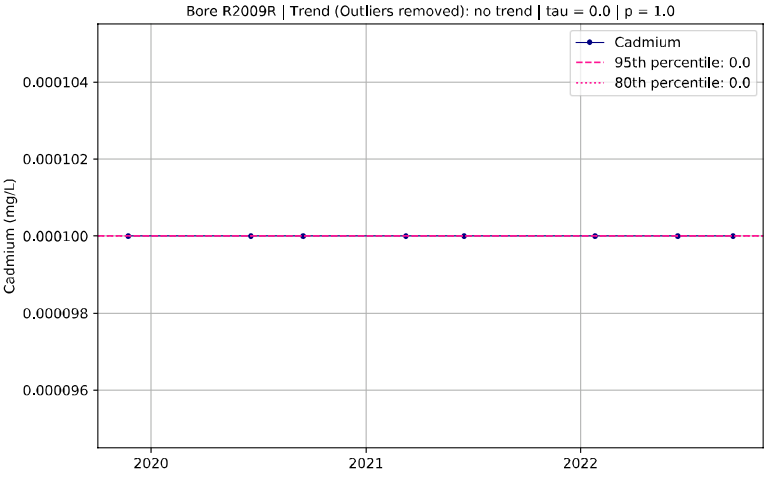
Bore R2009R | Trend (Outliers removed): no trend | tau = 0.571 | p = 0.063



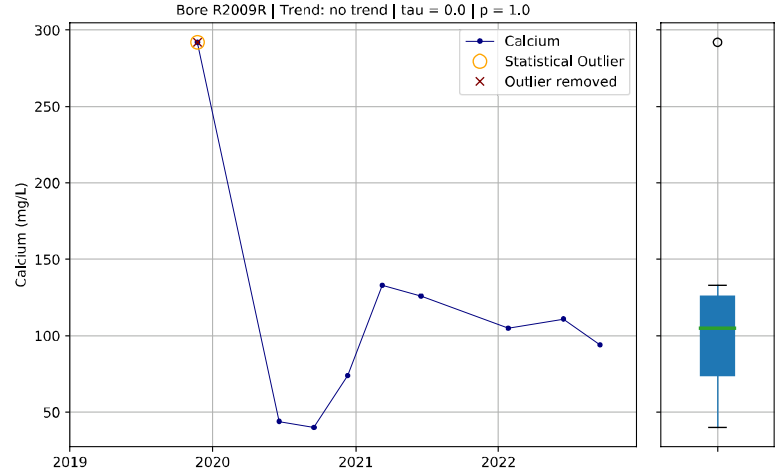
Bore R2009R | Trend: no trend | tau = 0.0 | p = 1.0



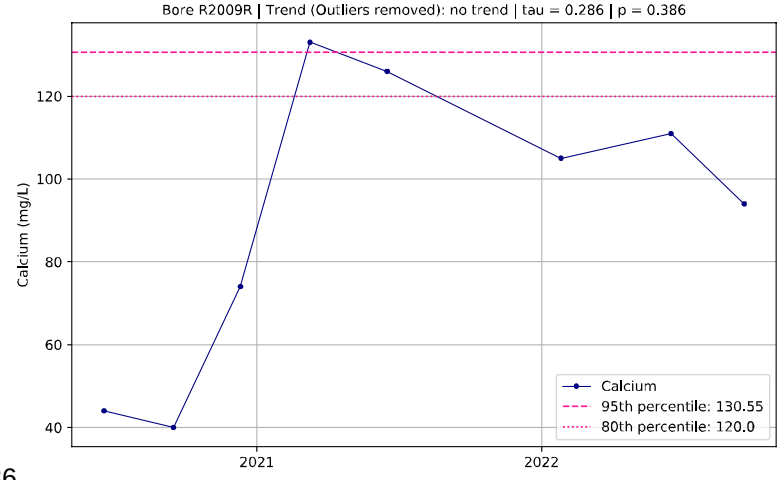
Bore R2009R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0

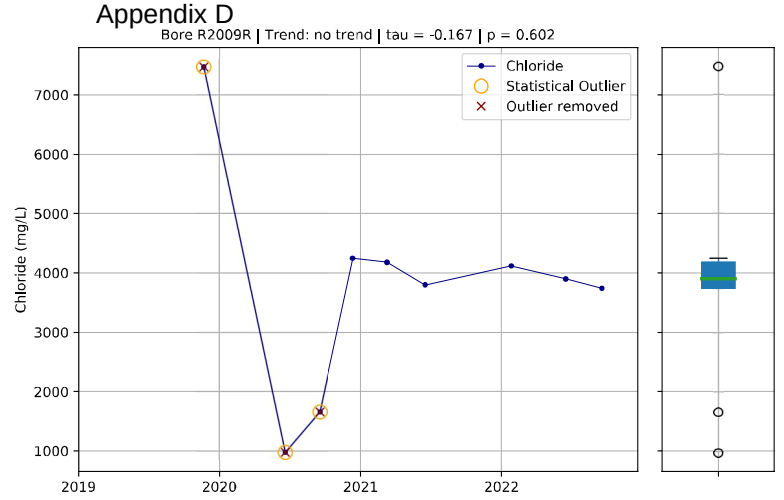


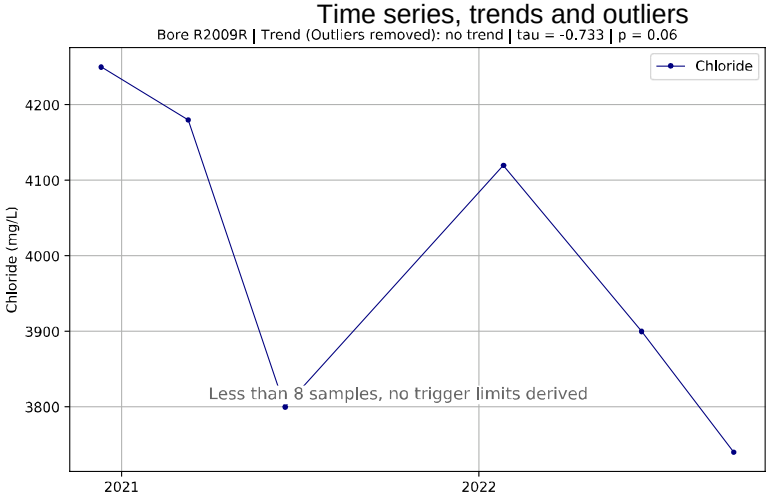
Bore R2009R | Trend: no trend | tau = 0.0 | p = 1.0

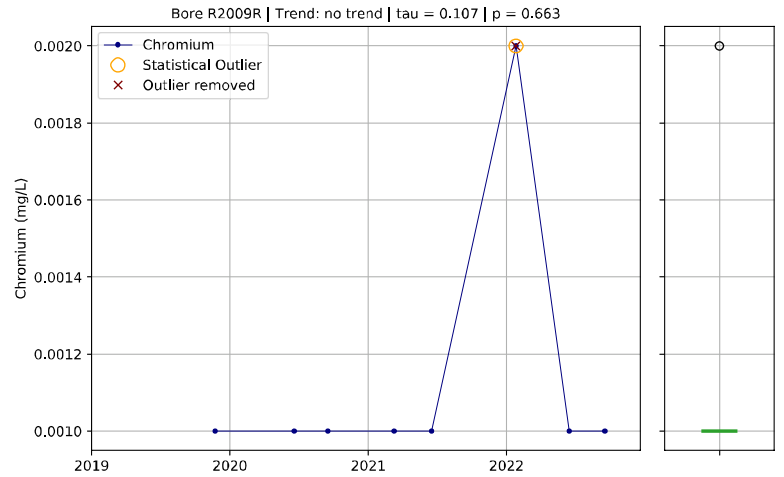


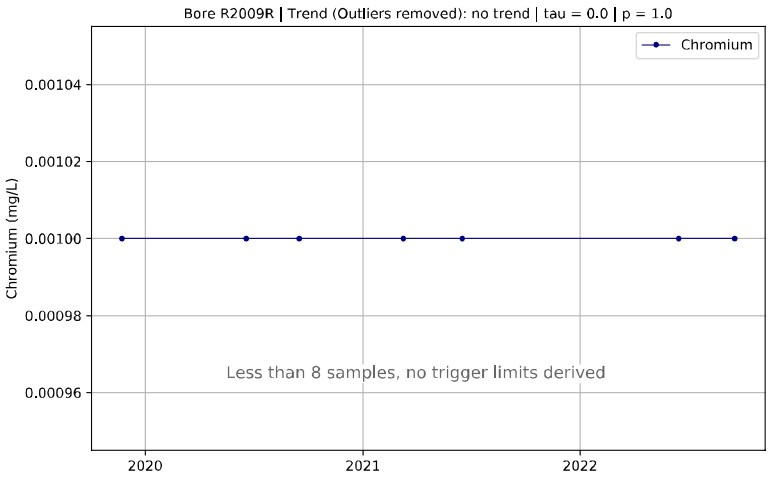
Bore R2009R | Trend (Outliers removed): no trend | tau = 0.286 | p = 0.386

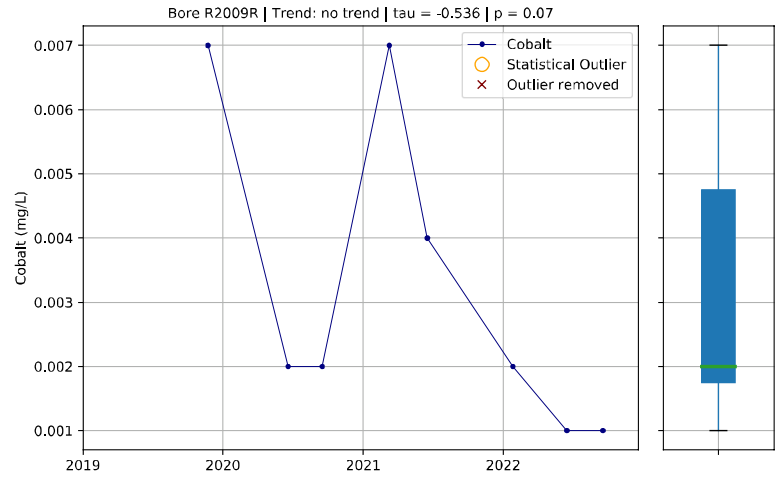


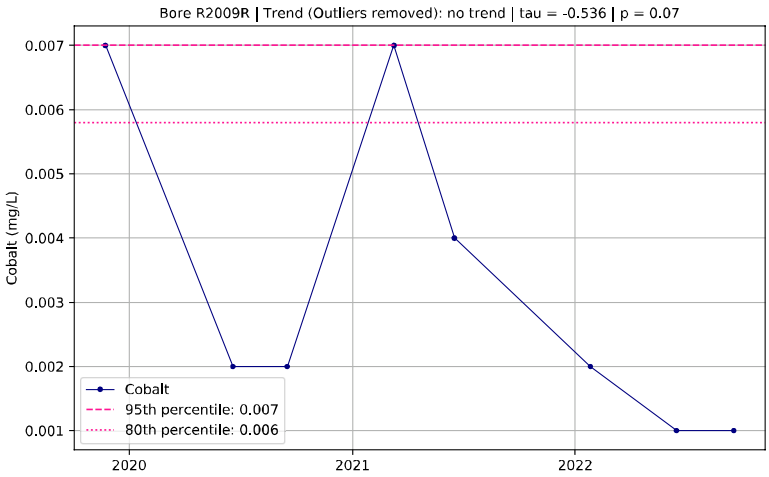

Bore R2009R | Trend: no trend | tau = -0.167 | p = 0.602
Chloride
Statistical Outlier
Outlier removed
Chloride (mg/L)

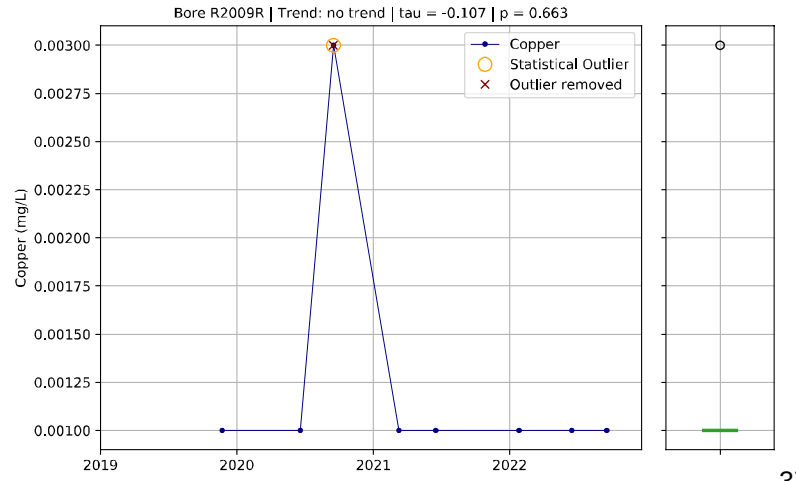

Bore R2009R | Trend (Outliers removed): no trend | tau = -0.733 | p = 0.06
Chloride
Chloride (mg/L)
Less than 8 samples, no trigger limits derived

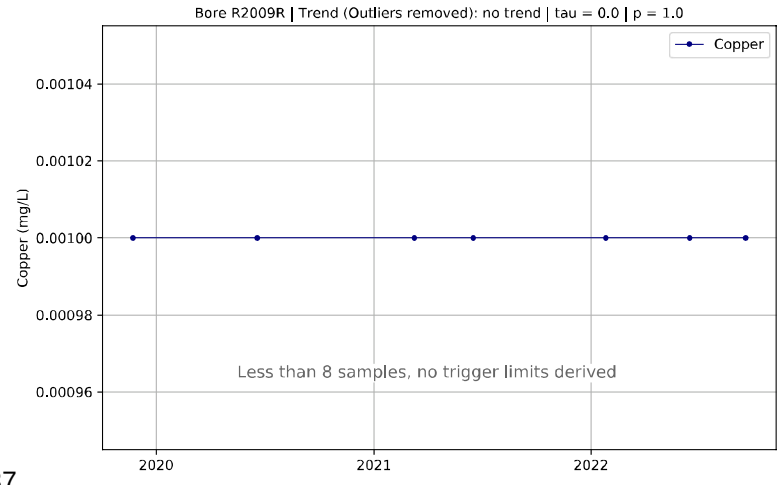

Bore R2009R | Trend: no trend | tau = 0.107 | p = 0.663
Chromium
Statistical Outlier
Outlier removed
Chromium (mg/L)

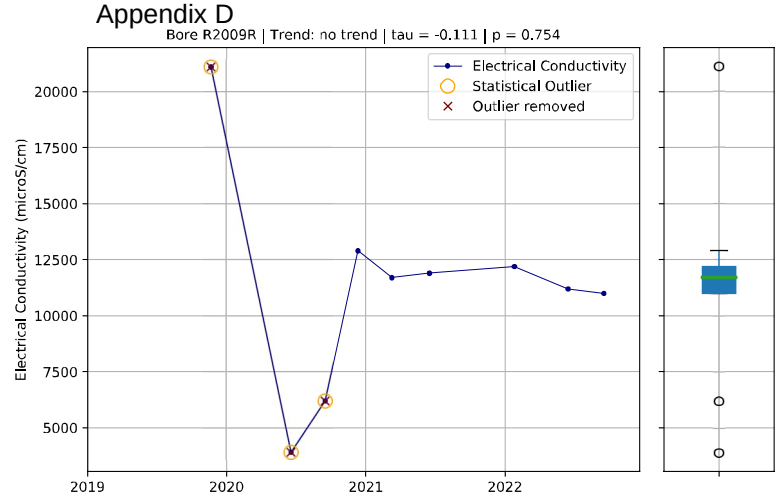

Bore R2009R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Chromium
Chromium (mg/L)
Less than 8 samples, no trigger limits derived

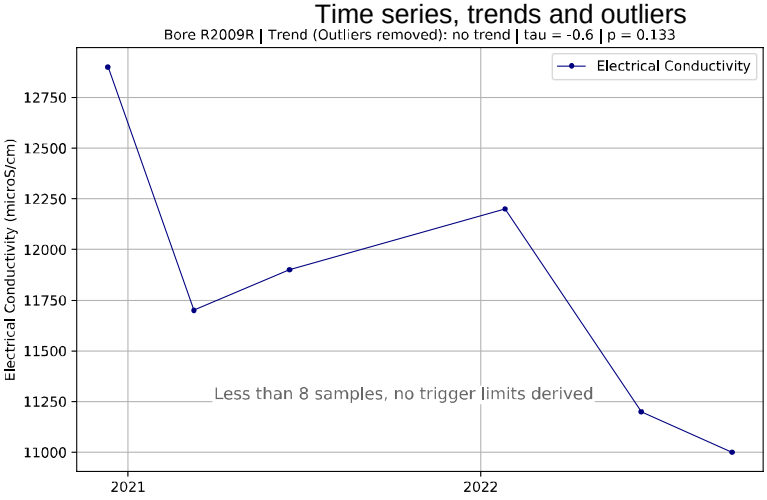

Bore R2009R | Trend: no trend | tau = -0.536 | p = 0.07
Cobalt
Statistical Outlier
Outlier removed
Cobalt (mg/L)

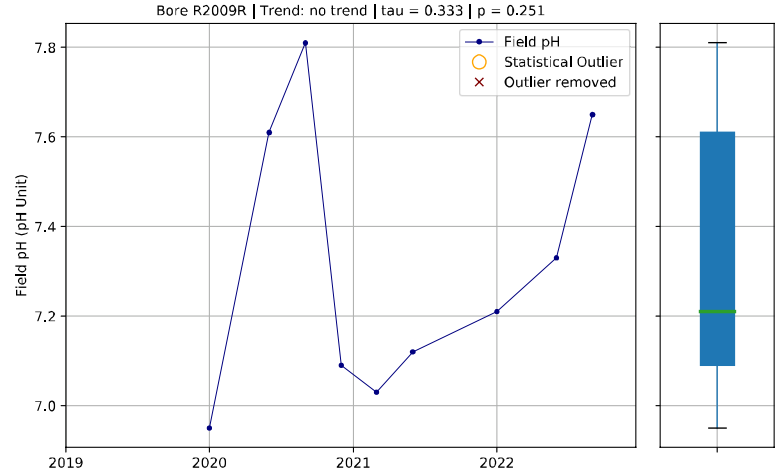

Bore R2009R | Trend (Outliers removed): no trend | tau = -0.536 | p = 0.07
Cobalt
95th percentile: 0.007
80th percentile: 0.006
Cobalt (mg/L)

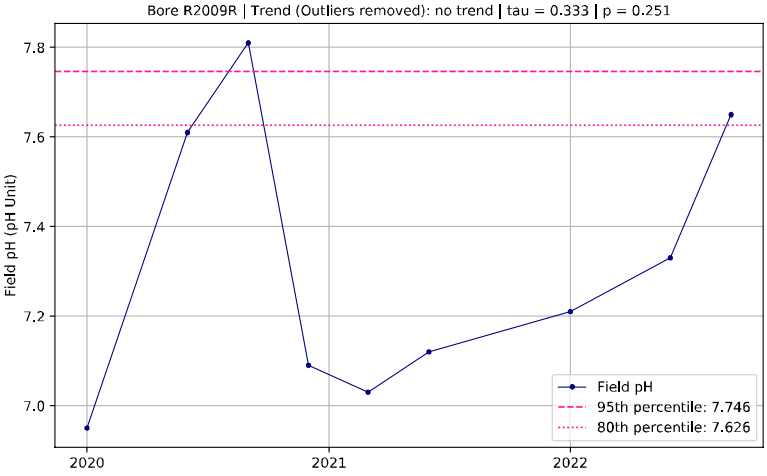

Bore R2009R | Trend: no trend | tau = -0.107 | p = 0.663
Copper
Statistical Outlier
Outlier removed
Copper (mg/L)

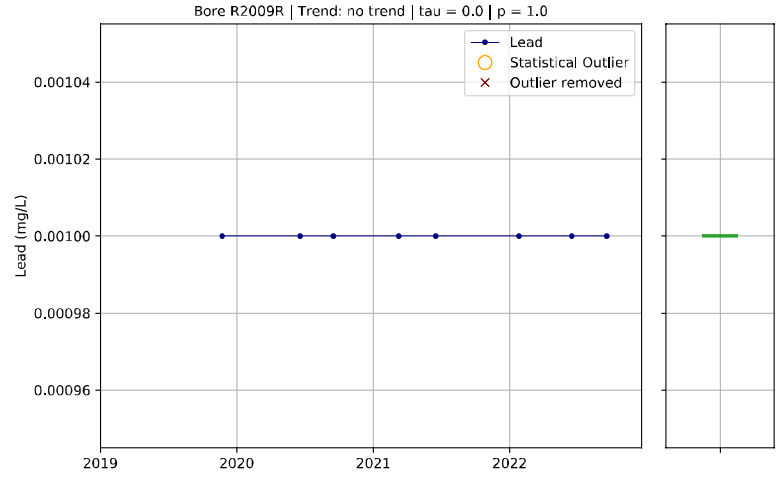

Bore R2009R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Copper
Copper (mg/L)
Less than 8 samples, no trigger limits derived

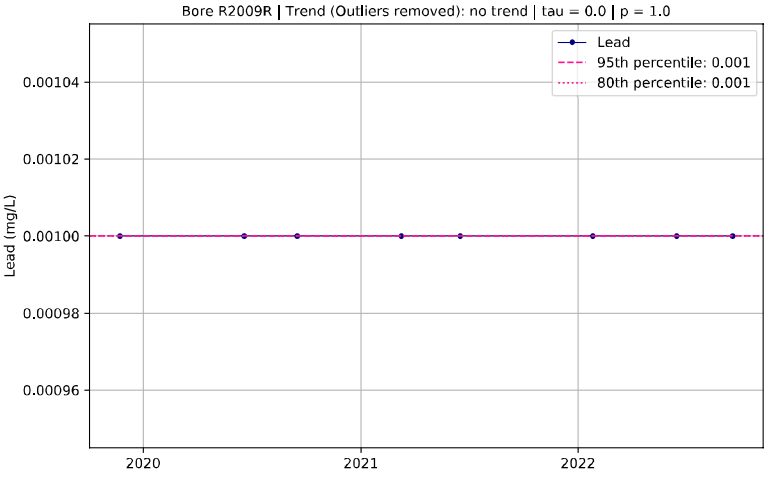

Bore R2009R | Trend: no trend | tau = -0.111 | p = 0.754
Electrical Conductivity
Statistical Outlier
Outlier removed
Electrical Conductivity (microS/cm)

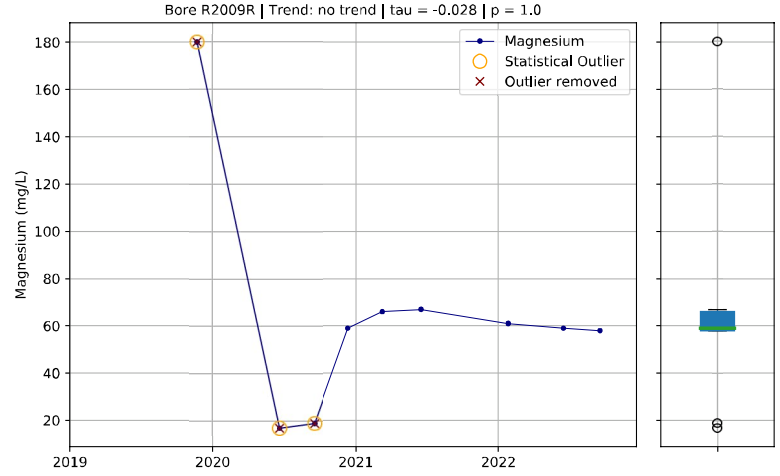

Bore R2009R | Trend (Outliers removed): no trend | tau = -0.6 | p = 0.133
Electrical Conductivity
Electrical Conductivity (microS/cm)
Less than 8 samples, no trigger limits derived

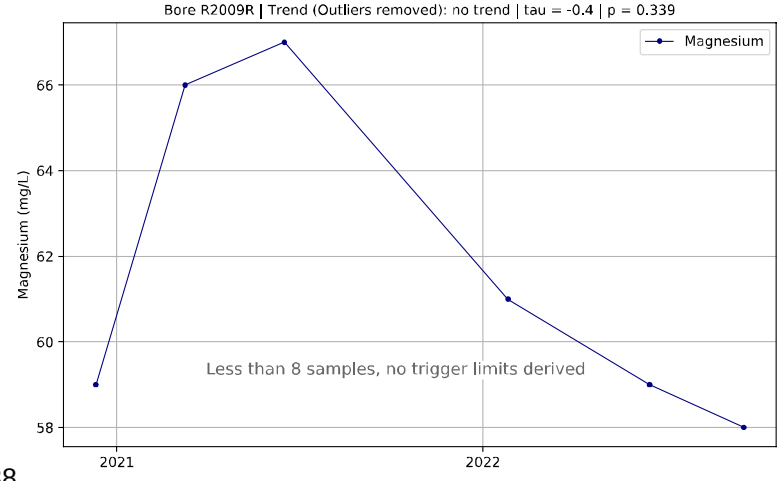

Bore R2009R | Trend: no trend | tau = 0.333 | p = 0.251
Field pH
Statistical Outlier
Outlier removed
Field pH (pH Unit)

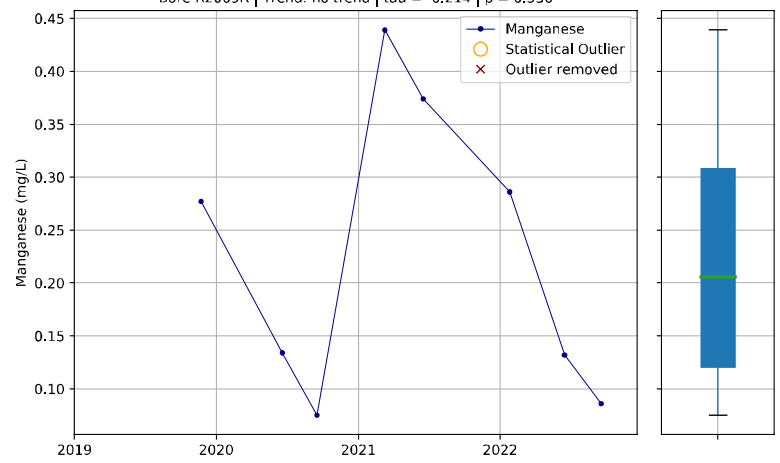

Bore R2009R | Trend (Outliers removed): no trend | tau = 0.333 | p = 0.251
Field pH (pH Unit)
Field pH
95th percentile: 7.746
80th percentile: 7.626

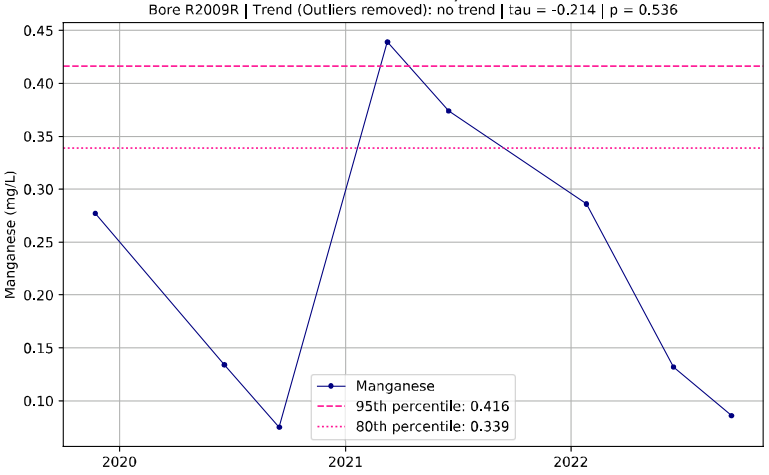

Bore R2009R | Trend: no trend | tau = 0.0 | p = 1.0
Lead
Statistical Outlier
Outlier removed
Lead (mg/L)

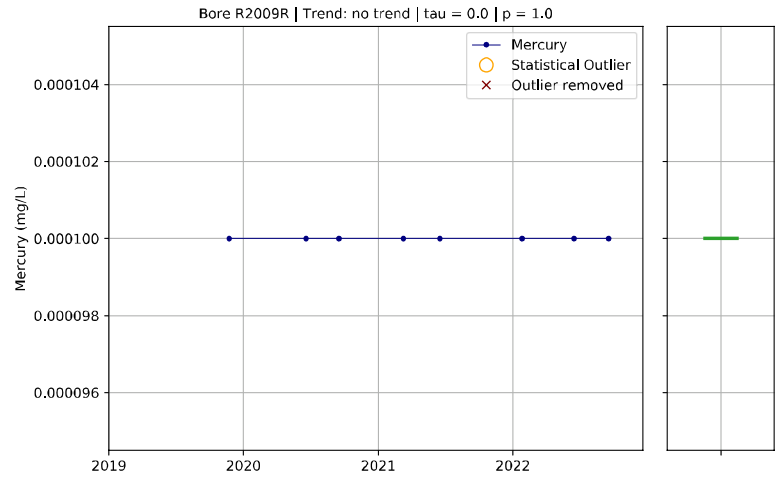

Bore R2009R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Lead
95th percentile: 0.001
80th percentile: 0.001
Lead (mg/L)

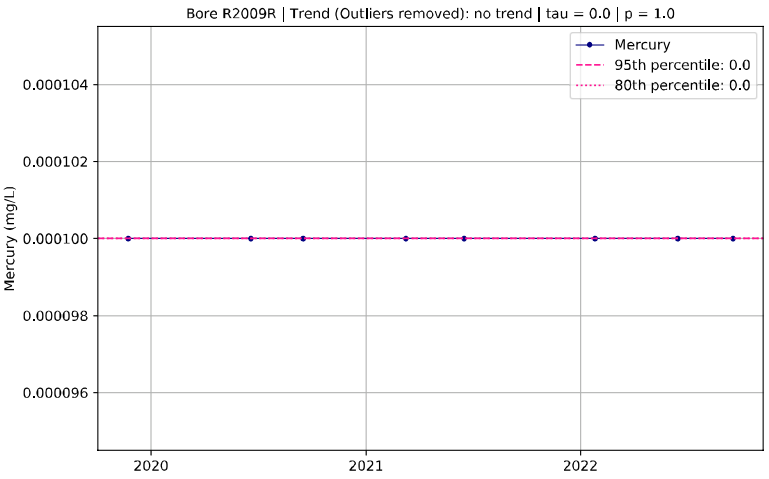

Bore R2009R | Trend: no trend | tau = -0.028 | p = 1.0
Magnesium
Statistical Outlier
Outlier removed
Magnesium (mg/L)

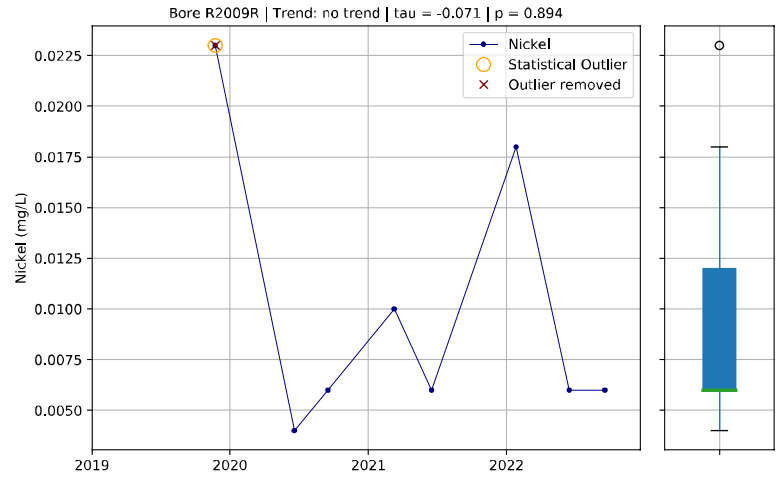

Bore R2009R | Trend (Outliers removed): no trend | tau = -0.4 | p = 0.339
Magnesium
Magnesium (mg/L)
Less than 8 samples, no trigger limits derived

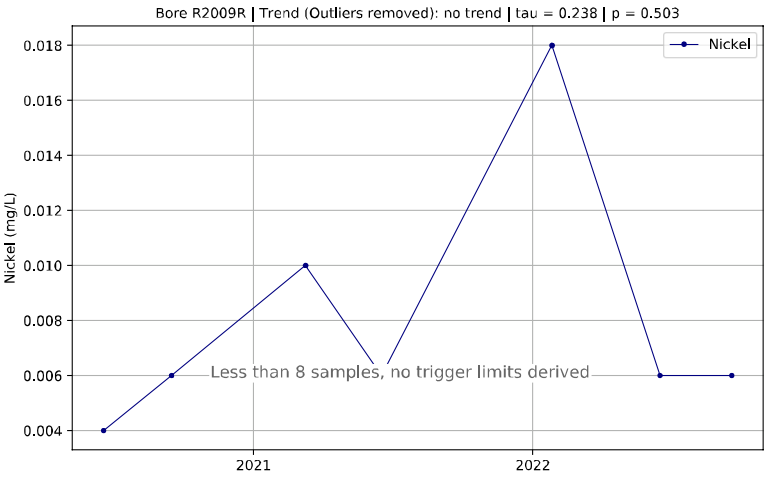

Bore R2009R | Trend: no trend | tau = -0.214 | p = 0.536
Manganese
Statistical Outlier
Outlier removed
Manganese (mg/L)
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
2019
2020
2021
2022

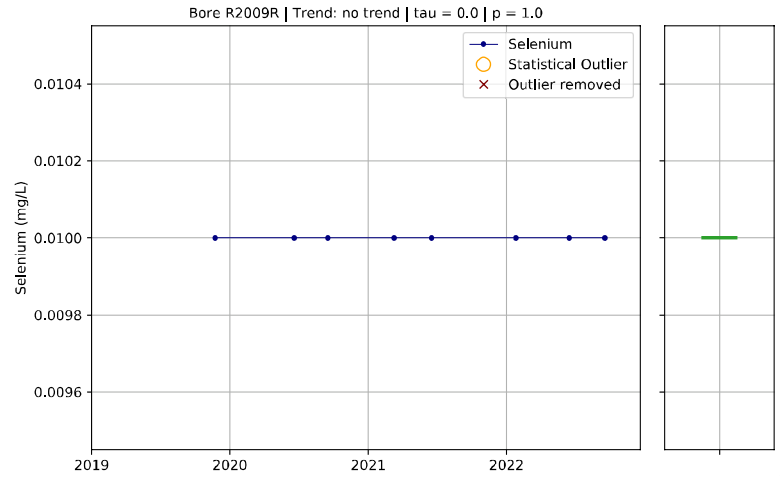

Bore R2009R | Trend (Outliers removed): no trend | tau = -0.214 | p = 0.536
Manganese (mg/L)
Manganese
95th percentile: 0.416
80th percentile: 0.339
2020
2021
2022

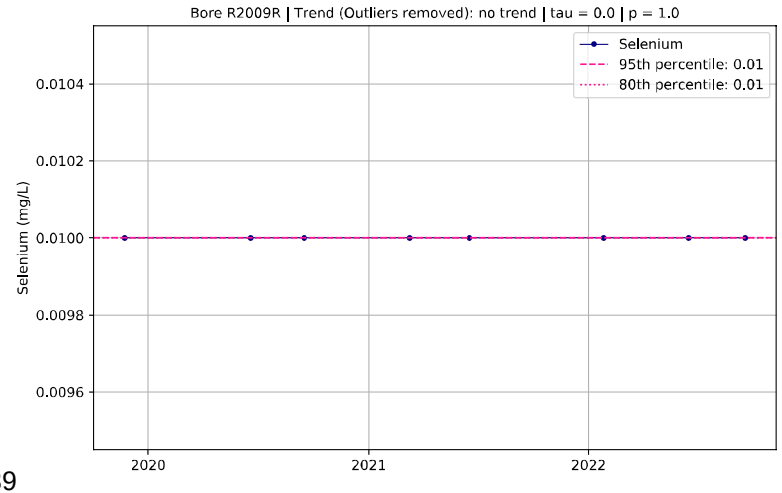

Bore R2009R | Trend: no trend | tau = 0.0 | p = 1.0
Mercury
Statistical Outlier
Outlier removed
Mercury (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022

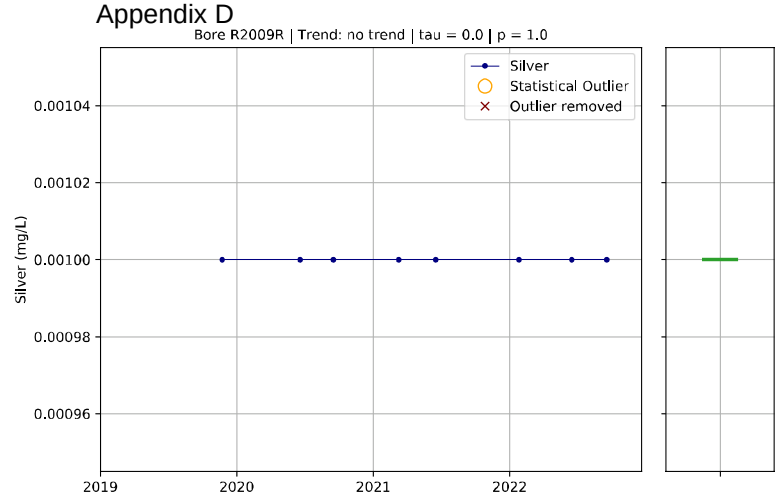

Bore R2009R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Mercury
95th percentile: 0.0
80th percentile: 0.0
Mercury (mg/L)
2020
2021
2022

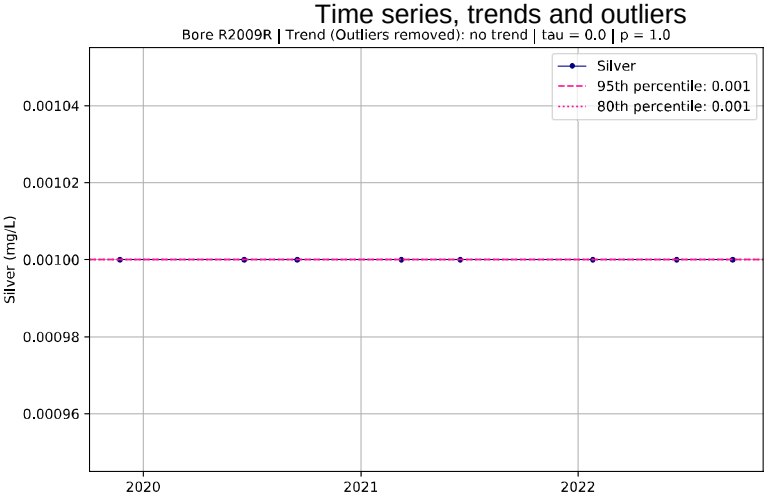

Bore R2009R | Trend: no trend | tau = -0.071 | p = 0.894
Nickel
Statistical Outlier
Outlier removed
Nickel (mg/L)
0.0225
0.0200
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
2019
2020
2021
2022

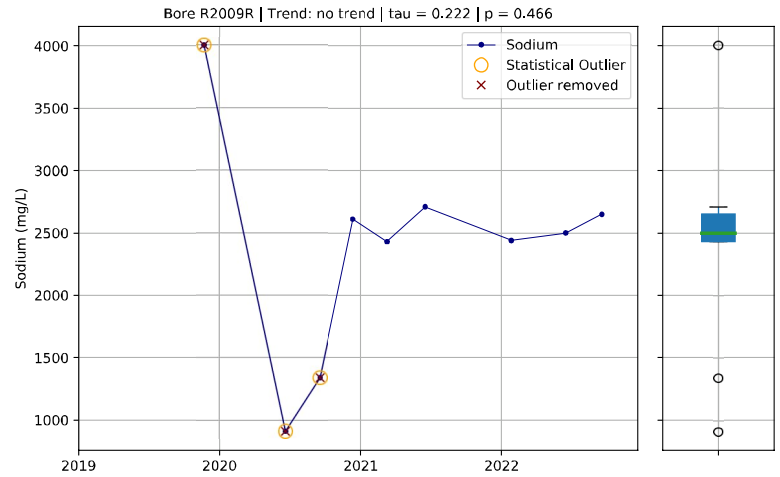

Bore R2009R | Trend (Outliers removed): no trend | tau = 0.238 | p = 0.503
Nickel
Nickel (mg/L)
0.018
0.016
0.014
0.012
0.010
0.008
0.006
0.004
Less than 8 samples, no trigger limits derived
2021
2022

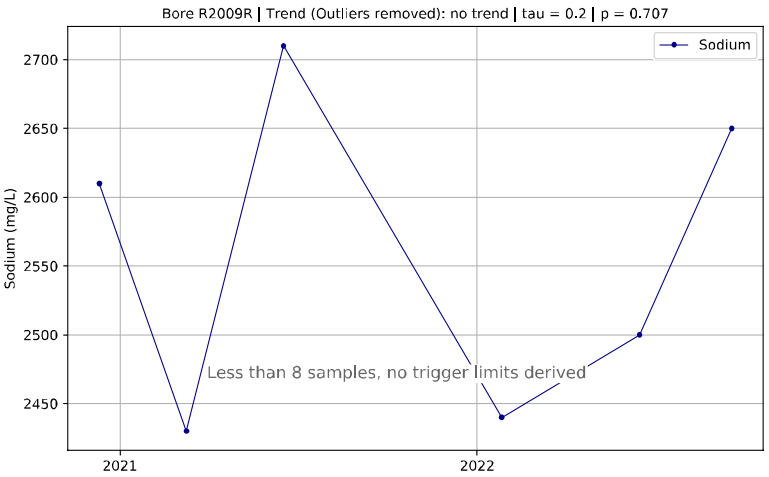

Bore R2009R | Trend: no trend | tau = 0.0 | p = 1.0
Selenium
Statistical Outlier
Outlier removed
Selenium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2019
2020
2021
2022

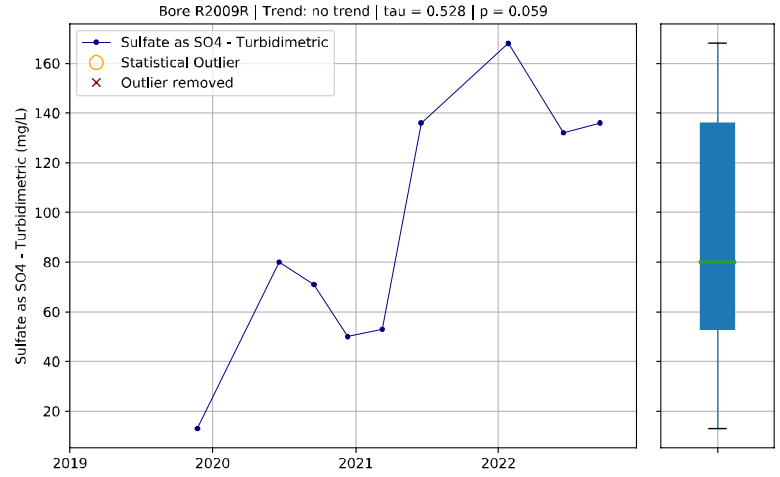

Bore R2009R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Selenium
95th percentile: 0.01
80th percentile: 0.01
Selenium (mg/L)
2020
2021
2022

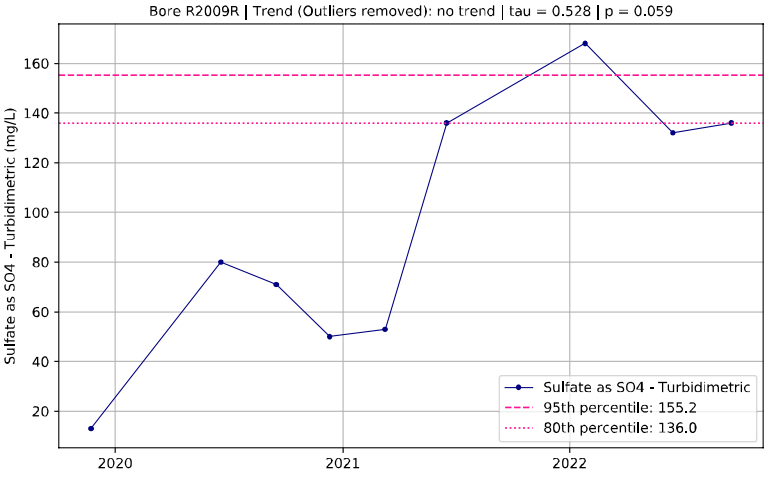

Bore R2009R | Trend: no trend | tau = 0.0 | p = 1.0
Silver
Statistical Outlier
Outlier removed
Silver (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022

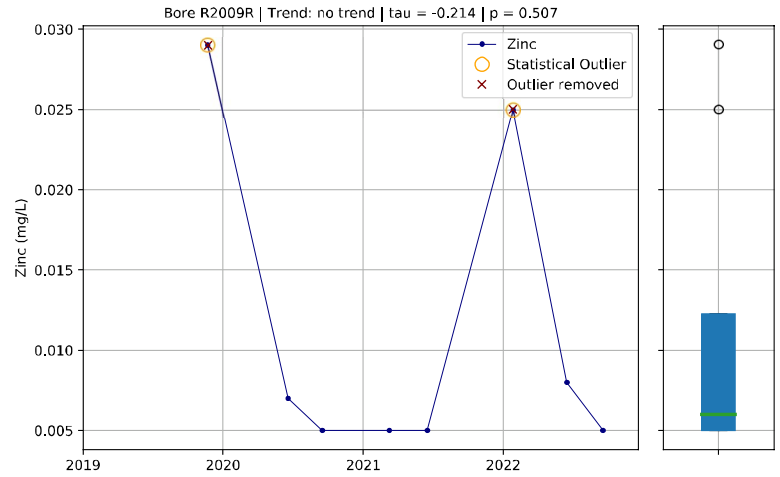

Bore R2009R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Silver
95th percentile: 0.001
80th percentile: 0.001
Silver (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2020
2021
2022

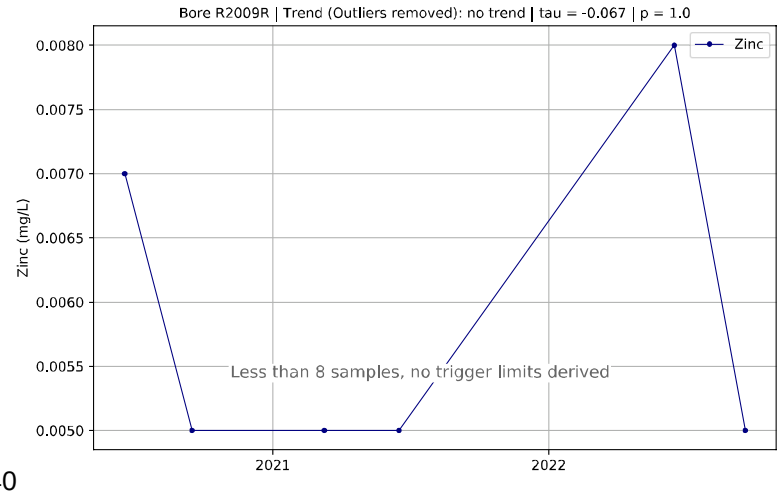

Bore R2009R | Trend: no trend | tau = 0.222 | p = 0.466
Sodium
Statistical Outlier
Outlier removed
Sodium (mg/L)
4000
3500
3000
2500
2000
1500
1000
2019
2020
2021
2022


Bore R2009R | Trend (Outliers removed): no trend | tau = 0.2 | p = 0.707
Sodium
Sodium (mg/L)
2700
2650
2600
2550
2500
2450
Less than 8 samples, no trigger limits derived
2021
2022

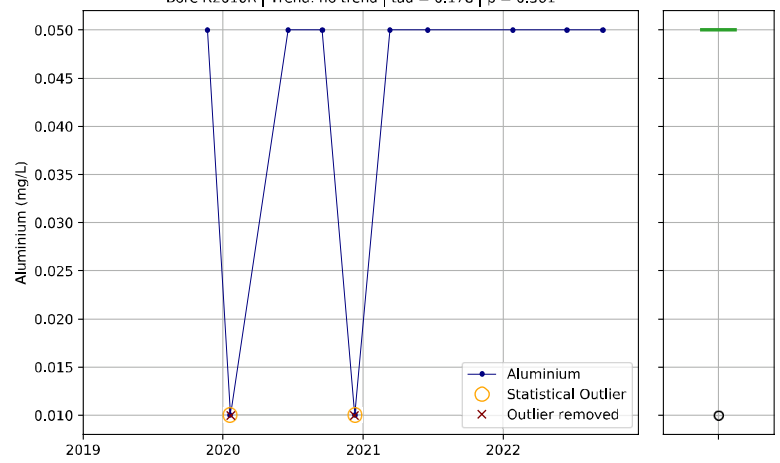

Bore R2009R | Trend: no trend | tau = 0.528 | p = 0.059
Sulfate as SO4 - Turbidimetric
Statistical Outlier
Outlier removed
Sulfate as SO4 - Turbidimetric (mg/L)
160
140
120
100
80
60
40
20
2019
2020
2021
2022

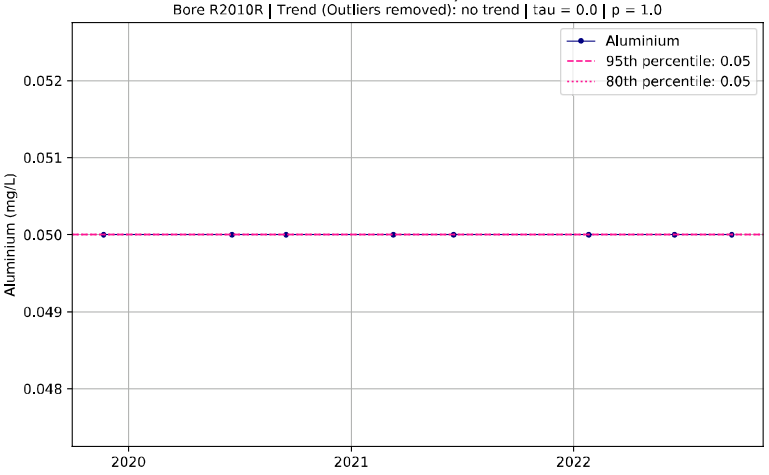

Bore R2009R | Trend (Outliers removed): no trend | tau = 0.528 | p = 0.059
Sulfate as SO4 - Turbidimetric (mg/L)
160
140
120
100
80
60
40
20
Sulfate as SO4 - Turbidimetric
95th percentile: 155.2
80th percentile: 136.0
2020
2021
2022

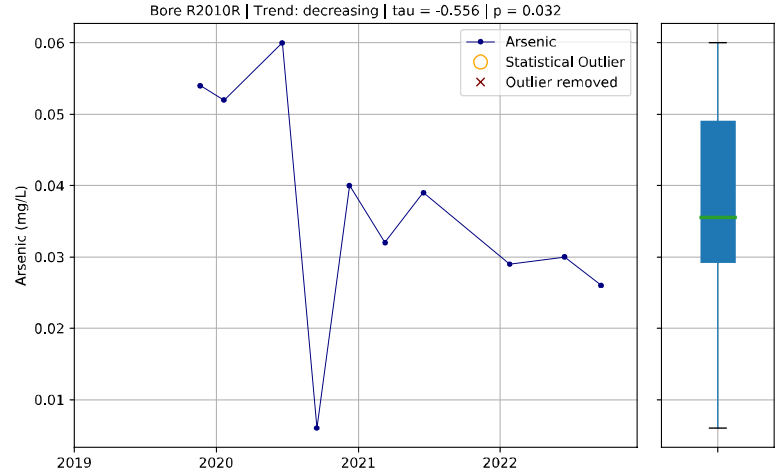

Bore R2009R | Trend: no trend | tau = -0.214 | p = 0.507
Zinc
Statistical Outlier
Outlier removed
Zinc (mg/L)
0.030
0.025
0.020
0.015
0.010
0.005
2019
2020
2021
2022

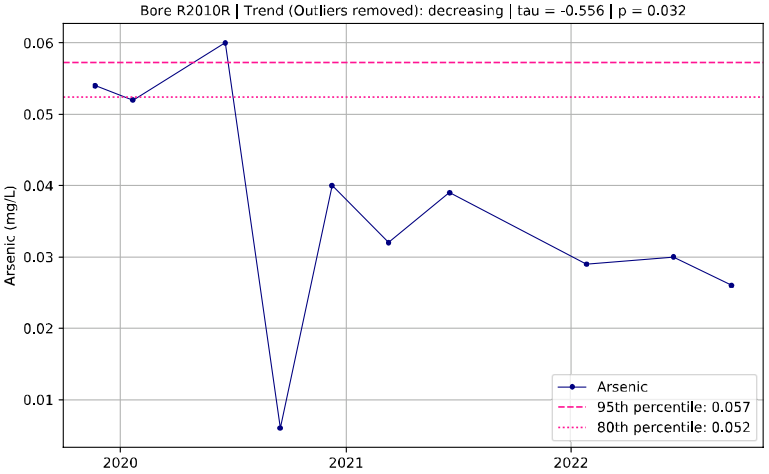

Bore R2009R | Trend (Outliers removed): no trend | tau = -0.067 | p = 1.0
Zinc
Zinc (mg/L)
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
Less than 8 samples, no trigger limits derived
2021
2022

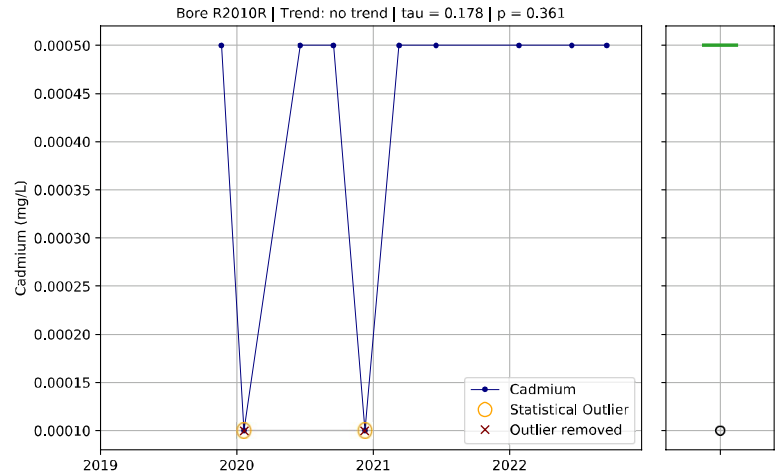
Time series, trends and outliers

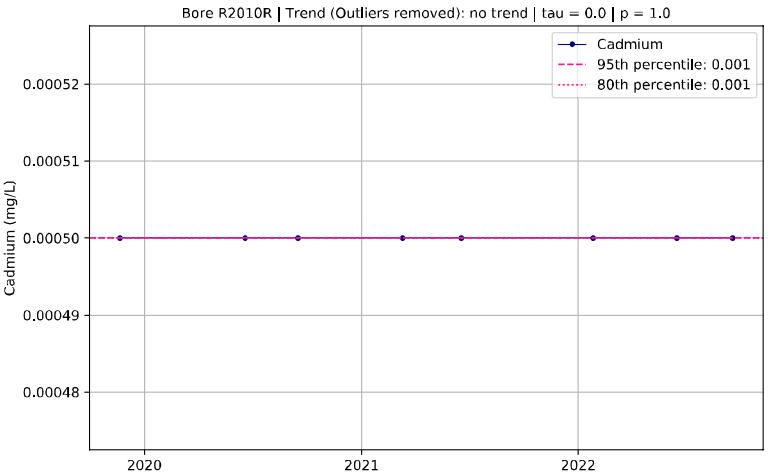


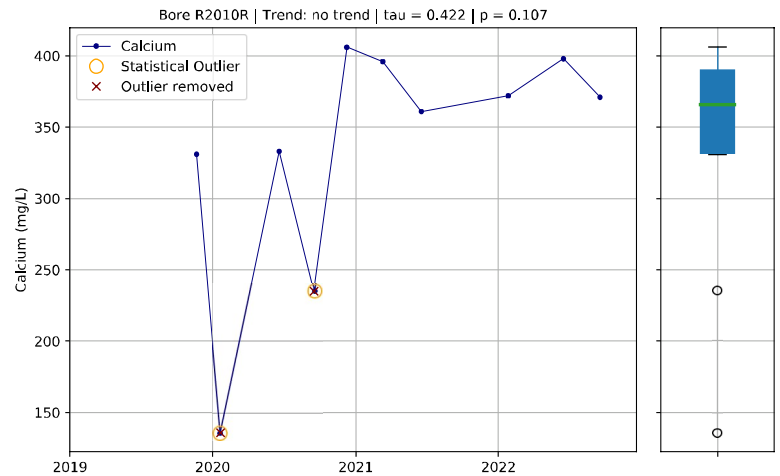


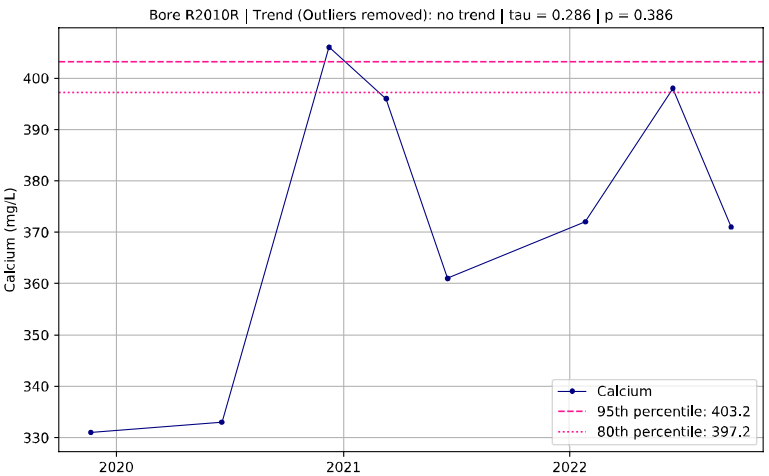


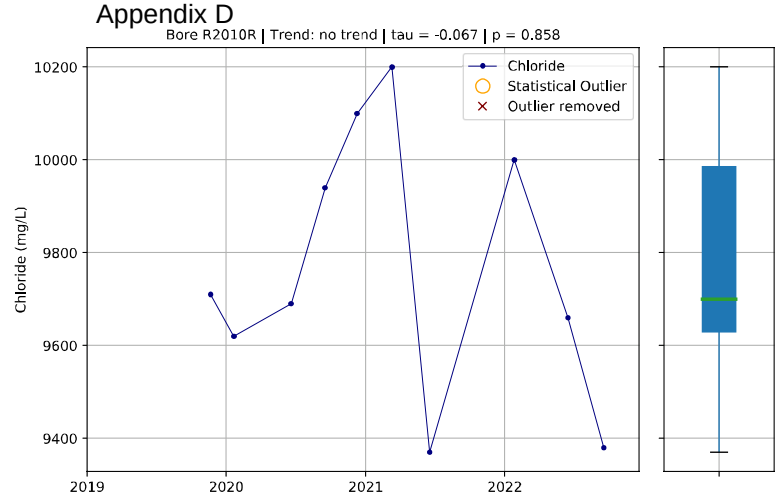


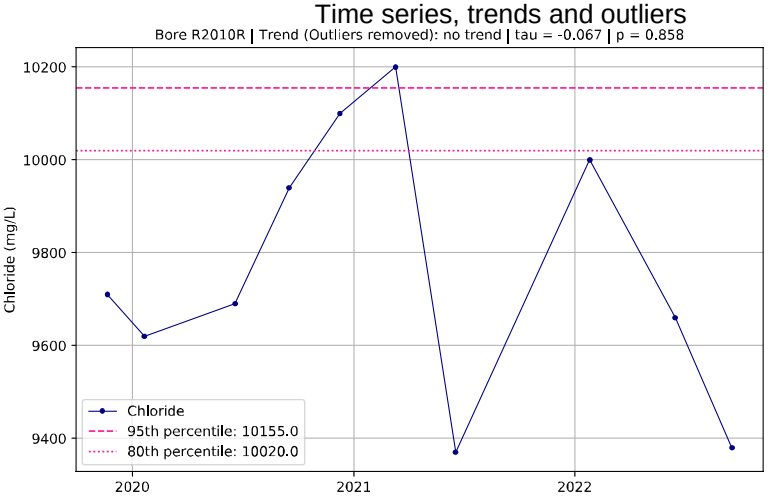


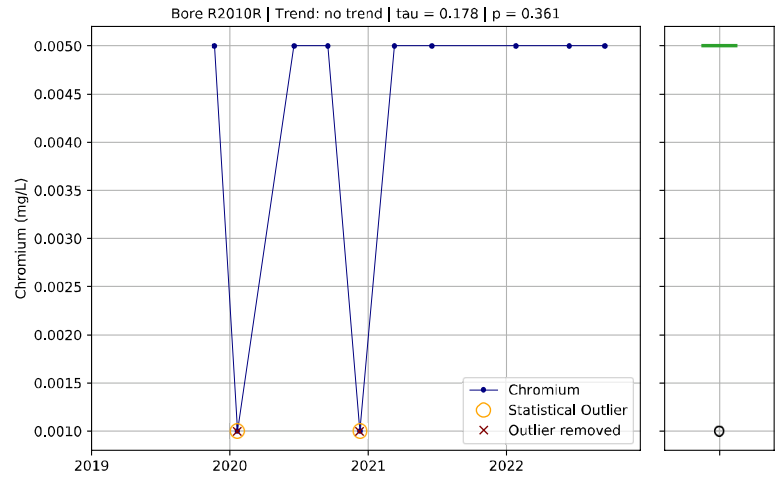


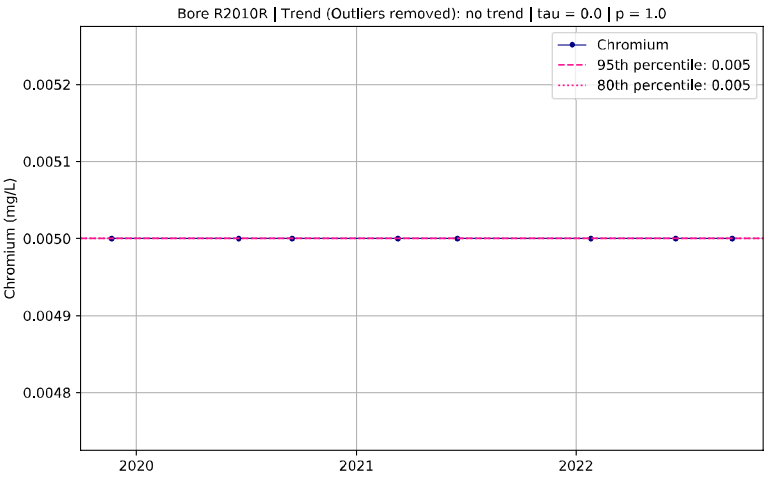


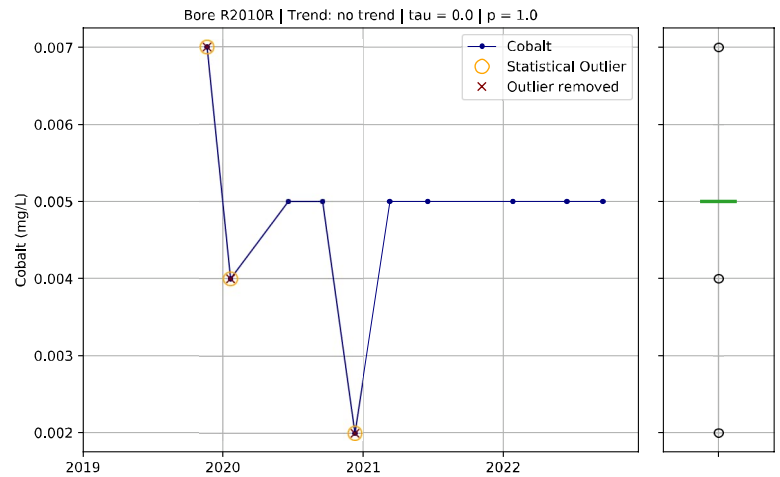


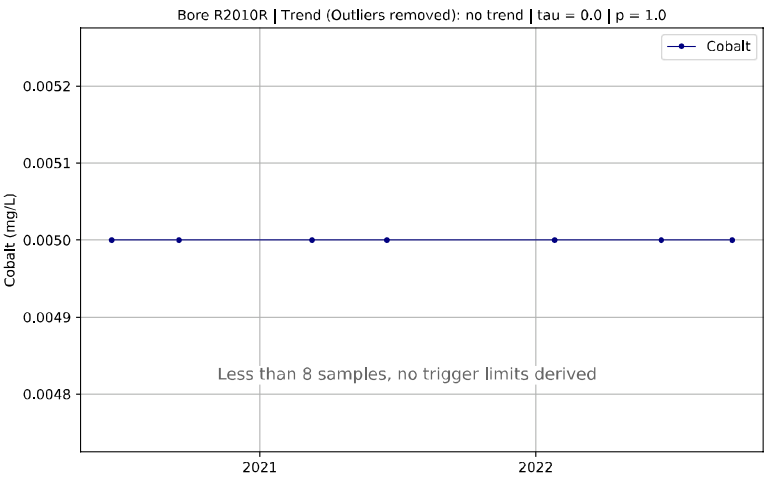

Bore R2010R | Trend: no trend | tau = -0.067 | p = 0.858
Chloride
Statistical Outlier
Outlier removed
Chloride (mg/L)

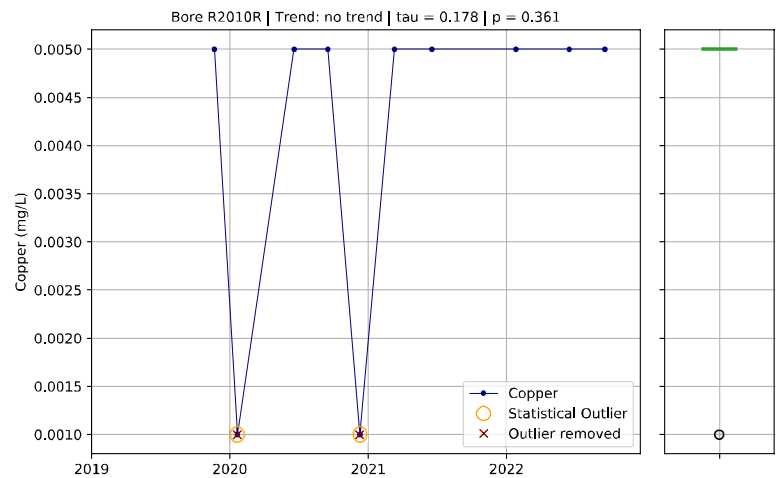

Bore R2010R | Trend (Outliers removed): no trend | tau = -0.067 | p = 0.858
Chloride
95th percentile: 10155.0
80th percentile: 10020.0
Chloride (mg/L)

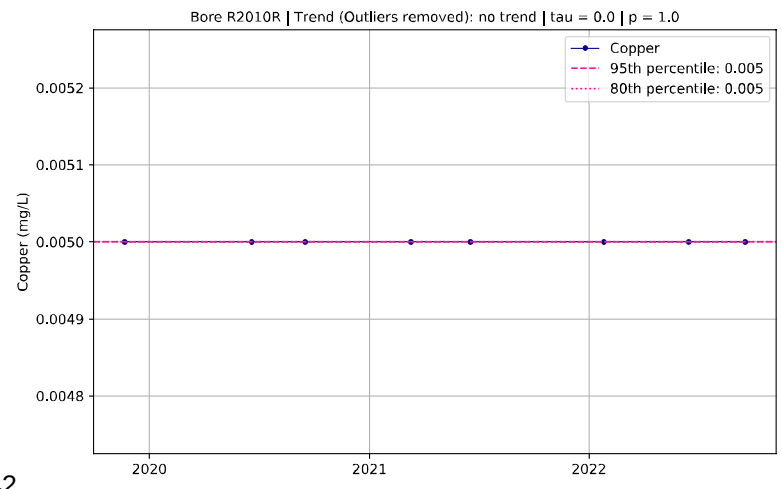

Bore R2010R | Trend: no trend | tau = 0.178 | p = 0.361
Chromium
Statistical Outlier
Outlier removed
Chromium (mg/L)

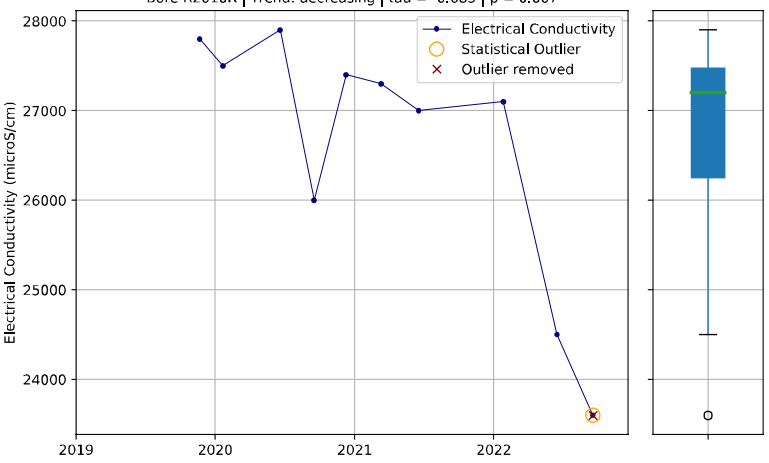

Bore R2010R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Chromium
95th percentile: 0.005
80th percentile: 0.005
Chromium (mg/L)

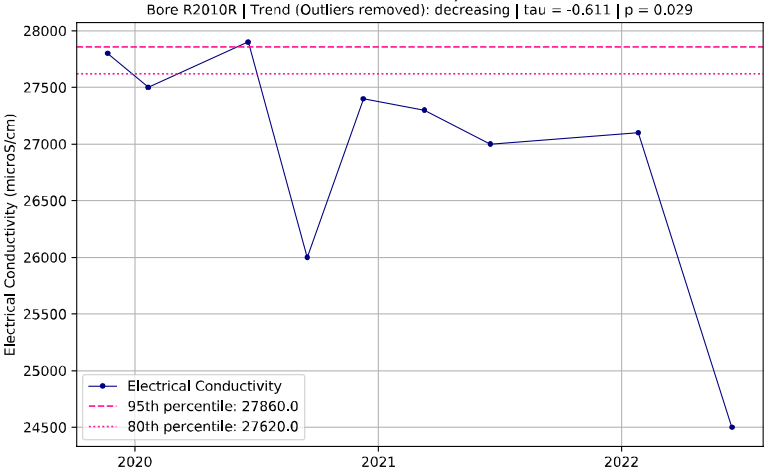

Bore R2010R | Trend: no trend | tau = 0.0 | p = 1.0
Cobalt
Statistical Outlier
Outlier removed
Cobalt (mg/L)

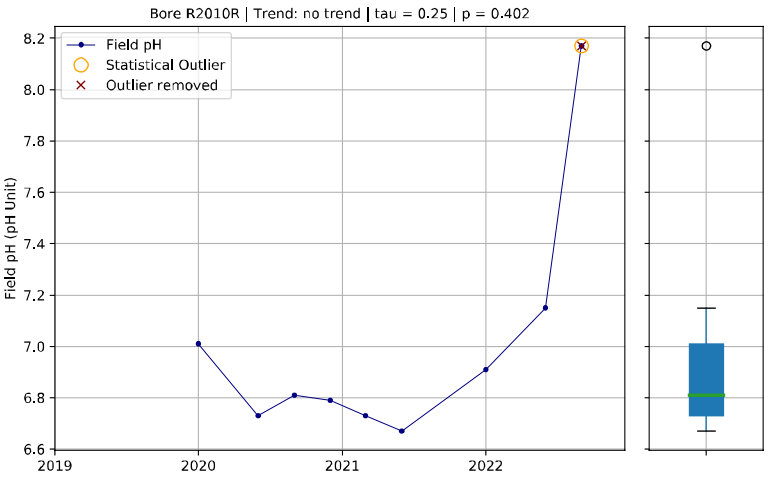

Bore R2010R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Cobalt
Less than 8 samples, no trigger limits derived
Cobalt (mg/L)

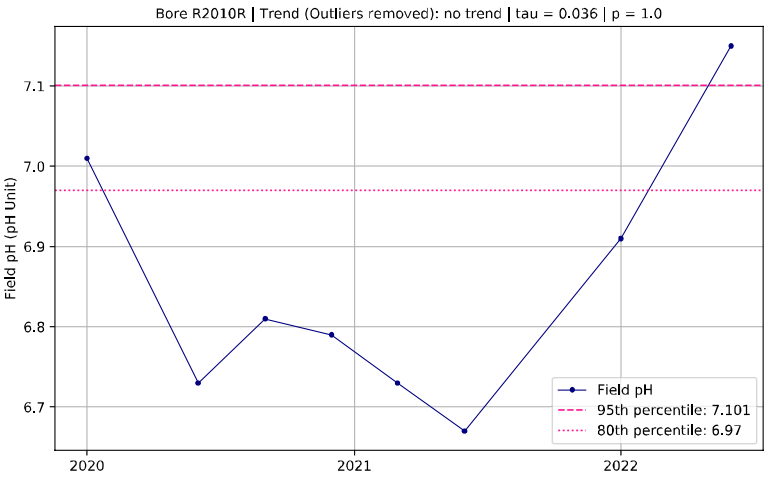

Bore R2010R | Trend: no trend | tau = 0.178 | p = 0.361
Copper
Statistical Outlier
Outlier removed
Copper (mg/L)

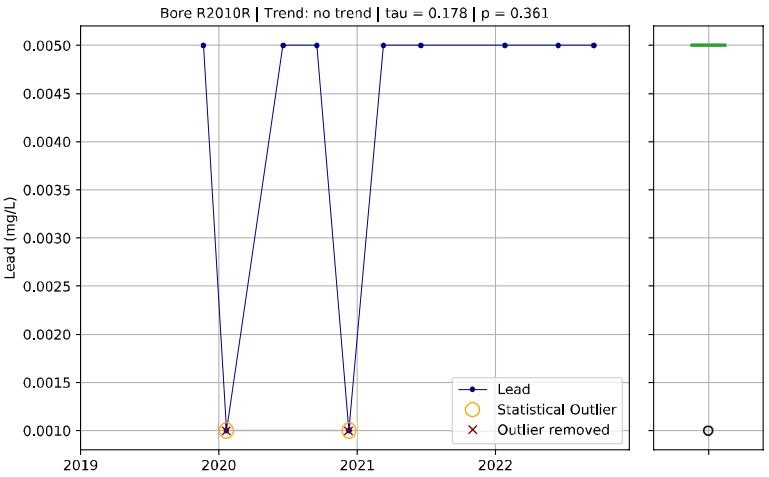

Bore R2010R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Copper
95th percentile: 0.005
80th percentile: 0.005
Copper (mg/L)

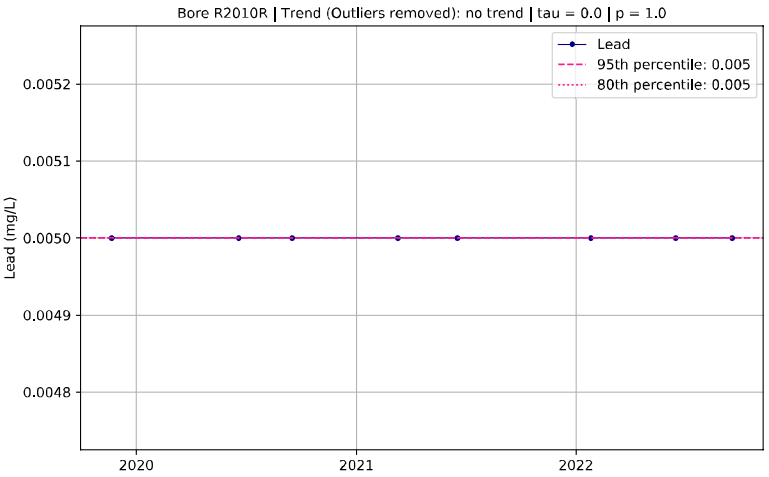

Bore R2010R | Trend: decreasing | tau = -0.689 | p = 0.007
Electrical Conductivity
Statistical Outlier
Outlier removed
Electrical Conductivity (microS/cm)

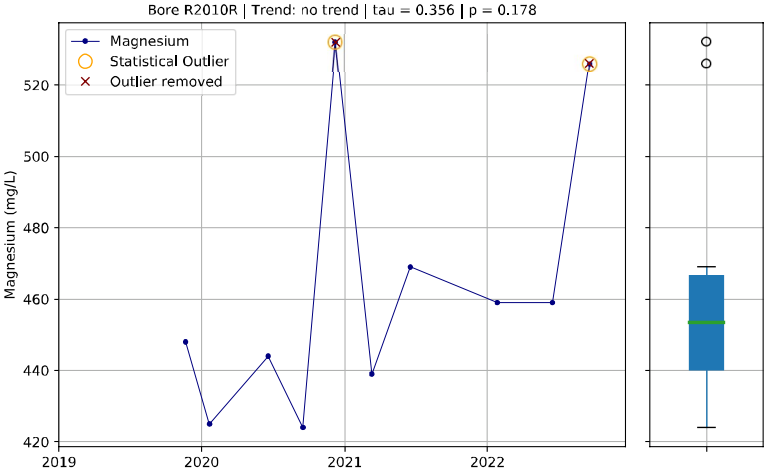

Bore R2010R | Trend (Outliers removed): decreasing | tau = -0.611 | p = 0.029
Electrical Conductivity
95th percentile: 27860.0
80th percentile: 27620.0
Electrical Conductivity (microS/cm)

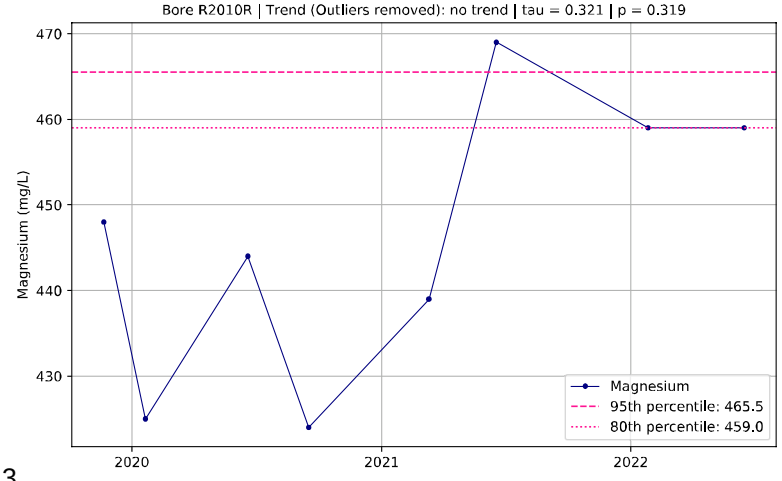

Bore R2010R | Trend: no trend | tau = 0.25 | p = 0.402
Field pH
Statistical Outlier
Outlier removed
Field pH (pH Unit)

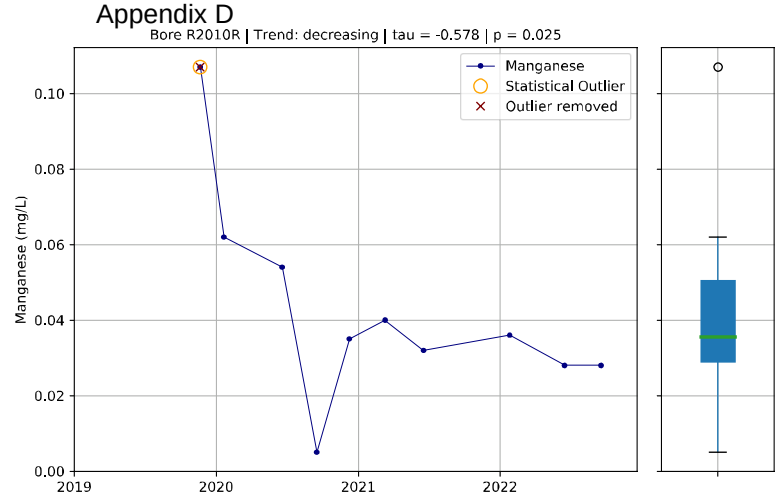

Bore R2010R | Trend (Outliers removed): no trend | tau = 0.036 | p = 1.0
Field pH
95th percentile: 7.101
80th percentile: 6.97
Field pH (pH Unit)

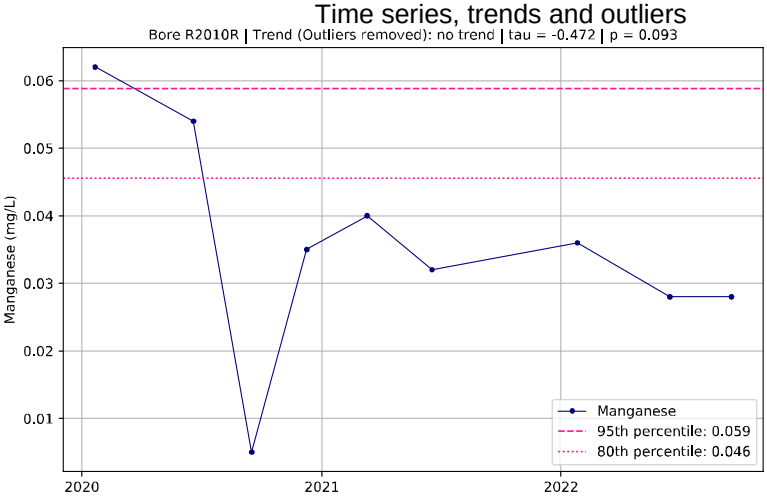

Bore R2010R | Trend: no trend | tau = 0.178 | p = 0.361
Lead
Statistical Outlier
Outlier removed
Lead (mg/L)

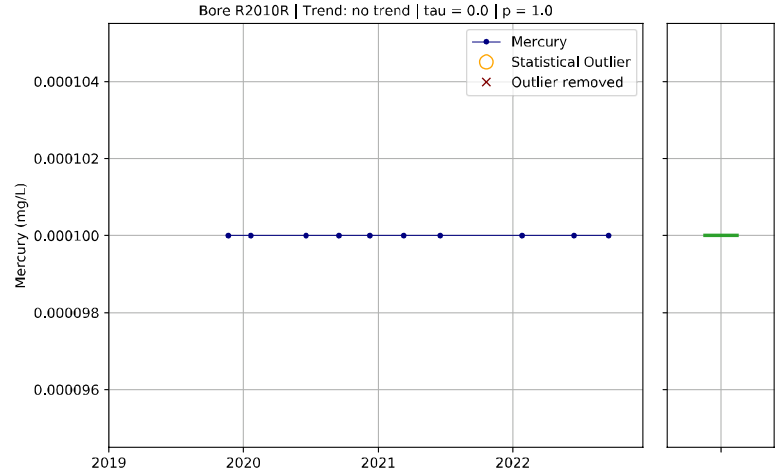

Bore R2010R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Lead
95th percentile: 0.005
80th percentile: 0.005
Lead (mg/L)

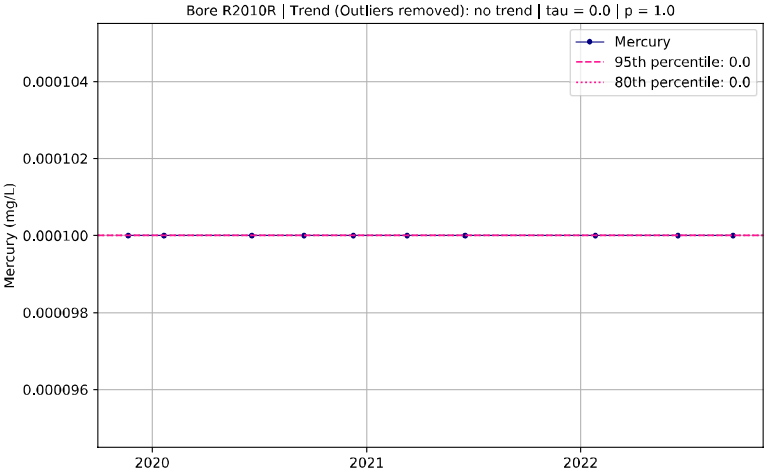

Bore R2010R | Trend: no trend | tau = 0.356 | p = 0.178
Magnesium
Statistical Outlier
Outlier removed
Magnesium (mg/L)

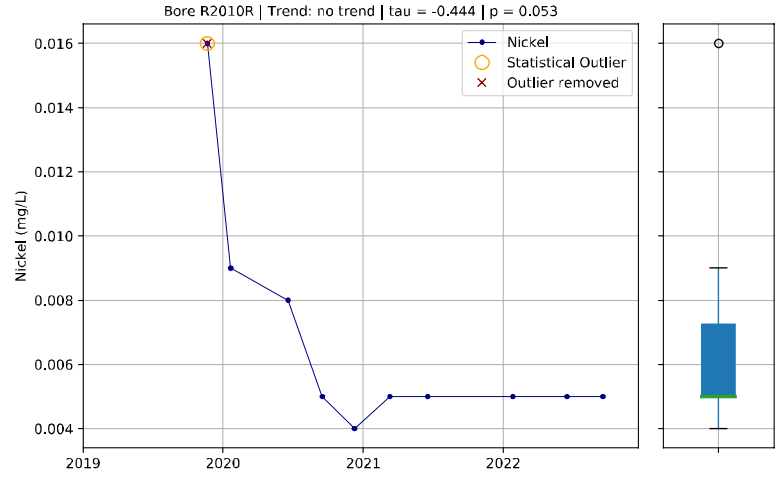

Bore R2010R | Trend (Outliers removed): no trend | tau = 0.321 | p = 0.319
Magnesium
95th percentile: 465.5
80th percentile: 459.0
Magnesium (mg/L)

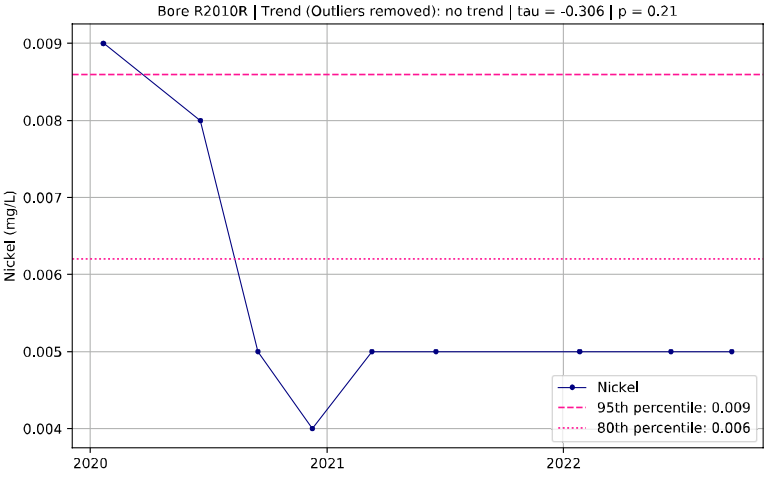

Bore R2010R | Trend: decreasing | tau = -0.578 | p = 0.025
Manganese
Statistical Outlier
Outlier removed
Manganese (mg/L)
0.10
0.08
0.06
0.04
0.02
0.00
2019
2020
2021
2022

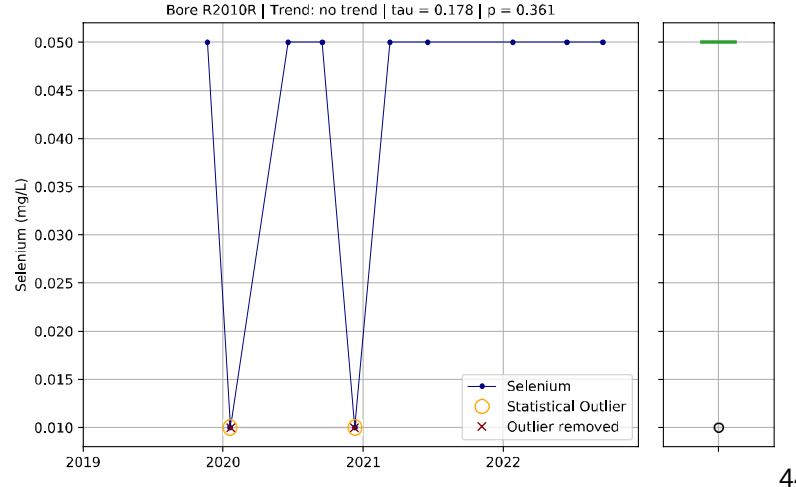

Bore R2010R | Trend (Outliers removed): no trend | tau = -0.472 | p = 0.093
Manganese (mg/L)
0.06
0.05
0.04
0.03
0.02
0.01
2020
2021
2022
Manganese
95th percentile: 0.059
80th percentile: 0.046

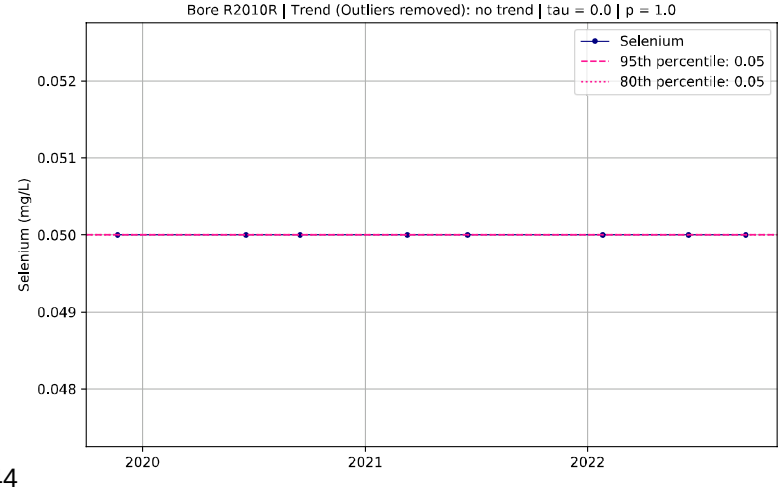

Bore R2010R | Trend: no trend | tau = 0.0 | p = 1.0
Mercury
Statistical Outlier
Outlier removed
Mercury (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022

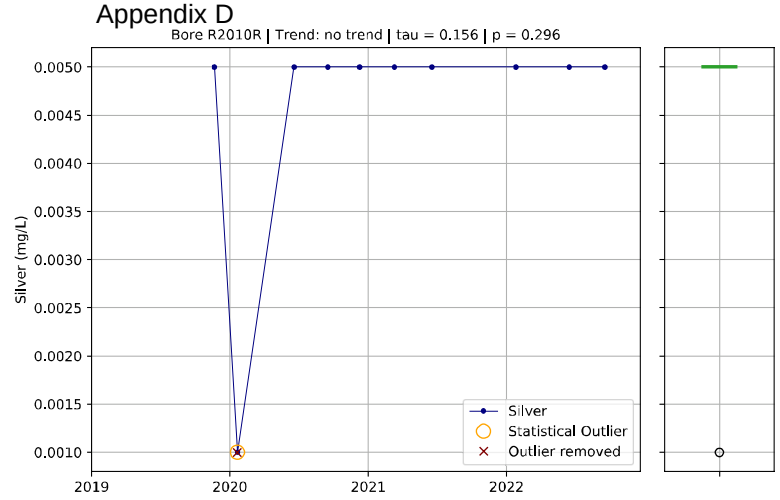

Bore R2010R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Mercury
95th percentile: 0.0
80th percentile: 0.0
Mercury (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2020
2021
2022

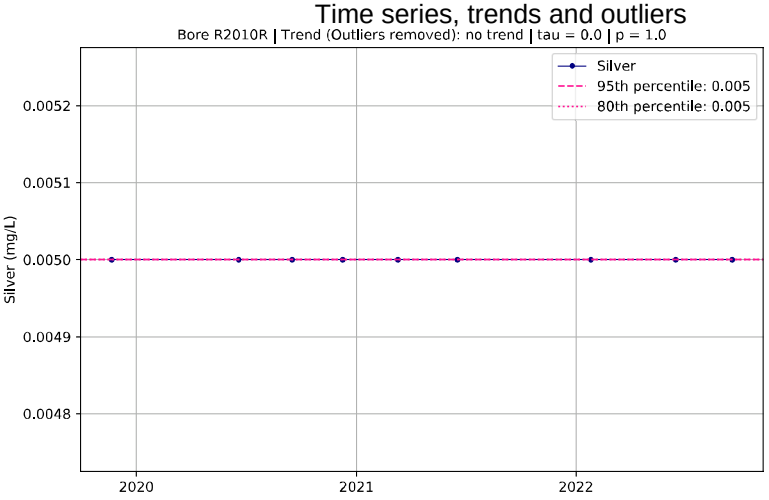

Bore R2010R | Trend: no trend | tau = -0.444 | p = 0.053
Nickel
Statistical Outlier
Outlier removed
Nickel (mg/L)
0.016
0.014
0.012
0.010
0.008
0.006
0.004
2019
2020
2021
2022

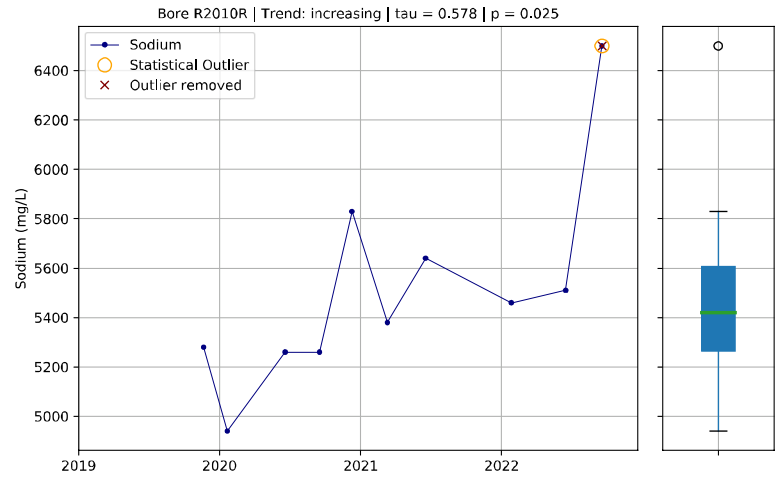

Bore R2010R | Trend (Outliers removed): no trend | tau = -0.306 | p = 0.21
Nickel (mg/L)
0.009
0.008
0.007
0.006
0.005
0.004
2020
2021
2022
Nickel
95th percentile: 0.009
80th percentile: 0.006

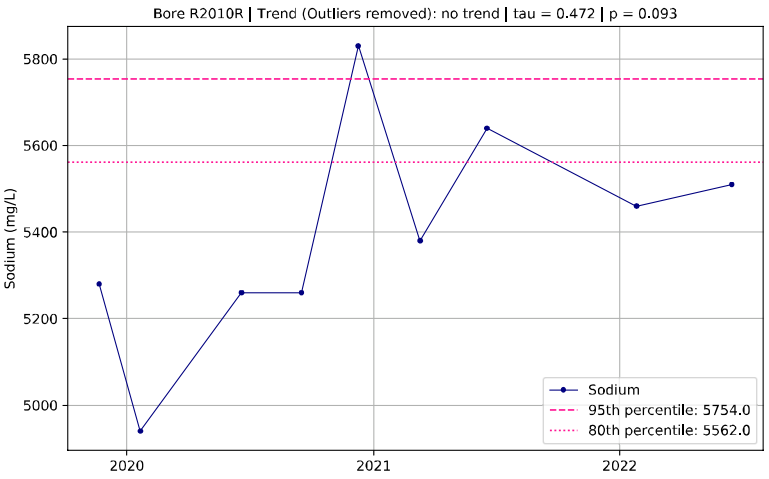

Bore R2010R | Trend: no trend | tau = 0.178 | p = 0.361
Selenium
Statistical Outlier
Outlier removed
Selenium (mg/L)
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
2019
2020
2021
2022

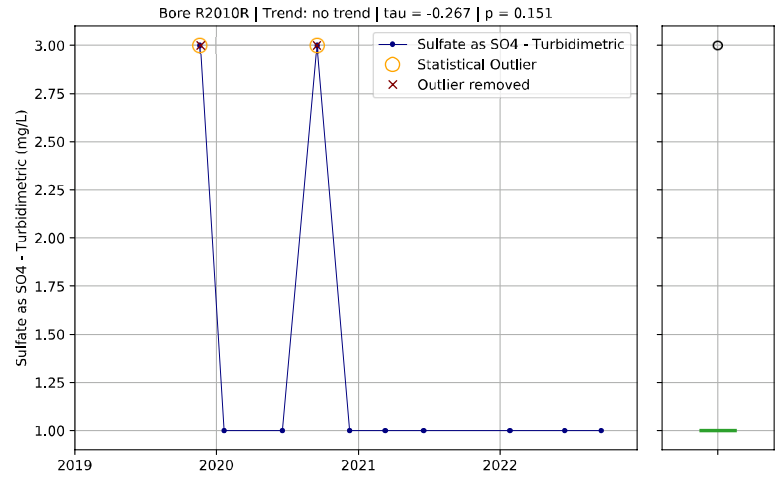

Bore R2010R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Selenium
95th percentile: 0.05
80th percentile: 0.05
Selenium (mg/L)
0.052
0.051
0.050
0.049
0.048
2020
2021
2022

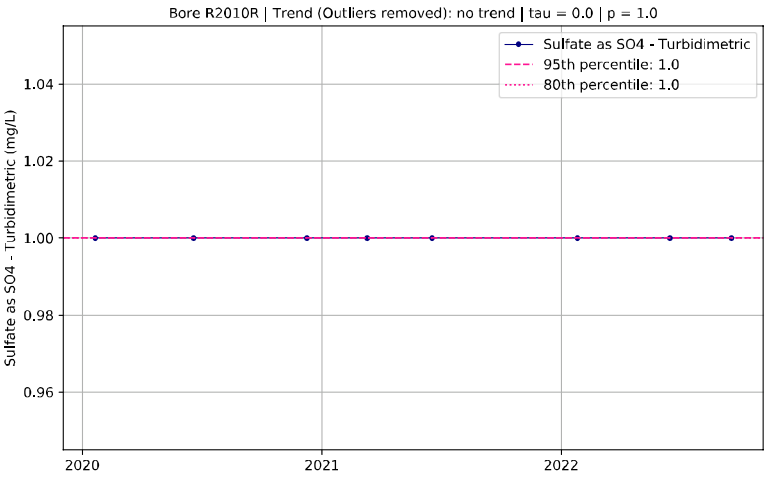

Bore R2010R | Trend: no trend | tau = 0.156 | p = 0.296
Silver (mg/L)
Silver
Statistical Outlier
Outlier removed

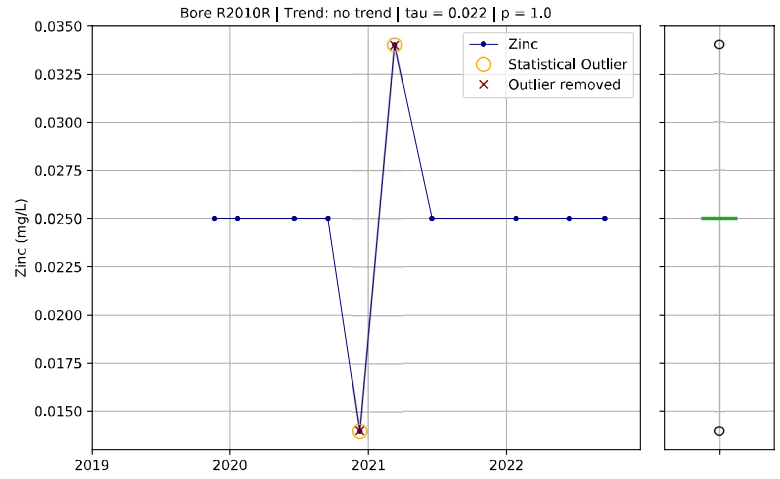

Bore R2010R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Silver (mg/L)
Silver
95th percentile: 0.005
80th percentile: 0.005

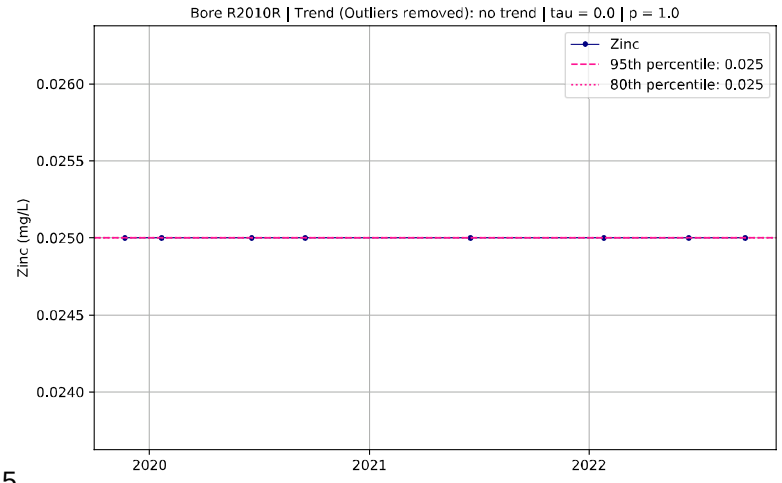

Bore R2010R | Trend: increasing | tau = 0.578 | p = 0.025
Sodium (mg/L)
Sodium
Statistical Outlier
Outlier removed

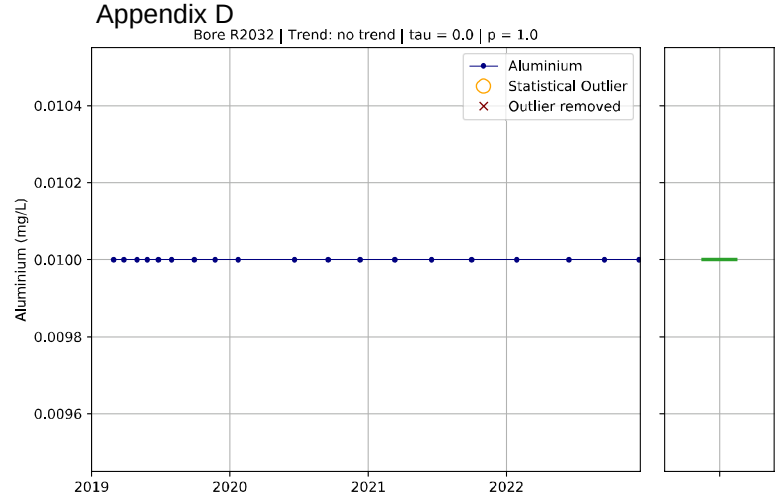

Bore R2010R | Trend (Outliers removed): no trend | tau = 0.472 | p = 0.093
Sodium (mg/L)
Sodium
95th percentile: 5754.0
80th percentile: 5562.0

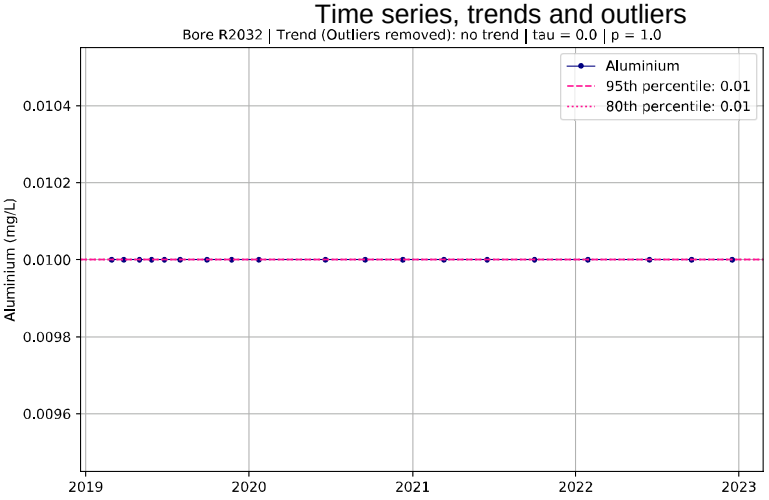

Bore R2010R | Trend: no trend | tau = -0.267 | p = 0.151
Sulfate as SO4 - Turbidimetric (mg/L)
Sulfate as SO4 - Turbidimetric
Statistical Outlier
Outlier removed

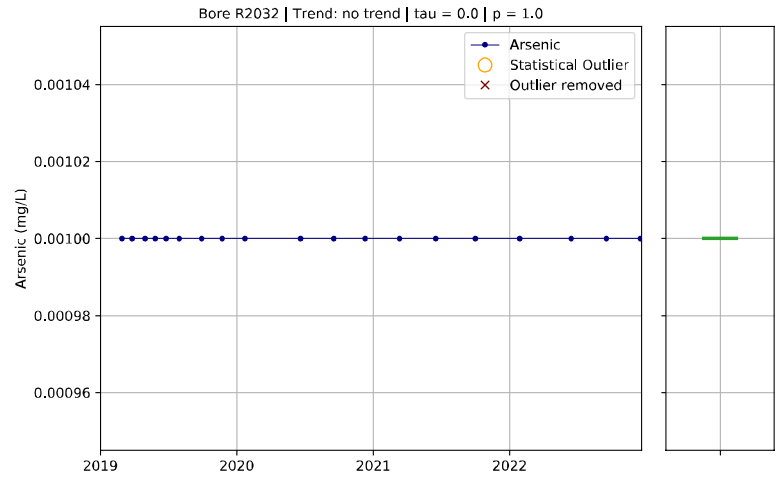

Bore R2010R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Sulfate as SO4 - Turbidimetric (mg/L)
Sulfate as SO4 - Turbidimetric
95th percentile: 1.0
80th percentile: 1.0

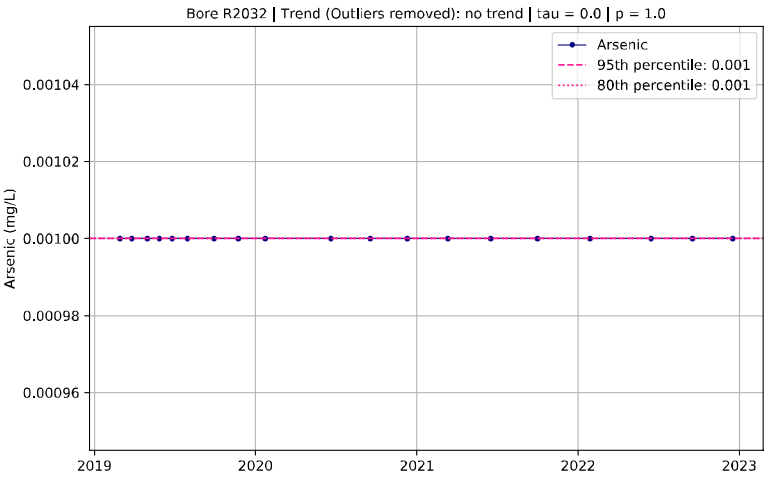

Bore R2010R | Trend: no trend | tau = 0.022 | p = 1.0
Zinc (mg/L)
Zinc
Statistical Outlier
Outlier removed

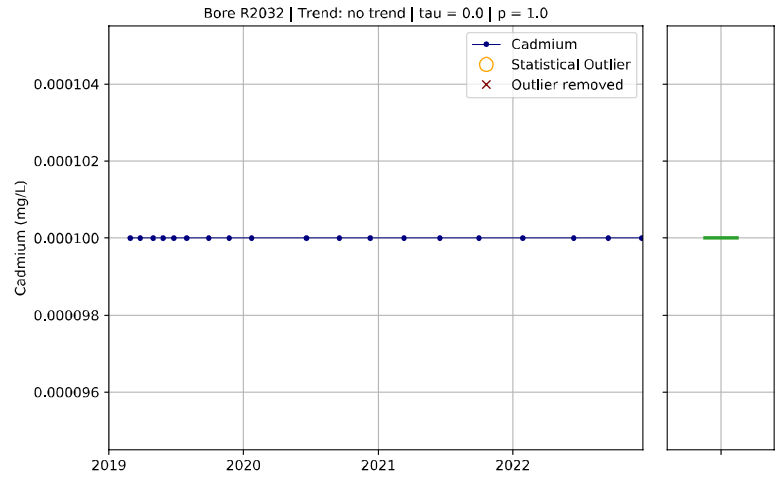

Bore R2010R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Zinc (mg/L)
Zinc
95th percentile: 0.025
80th percentile: 0.025

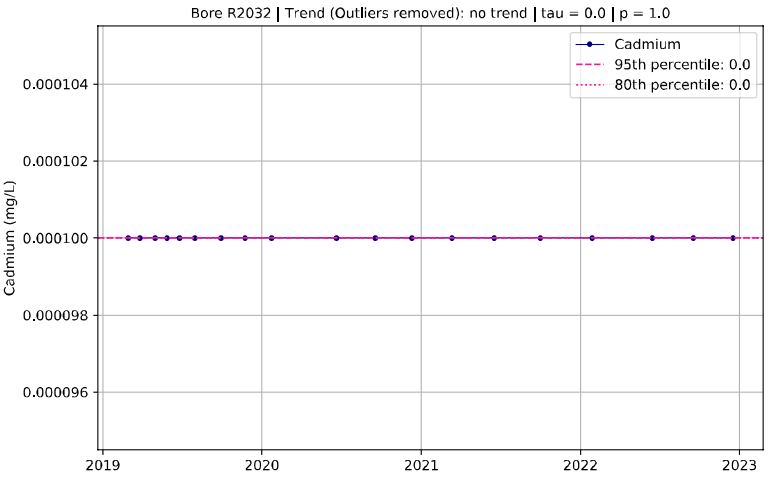

Bore R2032 | Trend: no trend | tau = 0.0 | p = 1.0
Aluminium
Statistical Outlier
Outlier removed
Aluminium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2019
2020
2021
2022

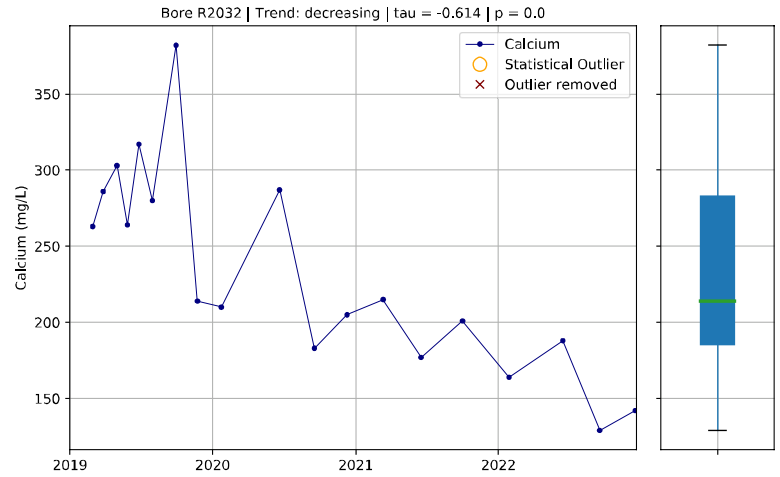

Bore R2032 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Aluminium
95th percentile: 0.01
80th percentile: 0.01
Aluminium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2019
2020
2021
2022
2023

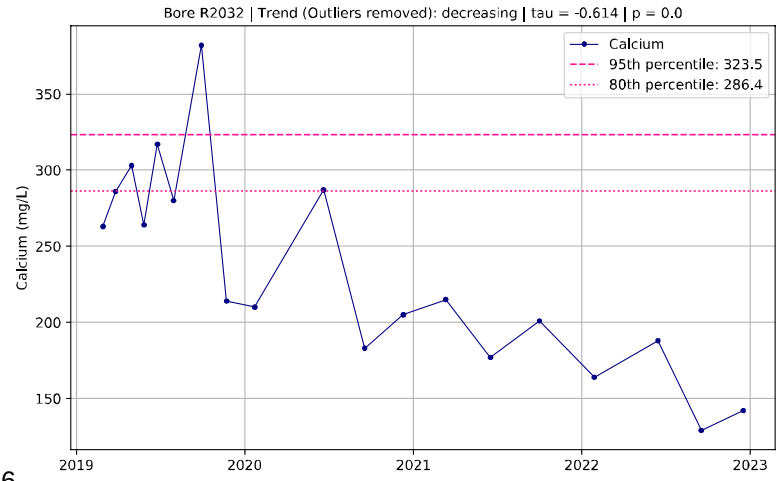

Bore R2032 | Trend: no trend | tau = 0.0 | p = 1.0
Arsenic
Statistical Outlier
Outlier removed
Arsenic (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022

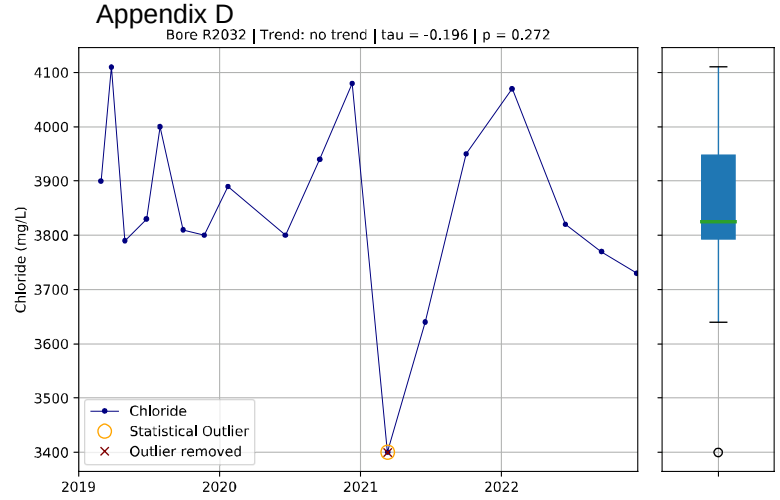

Bore R2032 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Arsenic
95th percentile: 0.001
80th percentile: 0.001
Arsenic (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022
2023

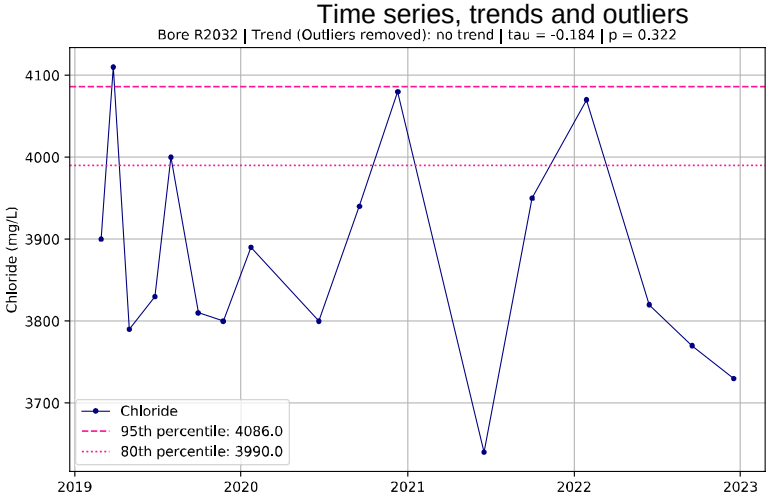

Bore R2032 | Trend: no trend | tau = 0.0 | p = 1.0
Cadmium
Statistical Outlier
Outlier removed
Cadmium (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022

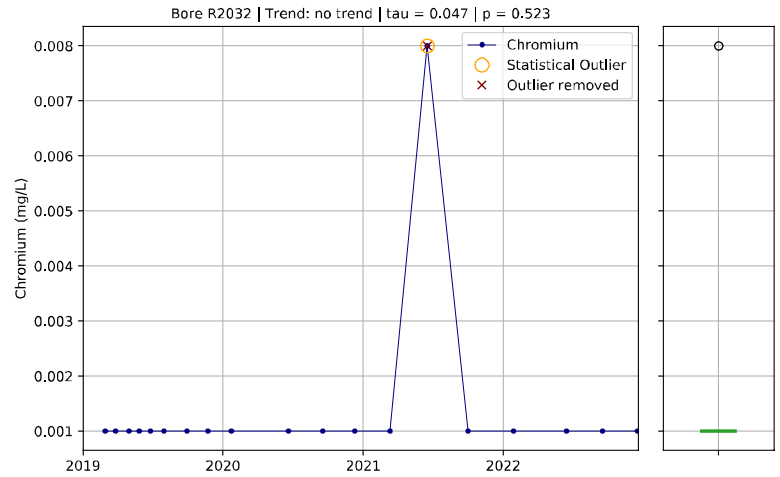

Bore R2032 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Cadmium
95th percentile: 0.0
80th percentile: 0.0
Cadmium (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022
2023

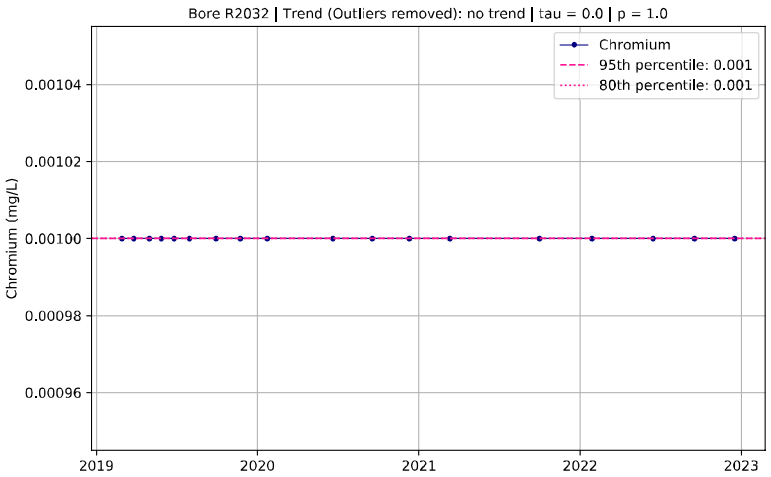

Bore R2032 | Trend: decreasing | tau = -0.614 | p = 0.0
Calcium
Statistical Outlier
Outlier removed
Calcium (mg/L)
350
300
250
200
150
2019
2020
2021
2022

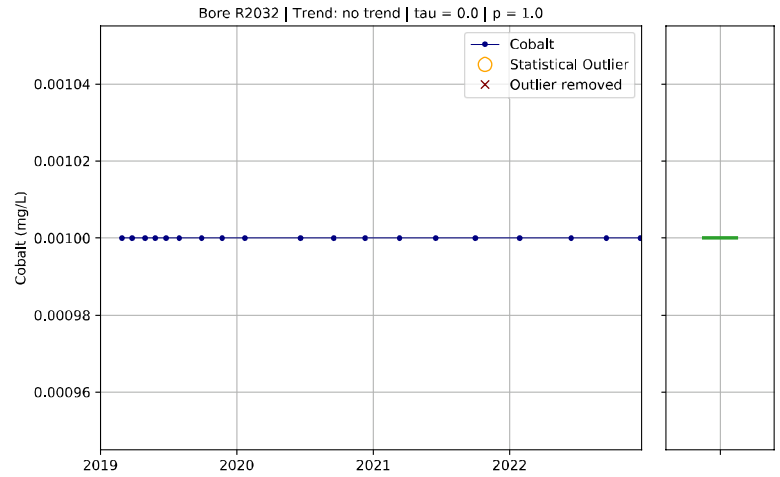

Bore R2032 | Trend (Outliers removed): decreasing | tau = -0.614 | p = 0.0
Calcium
95th percentile: 323.5
80th percentile: 286.4
Calcium (mg/L)
350
300
250
200
150
2019
2020
2021
2022
2023

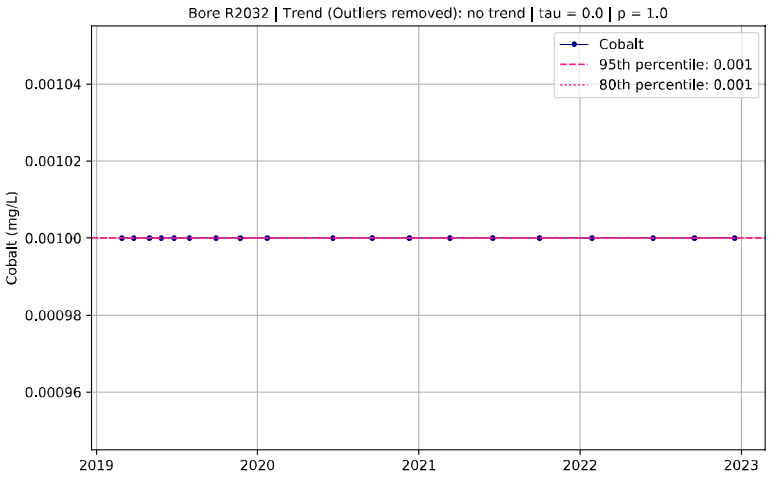

Bore R2032 | Trend: no trend | tau = -0.196 | p = 0.272
Chloride (mg/L)
Chloride
Statistical Outlier
Outlier removed

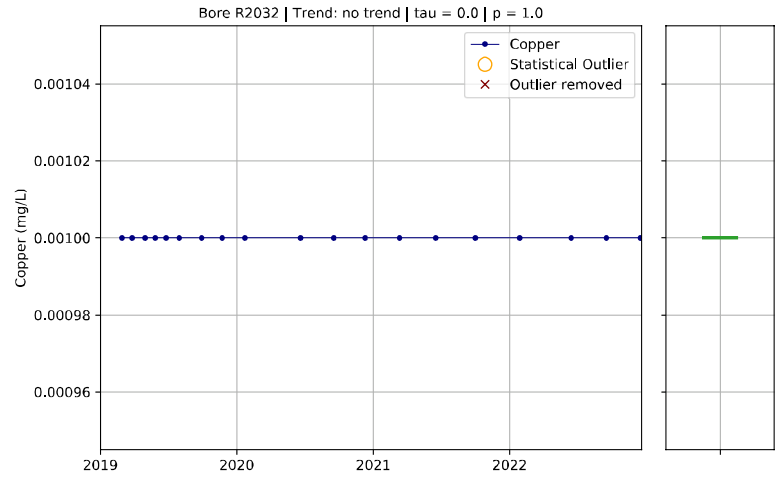

Bore R2032 | Trend (Outliers removed): no trend | tau = -0.184 | p = 0.322
Chloride (mg/L)
Chloride
95th percentile: 4086.0
80th percentile: 3990.0

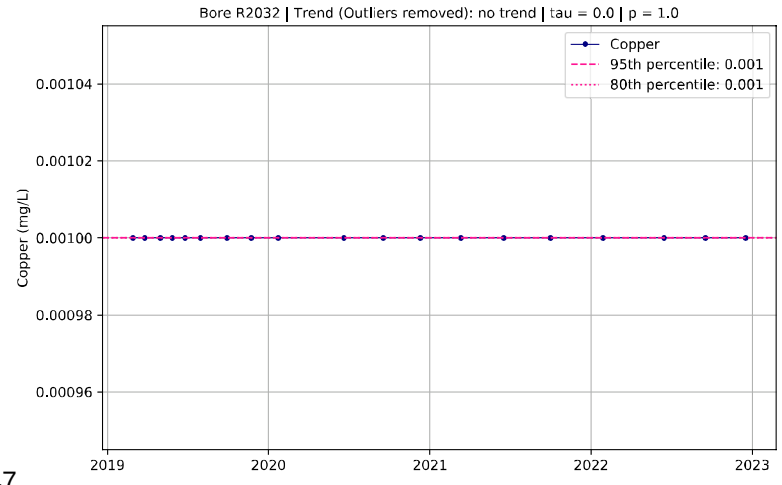

Bore R2032 | Trend: no trend | tau = 0.047 | p = 0.523
Chromium (mg/L)
Chromium
Statistical Outlier
Outlier removed

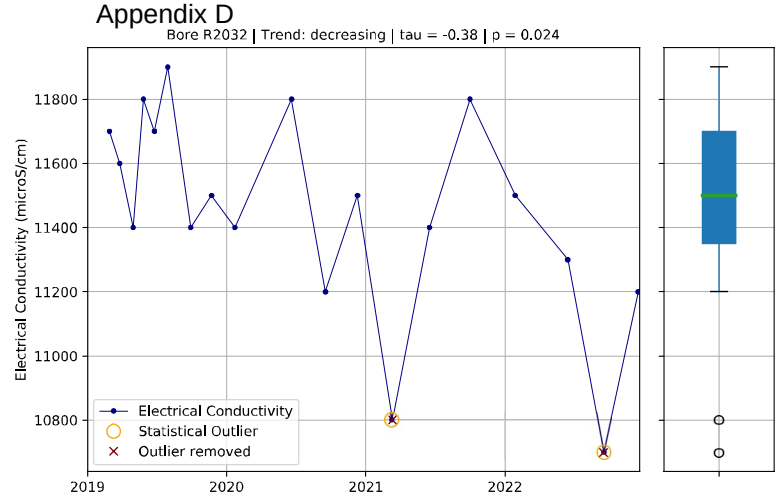

Bore R2032 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Chromium (mg/L)
Chromium
95th percentile: 0.001
80th percentile: 0.001

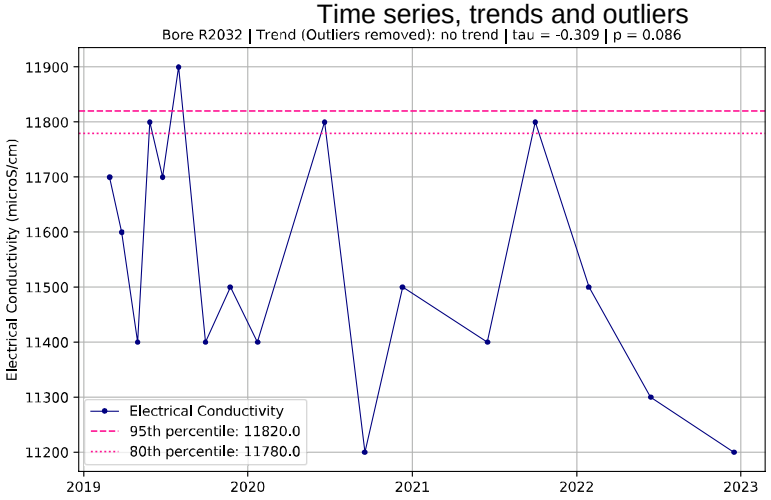

Bore R2032 | Trend: no trend | tau = 0.0 | p = 1.0
Cobalt (mg/L)
Cobalt
Statistical Outlier
Outlier removed

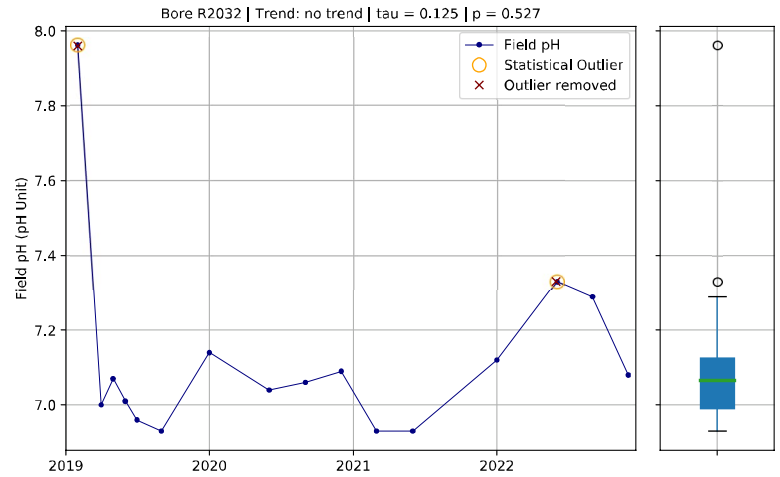

Bore R2032 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Cobalt (mg/L)
Cobalt
95th percentile: 0.001
80th percentile: 0.001

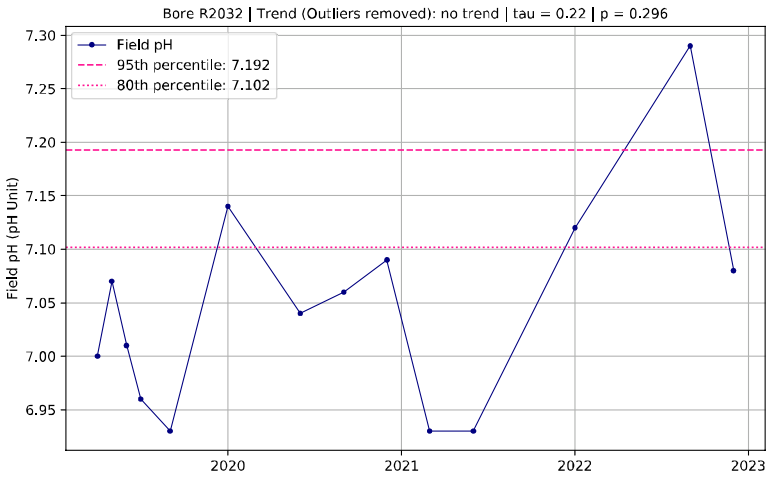

Bore R2032 | Trend: no trend | tau = 0.0 | p = 1.0
Copper (mg/L)
Copper
Statistical Outlier
Outlier removed

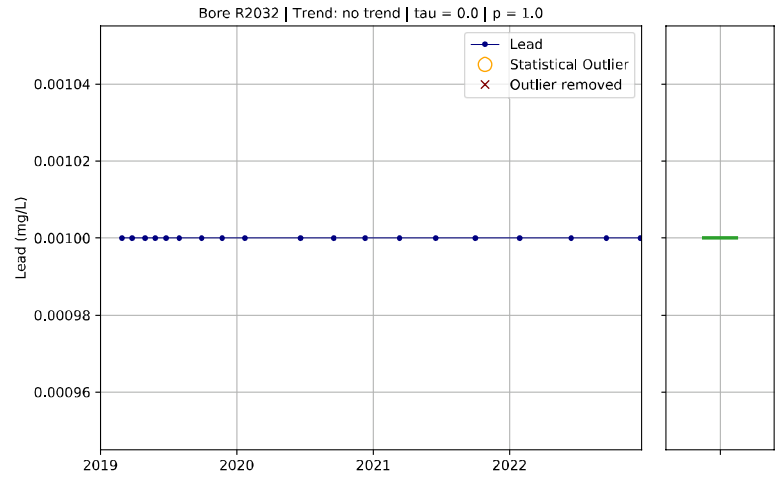

Bore R2032 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Copper (mg/L)
Copper
95th percentile: 0.001
80th percentile: 0.001

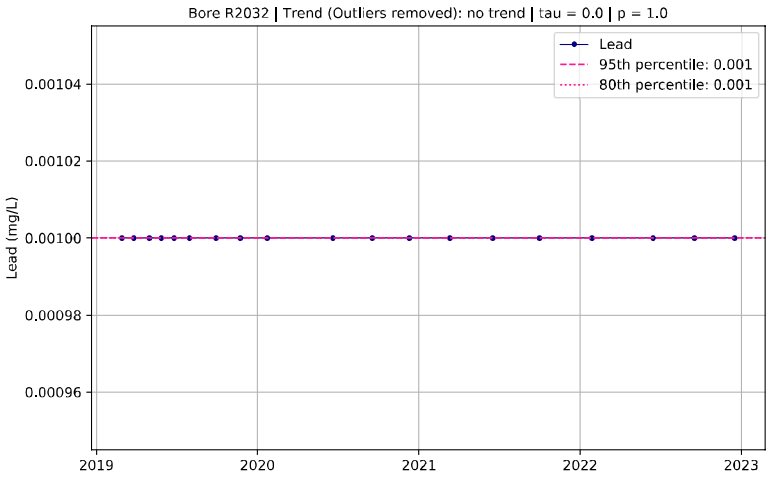

Bore R2032 | Trend: decreasing | tau = -0.38 | p = 0.024
Electrical Conductivity (microS/cm)
Electrical Conductivity
Statistical Outlier
Outlier removed

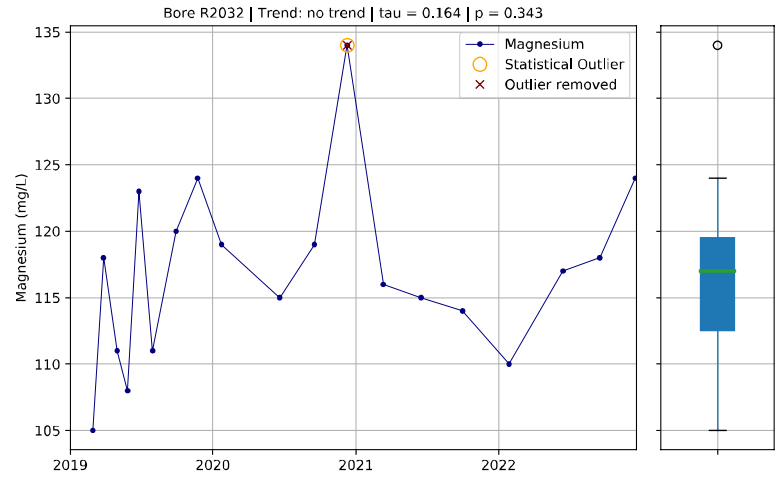

Bore R2032 | Trend (Outliers removed): no trend | tau = -0.309 | p = 0.086
Electrical Conductivity (microS/cm)
Electrical Conductivity
95th percentile: 11820.0
80th percentile: 11780.0

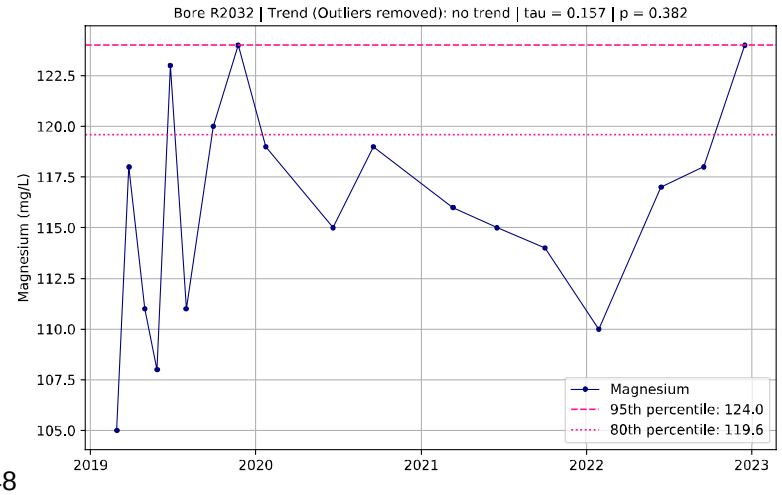

Bore R2032 | Trend: no trend | tau = 0.125 | p = 0.527
Field pH (pH Unit)
Field pH
Statistical Outlier
Outlier removed

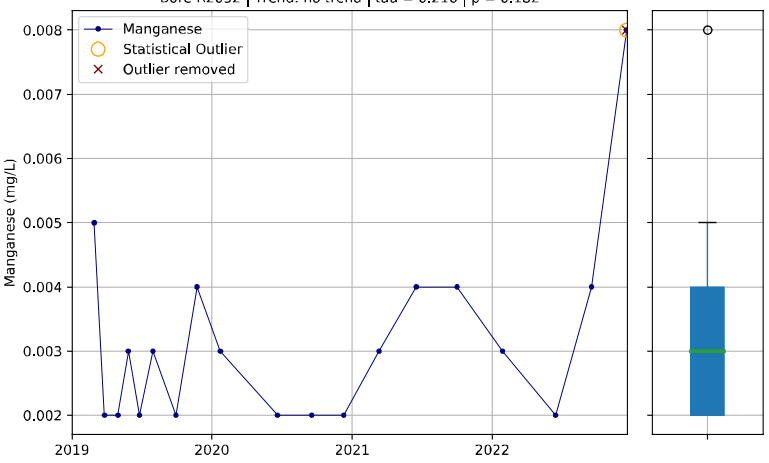

Bore R2032 | Trend (Outliers removed): no trend | tau = 0.22 | p = 0.296
Field pH (pH Unit)
Field pH
95th percentile: 7.192
80th percentile: 7.102

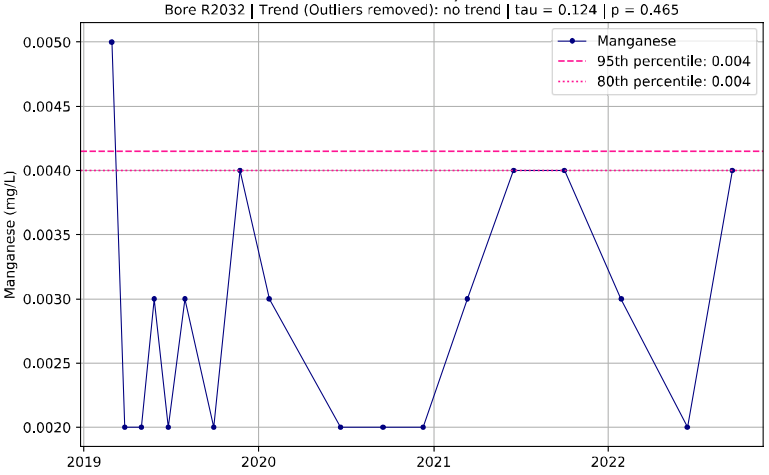

Bore R2032 | Trend: no trend | tau = 0.0 | p = 1.0
Lead (mg/L)
Lead
Statistical Outlier
Outlier removed


Bore R2032 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Lead (mg/L)
Lead
95th percentile: 0.001
80th percentile: 0.001

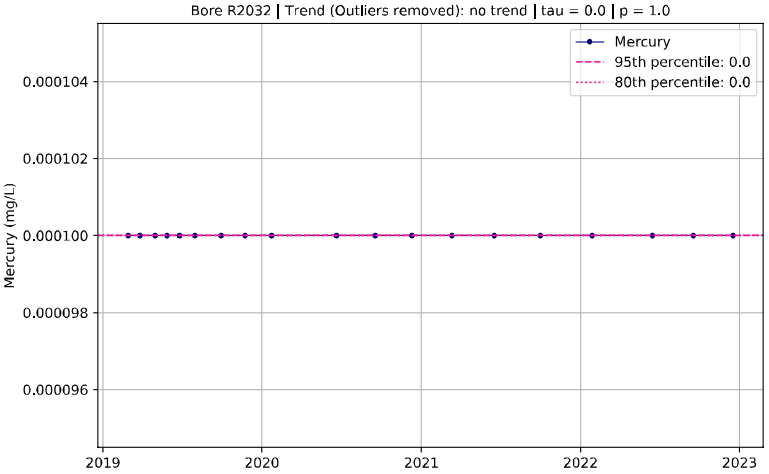

Bore R2032 | Trend: no trend | tau = 0.164 | p = 0.343
Magnesium (mg/L)
Magnesium
Statistical Outlier
Outlier removed

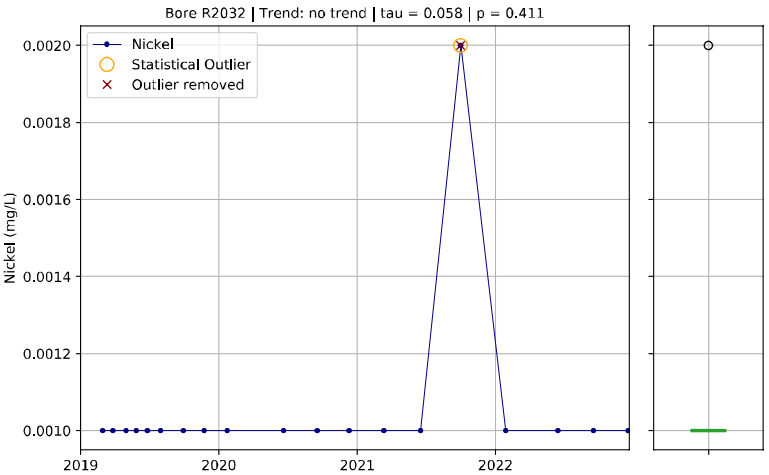

Bore R2032 | Trend (Outliers removed): no trend | tau = 0.157 | p = 0.382
Magnesium (mg/L)
Magnesium
95th percentile: 124.0
80th percentile: 119.6

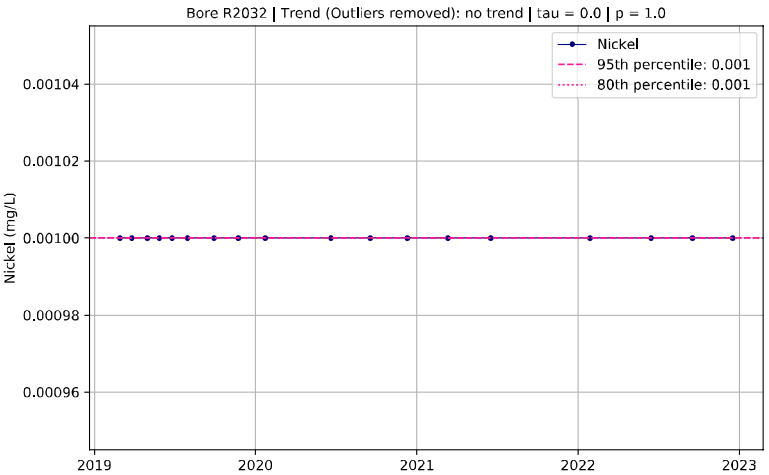

Bore R2032 | Trend: no trend | tau = 0.216 | p = 0.182
Manganese
Statistical Outlier
Outlier removed
Manganese (mg/L)
0.008
0.007
0.006
0.005
0.004
0.003
0.002
2019
2020
2021
2022

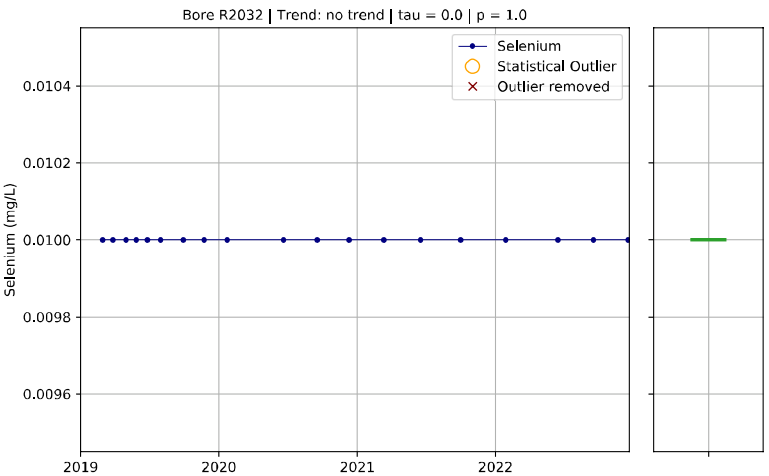

Bore R2032 | Trend (Outliers removed): no trend | tau = 0.124 | p = 0.465
Manganese
95th percentile: 0.004
80th percentile: 0.004
Manganese (mg/L)
0.0050
0.0045
0.0040
0.0035
0.0030
0.0025
0.0020
2019
2020
2021
2022

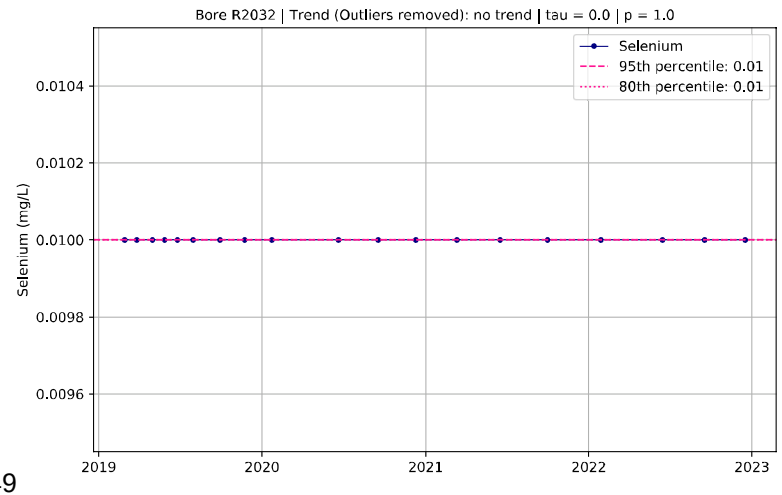
Bore R2032 | Trend: no trend | tau = 0.0 | p = 1.0
Mercury
Statistical Outlier
Outlier removed
Mercury (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022


Bore R2032 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Mercury
95th percentile: 0.0
80th percentile: 0.0
Mercury (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022
2023

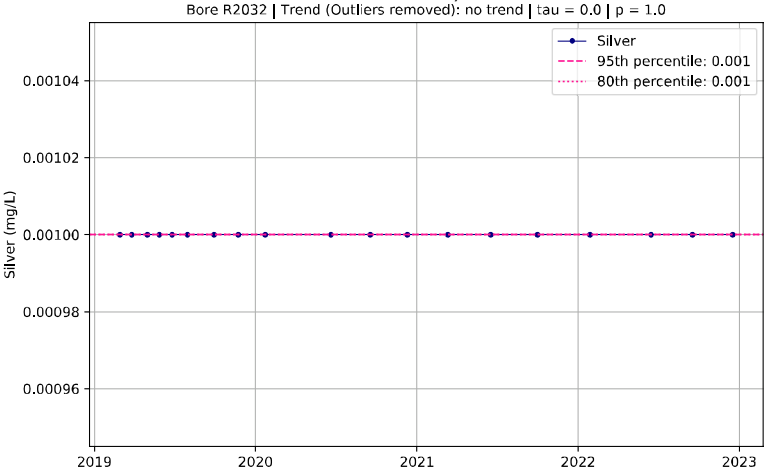

Bore R2032 | Trend: no trend | tau = 0.058 | p = 0.411
Nickel
Statistical Outlier
Outlier removed
Nickel (mg/L)
0.0020
0.0018
0.0016
0.0014
0.0012
0.0010
2019
2020
2021
2022

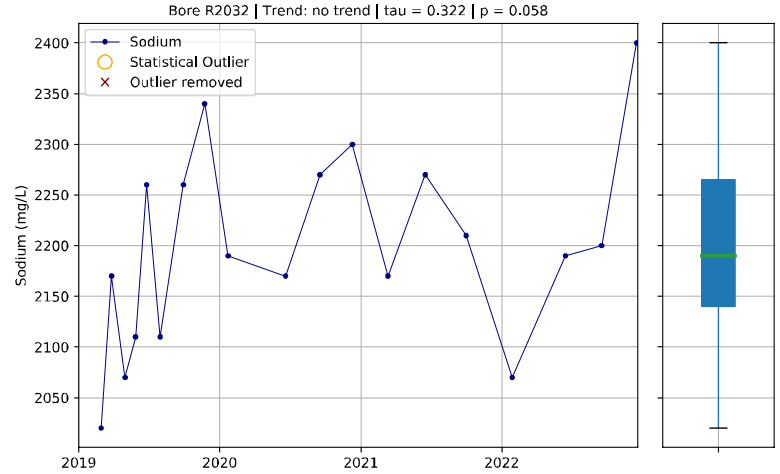

Bore R2032 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Nickel
95th percentile: 0.001
80th percentile: 0.001
Nickel (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022
2023

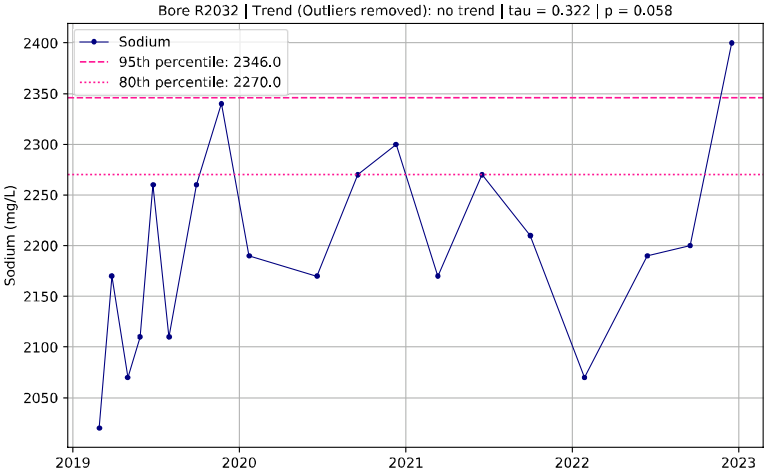

Bore R2032 | Trend: no trend | tau = 0.0 | p = 1.0
Selenium
Statistical Outlier
Outlier removed
Selenium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2019
2020
2021
2022

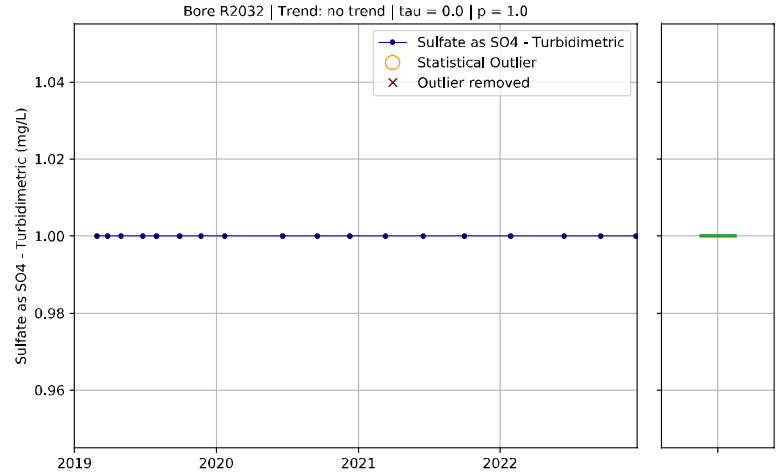

Bore R2032 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Selenium
95th percentile: 0.01
80th percentile: 0.01
Selenium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2019
2020
2021
2022
2023

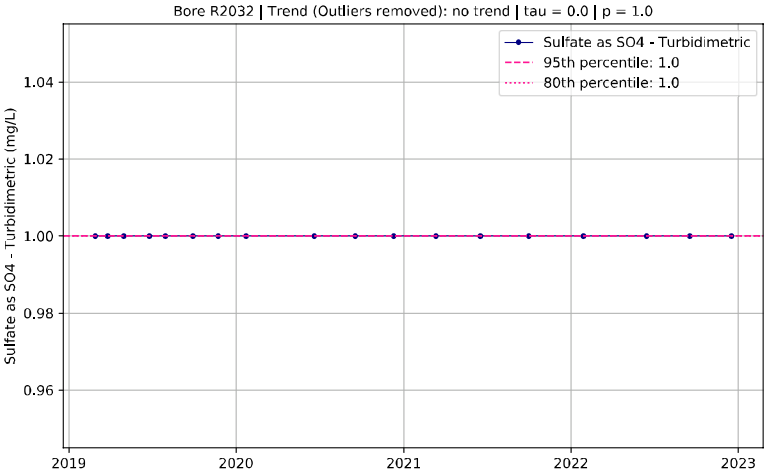
Bore R2032 | Trend: no trend | tau = 0.0 | p = 1.0
Silver
Statistical Outlier
Outlier removed
Silver (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022

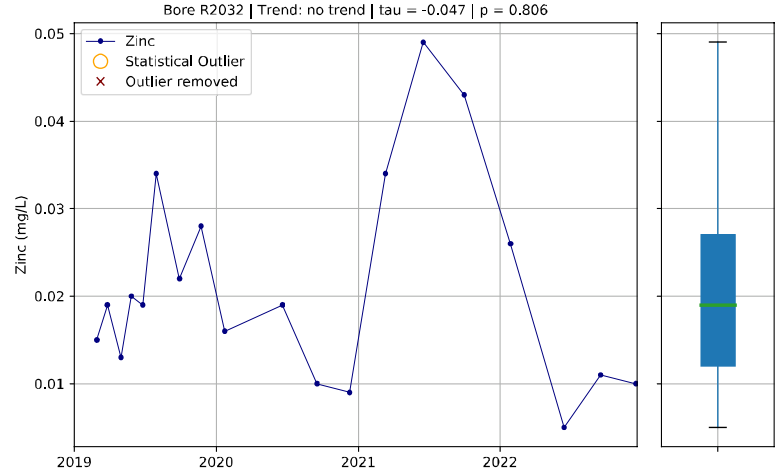

Bore R2032 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Silver
95th percentile: 0.001
80th percentile: 0.001
Silver (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022
2023

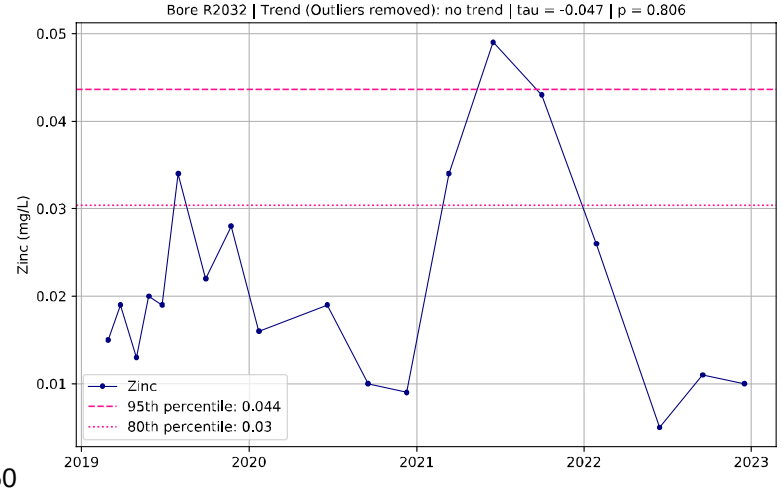

Bore R2032 | Trend: no trend | tau = 0.322 | p = 0.058
Sodium
Statistical Outlier
Outlier removed
Sodium (mg/L)
2400
2350
2300
2250
2200
2150
2100
2050
2019
2020
2021
2022

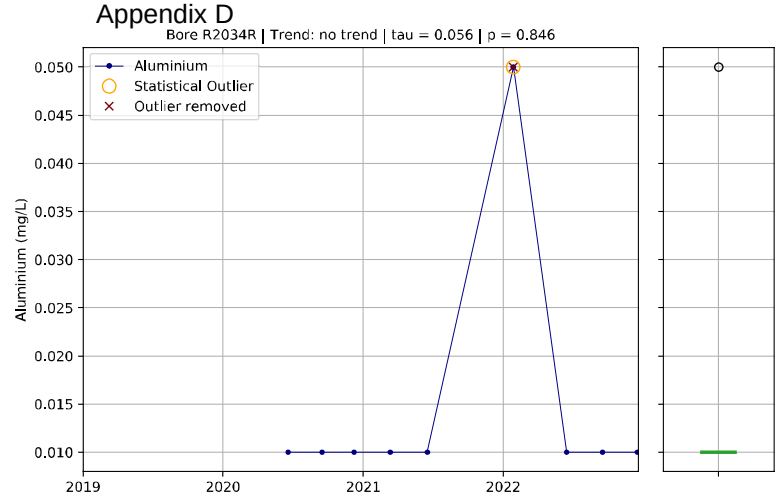

Bore R2032 | Trend (Outliers removed): no trend | tau = 0.322 | p = 0.058
Sodium
95th percentile: 2346.0
80th percentile: 2270.0
Sodium (mg/L)
2400
2350
2300
2250
2200
2150
2100
2050
2019
2020
2021
2022
2023

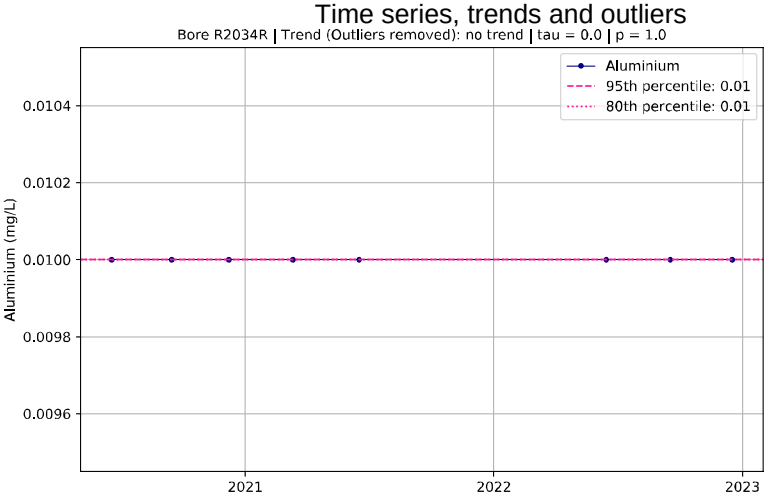

Bore R2032 | Trend: no trend | tau = 0.0 | p = 1.0
Sulfate as SO4 - Turbidimetric
Statistical Outlier
Outlier removed
Sulfate as SO4 - Turbidimetric (mg/L)
1.04
1.02
1.00
0.98
0.96
2019
2020
2021
2022

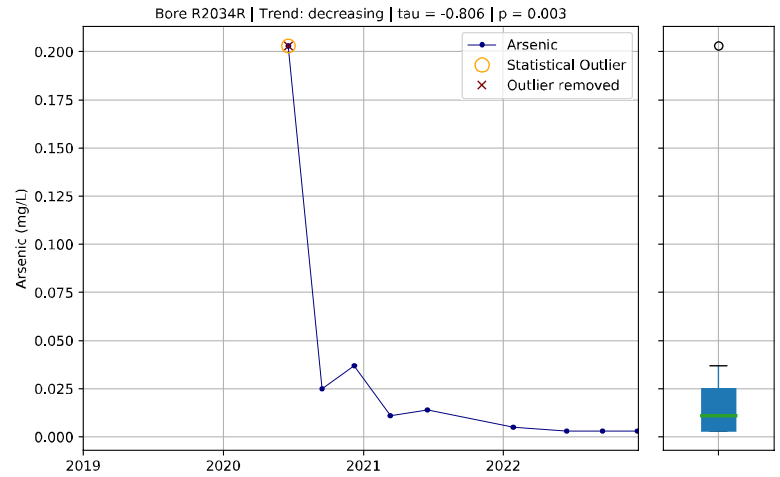

Bore R2032 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Sulfate as SO4 - Turbidimetric
95th percentile: 1.0
80th percentile: 1.0
Sulfate as SO4 - Turbidimetric (mg/L)
1.04
1.02
1.00
0.98
0.96
2019
2020
2021
2022
2023

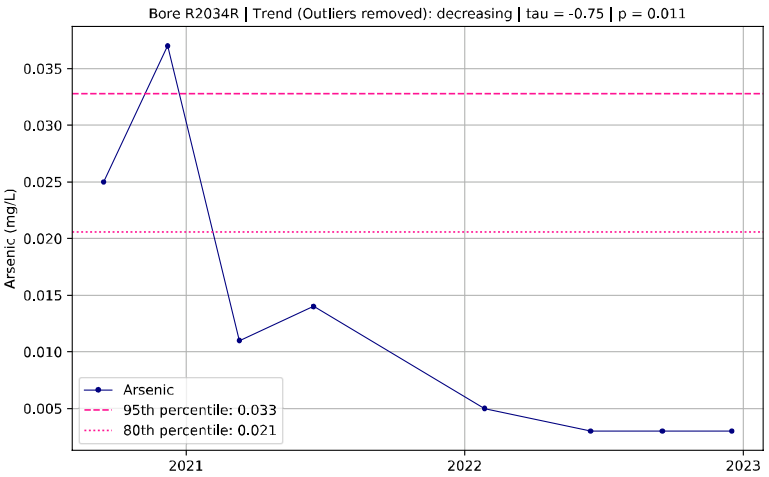

Bore R2032 | Trend: no trend | tau = -0.047 | p = 0.806
Zinc
Statistical Outlier
Outlier removed
Zinc (mg/L)
0.05
0.04
0.03
0.02
0.01
2019
2020
2021
2022

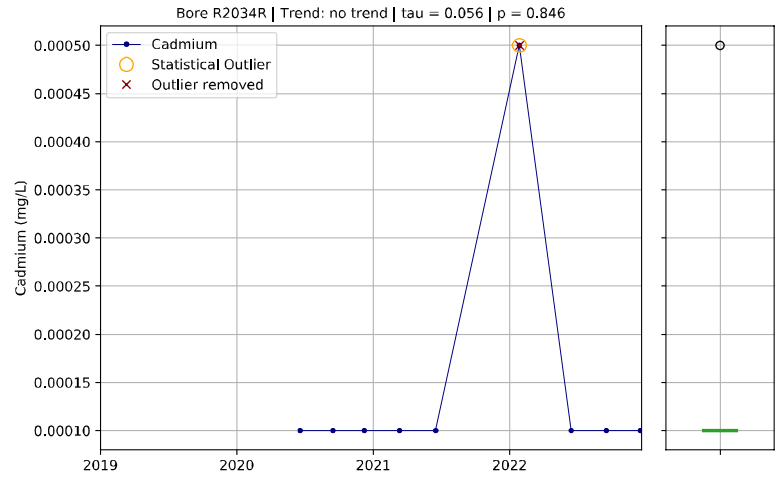

Bore R2032 | Trend (Outliers removed): no trend | tau = -0.047 | p = 0.806
Zinc
95th percentile: 0.044
80th percentile: 0.03
Zinc (mg/L)
0.05
0.04
0.03
0.02
0.01
2019
2020
2021
2022
2023

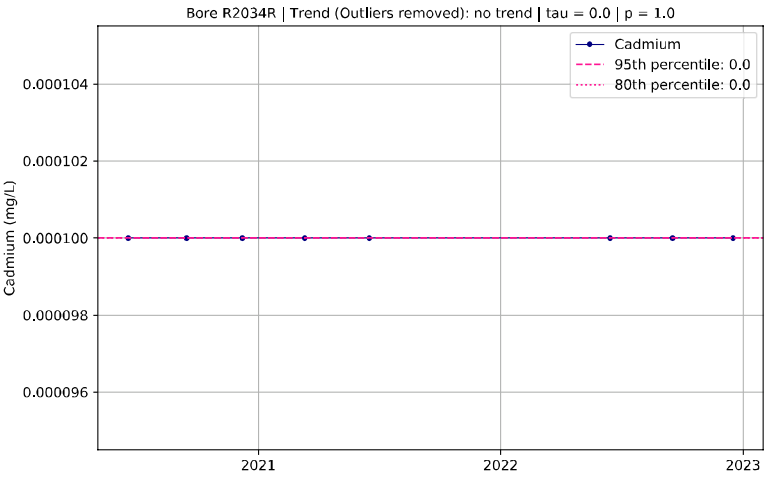

Bore R2034R | Trend: no trend | tau = 0.056 | p = 0.846
Aluminium
Statistical Outlier
Outlier removed
Aluminium (mg/L)

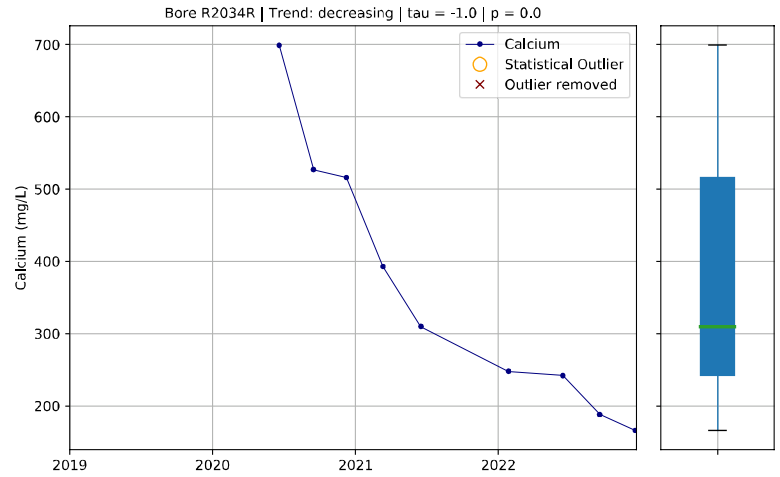

Bore R2034R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Aluminium
95th percentile: 0.01
80th percentile: 0.01
Aluminium (mg/L)

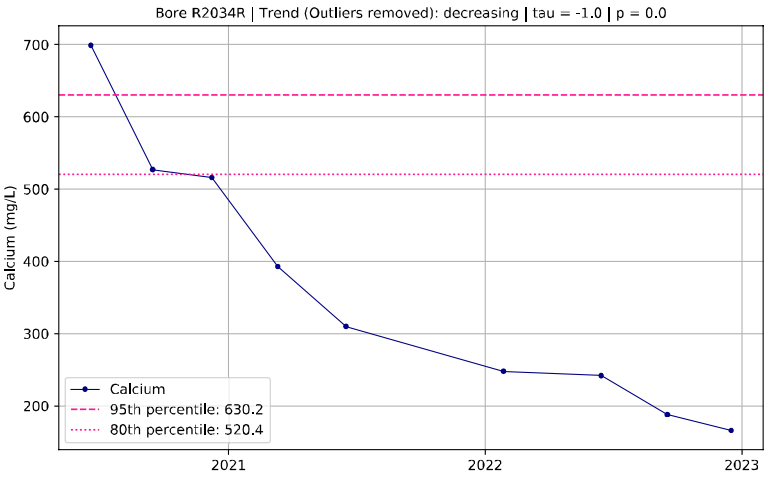

Bore R2034R | Trend: decreasing | tau = -0.806 | p = 0.003
Arsenic
Statistical Outlier
Outlier removed
Arsenic (mg/L)

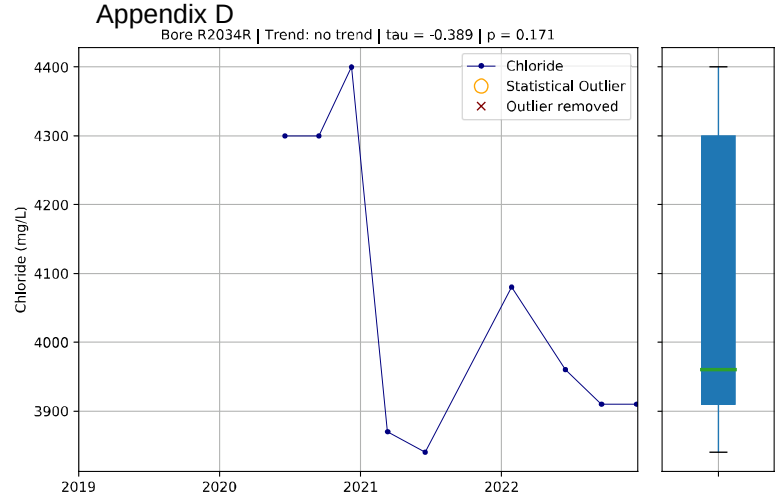

Bore R2034R | Trend (Outliers removed): decreasing | tau = -0.75 | p = 0.011
Arsenic
95th percentile: 0.033
80th percentile: 0.021
Arsenic (mg/L)

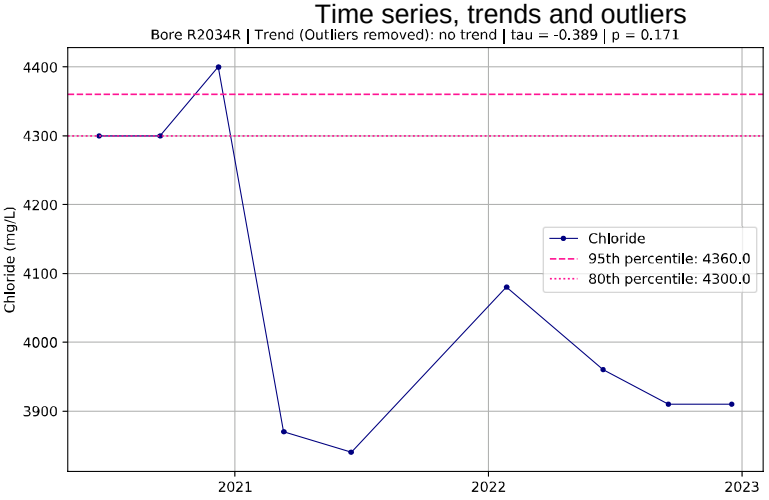

Bore R2034R | Trend: no trend | tau = 0.056 | p = 0.846
Cadmium
Statistical Outlier
Outlier removed
Cadmium (mg/L)

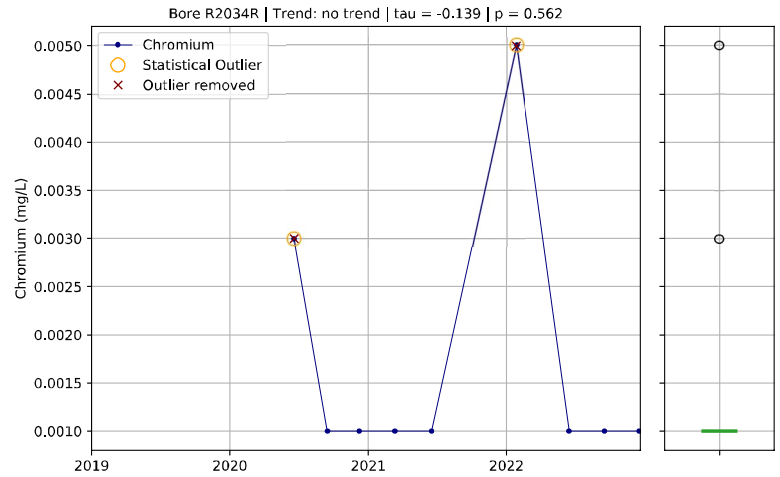

Bore R2034R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Cadmium
95th percentile: 0.0
80th percentile: 0.0
Cadmium (mg/L)

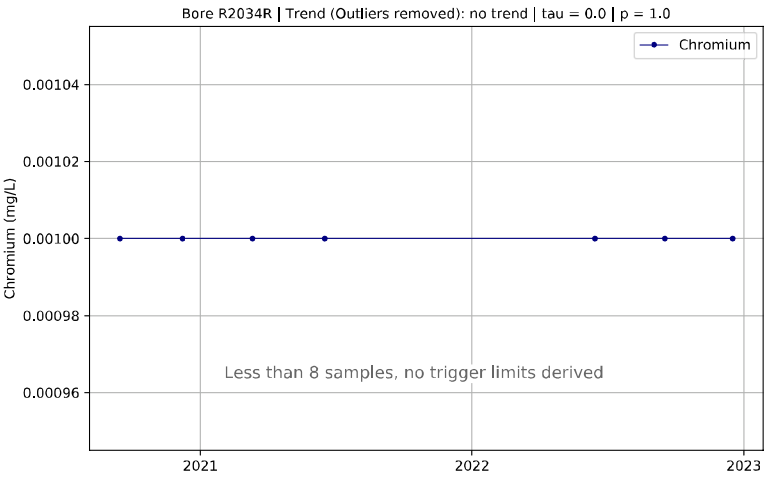

Bore R2034R | Trend: decreasing | tau = -1.0 | p = 0.0
Calcium
Statistical Outlier
Outlier removed
Calcium (mg/L)

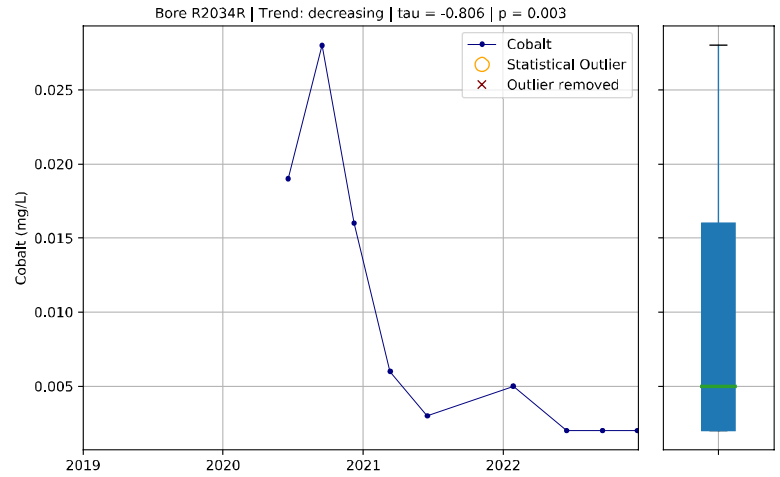

Bore R2034R | Trend (Outliers removed): decreasing | tau = -1.0 | p = 0.0
Calcium
95th percentile: 630.2
80th percentile: 520.4
Calcium (mg/L)

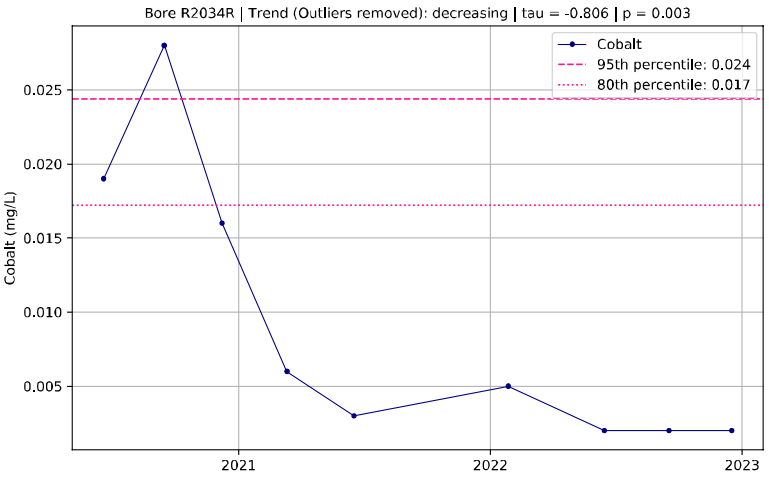

Bore R2034R | Trend: no trend | tau = -0.389 | p = 0.171
Chloride
Statistical Outlier
Outlier removed
Chloride (mg/L)

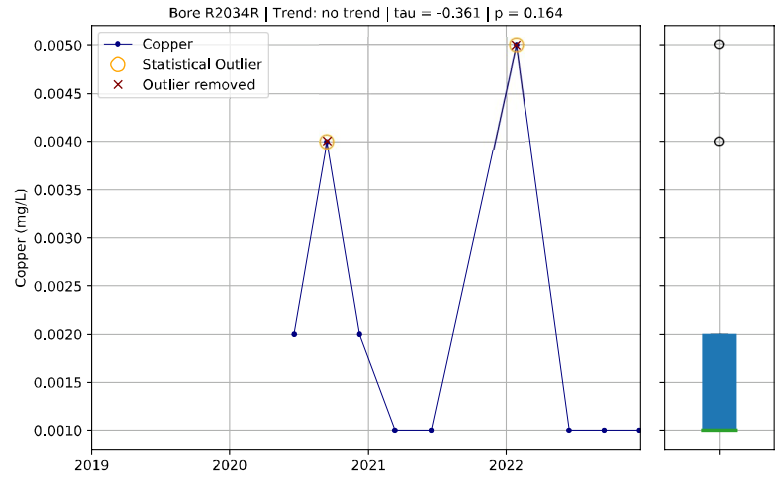

Bore R2034R | Trend (Outliers removed): no trend | tau = -0.389 | p = 0.171
Chloride
95th percentile: 4360.0
80th percentile: 4300.0
Chloride (mg/L)

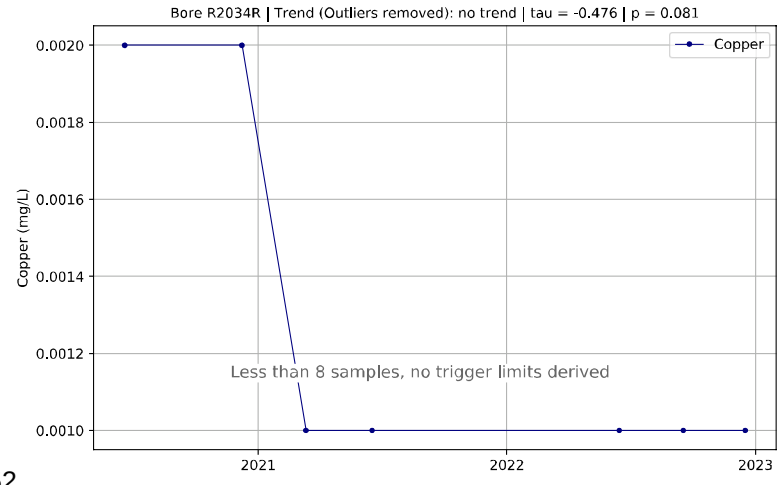

Bore R2034R | Trend: no trend | tau = -0.139 | p = 0.562
Chromium
Statistical Outlier
Outlier removed
Chromium (mg/L)

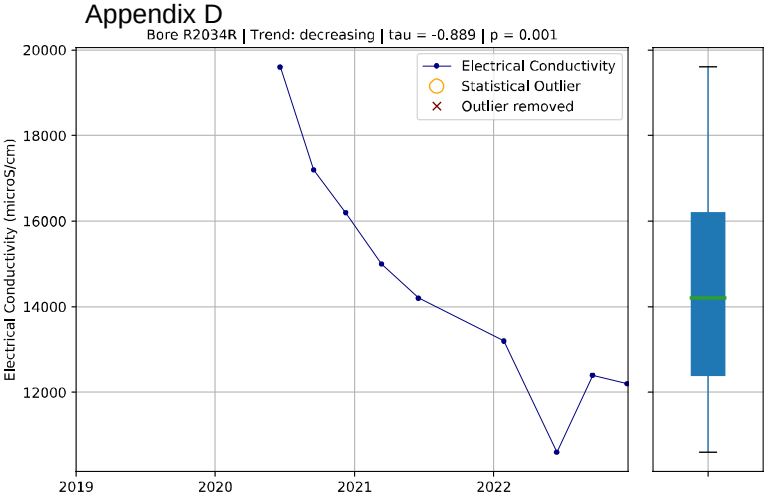

Bore R2034R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Chromium
Less than 8 samples, no trigger limits derived
Chromium (mg/L)

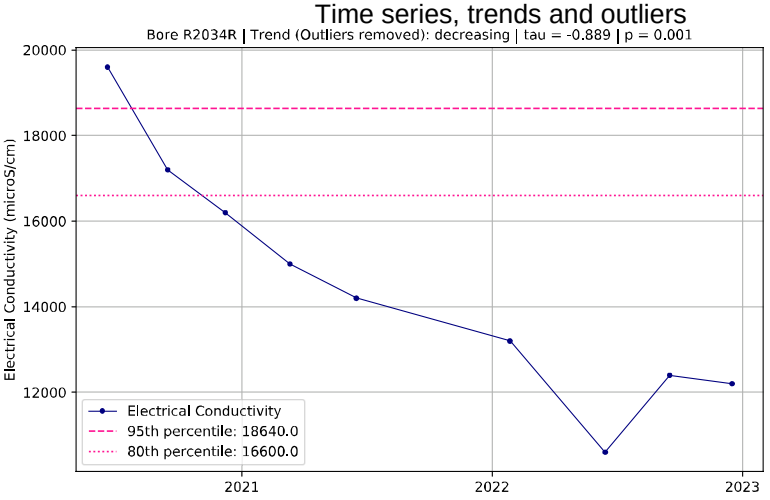

Bore R2034R | Trend: decreasing | tau = -0.806 | p = 0.003
Cobalt
Statistical Outlier
Outlier removed
Cobalt (mg/L)

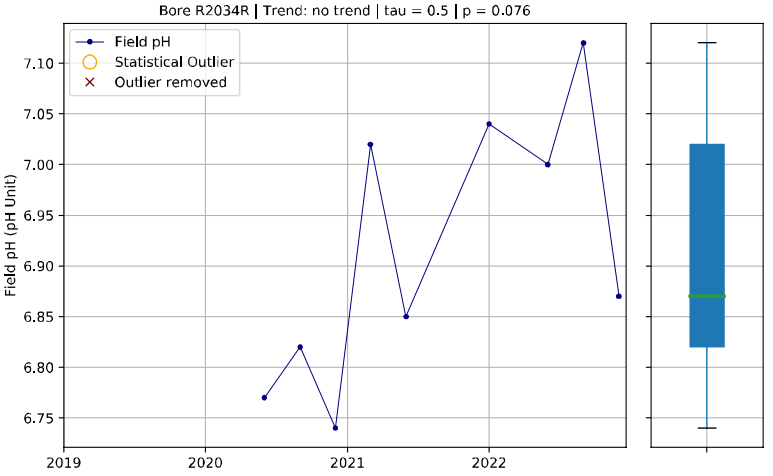

Bore R2034R | Trend (Outliers removed): decreasing | tau = -0.806 | p = 0.003
Cobalt
95th percentile: 0.024
80th percentile: 0.017
Cobalt (mg/L)

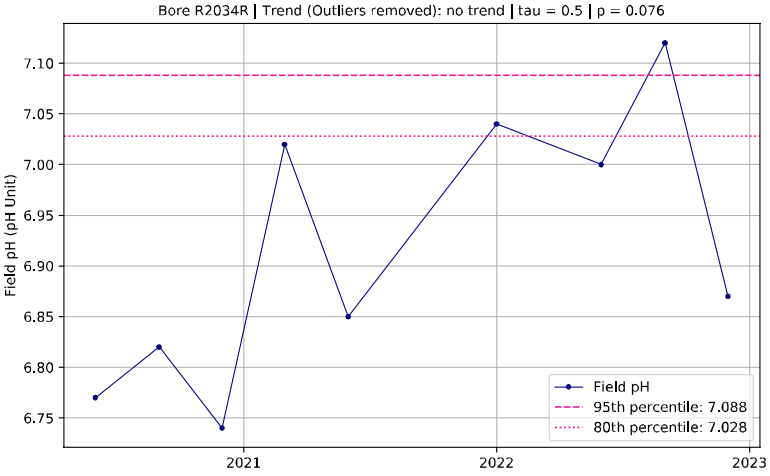

Bore R2034R | Trend: no trend | tau = -0.361 | p = 0.164
Copper
Statistical Outlier
Outlier removed
Copper (mg/L)

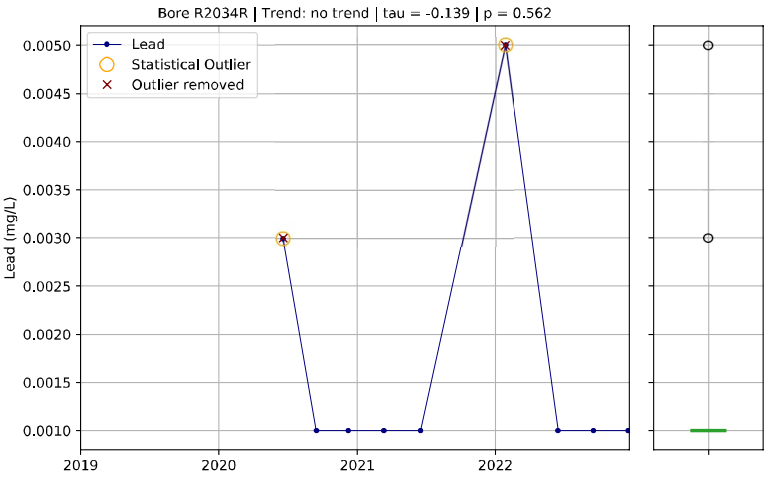

Bore R2034R | Trend (Outliers removed): no trend | tau = -0.476 | p = 0.081
Copper
Less than 8 samples, no trigger limits derived
Copper (mg/L)

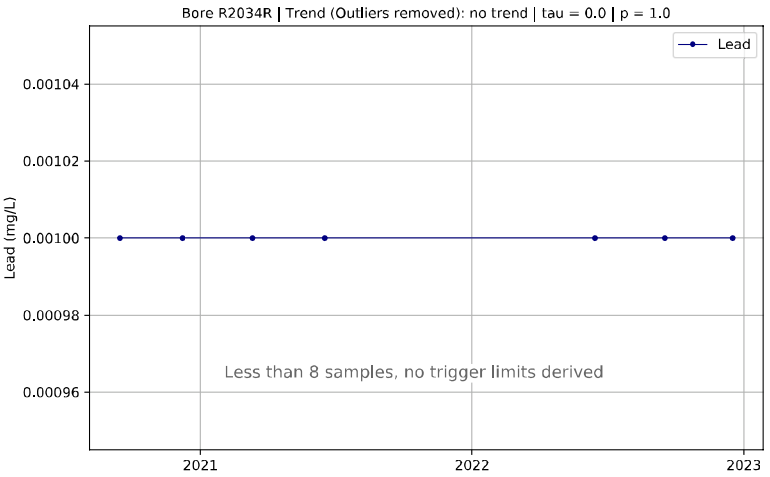

Bore R2034R | Trend: decreasing | tau = -0.889 | p = 0.001
Electrical Conductivity
Statistical Outlier
Outlier removed
Electrical Conductivity (microS/cm)

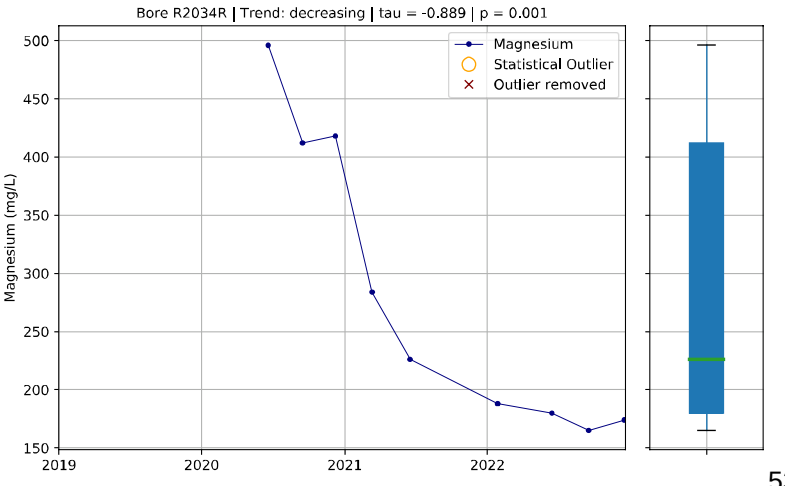

Bore R2034R | Trend (Outliers removed): decreasing | tau = -0.889 | p = 0.001
Electrical Conductivity
95th percentile: 18640.0
80th percentile: 16600.0
Electrical Conductivity (microS/cm)

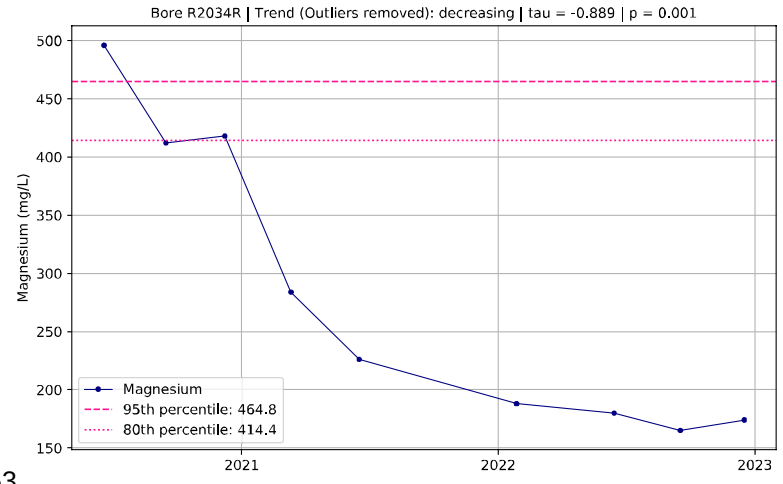

Bore R2034R | Trend: no trend | tau = 0.5 | p = 0.076
Field pH
Statistical Outlier
Outlier removed
Field pH (pH Unit)

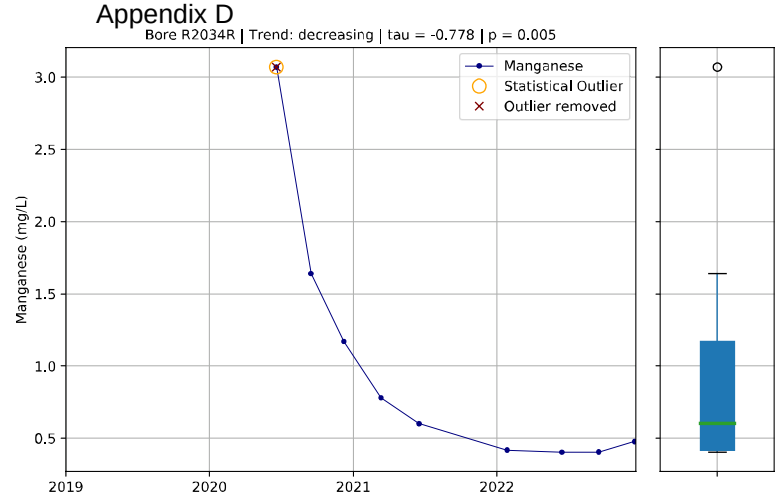

Bore R2034R | Trend (Outliers removed): no trend | tau = 0.5 | p = 0.076
Field pH
95th percentile: 7.088
80th percentile: 7.028
Field pH (pH Unit)

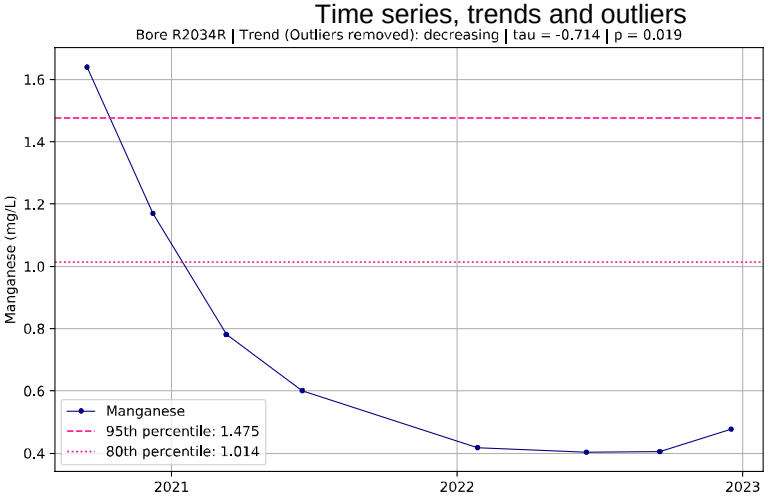

Bore R2034R | Trend: no trend | tau = -0.139 | p = 0.562
Lead
Statistical Outlier
Outlier removed
Lead (mg/L)

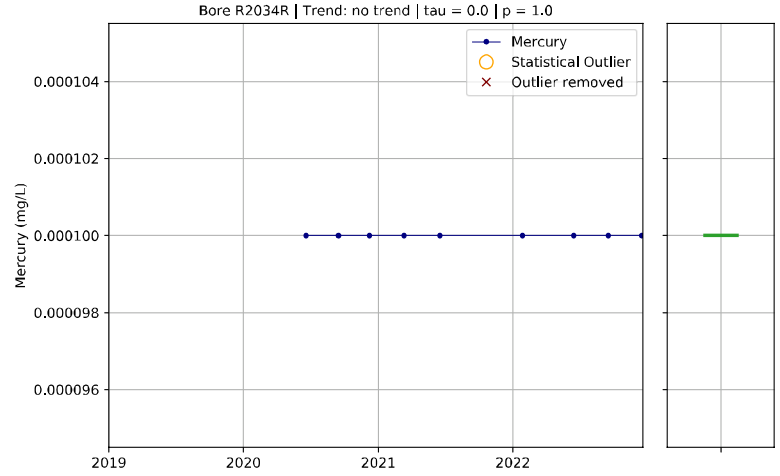

Bore R2034R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Lead
Less than 8 samples, no trigger limits derived
Lead (mg/L)

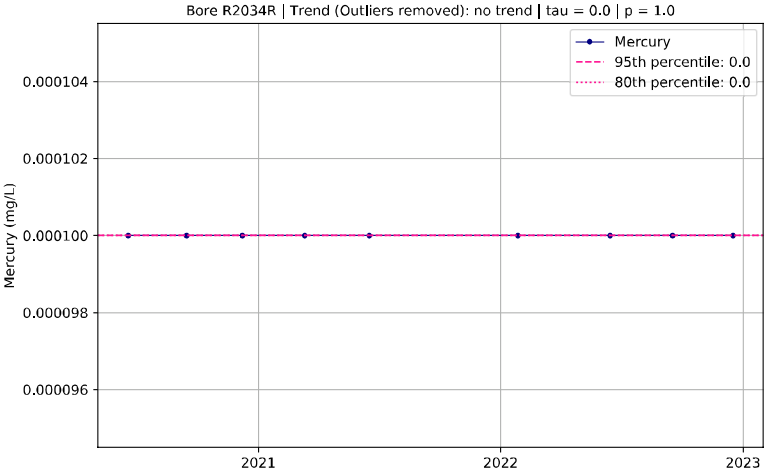

Bore R2034R | Trend: decreasing | tau = -0.889 | p = 0.001
Magnesium
Statistical Outlier
Outlier removed
Magnesium (mg/L)

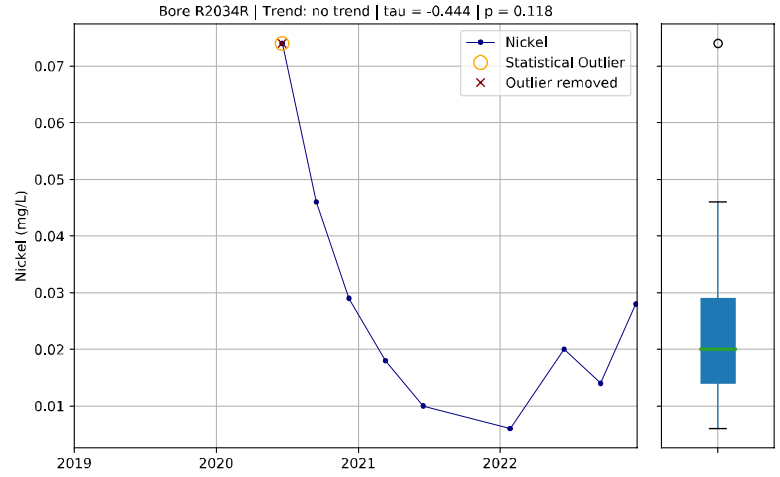

Bore R2034R | Trend (Outliers removed): decreasing | tau = -0.889 | p = 0.001
Magnesium
95th percentile: 464.8
80th percentile: 414.4
Magnesium (mg/L)

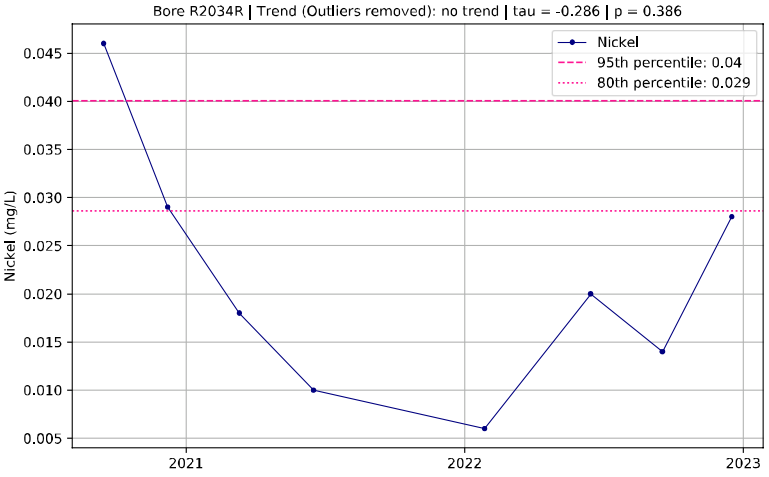

Bore R2034R | Trend: decreasing | tau = -0.778 | p = 0.005
Manganese
Statistical Outlier
Outlier removed
Manganese (mg/L)
3.0
2.5
2.0
1.5
1.0
0.5
2019
2020
2021
2022

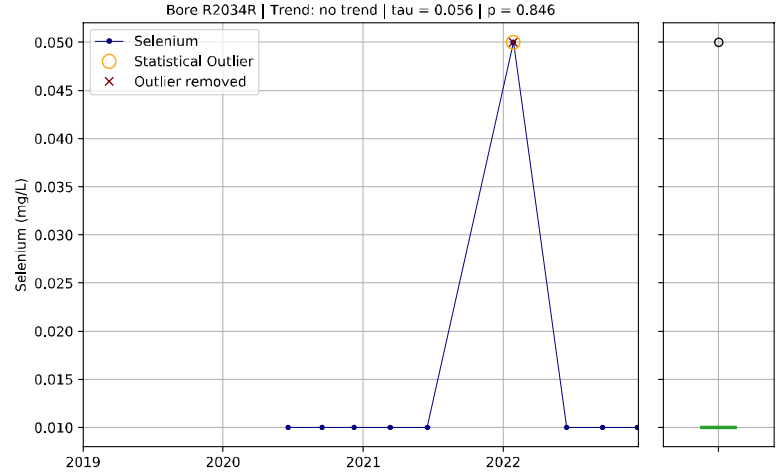

Bore R2034R | Trend (Outliers removed): decreasing | tau = -0.714 | p = 0.019
Manganese (mg/L)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
Manganese
95th percentile: 1.475
80th percentile: 1.014
2021
2022
2023

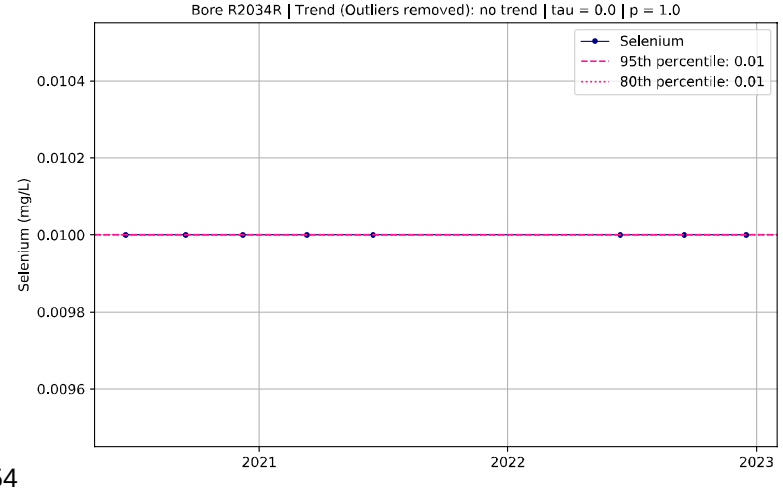

Bore R2034R | Trend: no trend | tau = 0.0 | p = 1.0
Mercury
Statistical Outlier
Outlier removed
Mercury (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022

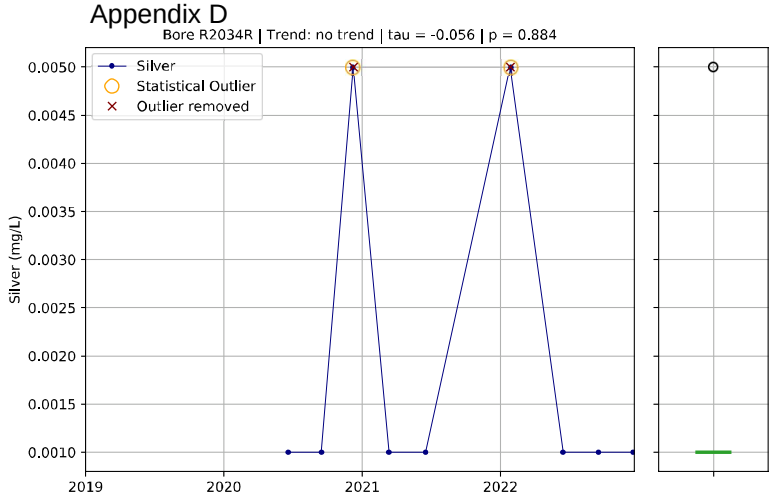

Bore R2034R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Mercury
95th percentile: 0.0
80th percentile: 0.0
Mercury (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2021
2022
2023

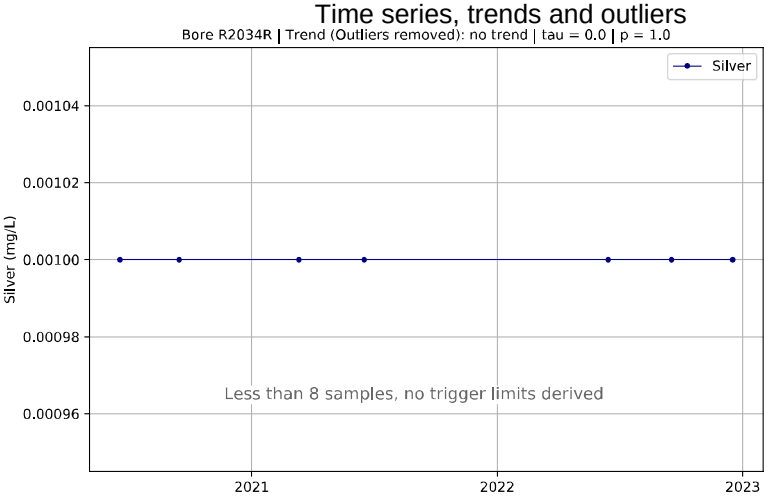

Bore R2034R | Trend: no trend | tau = -0.444 | p = 0.118
Nickel
Statistical Outlier
Outlier removed
Nickel (mg/L)
0.07
0.06
0.05
0.04
0.03
0.02
0.01
2019
2020
2021
2022

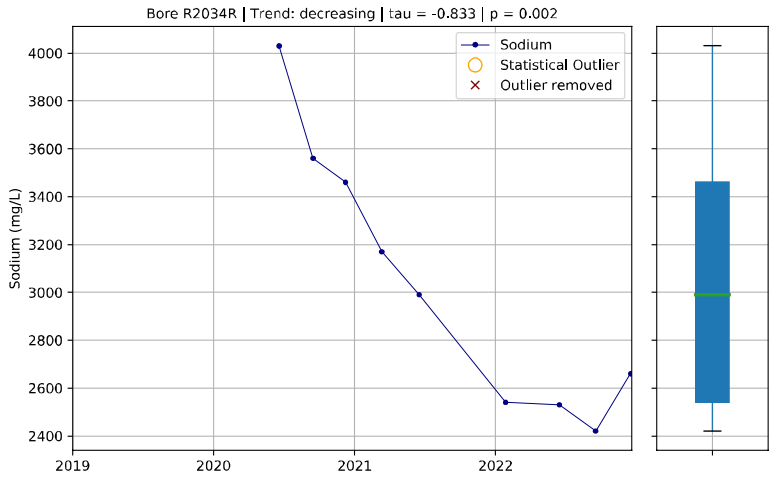

Bore R2034R | Trend (Outliers removed): no trend | tau = -0.286 | p = 0.386
Nickel
95th percentile: 0.04
80th percentile: 0.029
Nickel (mg/L)
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
2021
2022
2023

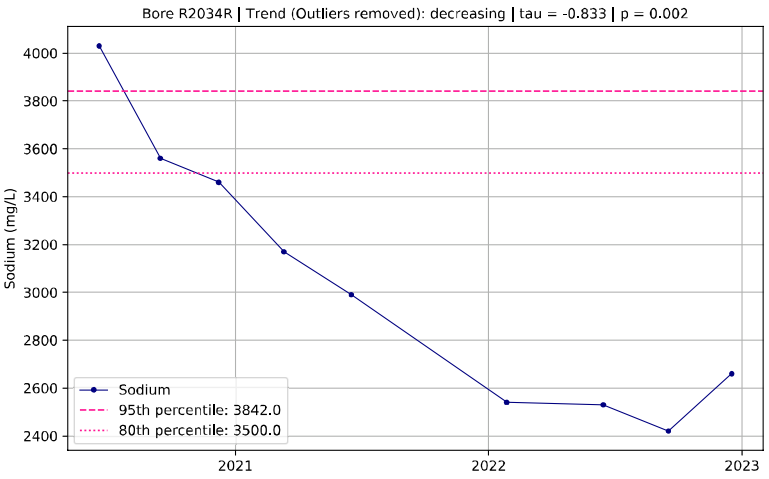

Bore R2034R | Trend: no trend | tau = 0.056 | p = 0.846
Selenium
Statistical Outlier
Outlier removed
Selenium (mg/L)
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
2019
2020
2021
2022

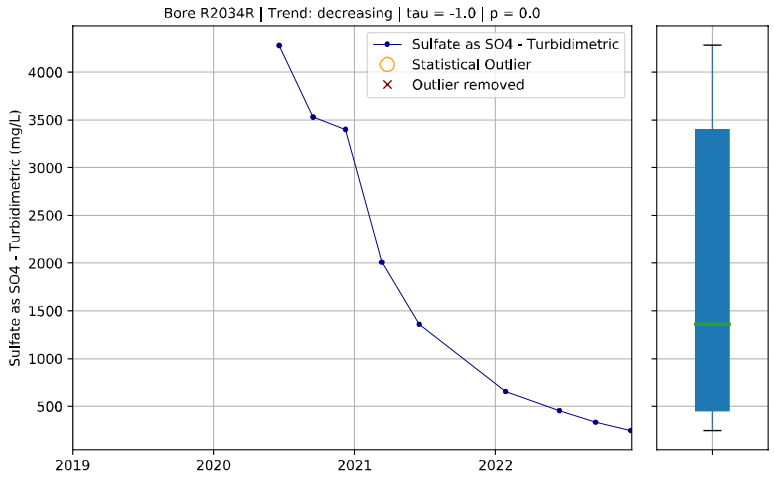

Bore R2034R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Selenium
95th percentile: 0.01
80th percentile: 0.01
Selenium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2021
2022
2023

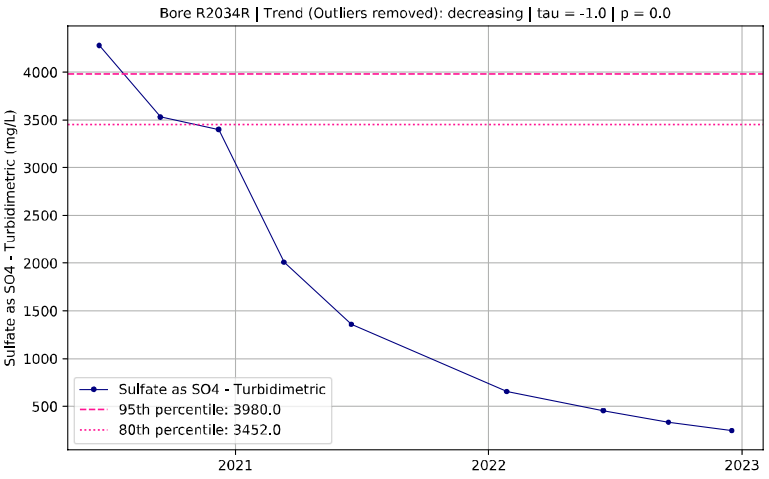

Bore R2034R | Trend: no trend | tau = -0.056 | p = 0.884
Silver
Statistical Outlier
Outlier removed
Silver (mg/L)

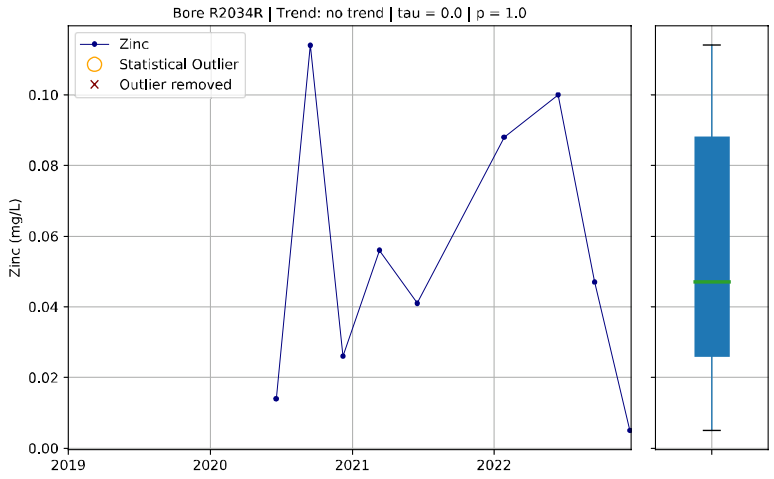

Bore R2034R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Silver
Silver (mg/L)
Less than 8 samples, no trigger limits derived

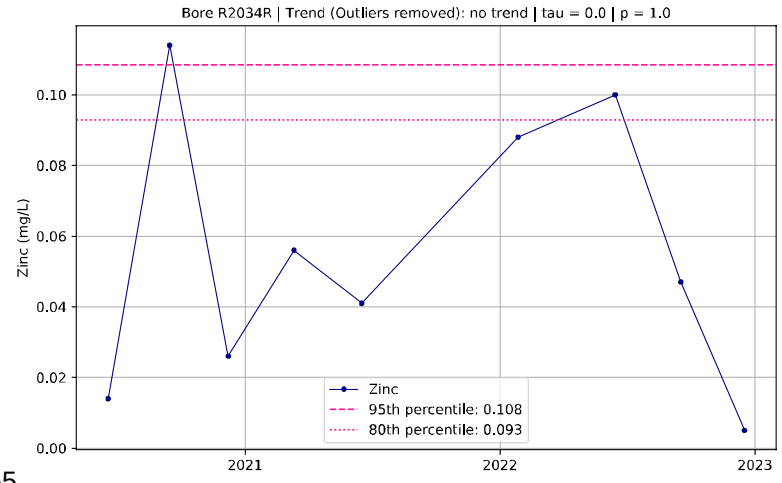

Bore R2034R | Trend: decreasing | tau = -0.833 | p = 0.002
Sodium
Statistical Outlier
Outlier removed
Sodium (mg/L)

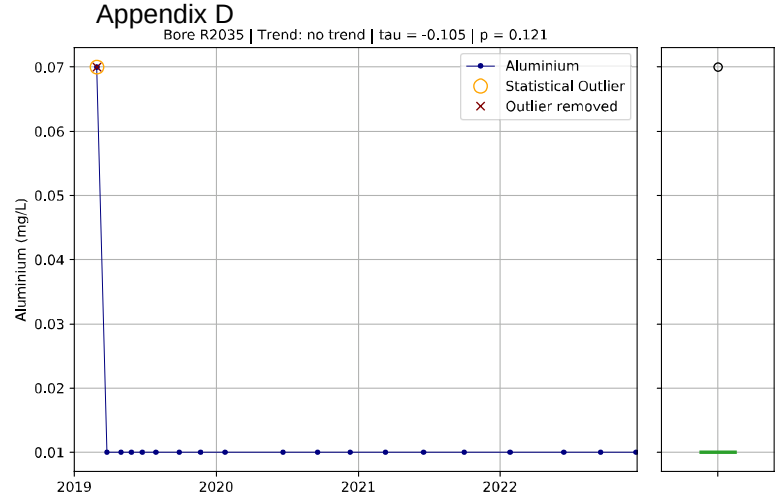

Bore R2034R | Trend (Outliers removed): decreasing | tau = -0.833 | p = 0.002
Sodium (mg/L)
Sodium
95th percentile: 3842.0
80th percentile: 3500.0

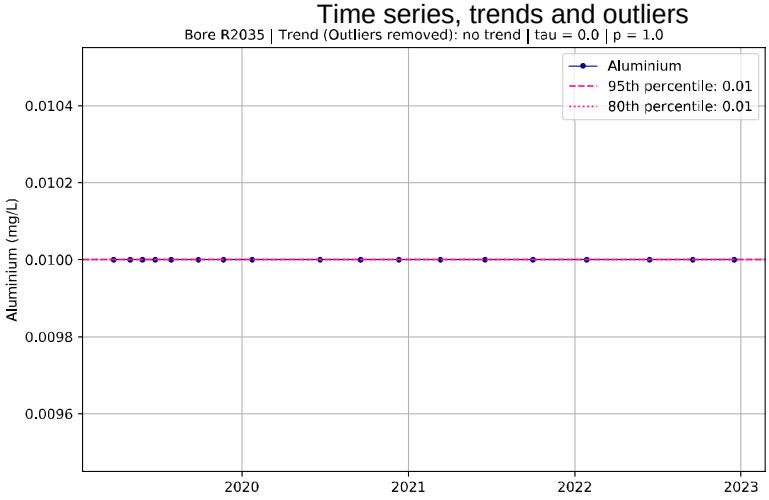

Bore R2034R | Trend: decreasing | tau = -1.0 | p = 0.0
Sulfate as SO4 - Turbidimetric
Statistical Outlier
Outlier removed
Sulfate as SO4 - Turbidimetric (mg/L)

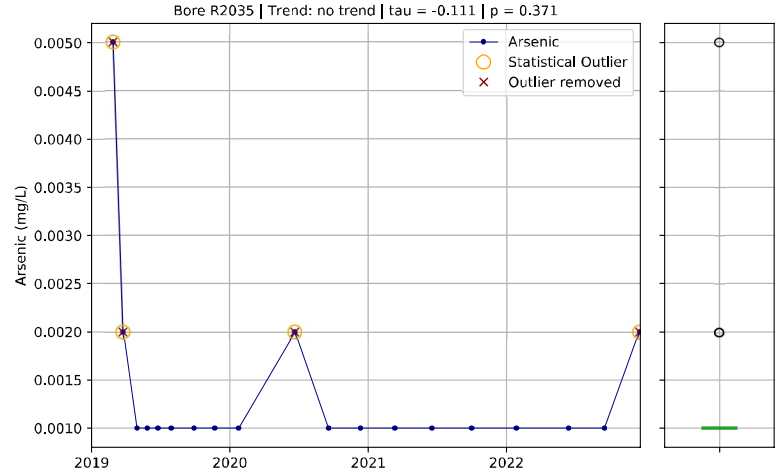

Bore R2034R | Trend (Outliers removed): decreasing | tau = -1.0 | p = 0.0
Sulfate as SO4 - Turbidimetric (mg/L)
Sulfate as SO4 - Turbidimetric
95th percentile: 3980.0
80th percentile: 3452.0

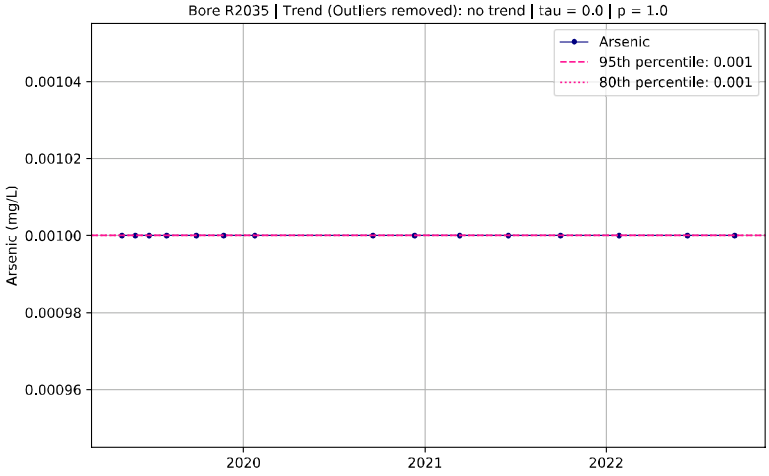

Bore R2034R | Trend: no trend | tau = 0.0 | p = 1.0
Zinc
Statistical Outlier
Outlier removed
Zinc (mg/L)


Bore R2034R | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Zinc (mg/L)
Zinc
95th percentile: 0.108
80th percentile: 0.093

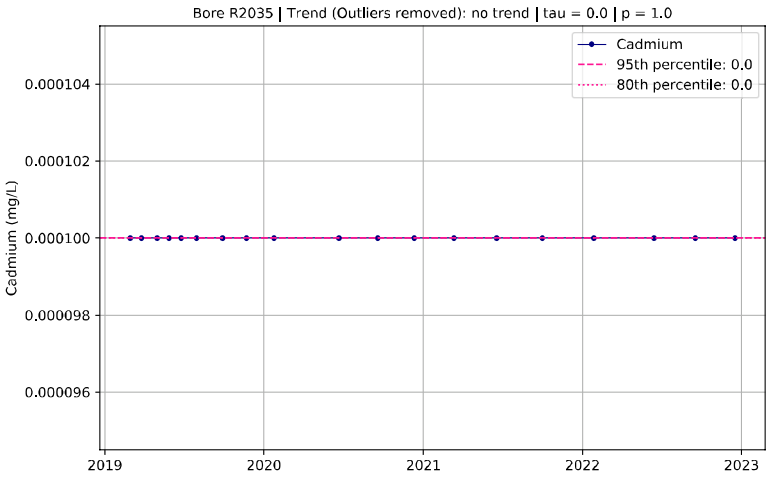

Bore R2035 | Trend: no trend | tau = -0.105 | p = 0.121
Aluminium
Statistical Outlier
Outlier removed
Aluminium (mg/L)

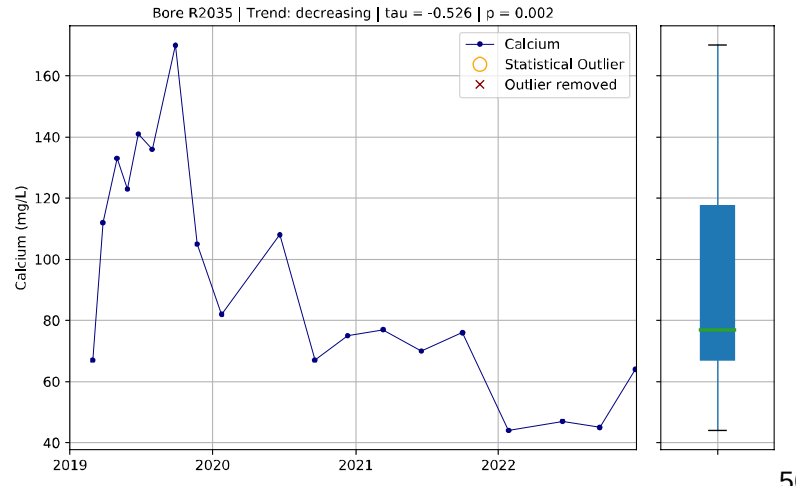

Bore R2035 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Aluminium
95th percentile: 0.01
80th percentile: 0.01
Aluminium (mg/L)

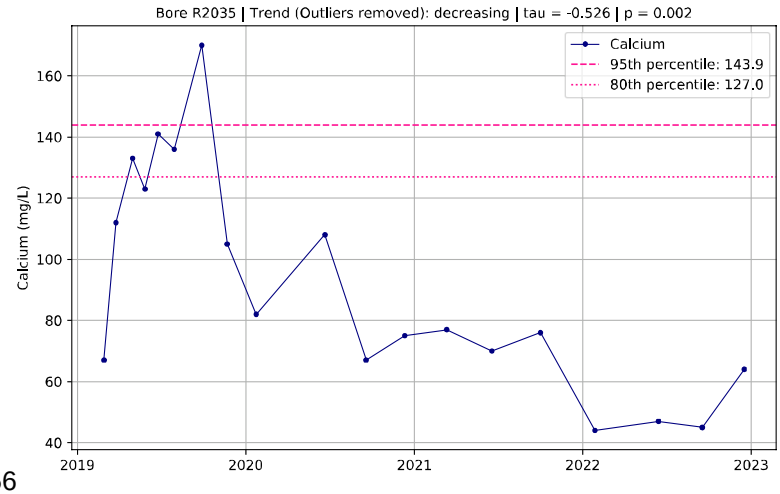

Bore R2035 | Trend: no trend | tau = -0.111 | p = 0.371
Arsenic
Statistical Outlier
Outlier removed
Arsenic (mg/L)

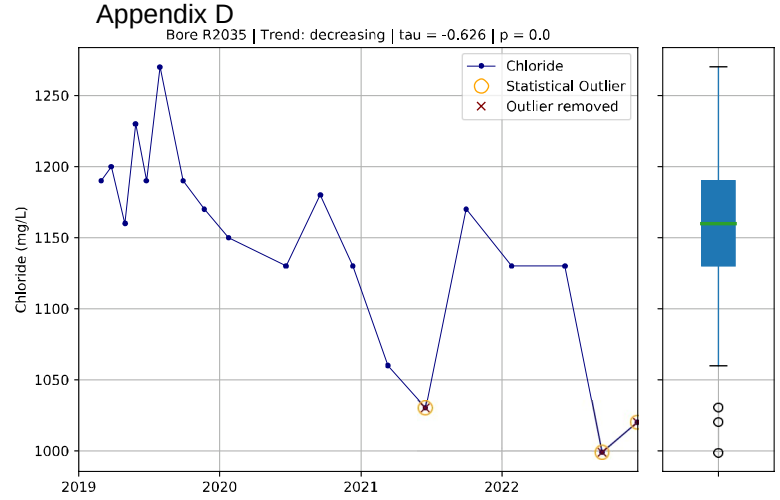

Bore R2035 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Arsenic
95th percentile: 0.001
80th percentile: 0.001
Arsenic (mg/L)

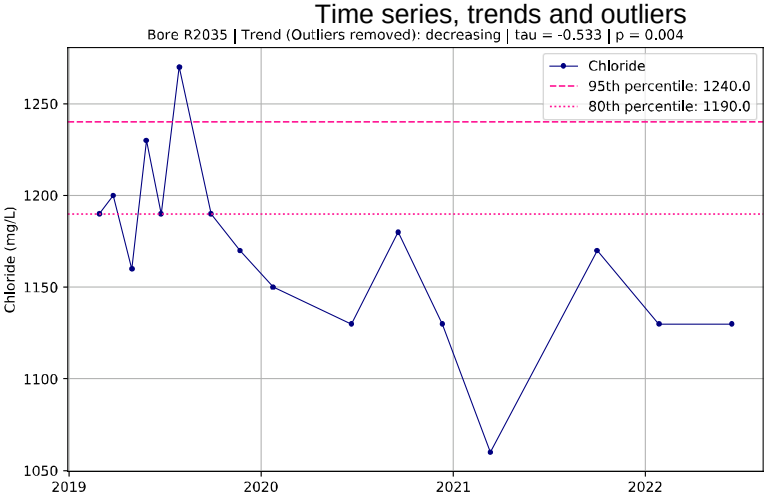
Bore R2035 | Trend: no trend | tau = 0.0 | p = 1.0
Cadmium
Statistical Outlier
Outlier removed
Cadmium (mg/L)

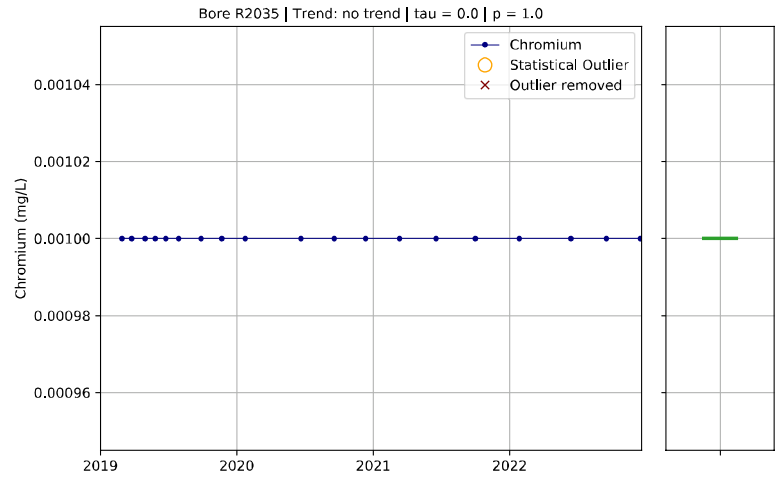

Bore R2035 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Cadmium
95th percentile: 0.0
80th percentile: 0.0
Cadmium (mg/L)

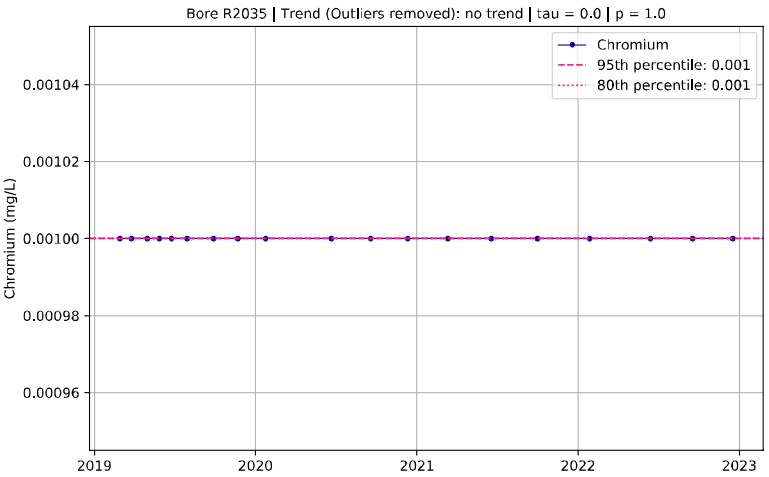

Bore R2035 | Trend: decreasing | tau = -0.526 | p = 0.002
Calcium
Statistical Outlier
Outlier removed
Calcium (mg/L)

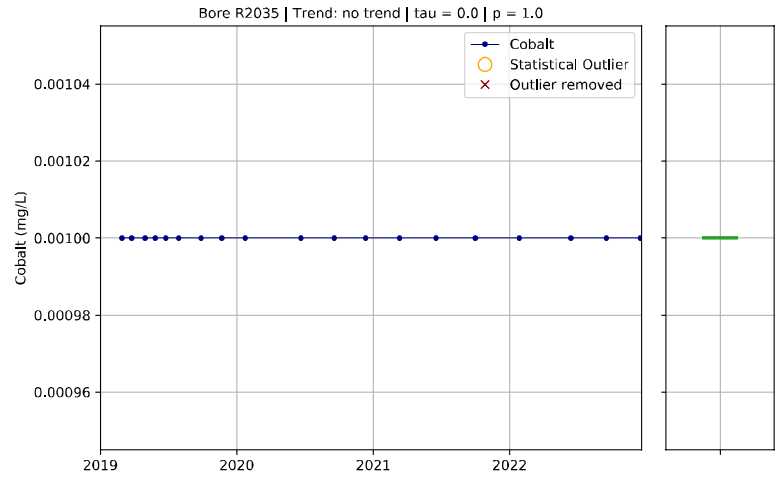

Bore R2035 | Trend (Outliers removed): decreasing | tau = -0.526 | p = 0.002
Calcium
95th percentile: 143.9
80th percentile: 127.0
Calcium (mg/L)

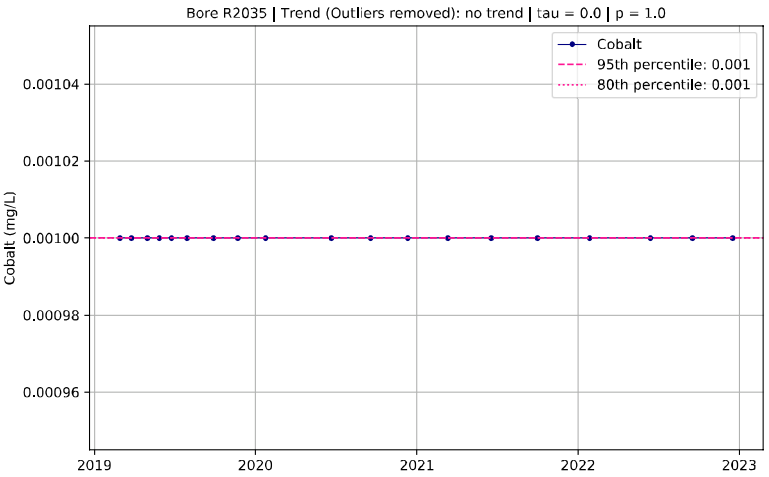

Bore R2035 | Trend: decreasing | tau = -0.626 | p = 0.0
Chloride
Statistical Outlier
Outlier removed
Chloride (mg/L)

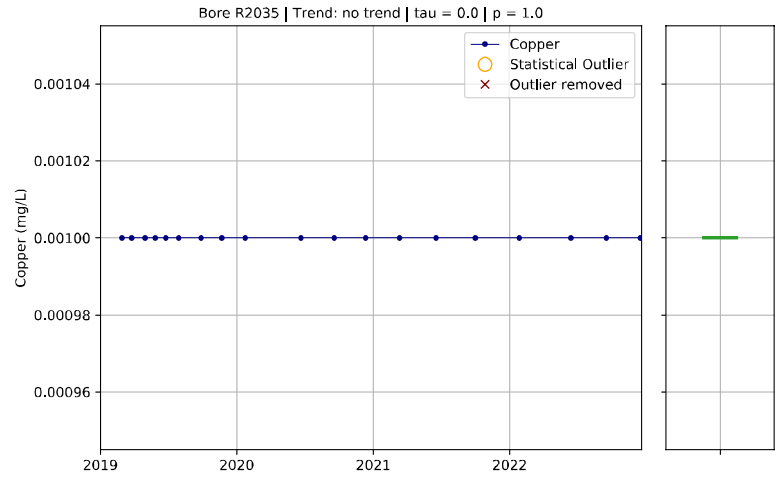

Bore R2035 | Trend (Outliers removed): decreasing | tau = -0.533 | p = 0.004
Chloride
95th percentile: 1240.0
80th percentile: 1190.0
Chloride (mg/L)

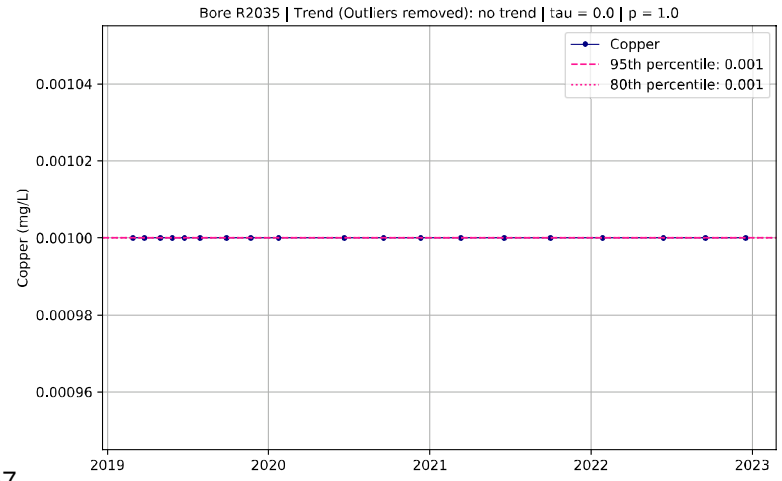

Bore R2035 | Trend: no trend | tau = 0.0 | p = 1.0
Chromium
Statistical Outlier
Outlier removed
Chromium (mg/L)

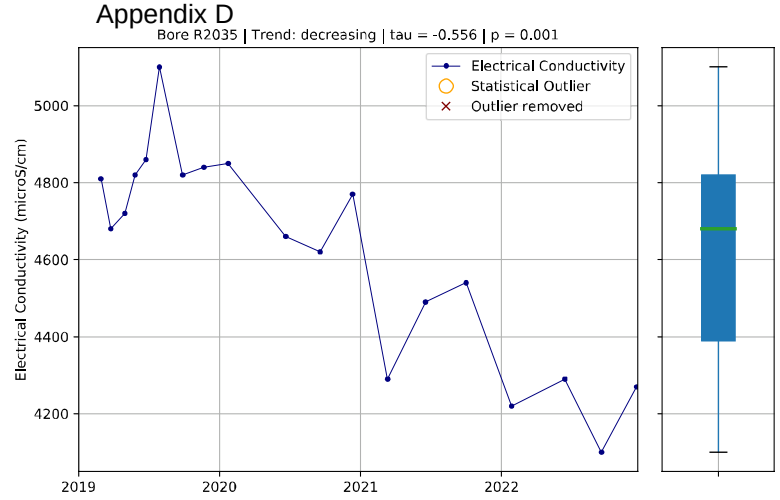

Bore R2035 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Chromium
95th percentile: 0.001
80th percentile: 0.001
Chromium (mg/L)

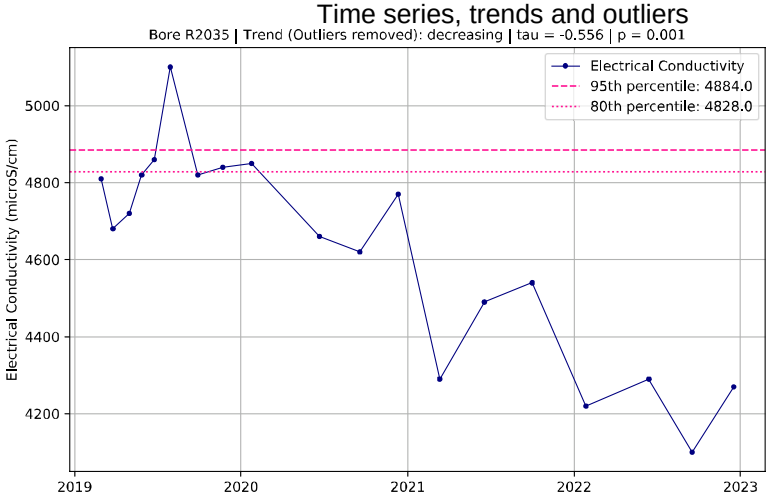

Bore R2035 | Trend: no trend | tau = 0.0 | p = 1.0
Cobalt
Statistical Outlier
Outlier removed
Cobalt (mg/L)

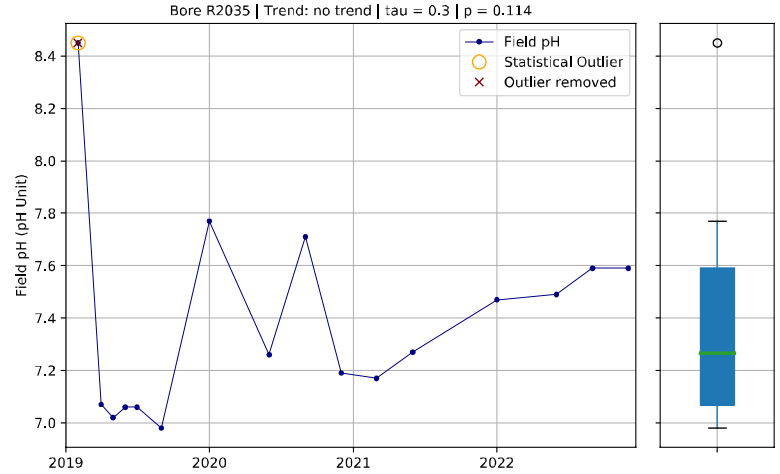

Bore R2035 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Cobalt
95th percentile: 0.001
80th percentile: 0.001
Cobalt (mg/L)

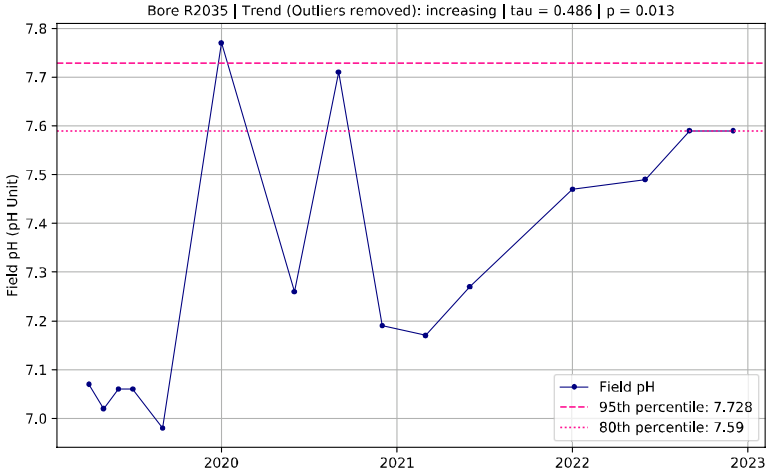

Bore R2035 | Trend: no trend | tau = 0.0 | p = 1.0
Copper
Statistical Outlier
Outlier removed
Copper (mg/L)

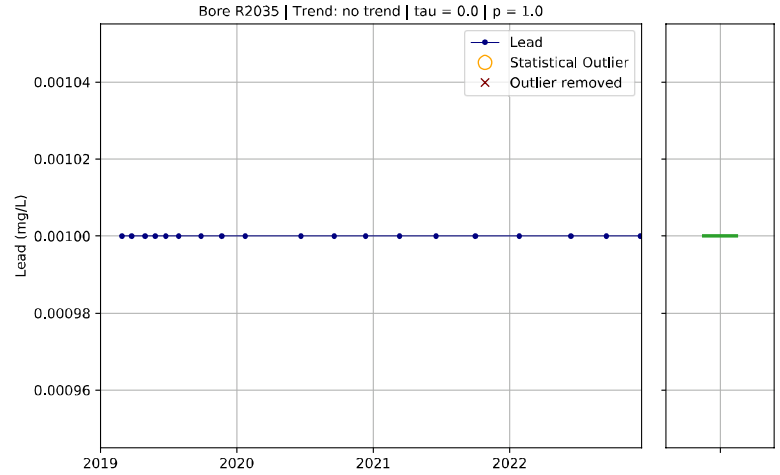

Bore R2035 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Copper
95th percentile: 0.001
80th percentile: 0.001
Copper (mg/L)

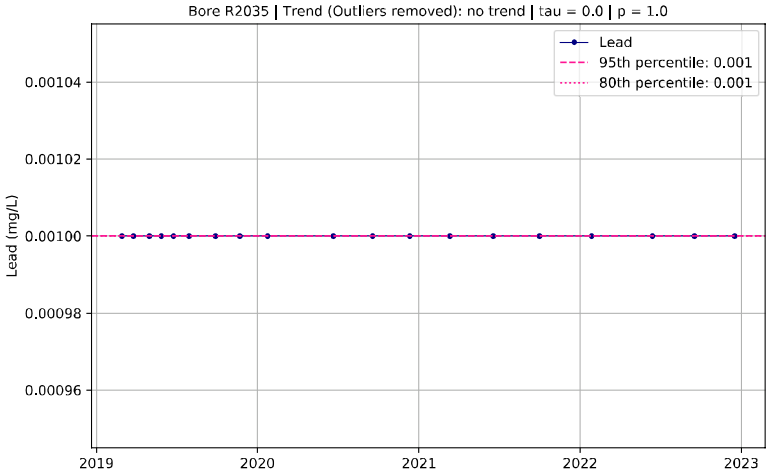

Bore R2035 | Trend: decreasing | tau = -0.556 | p = 0.001
Electrical Conductivity
Statistical Outlier
Outlier removed
Electrical Conductivity (microS/cm)

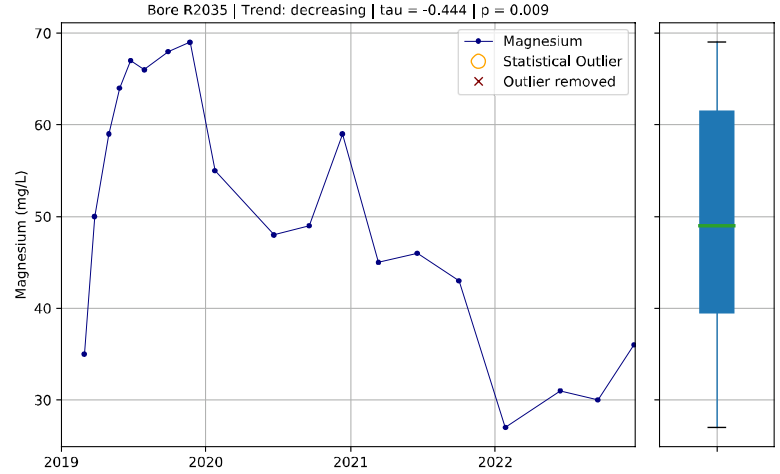

Bore R2035 | Trend (Outliers removed): decreasing | tau = -0.556 | p = 0.001
Electrical Conductivity
95th percentile: 4884.0
80th percentile: 4828.0
Electrical Conductivity (microS/cm)

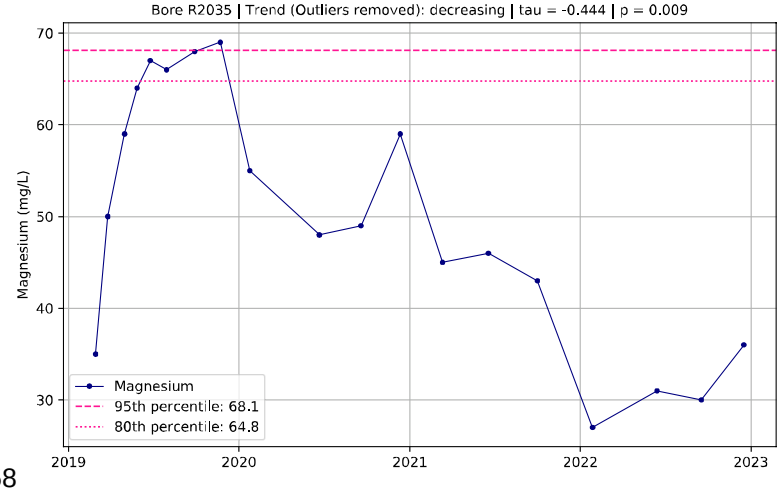

Bore R2035 | Trend: no trend | tau = 0.3 | p = 0.114
Field pH
Statistical Outlier
Outlier removed
Field pH (pH Unit)

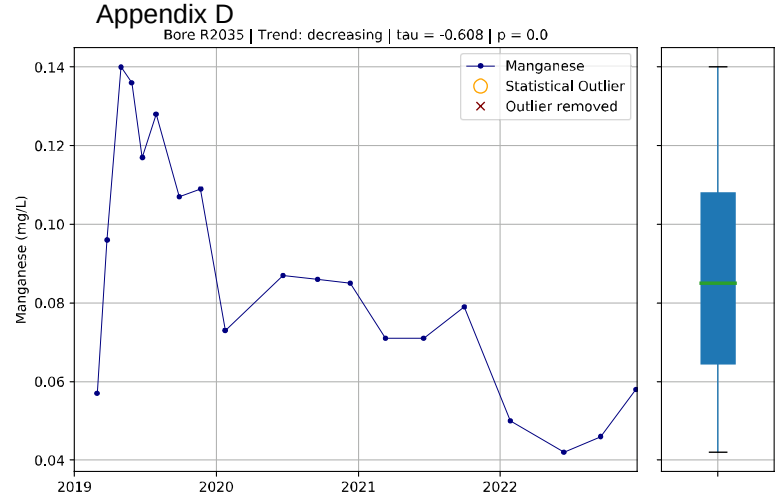

Bore R2035 | Trend (Outliers removed): increasing | tau = 0.486 | p = 0.013
Field pH
95th percentile: 7.728
80th percentile: 7.59
Field pH (pH Unit)

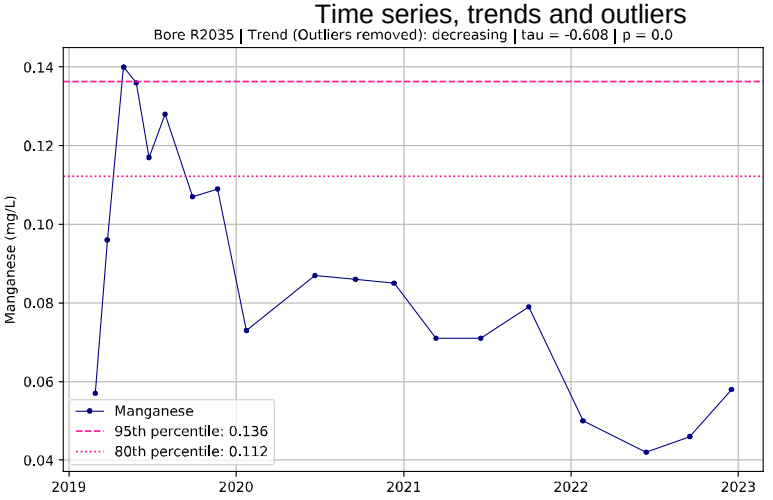

Bore R2035 | Trend: no trend | tau = 0.0 | p = 1.0
Lead
Statistical Outlier
Outlier removed
Lead (mg/L)

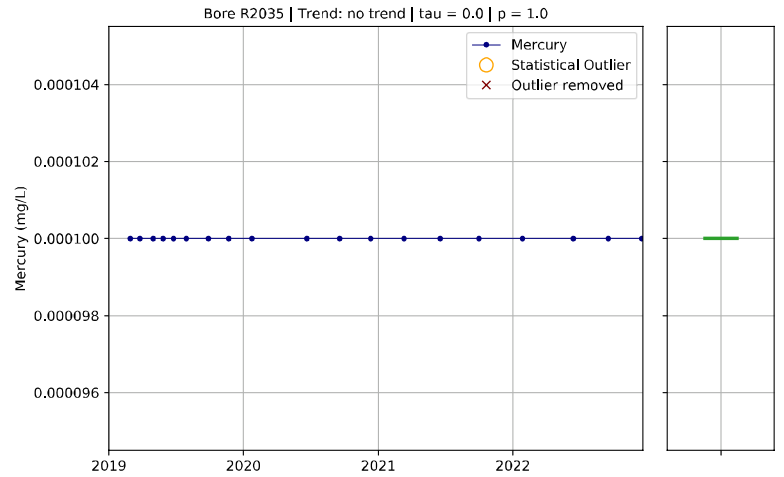

Bore R2035 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Lead
95th percentile: 0.001
80th percentile: 0.001
Lead (mg/L)

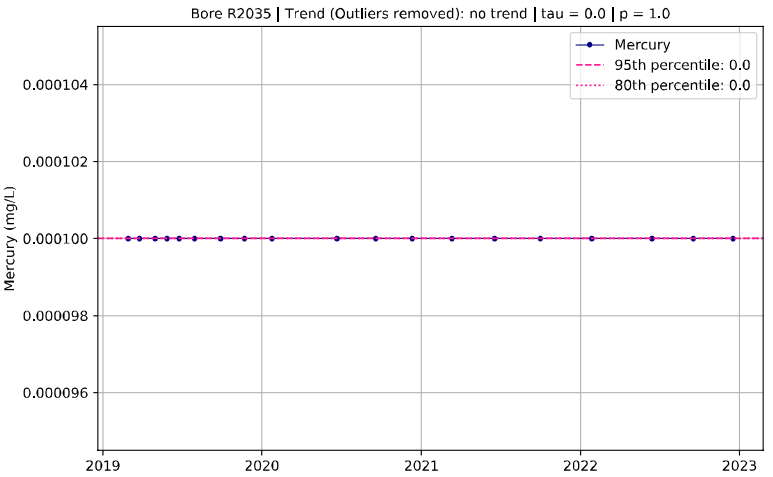

Bore R2035 | Trend: decreasing | tau = -0.444 | p = 0.009
Magnesium
Statistical Outlier
Outlier removed
Magnesium (mg/L)

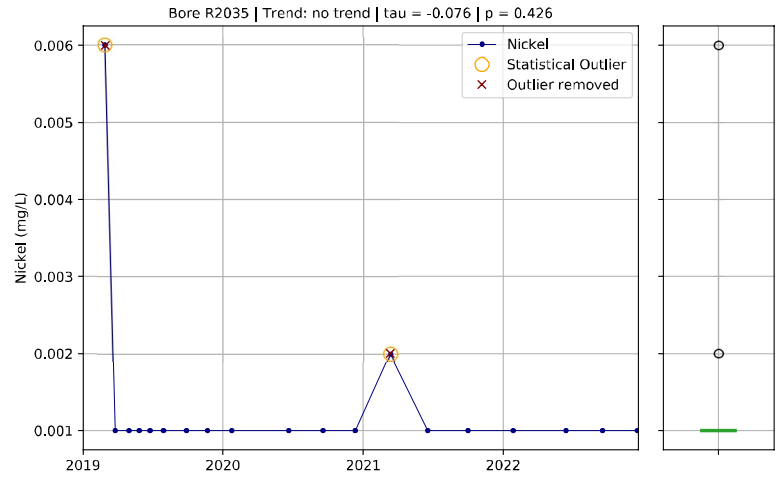

Bore R2035 | Trend (Outliers removed): decreasing | tau = -0.444 | p = 0.009
Magnesium
95th percentile: 68.1
80th percentile: 64.8
Magnesium (mg/L)

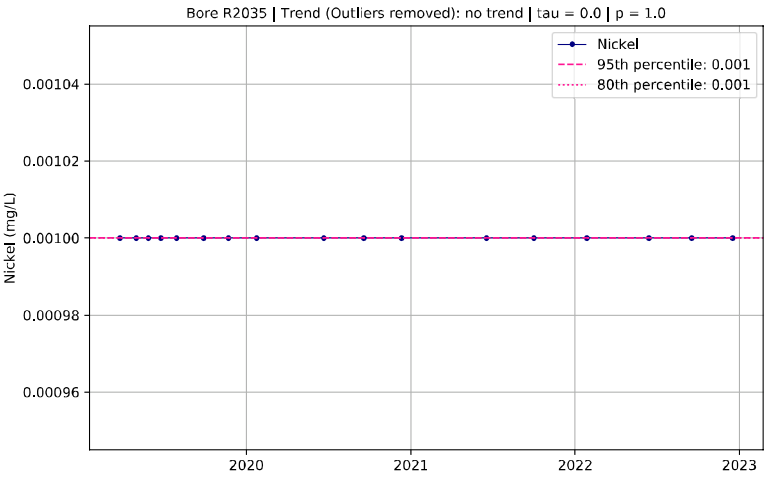

Bore R2035 | Trend: decreasing | tau = -0.608 | p = 0.0
Manganese
Statistical Outlier
Outlier removed
Manganese (mg/L)
0.14
0.12
0.10
0.08
0.06
0.04
2019
2020
2021
2022

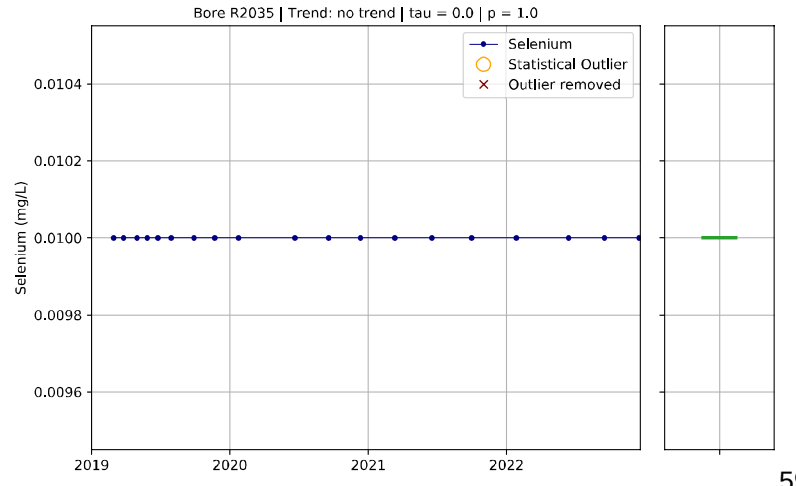

Bore R2035 | Trend (Outliers removed): decreasing | tau = -0.608 | p = 0.0
Manganese
95th percentile: 0.136
80th percentile: 0.112
Manganese (mg/L)
0.14
0.12
0.10
0.08
0.06
0.04
2019
2020
2021
2022
2023

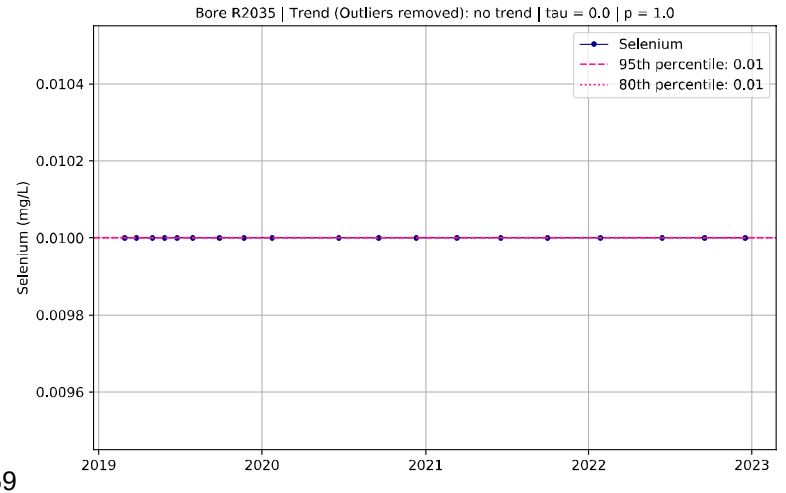

Bore R2035 | Trend: no trend | tau = 0.0 | p = 1.0
Mercury
Statistical Outlier
Outlier removed
Mercury (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022

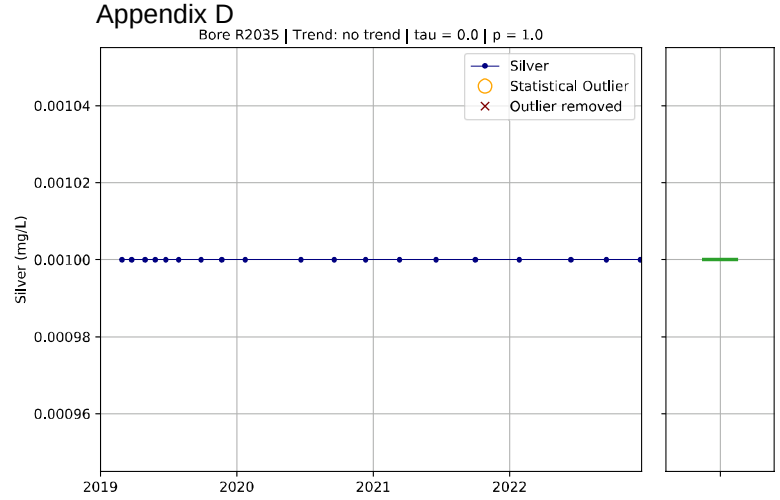

Bore R2035 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Mercury
95th percentile: 0.0
80th percentile: 0.0
Mercury (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022
2023

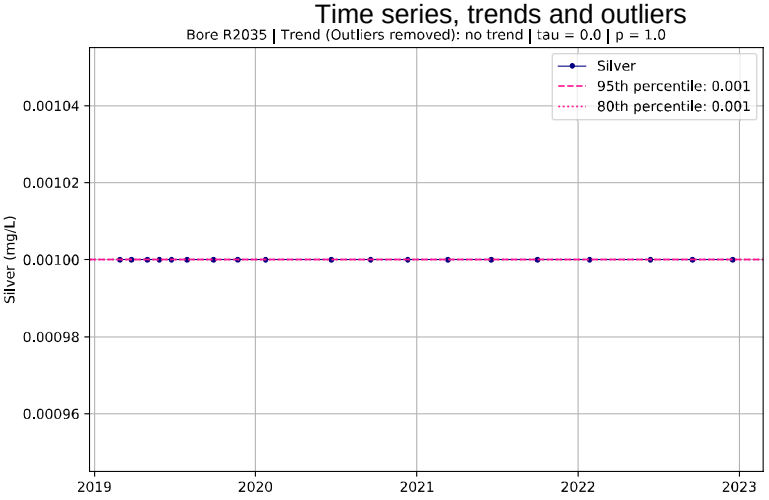

Bore R2035 | Trend: no trend | tau = -0.076 | p = 0.426
Nickel
Statistical Outlier
Outlier removed
Nickel (mg/L)
0.006
0.005
0.004
0.003
0.002
0.001
2019
2020
2021
2022

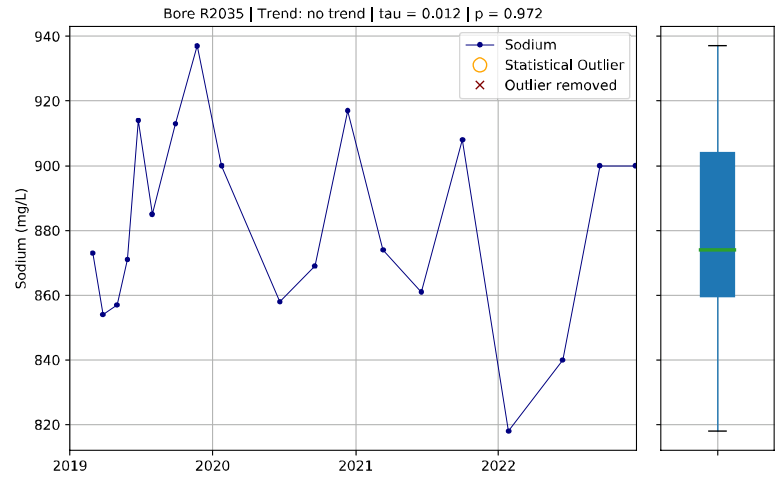

Bore R2035 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Nickel
95th percentile: 0.001
80th percentile: 0.001
Nickel (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2020
2021
2022
2023

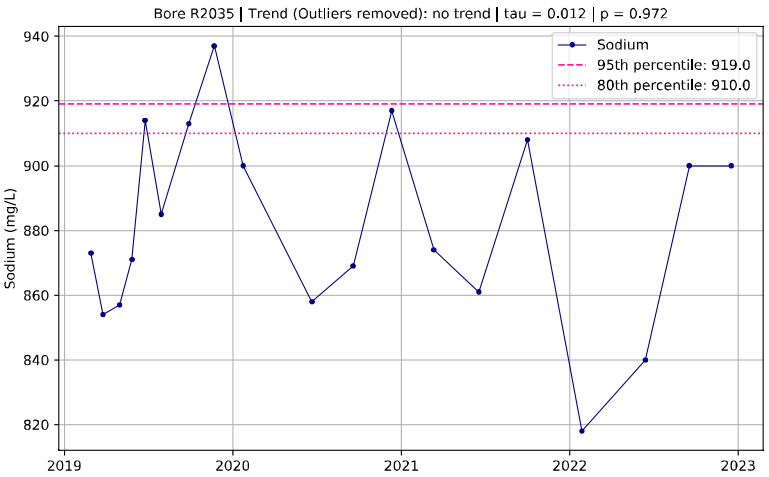

Bore R2035 | Trend: no trend | tau = 0.0 | p = 1.0
Selenium
Statistical Outlier
Outlier removed
Selenium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2019
2020
2021
2022

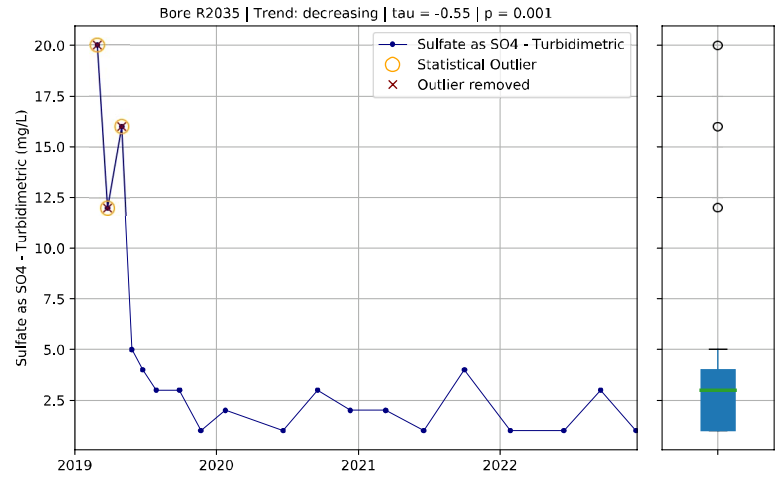

Bore R2035 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Selenium
95th percentile: 0.01
80th percentile: 0.01
Selenium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2019
2020
2021
2022
2023

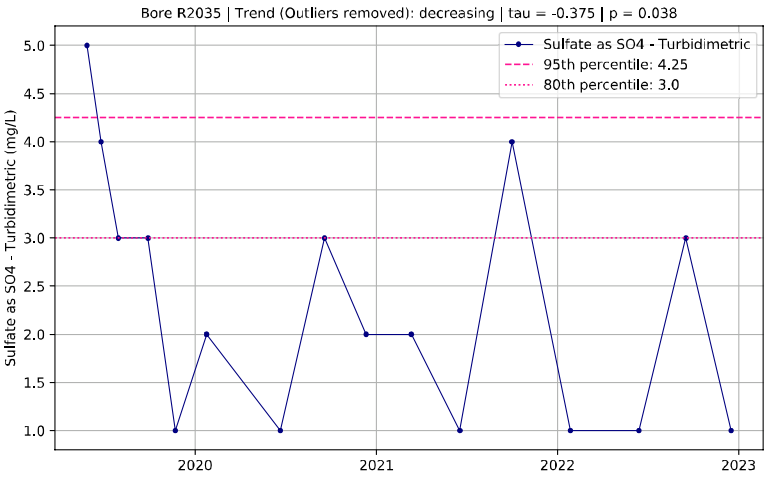

Bore R2035 | Trend: no trend | tau = 0.0 | p = 1.0
Silver
Statistical Outlier
Outlier removed
Silver (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022

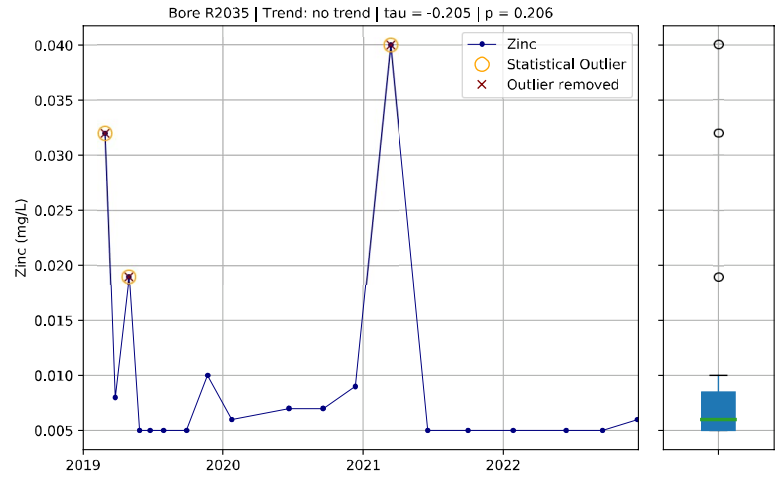

Bore R2035 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Silver
95th percentile: 0.001
80th percentile: 0.001
Silver (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022
2023

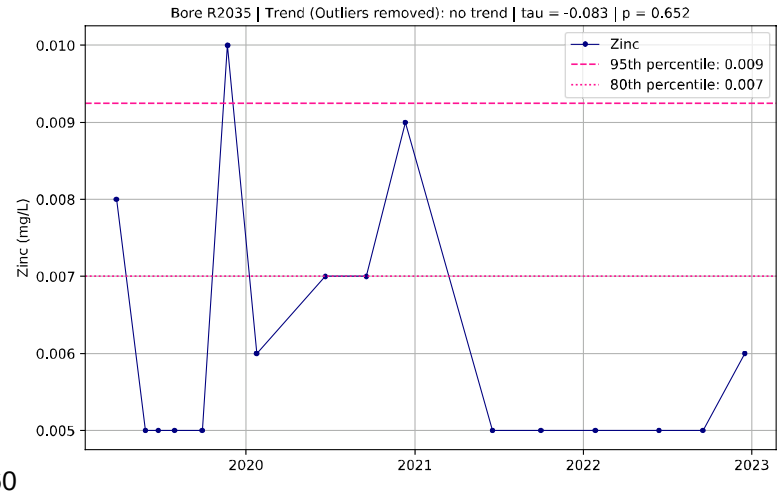

Bore R2035 | Trend: no trend | tau = 0.012 | p = 0.972
Sodium
Statistical Outlier
Outlier removed
Sodium (mg/L)
940
920
900
880
860
840
820
2019
2020
2021
2022

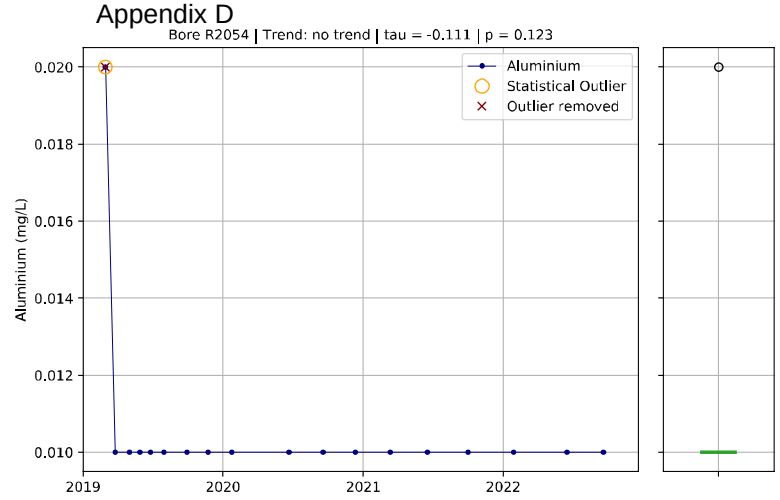

Bore R2035 | Trend (Outliers removed): no trend | tau = 0.012 | p = 0.972
Sodium
95th percentile: 919.0
80th percentile: 910.0
Sodium (mg/L)
940
920
900
880
860
840
820
2019
2020
2021
2022
2023

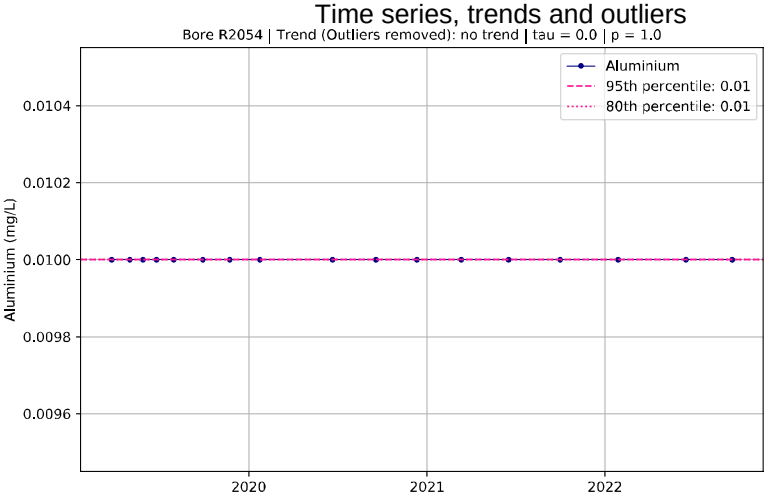

Bore R2035 | Trend: decreasing | tau = -0.55 | p = 0.001
Sulfate as SO4 - Turbidimetric
Statistical Outlier
Outlier removed
Sulfate as SO4 - Turbidimetric (mg/L)
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
2019
2020
2021
2022

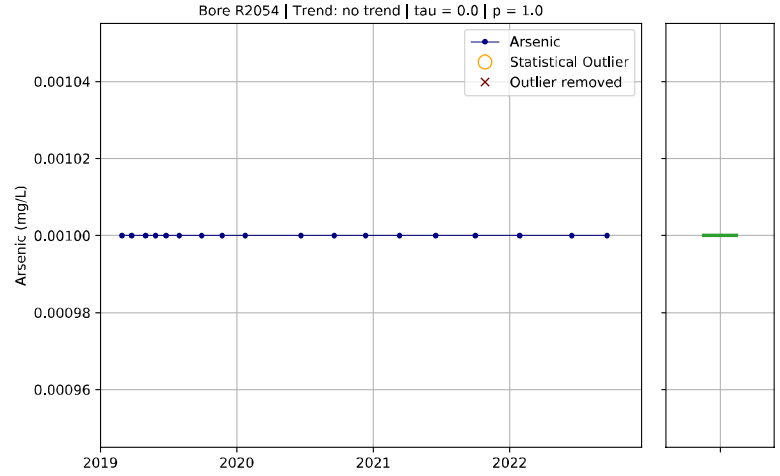

Bore R2035 | Trend (Outliers removed): decreasing | tau = -0.375 | p = 0.038
Sulfate as SO4 - Turbidimetric
95th percentile: 4.25
80th percentile: 3.0
Sulfate as SO4 - Turbidimetric (mg/L)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
2020
2021
2022
2023

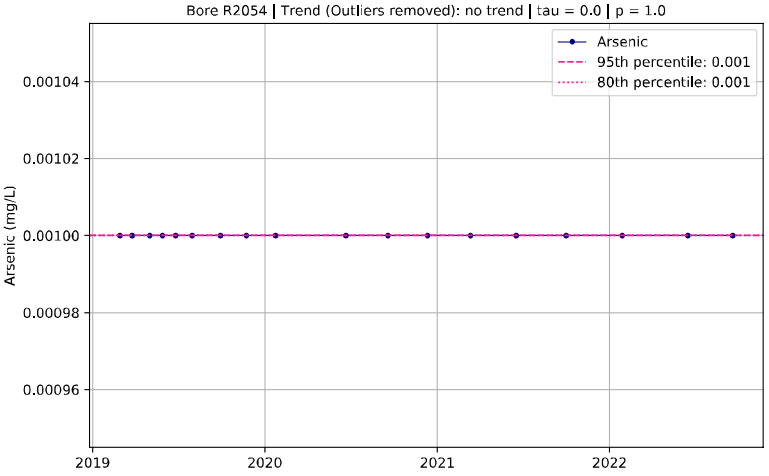

Bore R2035 | Trend: no trend | tau = -0.205 | p = 0.206
Zinc
Statistical Outlier
Outlier removed
Zinc (mg/L)
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
2019
2020
2021
2022

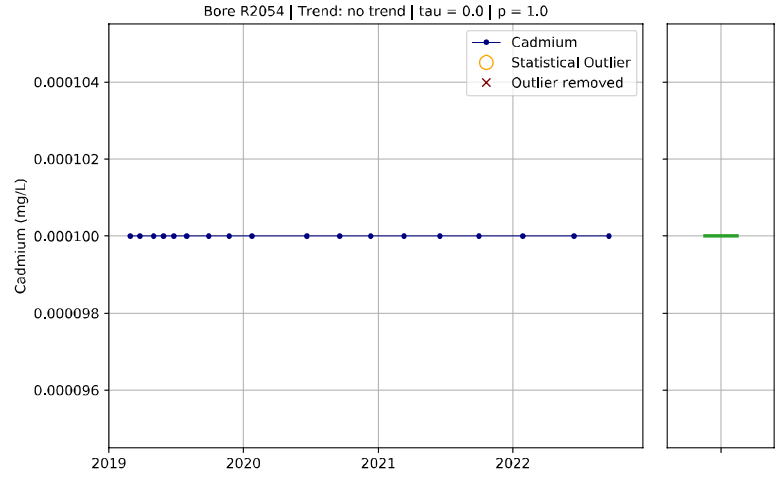

Bore R2035 | Trend (Outliers removed): no trend | tau = -0.083 | p = 0.652
Zinc
95th percentile: 0.009
80th percentile: 0.007
Zinc (mg/L)
0.010
0.009
0.008
0.007
0.006
0.005
2020
2021
2022
2023

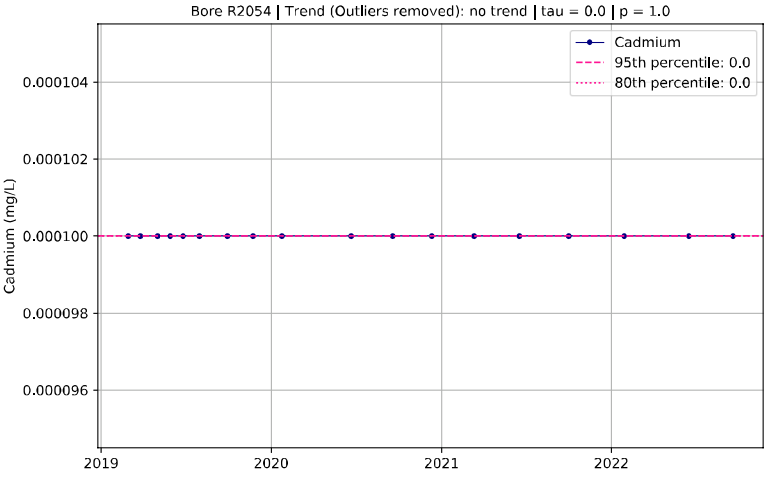

Bore R2054 | Trend: no trend | tau = -0.111 | p = 0.123
Aluminium
Statistical Outlier
Outlier removed
Aluminium (mg/L)
0.020
0.018
0.016
0.014
0.012
0.010
2019
2020
2021
2022

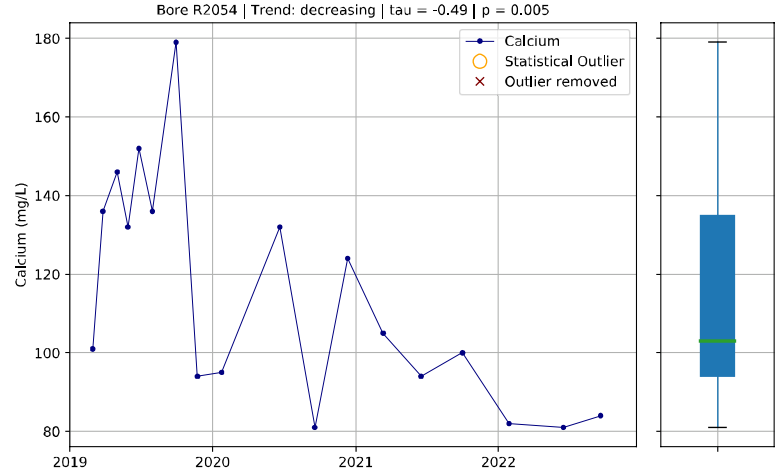

Bore R2054 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Aluminium
95th percentile: 0.01
80th percentile: 0.01
Aluminium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2020
2021
2022

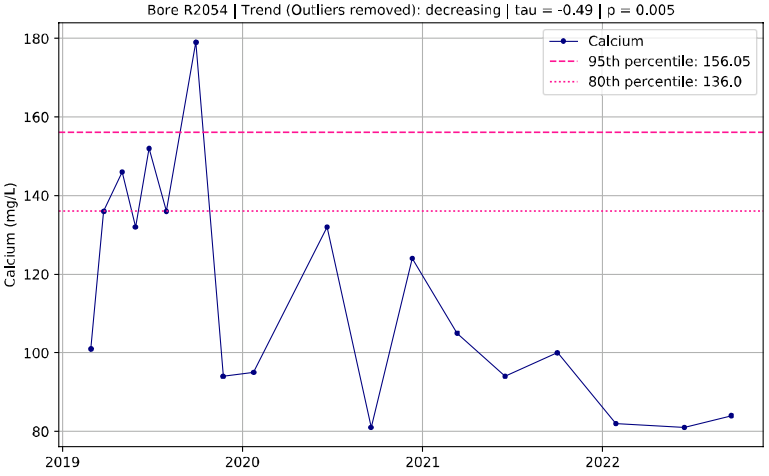

Bore R2054 | Trend: no trend | tau = 0.0 | p = 1.0
Arsenic
Statistical Outlier
Outlier removed
Arsenic (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022


Bore R2054 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Arsenic
95th percentile: 0.001
80th percentile: 0.001
Arsenic (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022

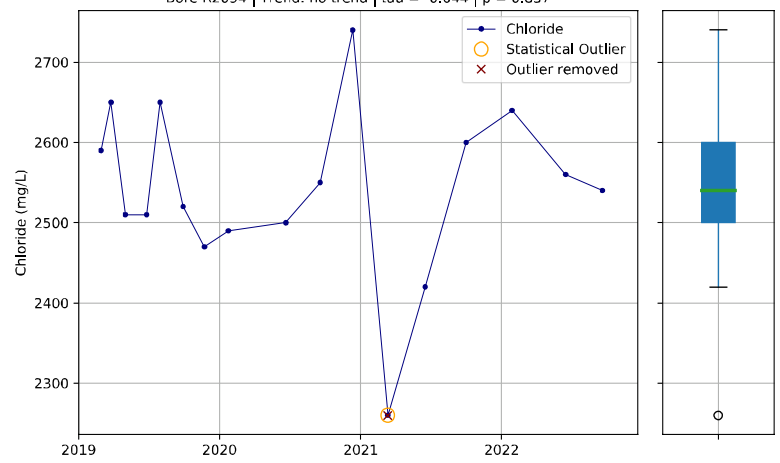

Bore R2054 | Trend: no trend | tau = 0.0 | p = 1.0
Cadmium
Statistical Outlier
Outlier removed
Cadmium (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022

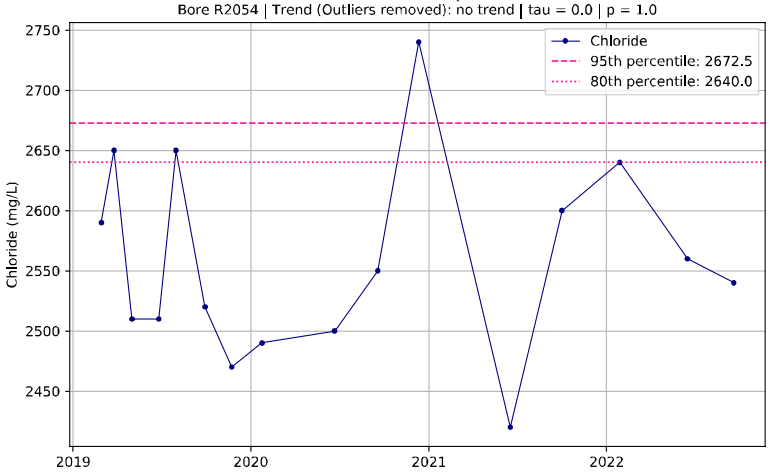

Bore R2054 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Cadmium
95th percentile: 0.0
80th percentile: 0.0
Cadmium (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022

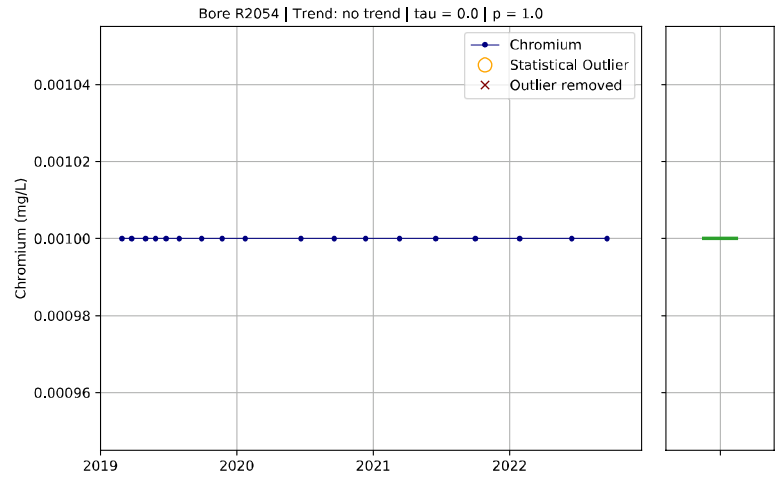

Bore R2054 | Trend: decreasing | tau = -0.49 | p = 0.005
Calcium
Statistical Outlier
Outlier removed
Calcium (mg/L)
180
160
140
120
100
80
2019
2020
2021
2022

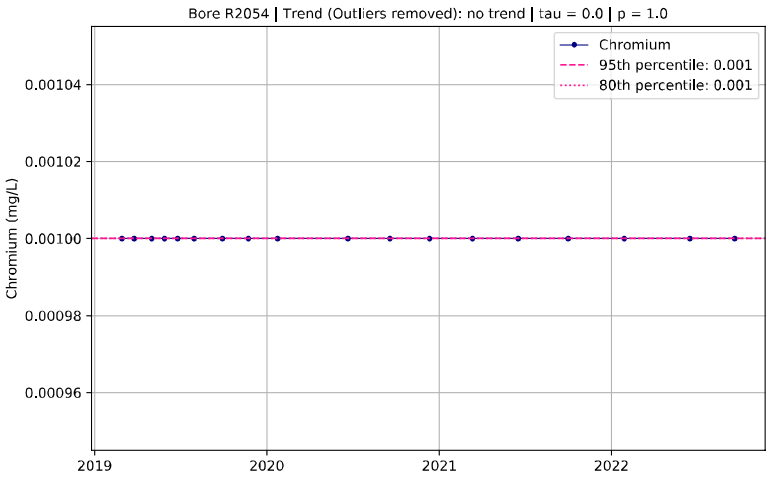

Bore R2054 | Trend (Outliers removed): decreasing | tau = -0.49 | p = 0.005
Calcium
95th percentile: 156.05
80th percentile: 136.0
Calcium (mg/L)
180
160
140
120
100
80
2019
2020
2021
2022

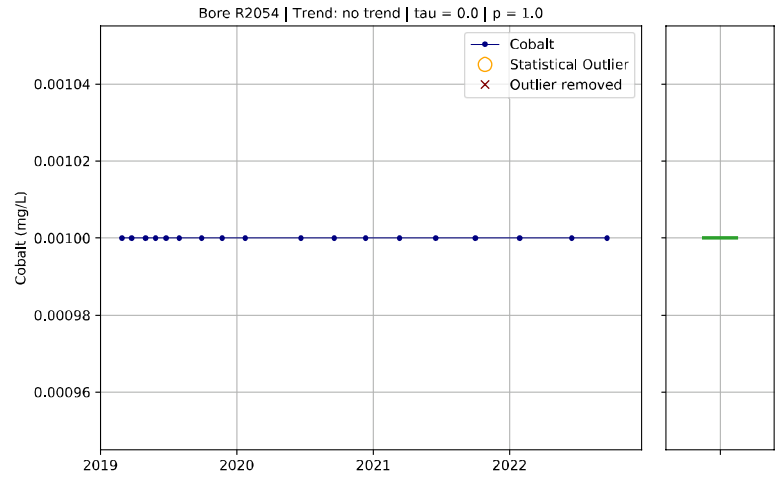
Time series, trends and outliers

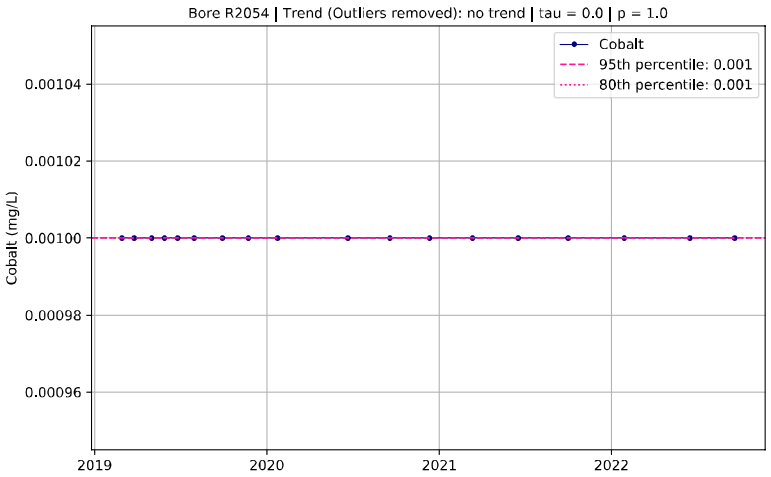


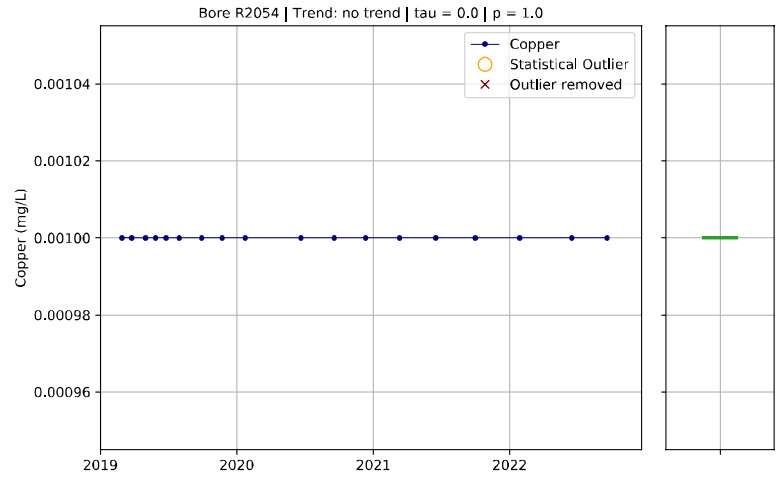


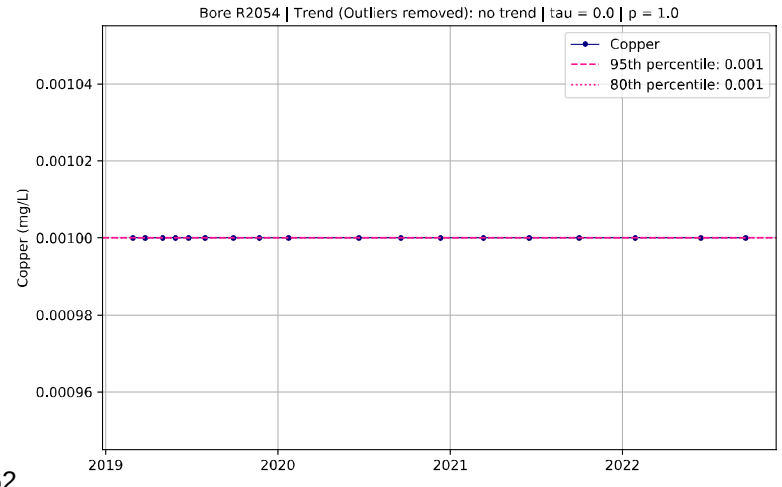


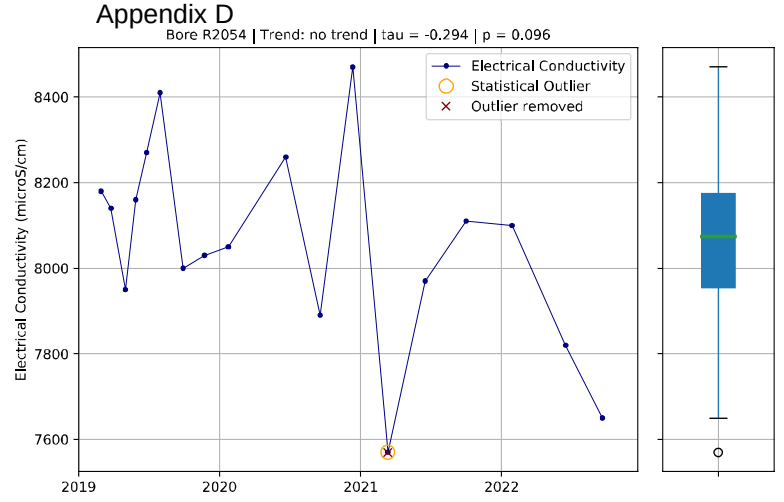


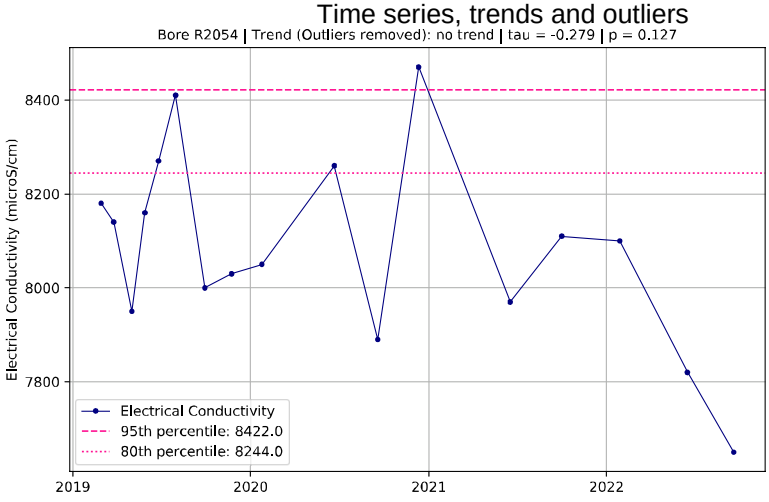


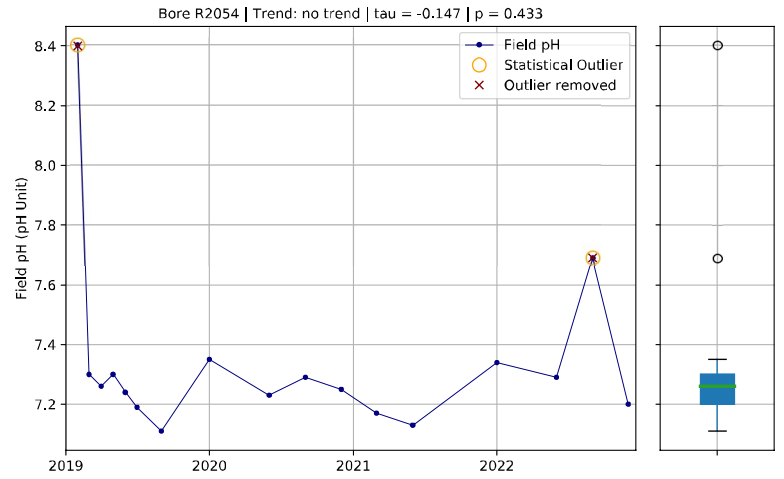


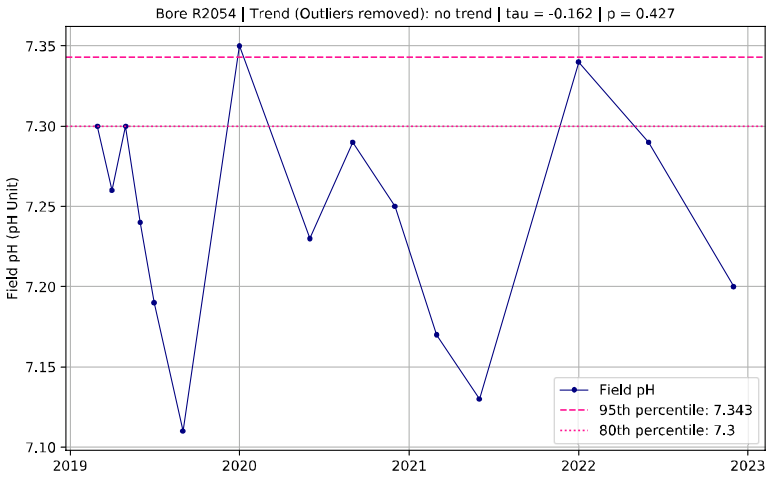




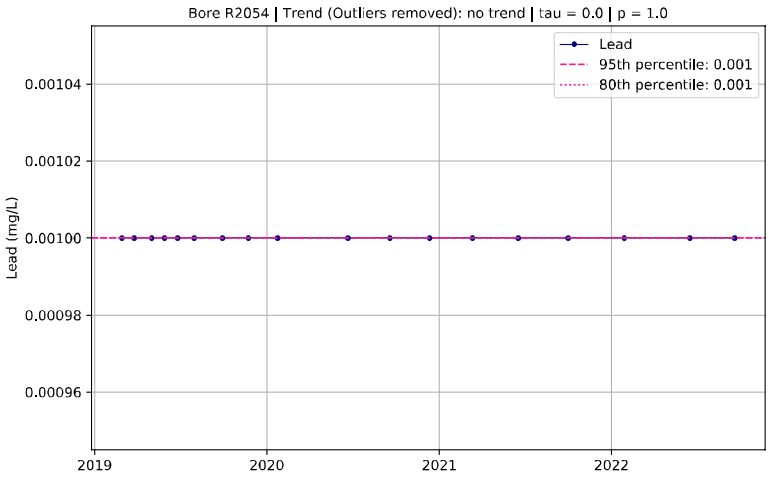

Bore R2054 | Trend: no trend | tau = -0.294 | p = 0.096
Electrical Conductivity
Statistical Outlier
Outlier removed
Electrical Conductivity (microS/cm)

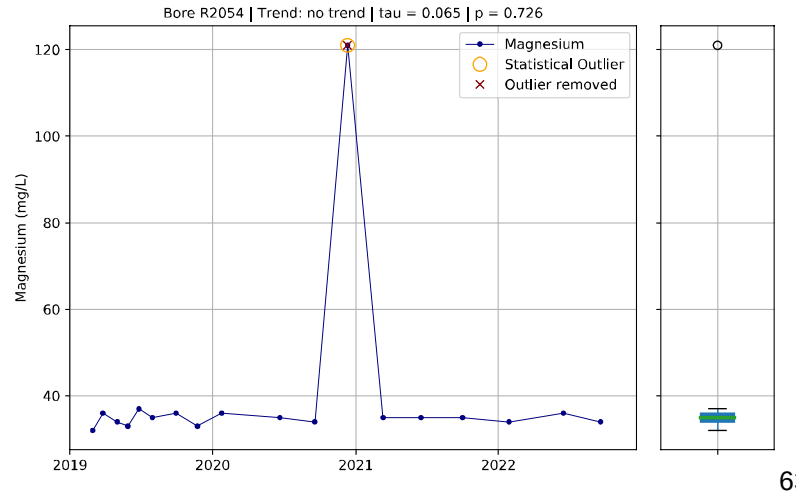

Bore R2054 | Trend (Outliers removed): no trend | tau = -0.279 | p = 0.127
Electrical Conductivity (microS/cm)
Electrical Conductivity
95th percentile: 8422.0
80th percentile: 8244.0

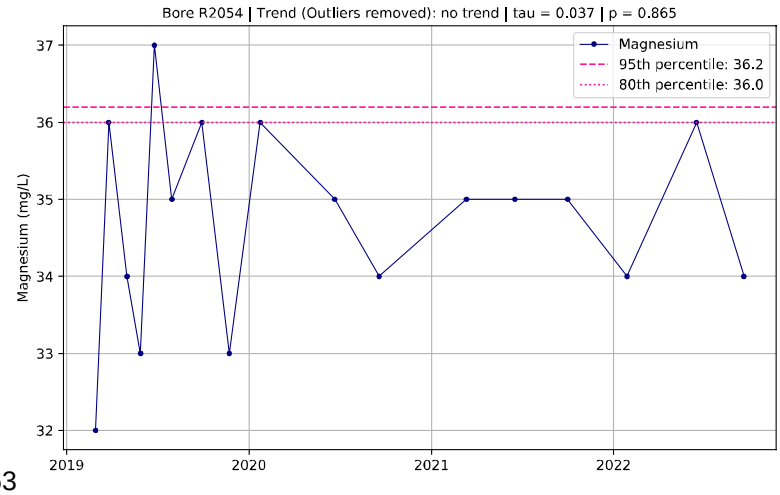

Bore R2054 | Trend: no trend | tau = -0.147 | p = 0.433
Field pH
Statistical Outlier
Outlier removed
Field pH (pH Unit)

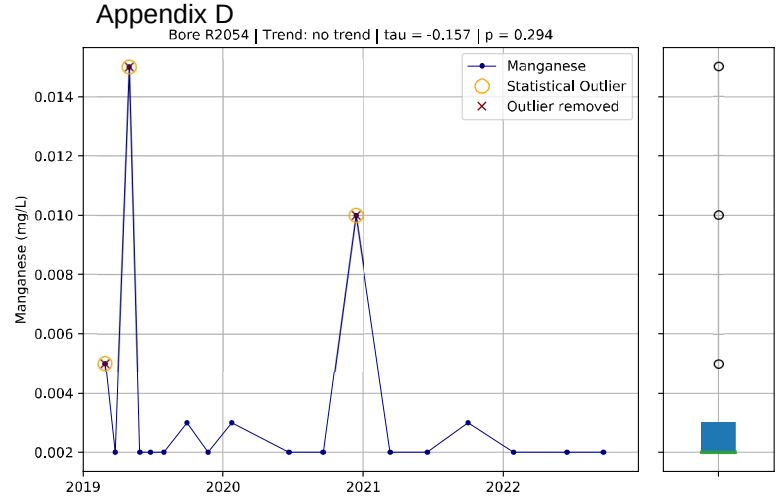

Bore R2054 | Trend (Outliers removed): no trend | tau = -0.162 | p = 0.427
Field pH (pH Unit)
Field pH
95th percentile: 7.343
80th percentile: 7.3

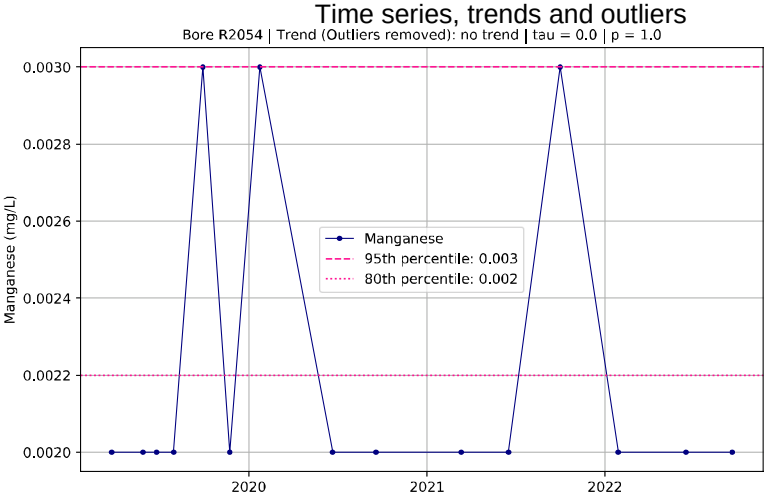
Bore R2054 | Trend: no trend | tau = 0.0 | p = 1.0
Lead
Statistical Outlier
Outlier removed
Lead (mg/L)

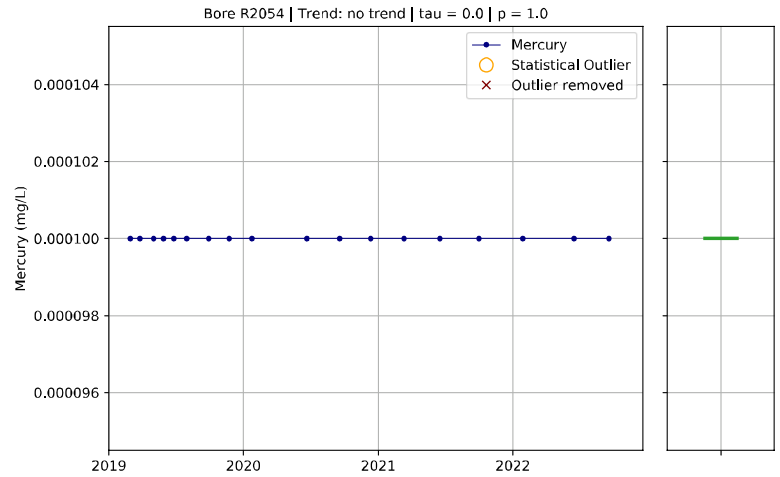

Bore R2054 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Lead (mg/L)
Lead
95th percentile: 0.001
80th percentile: 0.001

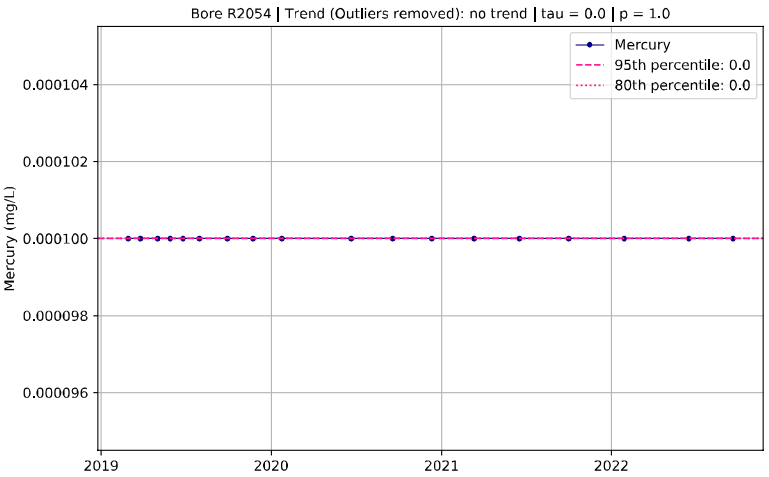

Bore R2054 | Trend: no trend | tau = 0.065 | p = 0.726
Magnesium
Statistical Outlier
Outlier removed
Magnesium (mg/L)

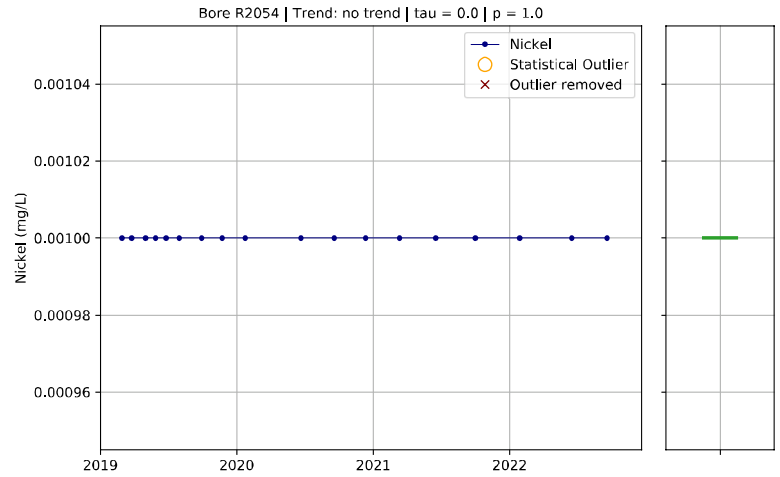

Bore R2054 | Trend (Outliers removed): no trend | tau = 0.037 | p = 0.865
Magnesium (mg/L)
Magnesium
95th percentile: 36.2
80th percentile: 36.0

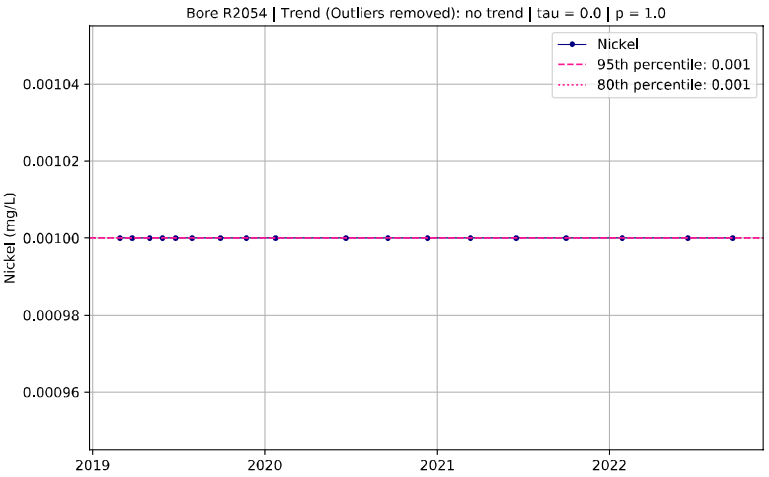

Bore R2054 | Trend: no trend | tau = -0.157 | p = 0.294
Manganese
Statistical Outlier
Outlier removed
Manganese (mg/L)
0.014
0.012
0.010
0.008
0.006
0.004
0.002
2019
2020
2021
2022

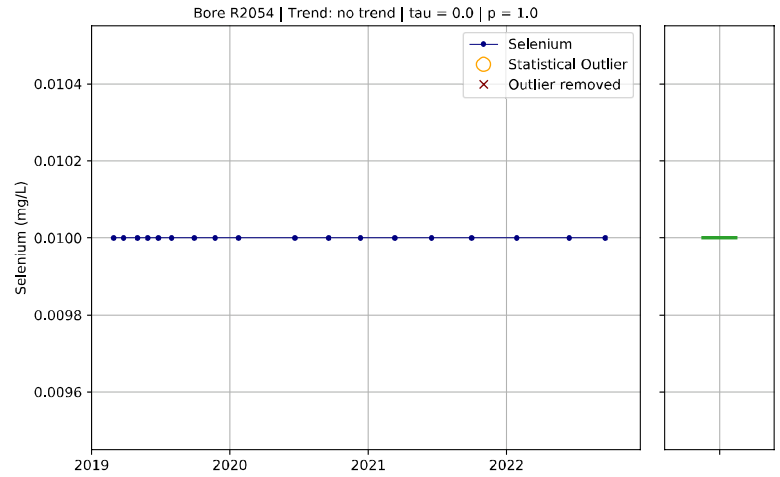

Bore R2054 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Manganese
95th percentile: 0.003
80th percentile: 0.002
Manganese (mg/L)
0.0030
0.0028
0.0026
0.0024
0.0022
0.0020
2020
2021
2022

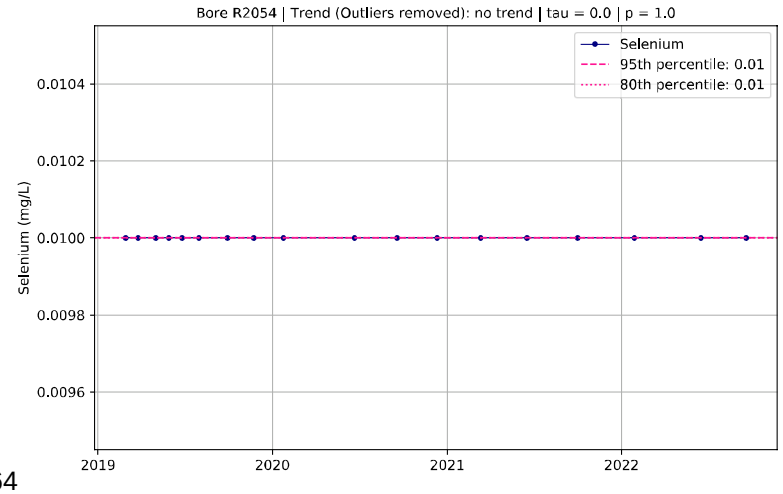

Bore R2054 | Trend: no trend | tau = 0.0 | p = 1.0
Mercury
Statistical Outlier
Outlier removed
Mercury (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022


Bore R2054 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Mercury
95th percentile: 0.0
80th percentile: 0.0
Mercury (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022

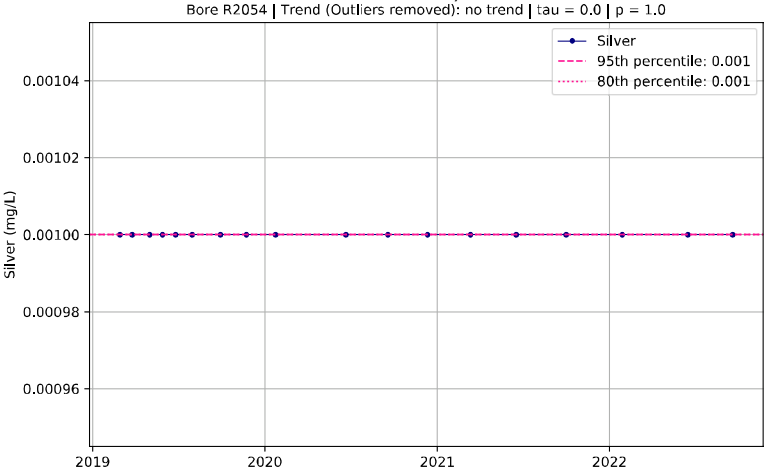

Bore R2054 | Trend: no trend | tau = 0.0 | p = 1.0
Nickel
Statistical Outlier
Outlier removed
Nickel (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022

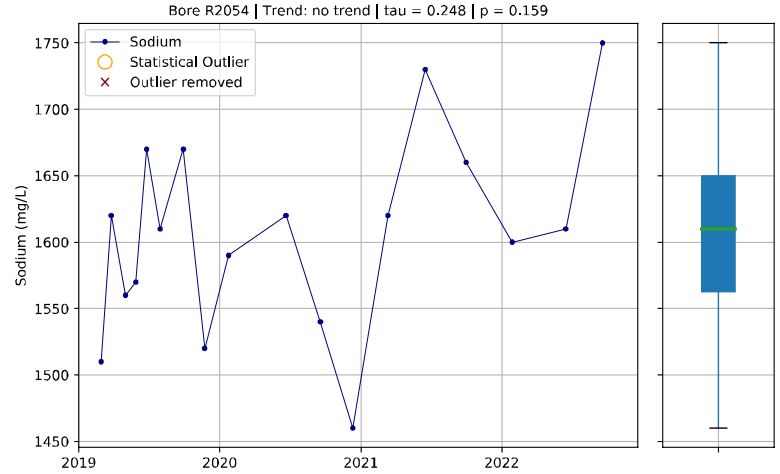

Bore R2054 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Nickel
95th percentile: 0.001
80th percentile: 0.001
Nickel (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022

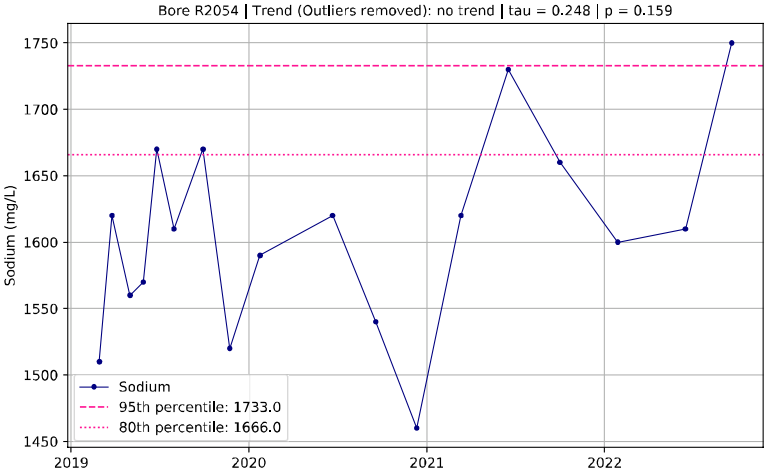

Bore R2054 | Trend: no trend | tau = 0.0 | p = 1.0
Selenium
Statistical Outlier
Outlier removed
Selenium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2019
2020
2021
2022

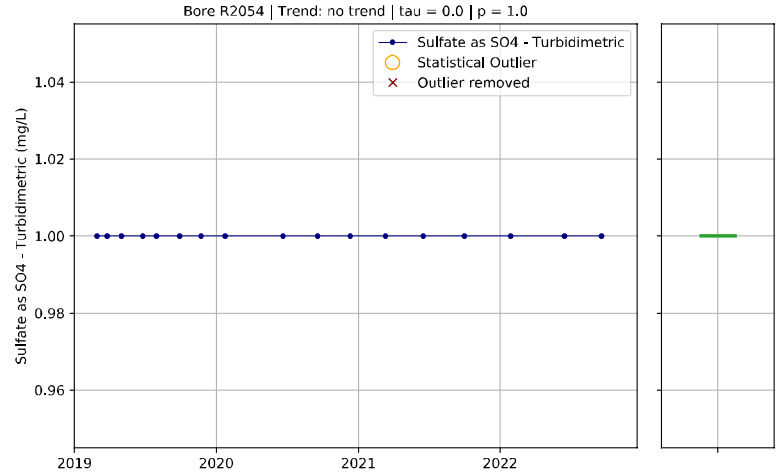

Bore R2054 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Selenium
95th percentile: 0.01
80th percentile: 0.01
Selenium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2019
2020
2021
2022

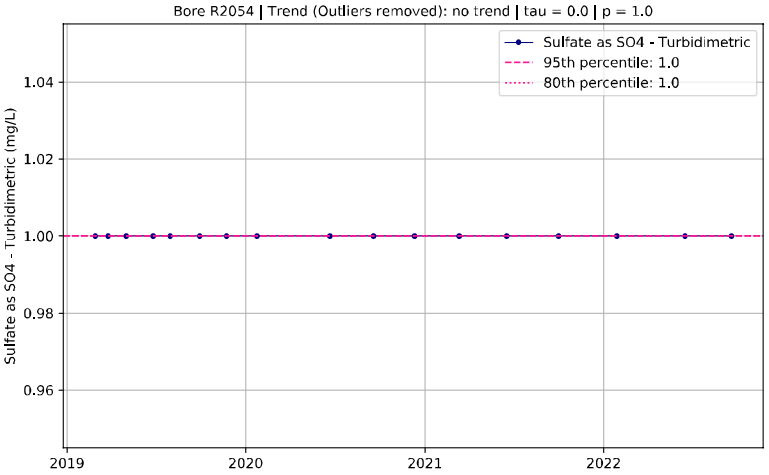
Bore R2054 | Trend: no trend | tau = 0.0 | p = 1.0
Silver
Statistical Outlier
Outlier removed
Silver (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022

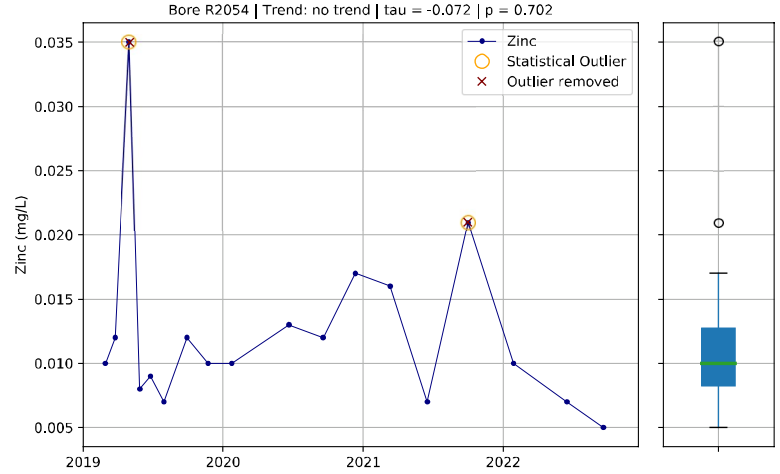

Bore R2054 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Silver
95th percentile: 0.001
80th percentile: 0.001
Silver (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022

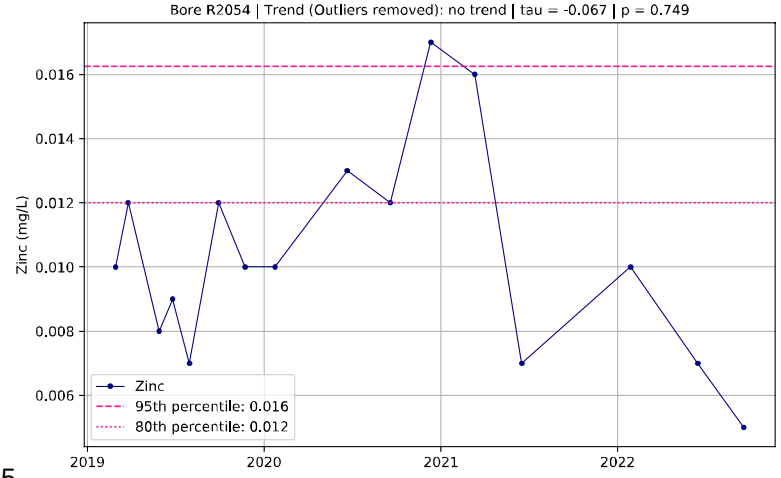

Bore R2054 | Trend: no trend | tau = 0.248 | p = 0.159
Sodium
Statistical Outlier
Outlier removed
Sodium (mg/L)
1750
1700
1650
1600
1550
1500
1450
2019
2020
2021
2022

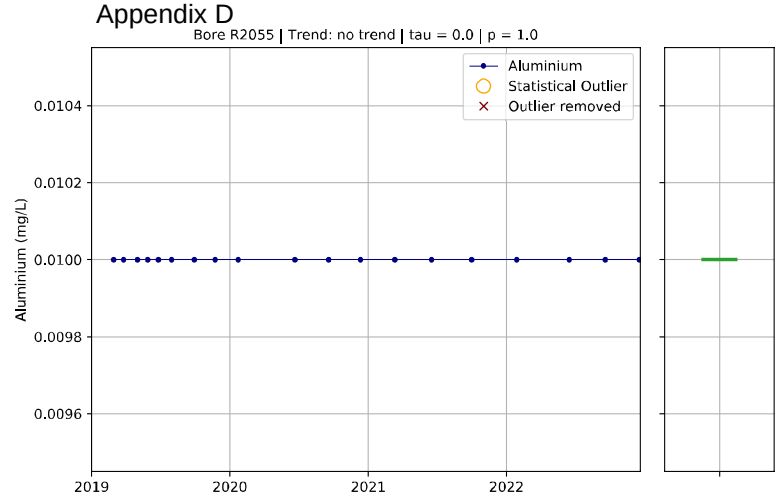

Bore R2054 | Trend (Outliers removed): no trend | tau = 0.248 | p = 0.159
Sodium
95th percentile: 1733.0
80th percentile: 1666.0
Sodium (mg/L)
1750
1700
1650
1600
1550
1500
1450
2019
2020
2021
2022

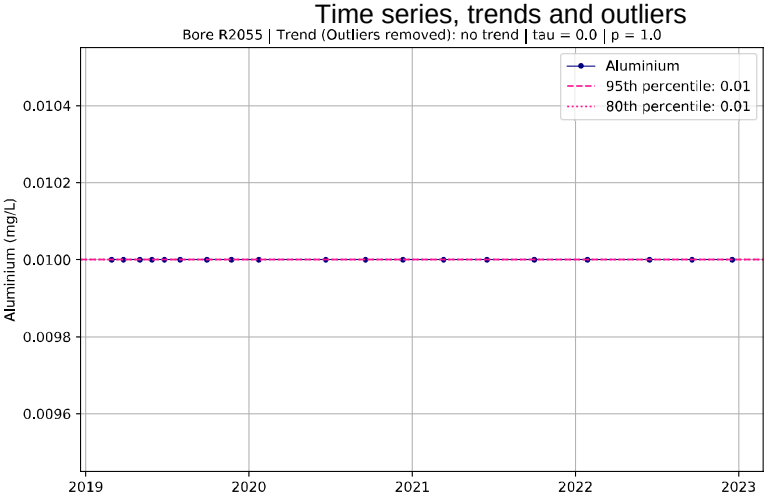

Bore R2054 | Trend: no trend | tau = 0.0 | p = 1.0
Sulfate as SO4 - Turbidimetric
Statistical Outlier
Outlier removed
Sulfate as SO4 - Turbidimetric (mg/L)
1.04
1.02
1.00
0.98
0.96
2019
2020
2021
2022

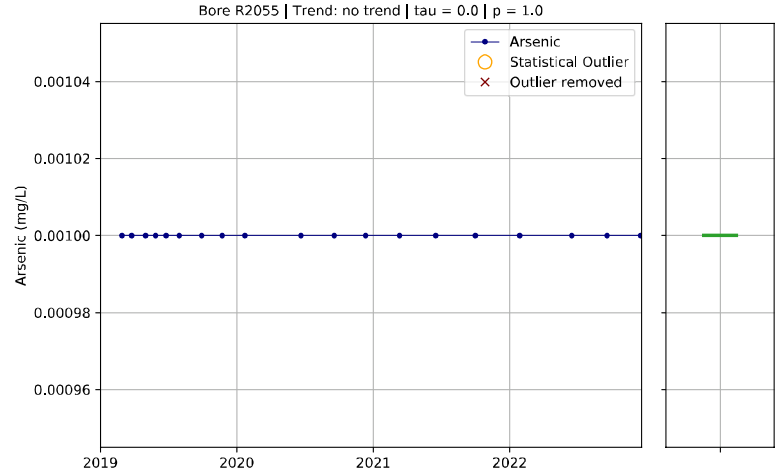

Bore R2054 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Sulfate as SO4 - Turbidimetric
95th percentile: 1.0
80th percentile: 1.0
Sulfate as SO4 - Turbidimetric (mg/L)
1.04
1.02
1.00
0.98
0.96
2019
2020
2021
2022

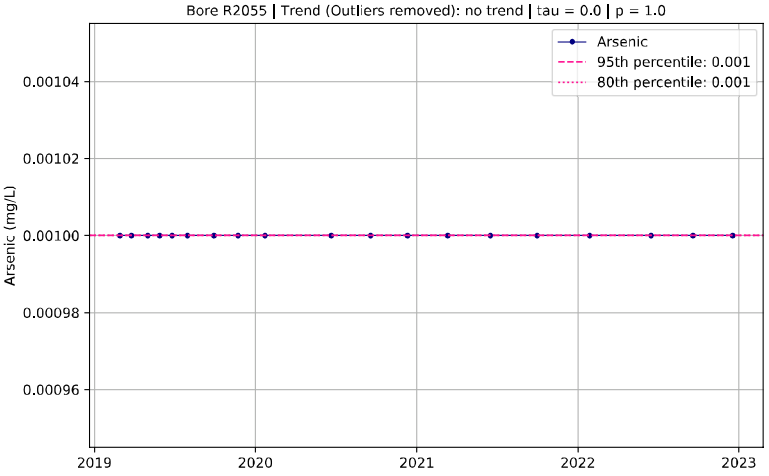

Bore R2054 | Trend: no trend | tau = -0.072 | p = 0.702
Zinc
Statistical Outlier
Outlier removed
Zinc (mg/L)
0.035
0.030
0.025
0.020
0.015
0.010
0.005
2019
2020
2021
2022

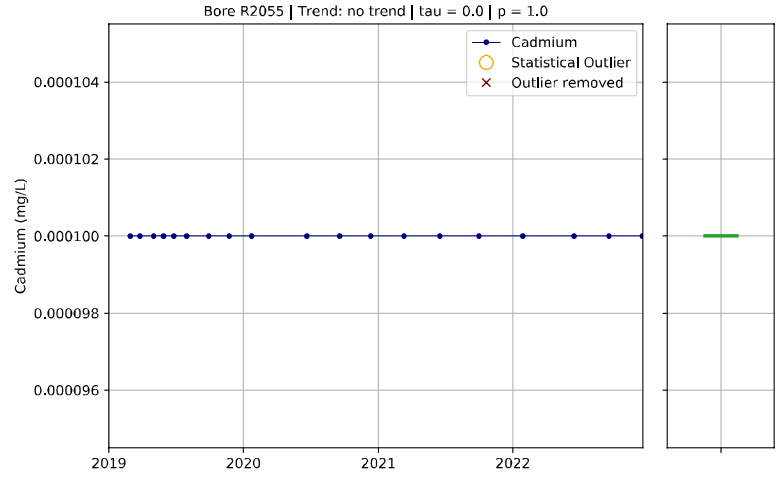

Bore R2054 | Trend (Outliers removed): no trend | tau = -0.067 | p = 0.749
Zinc
95th percentile: 0.016
80th percentile: 0.012
Zinc (mg/L)
0.016
0.014
0.012
0.010
0.008
0.006
2019
2020
2021
2022

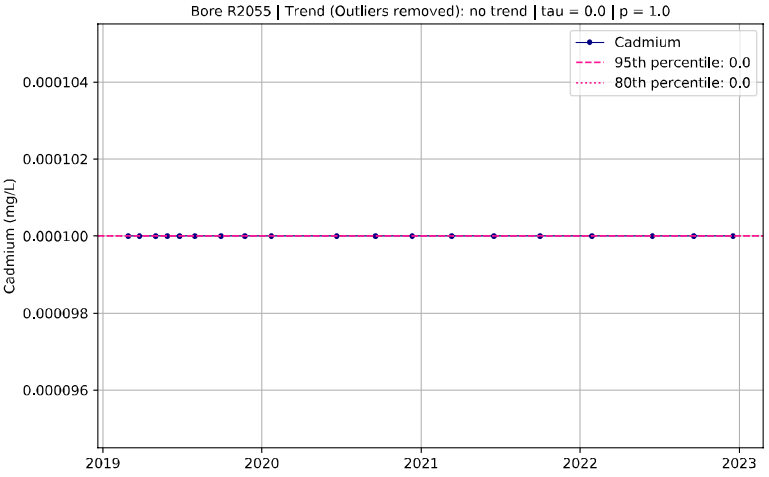

Bore R2055 | Trend: no trend | tau = 0.0 | p = 1.0
Aluminium
Statistical Outlier
Outlier removed
Aluminium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2019
2020
2021
2022

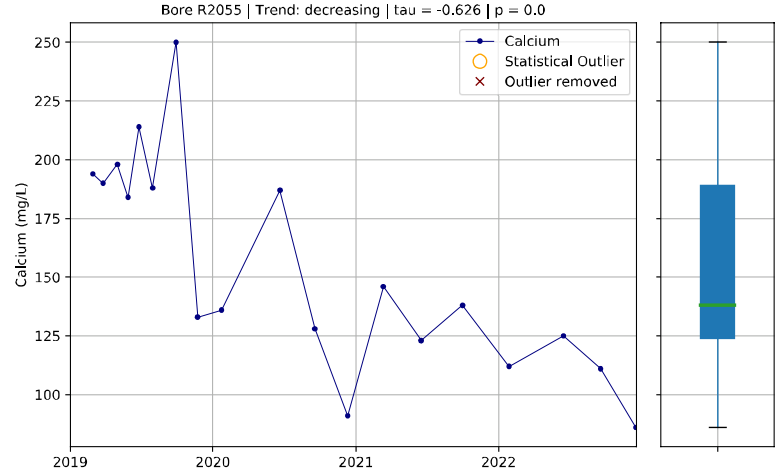

Bore R2055 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Aluminium
95th percentile: 0.01
80th percentile: 0.01
Aluminium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2019
2020
2021
2022
2023

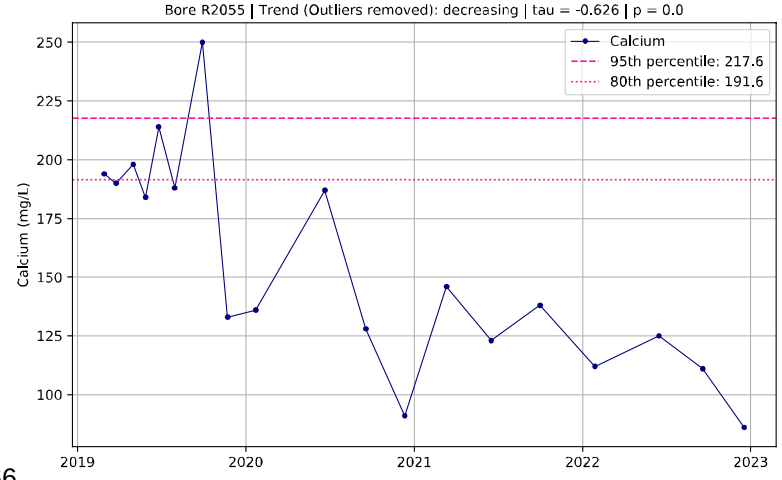

Bore R2055 | Trend: no trend | tau = 0.0 | p = 1.0
Arsenic
Statistical Outlier
Outlier removed
Arsenic (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022

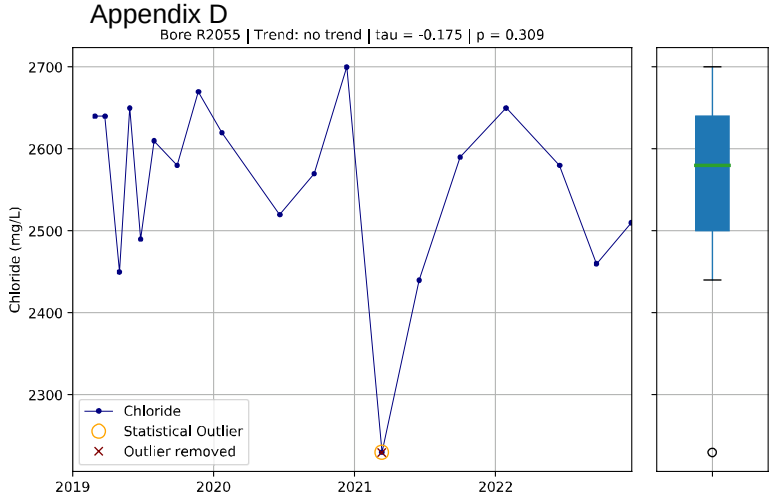

Bore R2055 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Arsenic
95th percentile: 0.001
80th percentile: 0.001
Arsenic (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022
2023

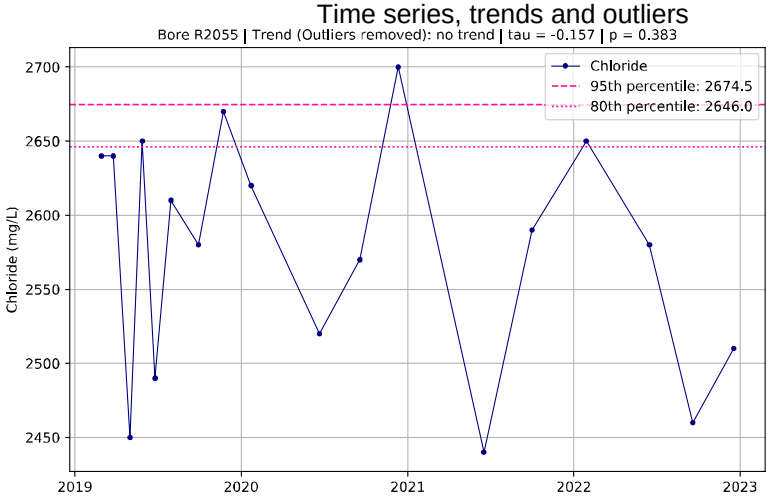

Bore R2055 | Trend: no trend | tau = 0.0 | p = 1.0
Cadmium
Statistical Outlier
Outlier removed
Cadmium (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022

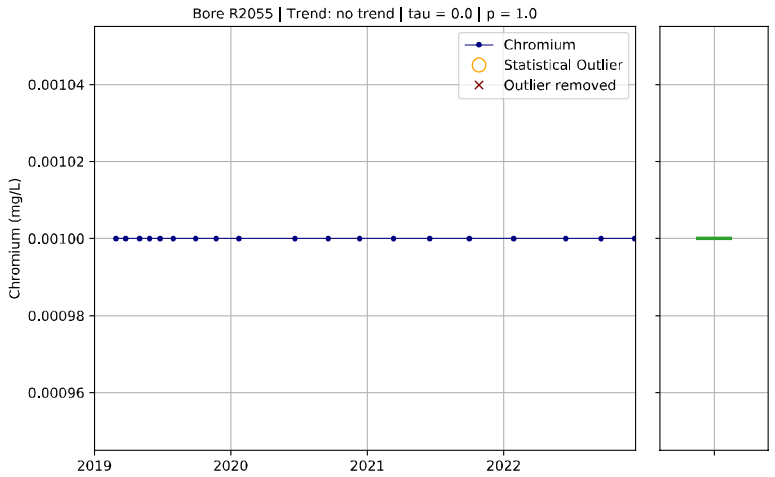

Bore R2055 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Cadmium
95th percentile: 0.0
80th percentile: 0.0
Cadmium (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022
2023

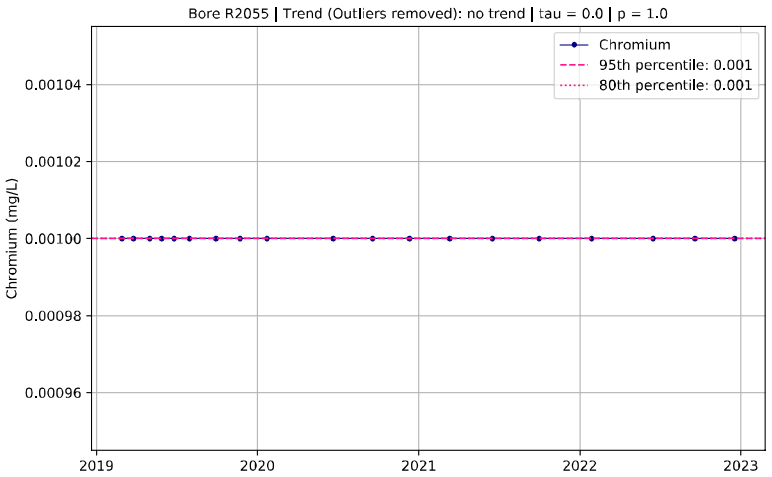

Bore R2055 | Trend: decreasing | tau = -0.626 | p = 0.0
Calcium
Statistical Outlier
Outlier removed
Calcium (mg/L)
250
225
200
175
150
125
100
2019
2020
2021
2022

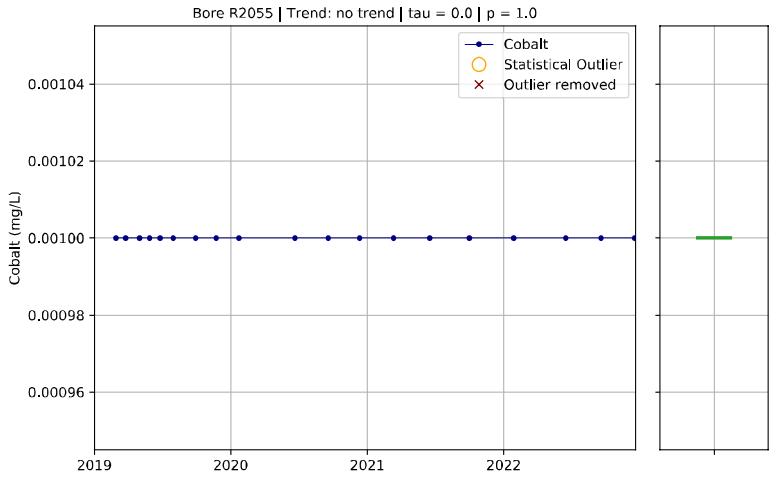

Bore R2055 | Trend (Outliers removed): decreasing | tau = -0.626 | p = 0.0
Calcium
95th percentile: 217.6
80th percentile: 191.6
Calcium (mg/L)
250
225
200
175
150
125
100
2019
2020
2021
2022
2023

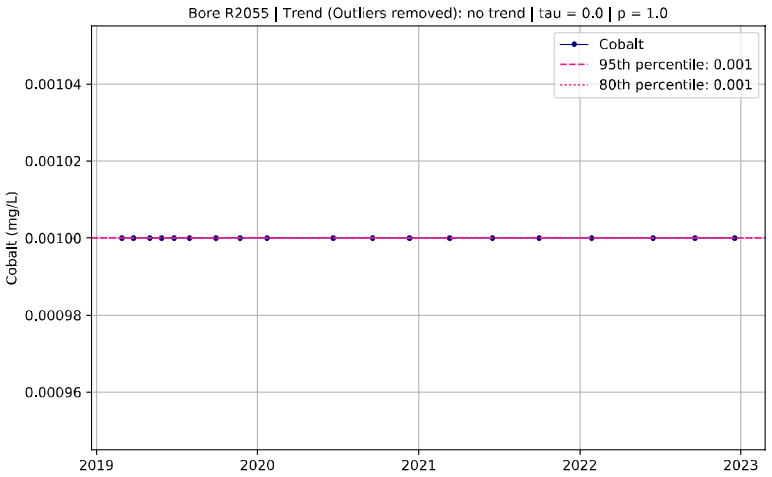

Bore R2055 | Trend: no trend | tau = -0.175 | p = 0.309
Chloride (mg/L)
Chloride
Statistical Outlier
Outlier removed

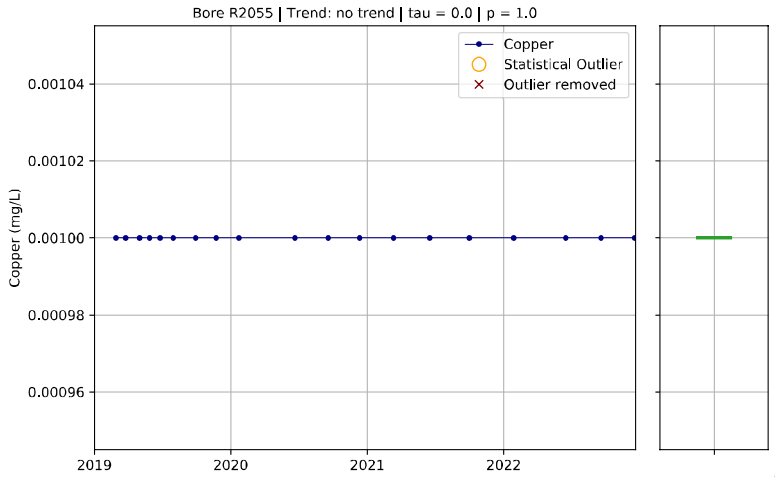

Bore R2055 | Trend (Outliers removed): no trend | tau = -0.157 | p = 0.383
Chloride (mg/L)
Chloride
95th percentile: 2674.5
80th percentile: 2646.0

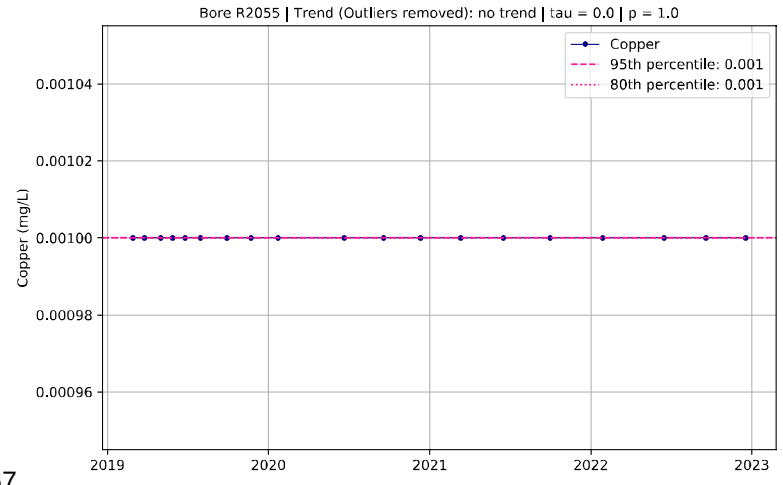

Bore R2055 | Trend: no trend | tau = 0.0 | p = 1.0
Chromium (mg/L)
Chromium
Statistical Outlier
Outlier removed

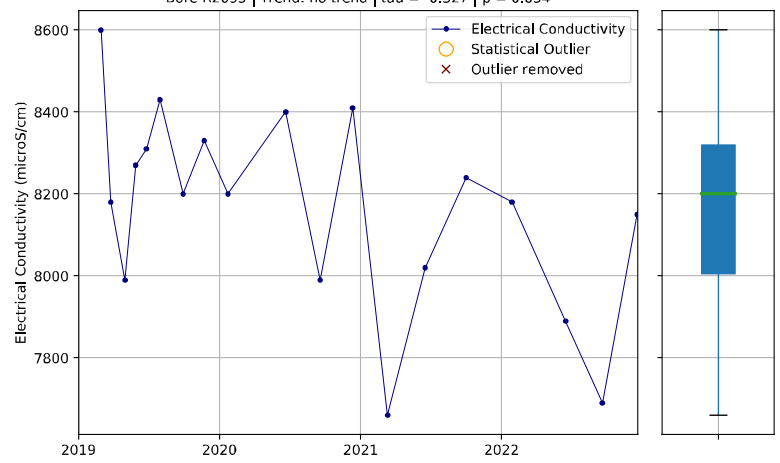

Bore R2055 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Chromium (mg/L)
Chromium
95th percentile: 0.001
80th percentile: 0.001

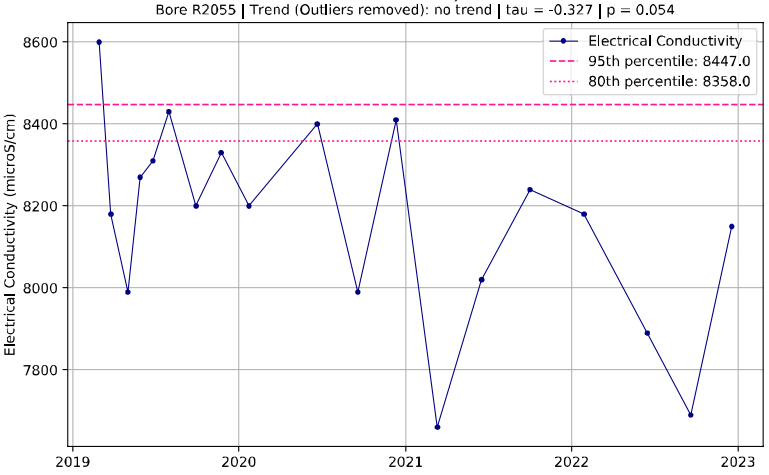

Bore R2055 | Trend: no trend | tau = 0.0 | p = 1.0
Cobalt (mg/L)
Cobalt
Statistical Outlier
Outlier removed

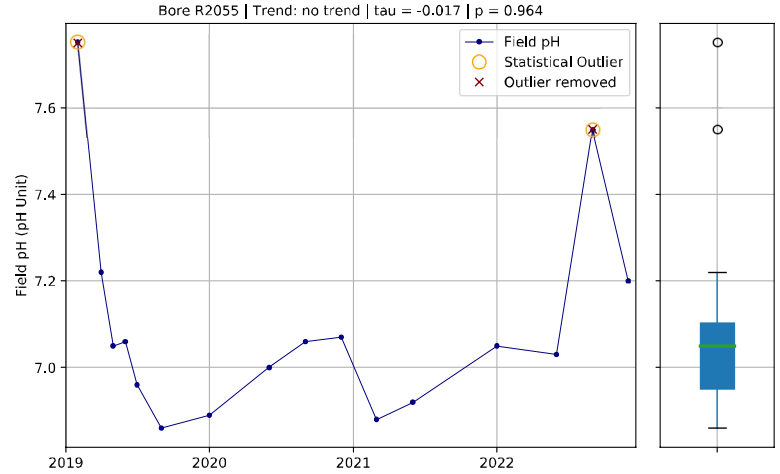

Bore R2055 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Cobalt (mg/L)
Cobalt
95th percentile: 0.001
80th percentile: 0.001

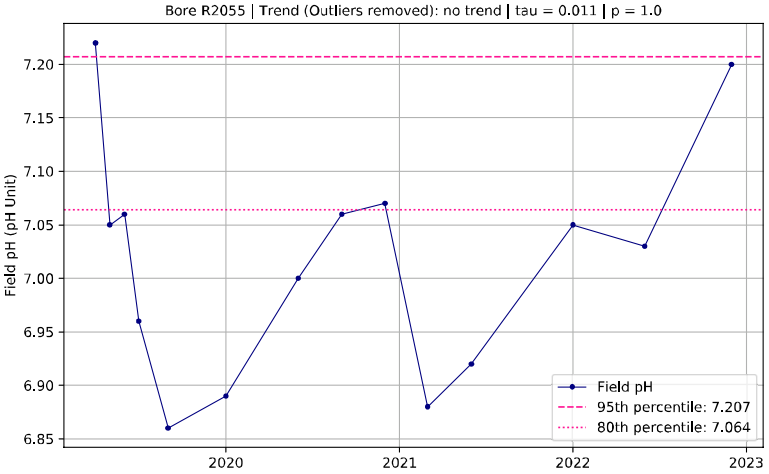

Bore R2055 | Trend: no trend | tau = 0.0 | p = 1.0
Copper (mg/L)
Copper
Statistical Outlier
Outlier removed


Bore R2055 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Copper (mg/L)
Copper
95th percentile: 0.001
80th percentile: 0.001

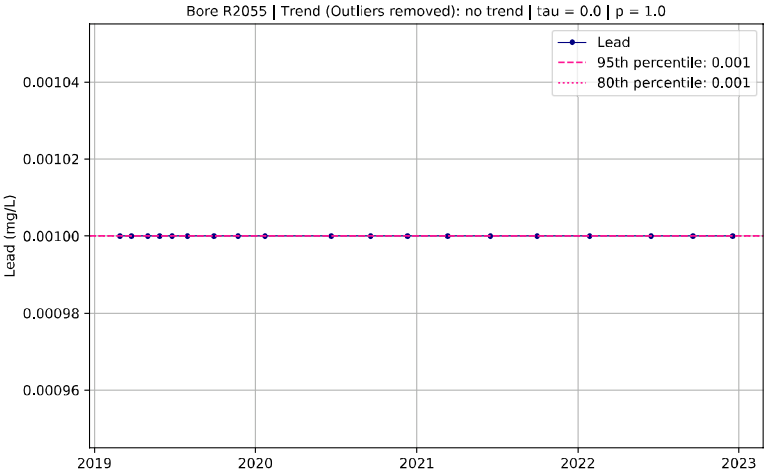

Bore R2055 | Trend: no trend | tau = -0.327 | p = 0.054
Electrical Conductivity
Statistical Outlier
Outlier removed
Electrical Conductivity (microS/cm)
8600
8400
8200
8000
7800
2019
2020
2021
2022

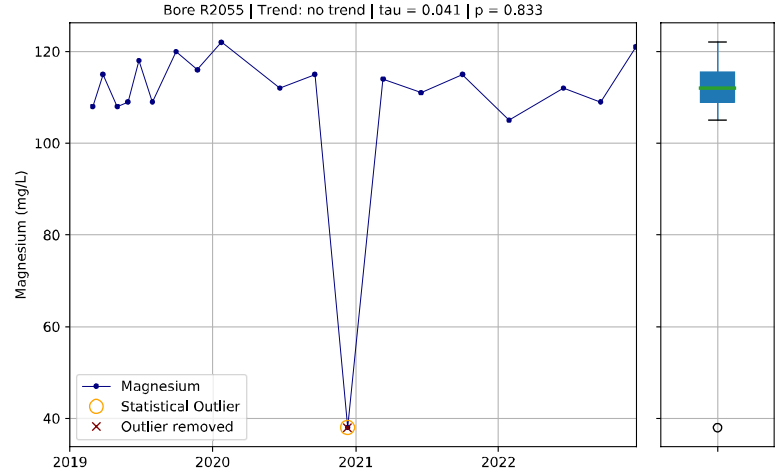

Bore R2055 | Trend (Outliers removed): no trend | tau = -0.327 | p = 0.054
Electrical Conductivity
95th percentile: 8447.0
80th percentile: 8358.0
Electrical Conductivity (microS/cm)
8600
8400
8200
8000
7800
2019
2020
2021
2022
2023

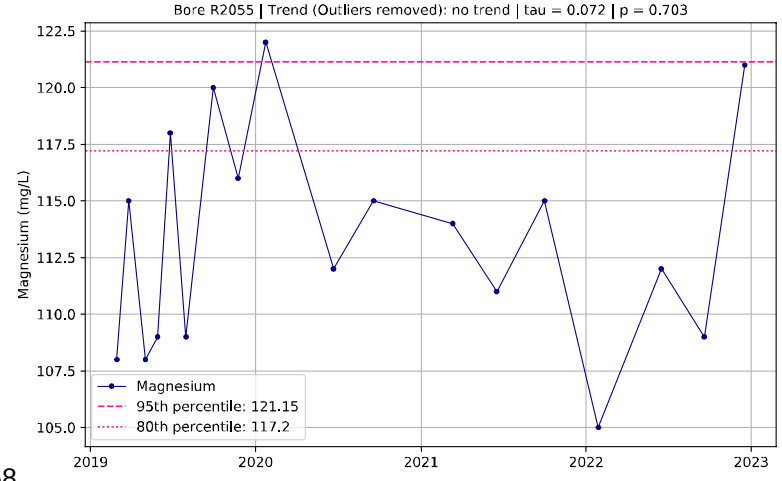

Bore R2055 | Trend: no trend | tau = -0.017 | p = 0.964
Field pH
Statistical Outlier
Outlier removed
Field pH (pH Unit)
7.6
7.4
7.2
7.0
2019
2020
2021
2022

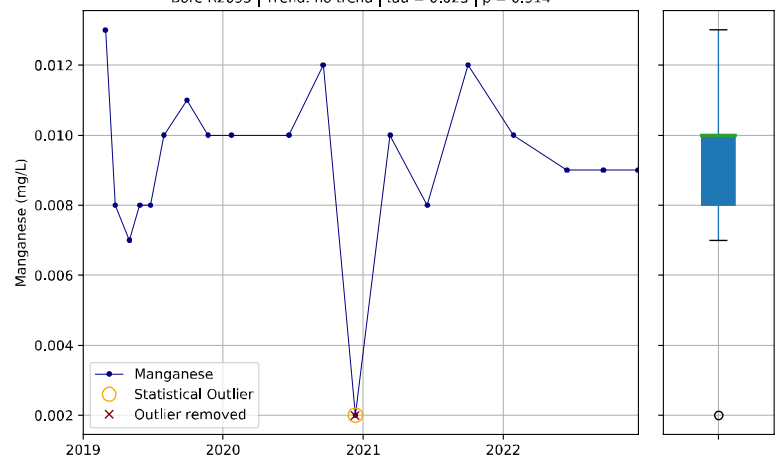

Bore R2055 | Trend (Outliers removed): no trend | tau = 0.011 | p = 1.0
Field pH
95th percentile: 7.207
80th percentile: 7.064
Field pH (pH Unit)
7.20
7.15
7.10
7.05
7.00
6.95
6.90
6.85
2020
2021
2022
2023

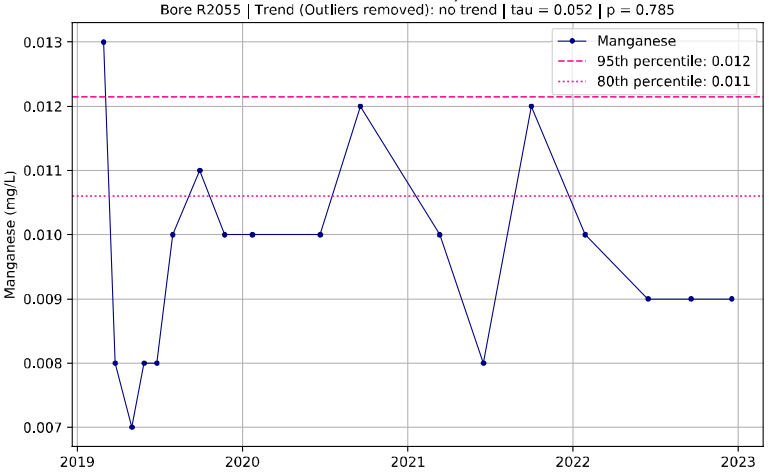
Bore R2055 | Trend: no trend | tau = 0.0 | p = 1.0
Lead
Statistical Outlier
Outlier removed
Lead (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022

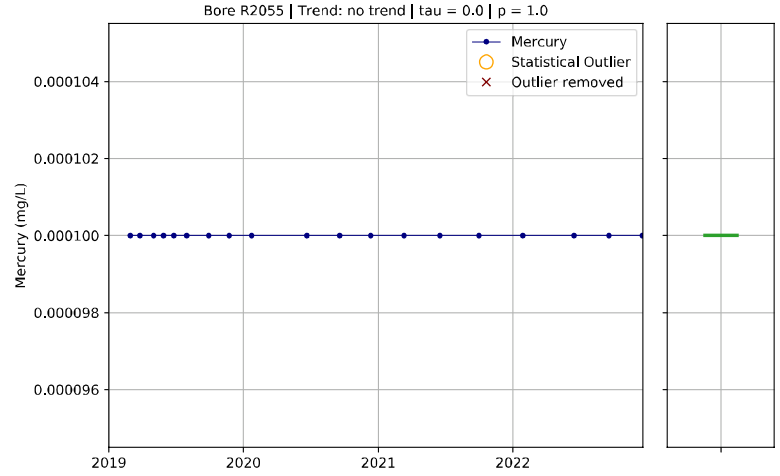

Bore R2055 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Lead
95th percentile: 0.001
80th percentile: 0.001
Lead (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022
2023

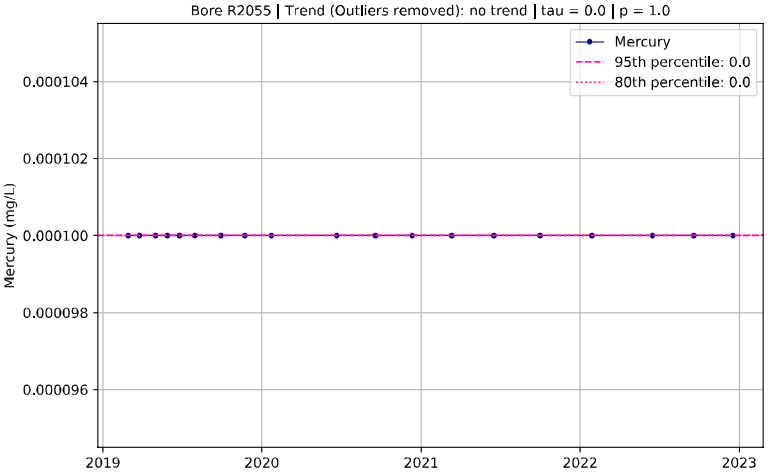

Bore R2055 | Trend: no trend | tau = 0.041 | p = 0.833
Magnesium
Statistical Outlier
Outlier removed
Magnesium (mg/L)
120
100
80
60
40
2019
2020
2021
2022

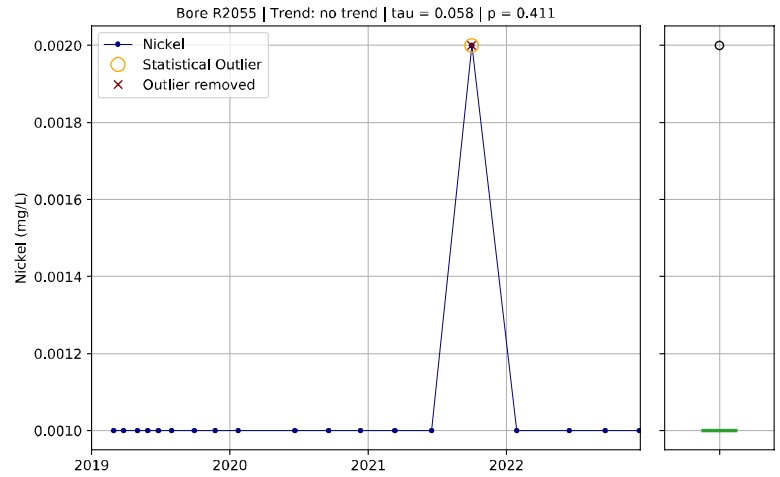

Bore R2055 | Trend (Outliers removed): no trend | tau = 0.072 | p = 0.703
Magnesium
95th percentile: 121.15
80th percentile: 117.2
Magnesium (mg/L)
122.5
120.0
117.5
115.0
112.5
110.0
107.5
105.0
2019
2020
2021
2022
2023

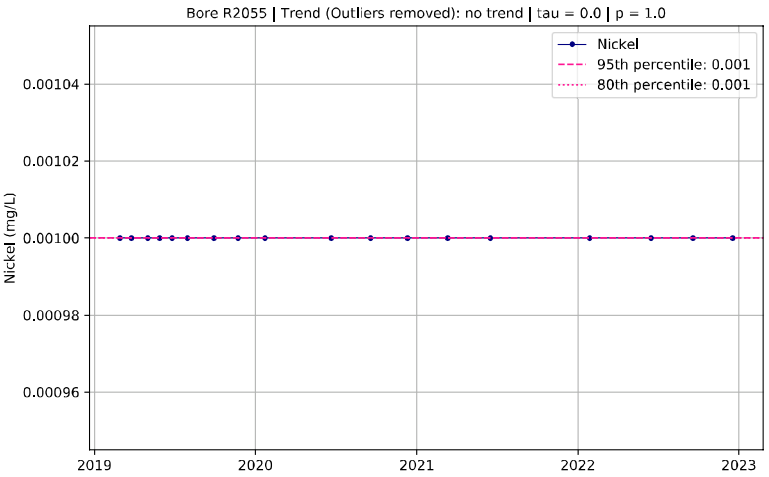

Bore R2055 | Trend: no trend | tau = 0.023 | p = 0.914
Manganese (mg/L)
Manganese
Statistical Outlier
Outlier removed

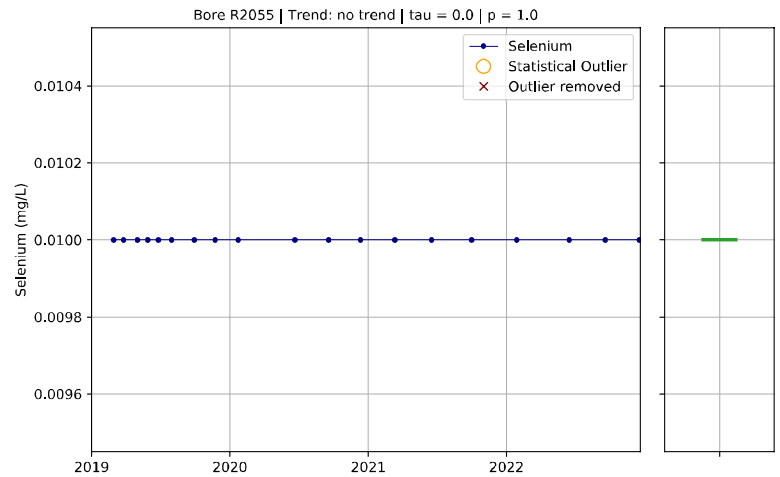

Bore R2055 | Trend (Outliers removed): no trend | tau = 0.052 | p = 0.785
Manganese (mg/L)
Manganese
95th percentile: 0.012
80th percentile: 0.011

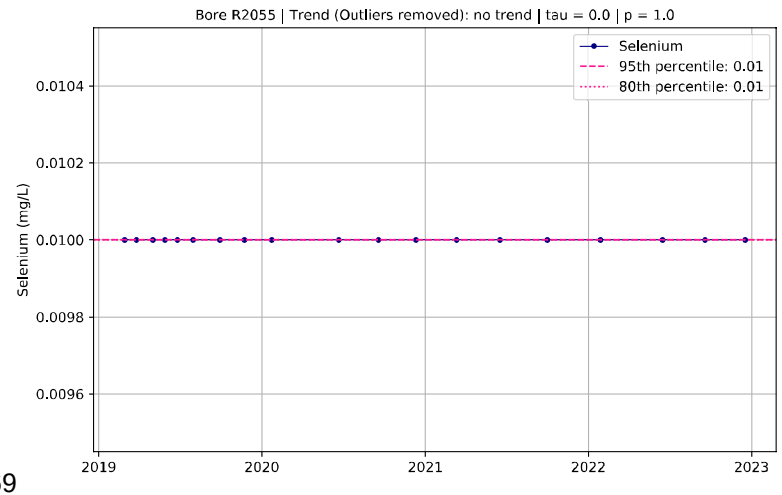

Bore R2055 | Trend: no trend | tau = 0.0 | p = 1.0
Mercury (mg/L)
Mercury
Statistical Outlier
Outlier removed


Bore R2055 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Mercury (mg/L)
Mercury
95th percentile: 0.0
80th percentile: 0.0

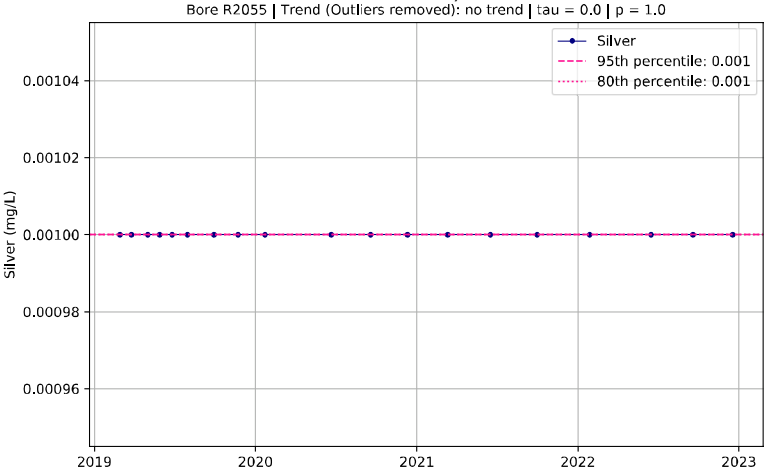

Bore R2055 | Trend: no trend | tau = 0.058 | p = 0.411
Nickel (mg/L)
Nickel
Statistical Outlier
Outlier removed

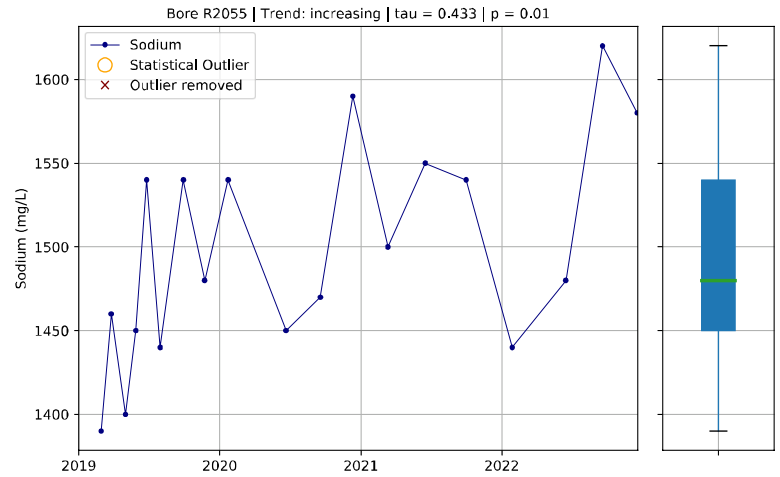

Bore R2055 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Nickel (mg/L)
Nickel
95th percentile: 0.001
80th percentile: 0.001

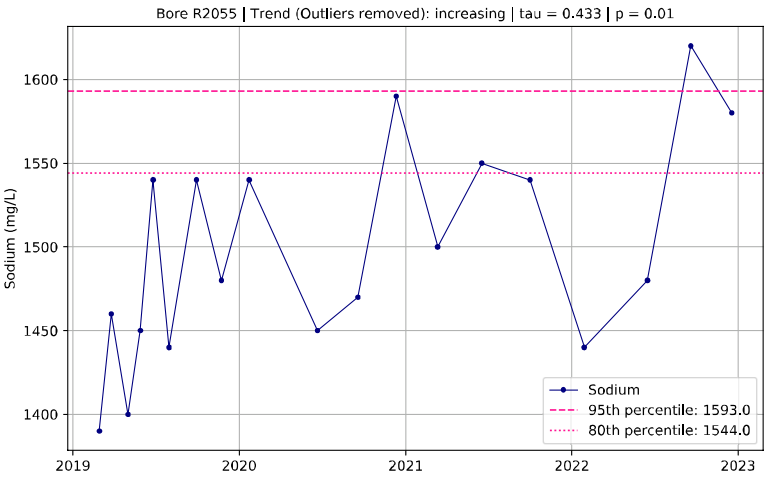

Bore R2055 | Trend: no trend | tau = 0.0 | p = 1.0
Selenium (mg/L)
Selenium
Statistical Outlier
Outlier removed

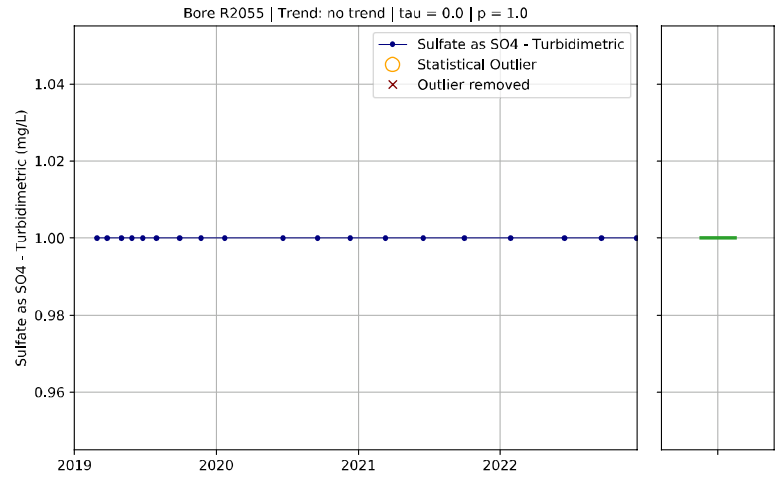

Bore R2055 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Selenium (mg/L)
Selenium
95th percentile: 0.01
80th percentile: 0.01

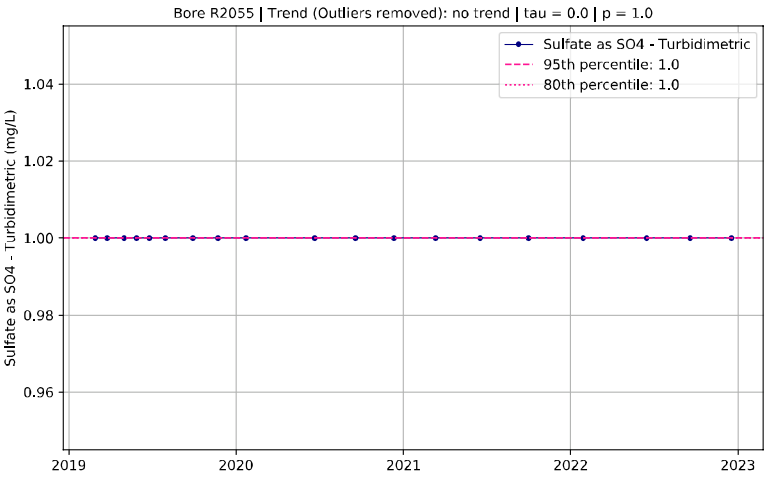
Bore R2055 | Trend: no trend | tau = 0.0 | p = 1.0
Silver
Statistical Outlier
Outlier removed
Silver (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022

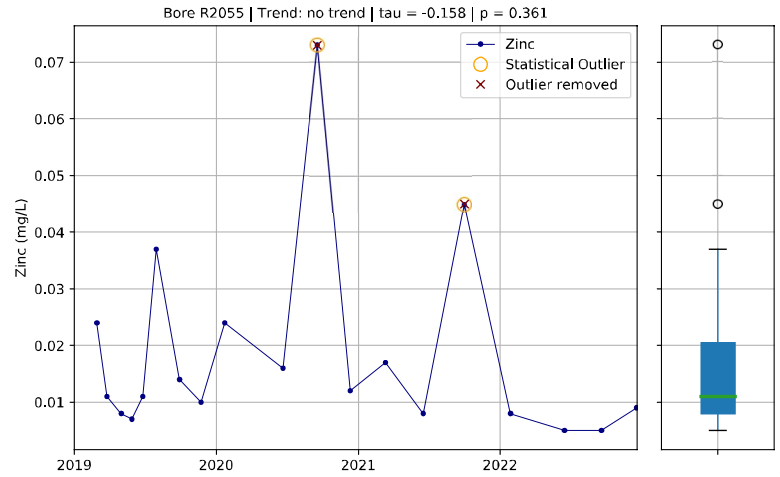

Bore R2055 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Silver
95th percentile: 0.001
80th percentile: 0.001
Silver (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2019
2020
2021
2022
2023

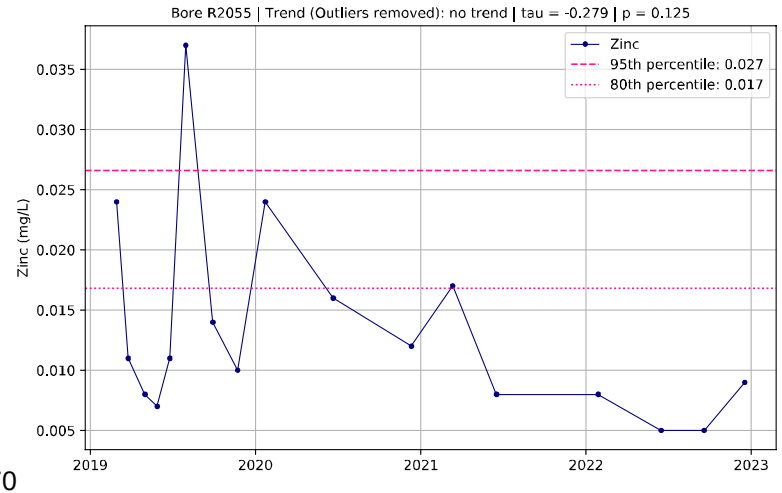

Bore R2055 | Trend: increasing | tau = 0.433 | p = 0.01
Sodium
Statistical Outlier
Outlier removed
Sodium (mg/L)
1600
1550
1500
1450
1400
2019
2020
2021
2022

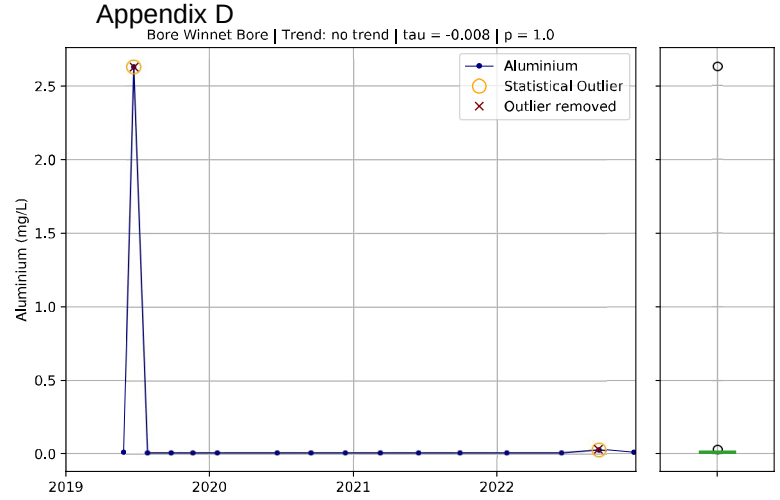

Bore R2055 | Trend (Outliers removed): increasing | tau = 0.433 | p = 0.01
Sodium
95th percentile: 1593.0
80th percentile: 1544.0
Sodium (mg/L)
1600
1550
1500
1450
1400
2019
2020
2021
2022
2023

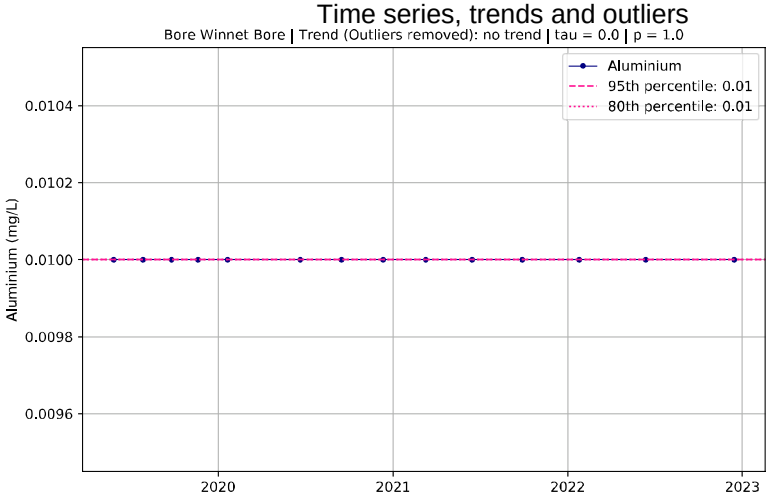

Bore R2055 | Trend: no trend | tau = 0.0 | p = 1.0
Sulfate as SO4 - Turbidimetric
Statistical Outlier
Outlier removed
Sulfate as SO4 - Turbidimetric (mg/L)
1.04
1.02
1.00
0.98
0.96
2019
2020
2021
2022

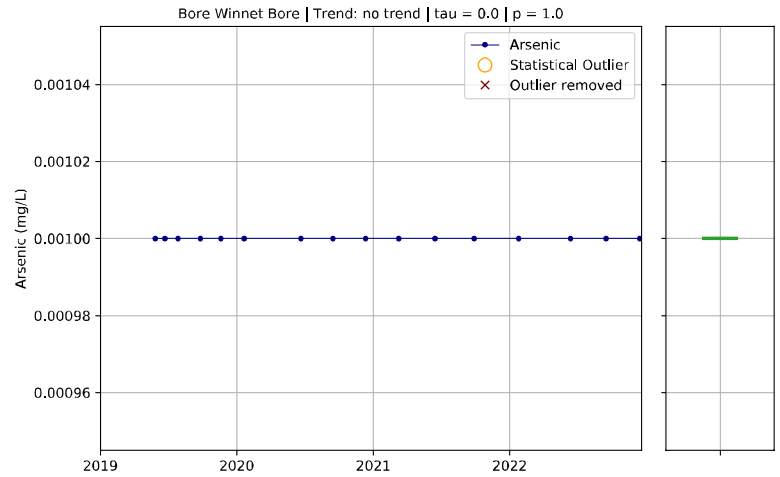

Bore R2055 | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Sulfate as SO4 - Turbidimetric
95th percentile: 1.0
80th percentile: 1.0
Sulfate as SO4 - Turbidimetric (mg/L)
1.04
1.02
1.00
0.98
0.96
2019
2020
2021
2022
2023

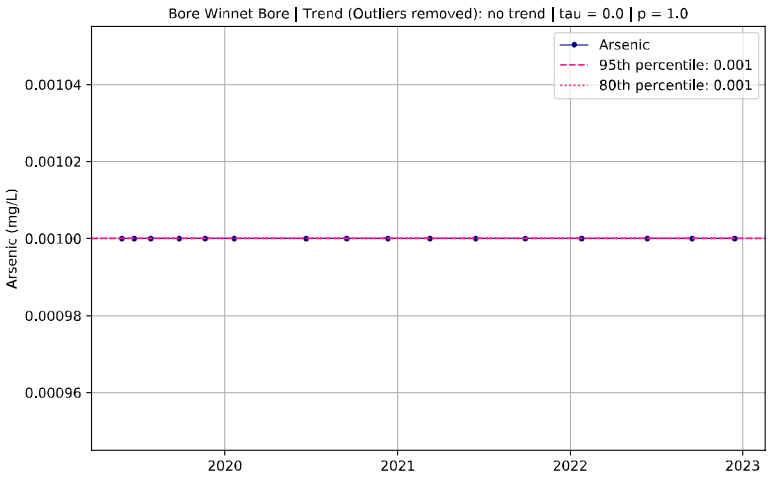

Bore R2055 | Trend: no trend | tau = -0.158 | p = 0.361
Zinc
Statistical Outlier
Outlier removed
Zinc (mg/L)
0.07
0.06
0.05
0.04
0.03
0.02
0.01
2019
2020
2021
2022

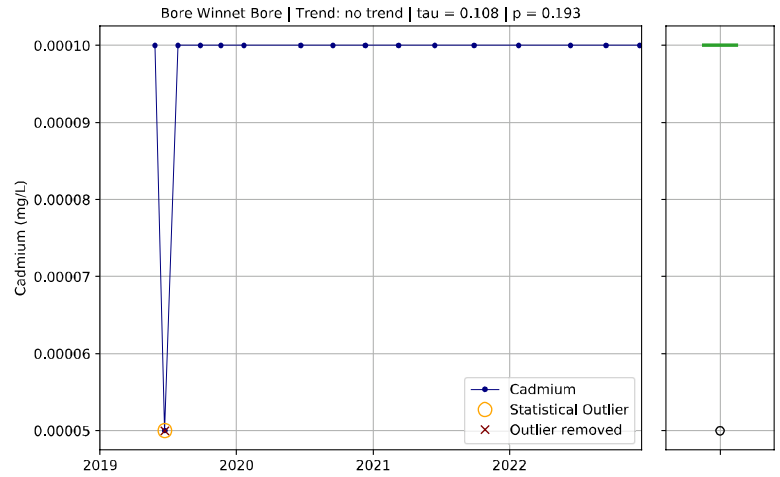

Bore R2055 | Trend (Outliers removed): no trend | tau = -0.279 | p = 0.125
Zinc
95th percentile: 0.027
80th percentile: 0.017
Zinc (mg/L)
0.035
0.030
0.025
0.020
0.015
0.010
0.005
2019
2020
2021
2022
2023

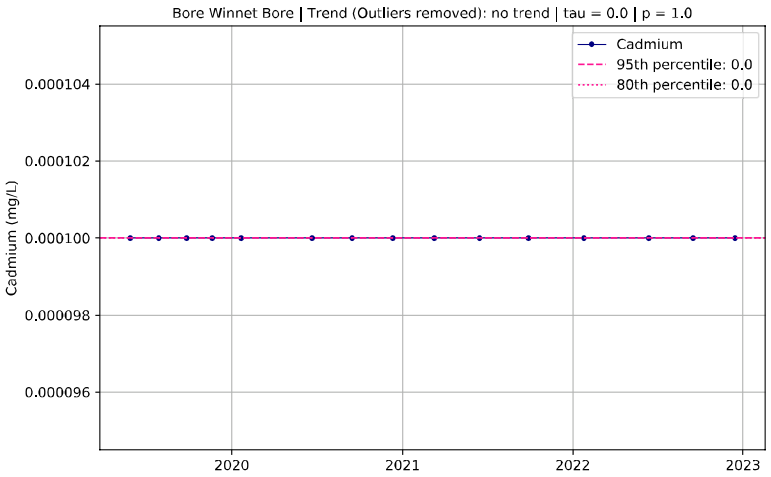

Bore Winnet Bore | Trend: no trend | tau = -0.008 | p = 1.0
Aluminium
Statistical Outlier
Outlier removed
Aluminium (mg/L)
2019
2020
2021
2022

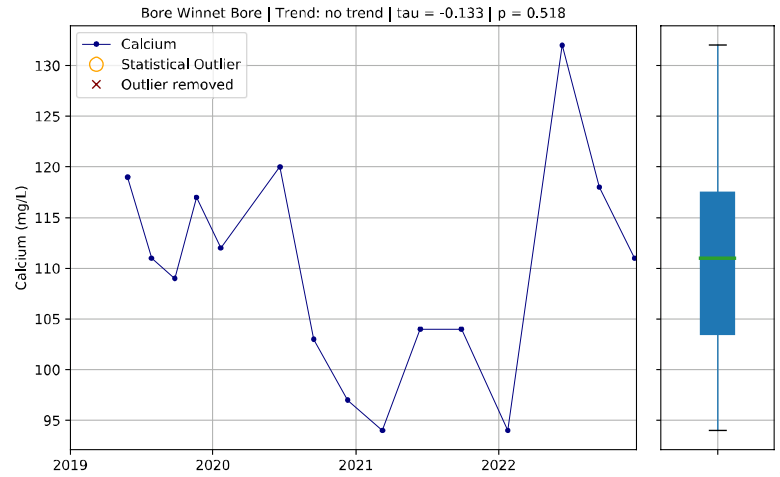

Bore Winnet Bore | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Aluminium
95th percentile: 0.01
80th percentile: 0.01
Aluminium (mg/L)
2020
2021
2022
2023

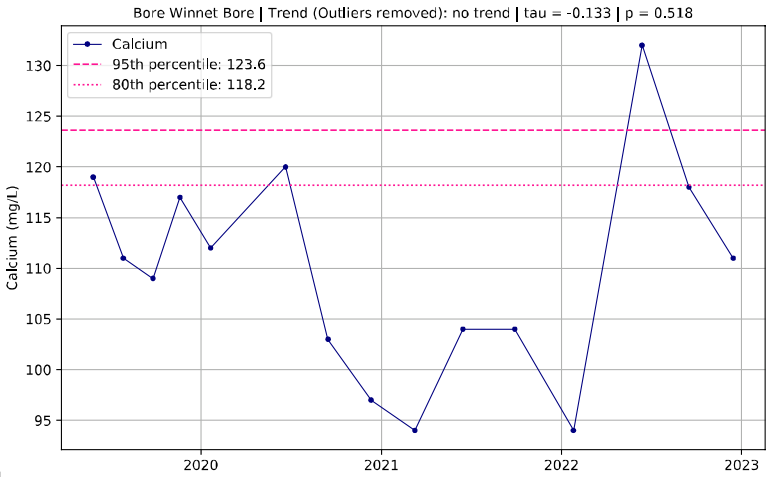

Bore Winnet Bore | Trend: no trend | tau = 0.0 | p = 1.0
Arsenic
Statistical Outlier
Outlier removed
Arsenic (mg/L)
2019
2020
2021
2022

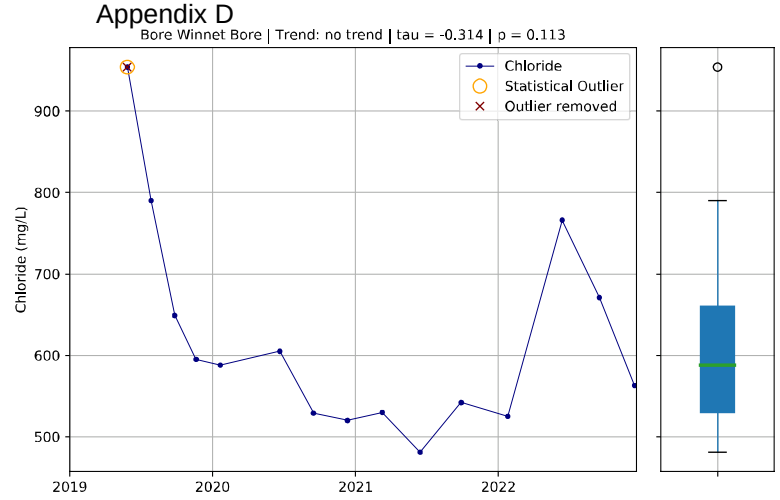

Bore Winnet Bore | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Arsenic
95th percentile: 0.001
80th percentile: 0.001
Arsenic (mg/L)
2020
2021
2022
2023

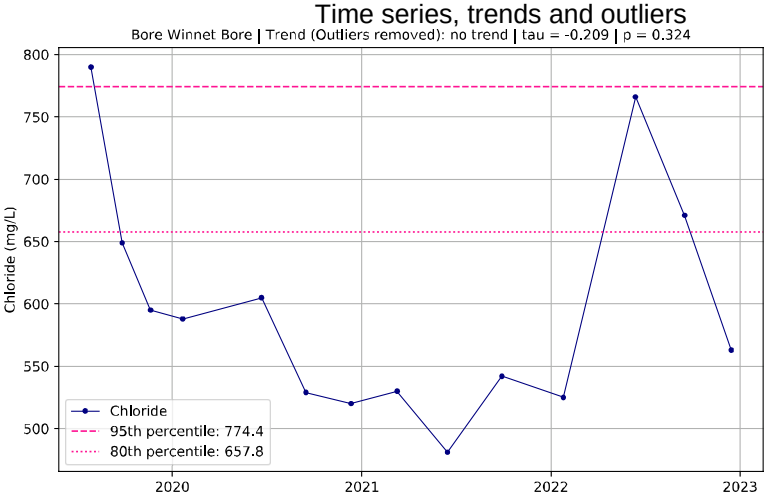

Bore Winnet Bore | Trend: no trend | tau = 0.108 | p = 0.193
Cadmium
Statistical Outlier
Outlier removed
Cadmium (mg/L)
2019
2020
2021
2022

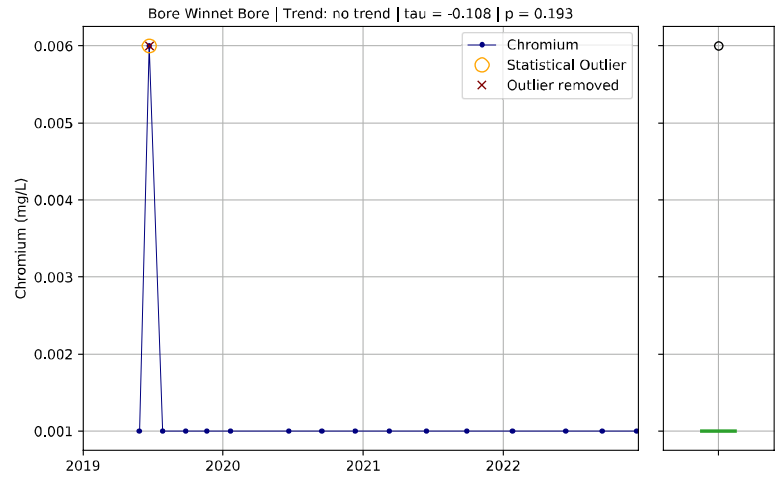

Bore Winnet Bore | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Cadmium
95th percentile: 0.0
80th percentile: 0.0
Cadmium (mg/L)
2020
2021
2022
2023

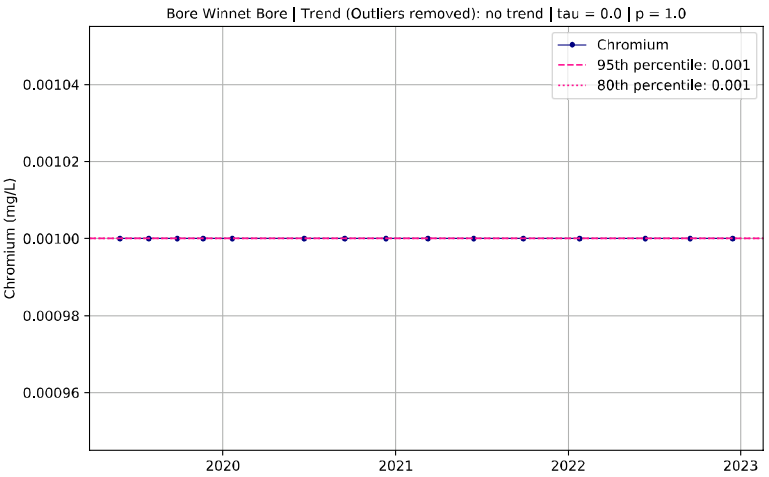

Bore Winnet Bore | Trend: no trend | tau = -0.133 | p = 0.518
Calcium
Statistical Outlier
Outlier removed
Calcium (mg/L)
2019
2020
2021
2022

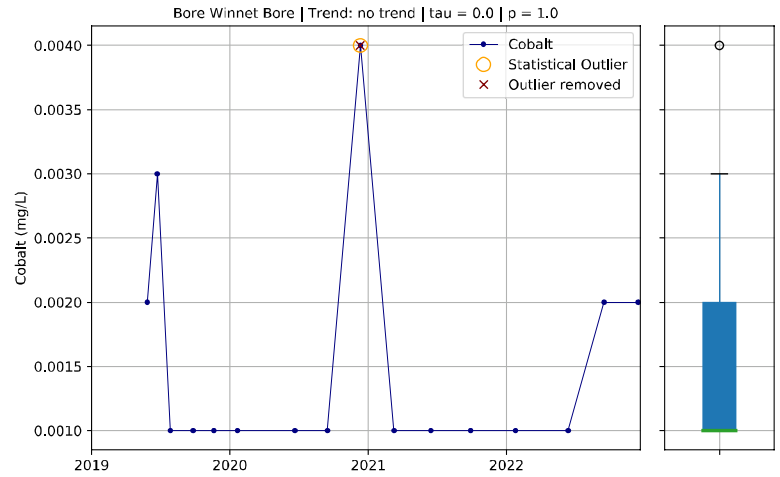

Bore Winnet Bore | Trend (Outliers removed): no trend | tau = -0.133 | p = 0.518
Calcium
95th percentile: 123.6
80th percentile: 118.2
Calcium (mg/L)
2020
2021
2022
2023

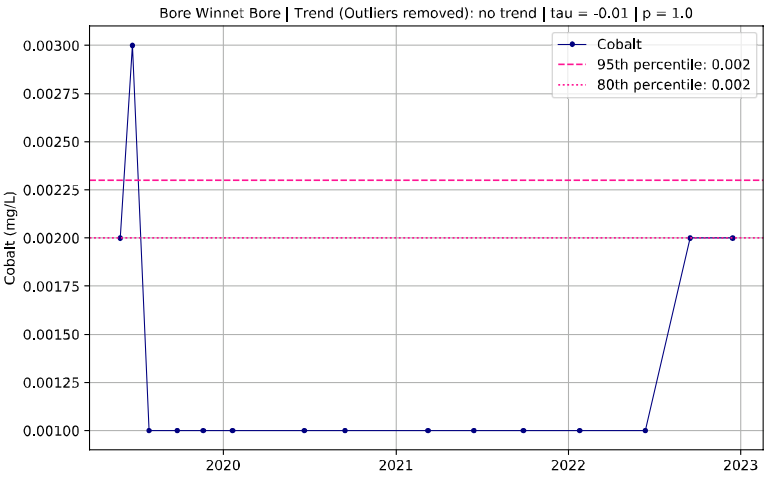

Bore Winnet Bore | Trend: no trend | tau = -0.314 | p = 0.113
Chloride
Statistical Outlier
Outlier removed
Chloride (mg/L)
900
800
700
600
500
2019
2020
2021
2022

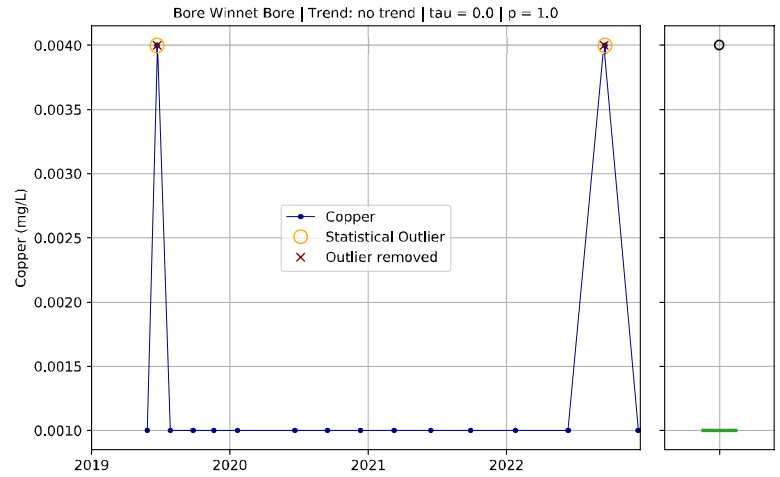

Bore Winnet Bore | Trend (Outliers removed): no trend | tau = -0.209 | p = 0.324
Chloride (mg/L)
800
750
700
650
600
550
500
Chloride
95th percentile: 774.4
80th percentile: 657.8
2020
2021
2022
2023


Bore Winnet Bore | Trend: no trend | tau = -0.108 | p = 0.193
Chromium
Statistical Outlier
Outlier removed
Chromium (mg/L)
0.006
0.005
0.004
0.003
0.002
0.001
2019
2020
2021
2022

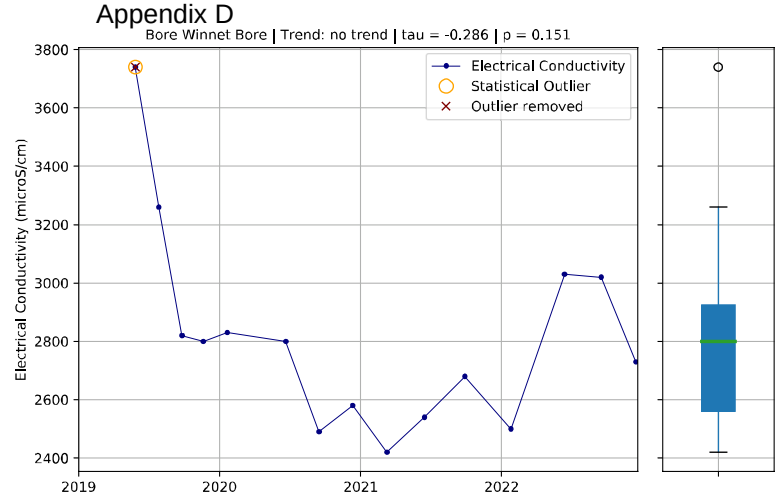

Bore Winnet Bore | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Chromium
95th percentile: 0.001
80th percentile: 0.001
Chromium (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2020
2021
2022
2023

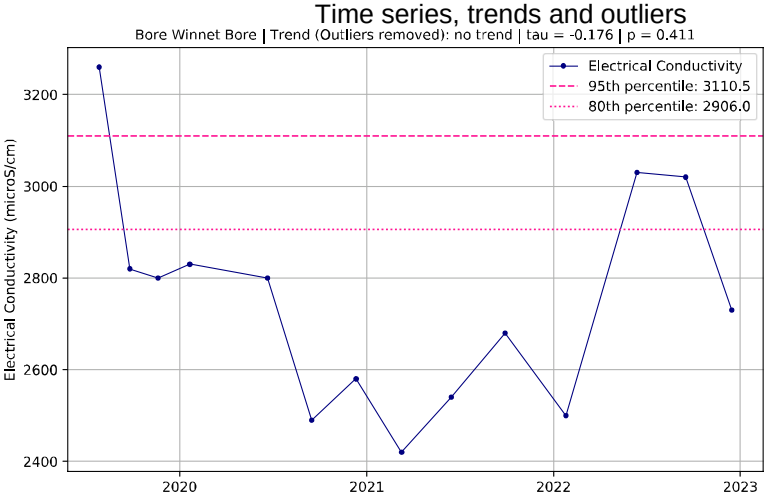

Bore Winnet Bore | Trend: no trend | tau = 0.0 | p = 1.0
Cobalt
Statistical Outlier
Outlier removed
Cobalt (mg/L)
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
2019
2020
2021
2022

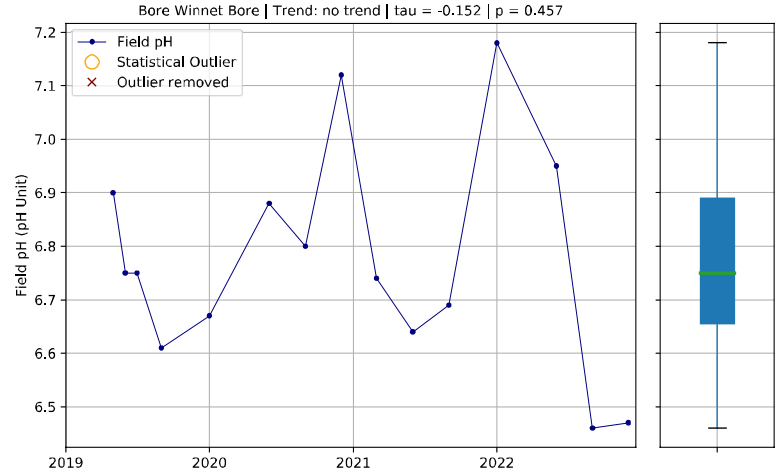

Bore Winnet Bore | Trend (Outliers removed): no trend | tau = -0.01 | p = 1.0
Cobalt
95th percentile: 0.002
80th percentile: 0.002
Cobalt (mg/L)
0.00300
0.00275
0.00250
0.00225
0.00200
0.00175
0.00150
0.00125
0.00100
2020
2021
2022
2023

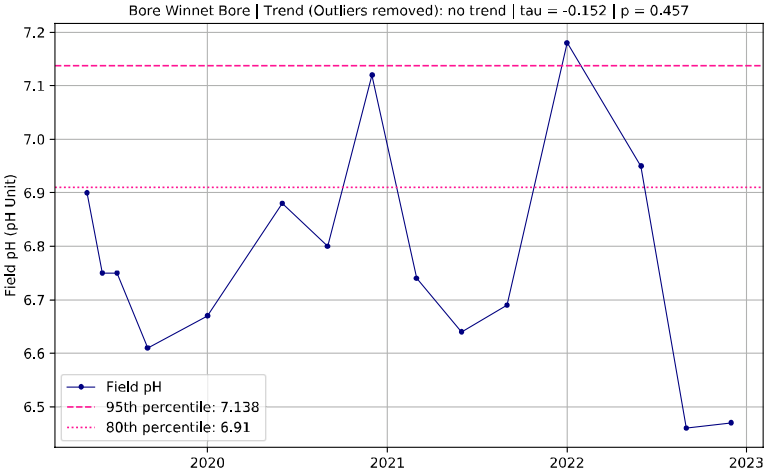

Bore Winnet Bore | Trend: no trend | tau = 0.0 | p = 1.0
Copper
Statistical Outlier
Outlier removed
Copper (mg/L)
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
2019
2020
2021
2022

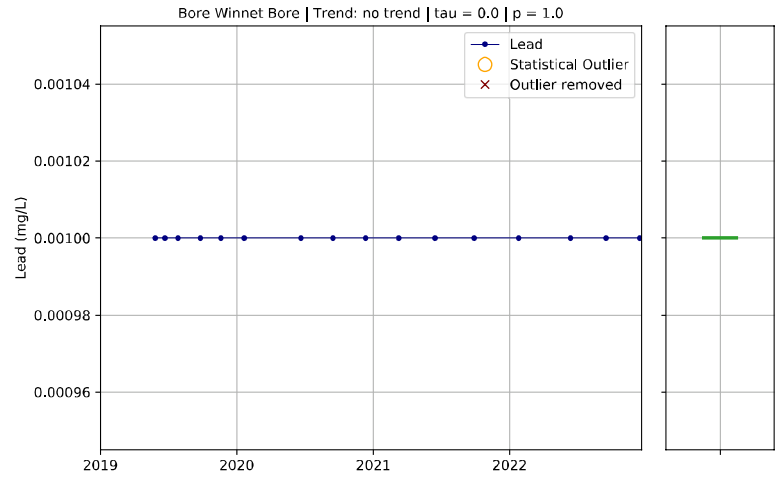
Bore Winnet Bore | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Copper
95th percentile: 0.001
80th percentile: 0.001
Copper (mg/L)
0.00104
0.00102
0.00100
0.00098
0.00096
2020
2021
2022
2023

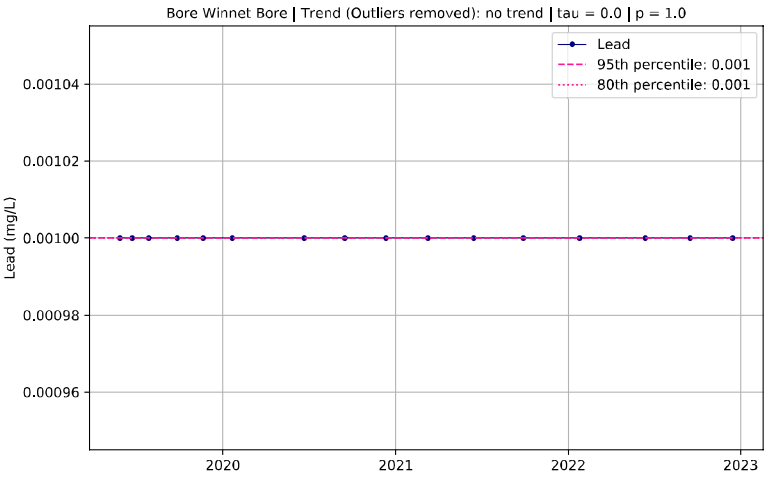

Bore Winnet Bore | Trend: no trend | tau = -0.286 | p = 0.151
Electrical Conductivity
Statistical Outlier
Outlier removed
Electrical Conductivity (microS/cm)

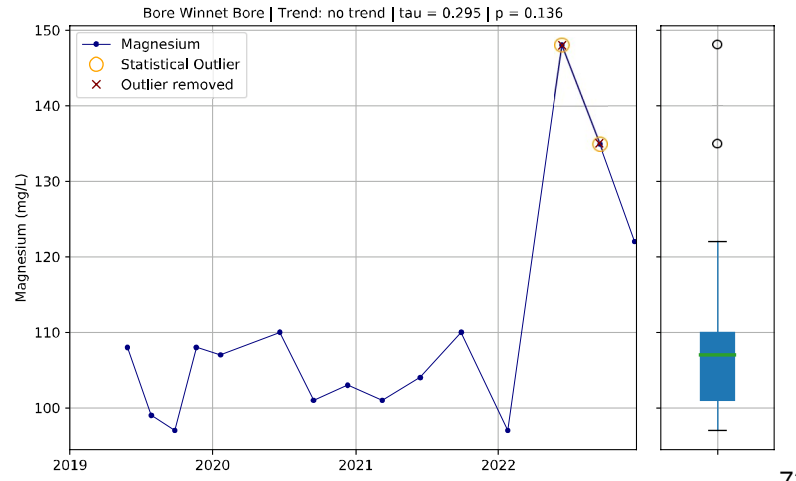

Bore Winnet Bore | Trend (Outliers removed): no trend | tau = -0.176 | p = 0.411
Electrical Conductivity
95th percentile: 3110.5
80th percentile: 2906.0
Electrical Conductivity (microS/cm)

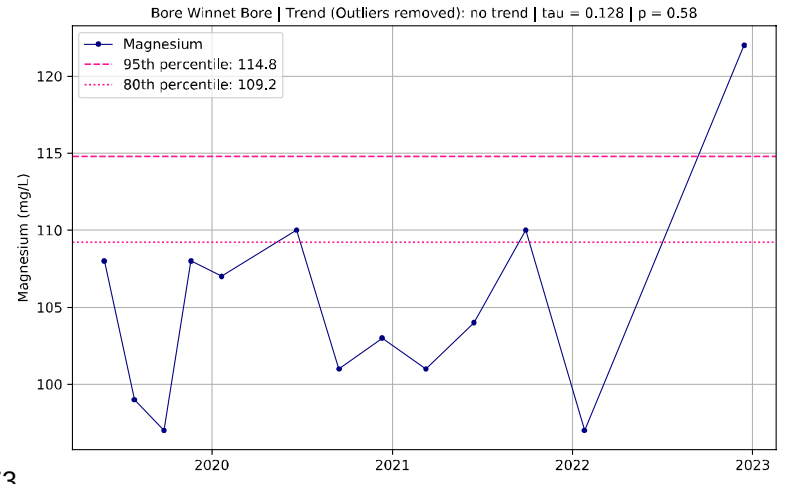

Bore Winnet Bore | Trend: no trend | tau = -0.152 | p = 0.457
Field pH
Statistical Outlier
Outlier removed
Field pH (pH Unit)

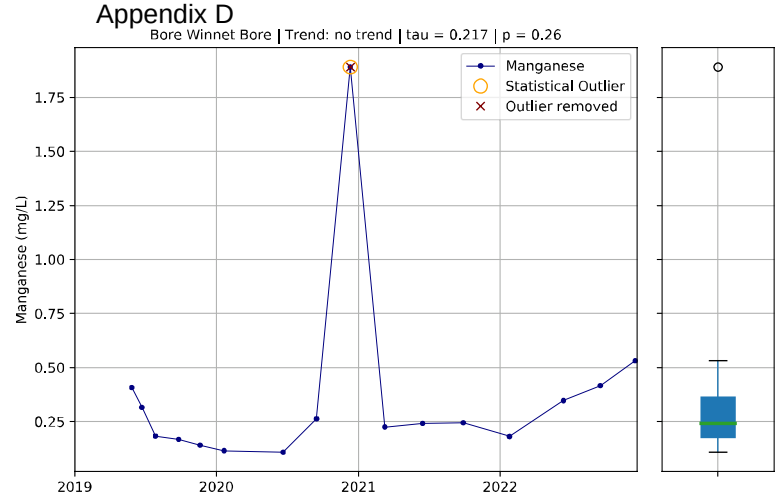

Bore Winnet Bore | Trend (Outliers removed): no trend | tau = -0.152 | p = 0.457
Field pH
95th percentile: 7.138
80th percentile: 6.91
Field pH (pH Unit)

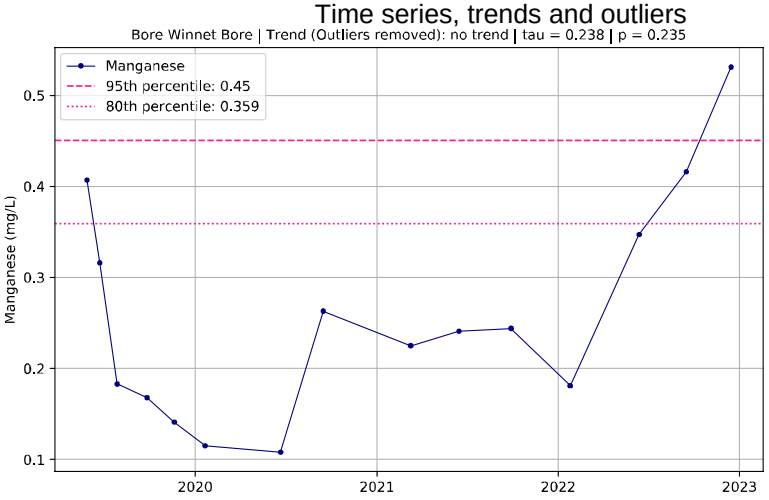

Bore Winnet Bore | Trend: no trend | tau = 0.0 | p = 1.0
Lead
Statistical Outlier
Outlier removed
Lead (mg/L)

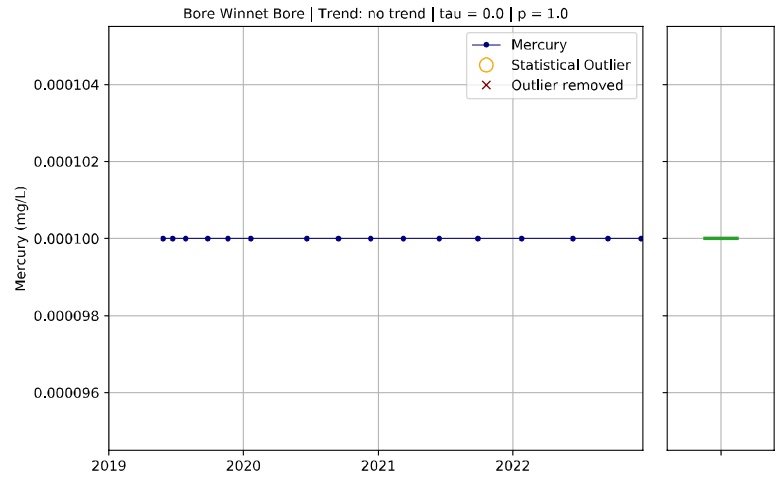

Bore Winnet Bore | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Lead
95th percentile: 0.001
80th percentile: 0.001
Lead (mg/L)

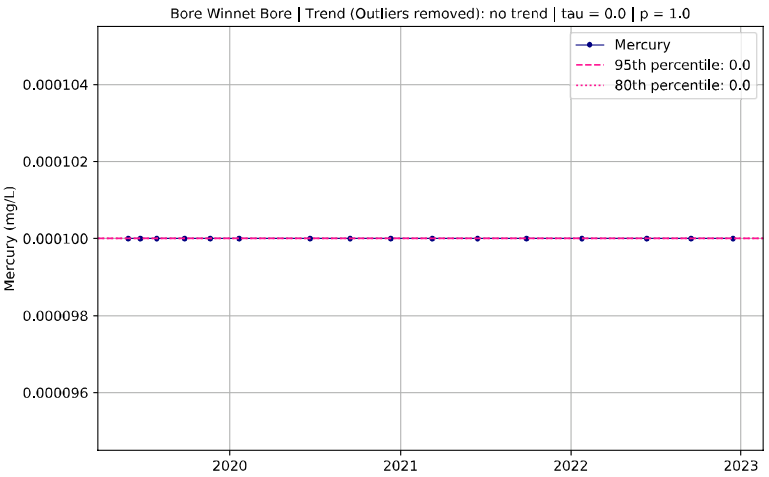

Bore Winnet Bore | Trend: no trend | tau = 0.295 | p = 0.136
Magnesium
Statistical Outlier
Outlier removed
Magnesium (mg/L)

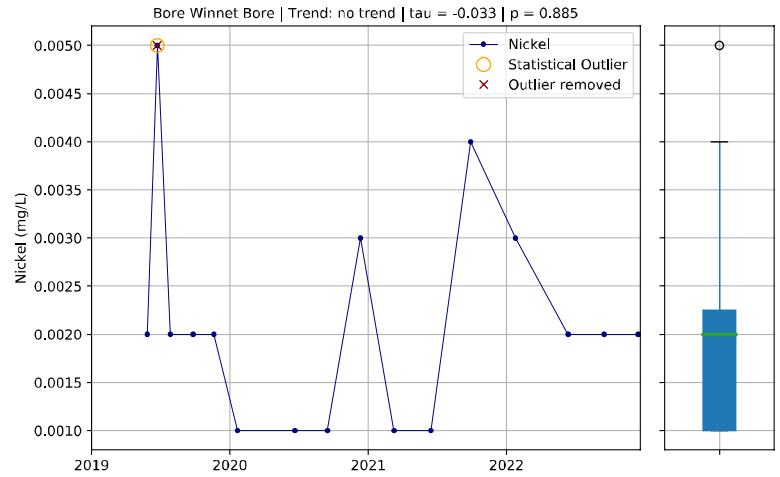

Bore Winnet Bore | Trend (Outliers removed): no trend | tau = 0.128 | p = 0.58
Magnesium
95th percentile: 114.8
80th percentile: 109.2
Magnesium (mg/L)

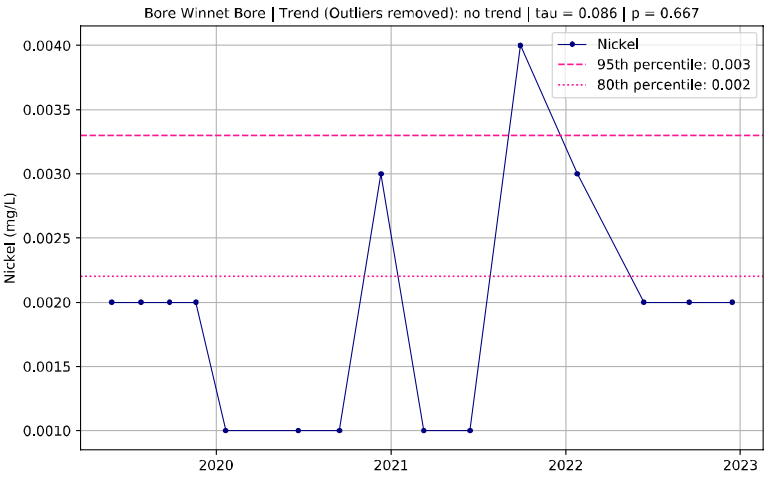

Bore Winnet Bore | Trend: no trend | tau = 0.217 | p = 0.26
Manganese
Statistical Outlier
Outlier removed
Manganese (mg/L)
1.75
1.50
1.25
1.00
0.75
0.50
0.25
2019
2020
2021
2022

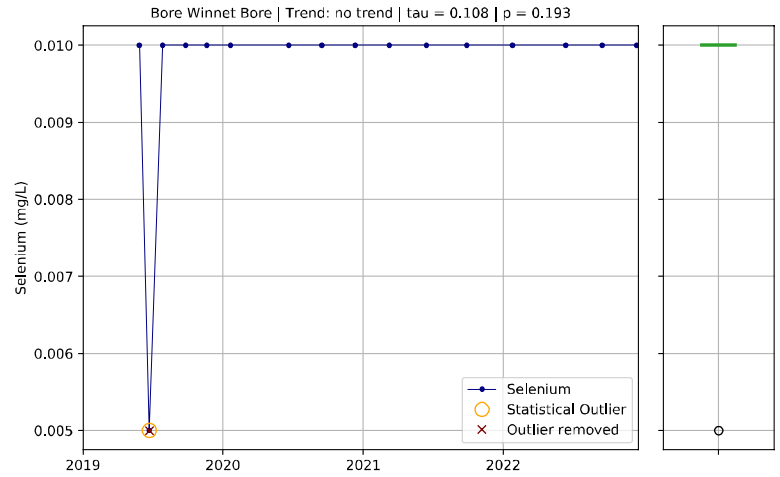

Bore Winnet Bore | Trend (Outliers removed): no trend | tau = 0.238 | p = 0.235
Manganese
95th percentile: 0.45
80th percentile: 0.359
Manganese (mg/L)
0.5
0.4
0.3
0.2
0.1
2020
2021
2022
2023

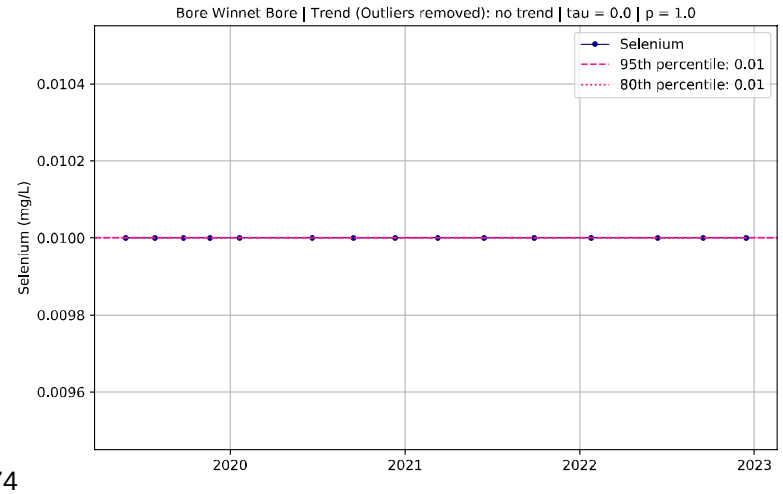

Bore Winnet Bore | Trend: no trend | tau = 0.0 | p = 1.0
Mercury
Statistical Outlier
Outlier removed
Mercury (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2019
2020
2021
2022

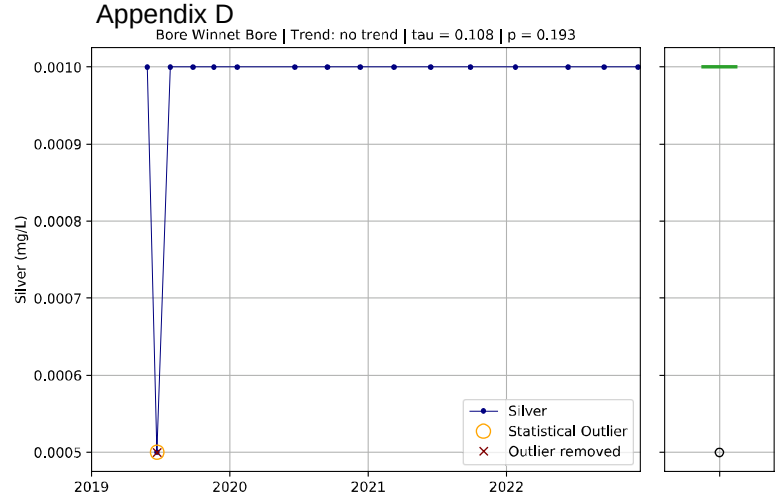

Bore Winnet Bore | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Mercury
95th percentile: 0.0
80th percentile: 0.0
Mercury (mg/L)
0.000104
0.000102
0.000100
0.000098
0.000096
2020
2021
2022
2023

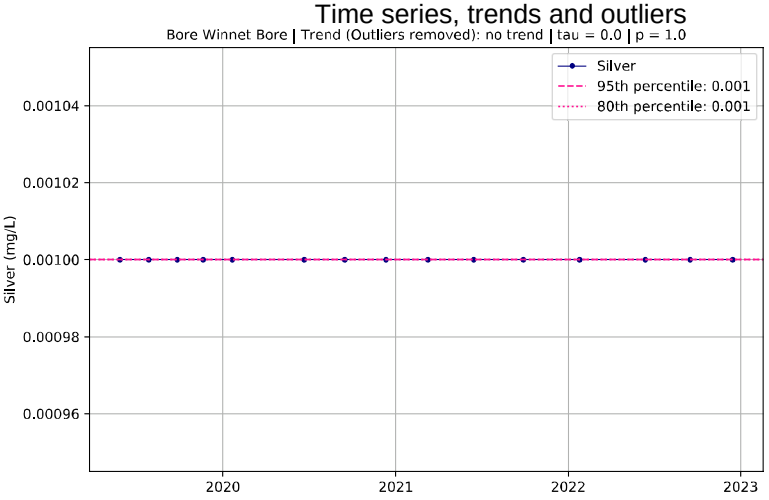

Bore Winnet Bore | Trend: no trend | tau = -0.033 | p = 0.885
Nickel
Statistical Outlier
Outlier removed
Nickel (mg/L)
0.0050
0.0045
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
2019
2020
2021
2022

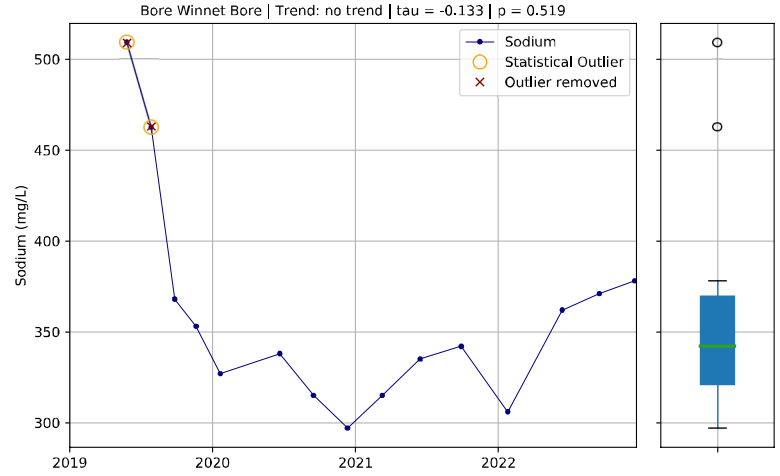

Bore Winnet Bore | Trend (Outliers removed): no trend | tau = 0.086 | p = 0.667
Nickel
95th percentile: 0.003
80th percentile: 0.002
Nickel (mg/L)
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
2020
2021
2022
2023

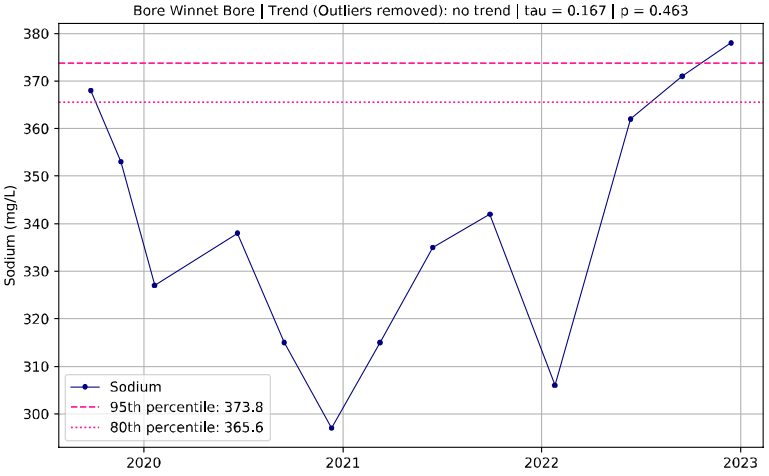

Bore Winnet Bore | Trend: no trend | tau = 0.108 | p = 0.193
Selenium
Statistical Outlier
Outlier removed
Selenium (mg/L)
0.010
0.009
0.008
0.007
0.006
0.005
2019
2020
2021
2022

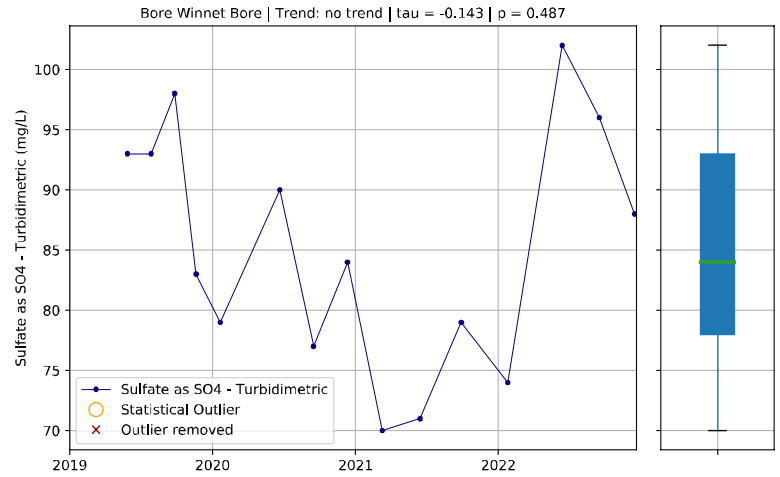

Bore Winnet Bore | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Selenium
95th percentile: 0.01
80th percentile: 0.01
Selenium (mg/L)
0.0104
0.0102
0.0100
0.0098
0.0096
2020
2021
2022
2023

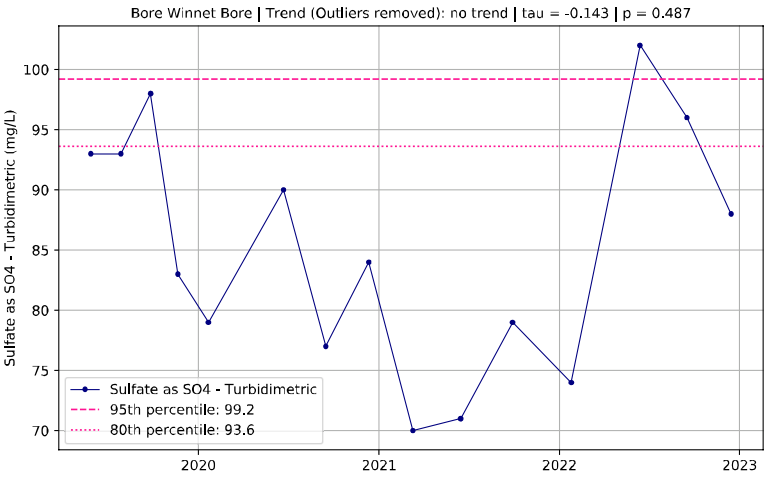

Bore Winnet Bore | Trend: no trend | tau = 0.108 | p = 0.193
Silver (mg/L)
Silver
Statistical Outlier
Outlier removed

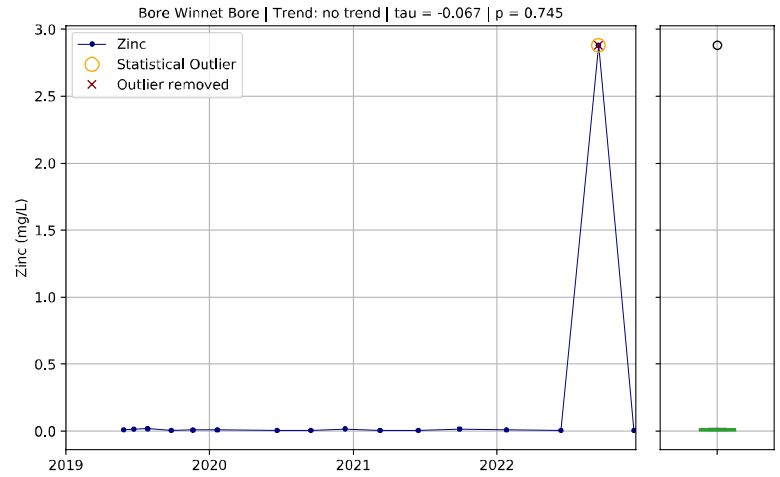

Bore Winnet Bore | Trend (Outliers removed): no trend | tau = 0.0 | p = 1.0
Silver (mg/L)
Silver
95th percentile: 0.001
80th percentile: 0.001

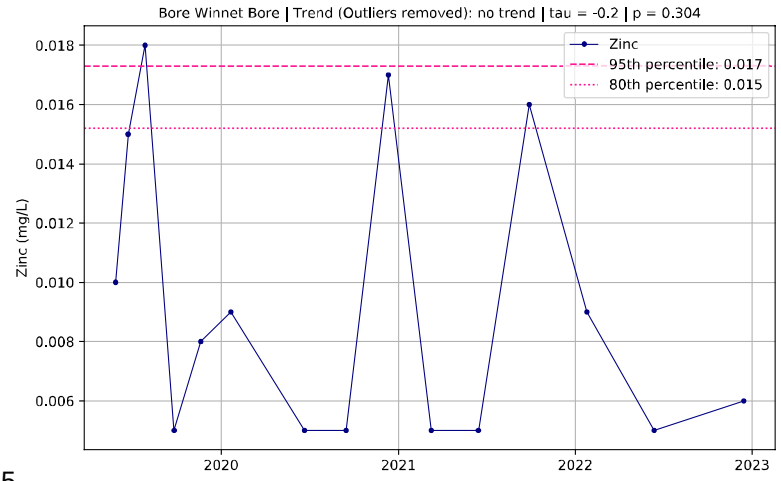

Bore Winnet Bore | Trend: no trend | tau = -0.133 | p = 0.519
Sodium (mg/L)
Sodium
Statistical Outlier
Outlier removed


Bore Winnet Bore | Trend (Outliers removed): no trend | tau = 0.167 | p = 0.463
Sodium (mg/L)
Sodium
95th percentile: 373.8
80th percentile: 365.6


Bore Winnet Bore | Trend: no trend | tau = -0.143 | p = 0.487
Sulfate as SO4 - Turbidimetric (mg/L)
Sulfate as SO4 - Turbidimetric
Statistical Outlier
Outlier removed


Bore Winnet Bore | Trend (Outliers removed): no trend | tau = -0.143 | p = 0.487
Sulfate as SO4 - Turbidimetric (mg/L)
Sulfate as SO4 - Turbidimetric
95th percentile: 99.2
80th percentile: 93.6


Bore Winnet Bore | Trend: no trend | tau = -0.067 | p = 0.745
Zinc (mg/L)
Zinc
Statistical Outlier
Outlier removed


Bore Winnet Bore | Trend (Outliers removed): no trend | tau = -0.2 | p = 0.304
Zinc (mg/L)
Zinc
95th percentile: 0.017
80th percentile: 0.015

APPENDIX E

Project Monitoring Bores Summary Statistics – Trigger Derivation

Appendix E

C2105R

Trigger derivation table

	Field pH	Electrical Conductivity (µS/cm)	Aluminium Dissolved (mg/L)	Calcium Dissolved (mg/L)	Chloride Dissolved (mg/L)	Magnesium Dissolved (mg/L)	Manganese Dissolved (mg/L)	Sodium Dissolved (mg/L)	Sulfate as SO4 - Turbidimetric	Zinc Dissolved (mg/L)	Arsenic Dissolved (mg/L)	Cadmium Dissolved (mg/L)	Chromium Dissolved (mg/L)	Cobalt Dissolved (mg/L)	Copper Dissolved (mg/L)	Lead Dissolved (mg/L)	Mercury Dissolved (mg/L)	Nickel Dissolved (mg/L)	Selenium Dissolved (mg/L)	Silver Dissolved (mg/L)
Water quality Guidelines																				
Isaac River Sub-basin - ANZECC 2000 - Aquatic 95% spp	6.5-8.5	-	0.055	-	-	-	1.9	-	-	0.008	0.024	0.0002	0.001	-	0.0014	0.0034	0.0006	0.011	0.011	0.00005
ADWG Guidelines - Aesthetic	6.5-8.5	900	0.2	-	250	-	0.1	180	250	3	-	-	-	-	1					
ADWG Guidelines - Health	-	-	-	-	-	-	0.5	-	-	-	0.01	0.002	0.05	-	2	0.01	0.001	0.02	0.01	0.1
Isaac River Sub-basin - Irrigation	-	-	20	-	-	-	10	-	-	5	2	0.05	1	0.1	5	5	0.002	2	0.05	-
Isaac River Sub-basin - Stock	-	7500	5	1000	-	2000	-	-	1000	20	0.5	0.01	1	1	1	0.1	0.002	1	0.02	-
Statistics																				
Count	8	8	9	9	7	10	8	10	10	10	7	9	8	9	9	9	10	7	9	9
Percent of LOR	0	0	100	0	0	0	0	0	10	40	86	100	100	89	100	100	100	100	100	100
Date from	01-01-2020	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-06-2020	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-11-2019
Date to	01-12-2022	26-01-2022	18-09-2022	18-09-2022	15-06-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022
Minimum	6.2	29900	0.05	873	11000	890	0.42	4760	1	0.021	0.005	0.0005	0.005	0.005	0.005	0.005	0.0001	0.005	0.05	0.005
5th percentile	6.3	29935	0.05	874	11000	895	0.44	4823	1	0.023	0.005	0.0005	0.005	0.005	0.005	0.005	0.0001	0.005	0.05	0.005
20th percentile	6.4	30080	0.05	876	11020	938	0.48	4948	1.8	0.025	0.005	0.0005	0.005	0.005	0.005	0.005	0.0001	0.005	0.05	0.005
Median	6.5	30700	0.05	911	11200	966	0.54	5090	7	0.029	0.005	0.0005	0.005	0.005	0.005	0.005	0.0001	0.005	0.05	0.005
80th percentile	6.6	31520	0.05	940	11200	1003	0.59	5290	8	0.042	0.005	0.0005	0.005	0.005	0.005	0.005	0.0001	0.005	0.05	0.005
95th percentile	6.7	32380	0.05	970	11340	1020	0.62	5416	11.85	0.047	0.0057	0.0005	0.005	0.005	0.005	0.005	0.0001	0.005	0.05	0.005
Maximum	6.8	32800	0.05	971	11400	1020	0.62	5420	15	0.050	0.006	0.0005	0.005	0.005	0.005	0.005	0.0001	0.005	0.05	0.005
Trigger derivation considerations																				
Trigger Development not possible due less than 8 samples					x						x							x		
Trigger Development not possible due to more than 15% of values <LOR			x							x	x	x	x	x	x	x	x	x	x	x
Trend (after outlier removal)																				
Proposed Trigger Limits																				
Limit A (80th Percentile)																				
Limit B (95th Percentile) or applicable guideline	6.5-8.5	32380	0.055	970	11340	1020	0.62	5416	12	3	0.01	0.002	0.05	0.1	1	0.01	0.0006	0.011	0.05	0.1

C2136

	Field pH	Electrical Conductivity (µS/cm)	Aluminium Dissolved (mg/L)	Calcium Dissolved (mg/L)	Chloride Dissolved (mg/L)	Magnesium Dissolved (mg/L)	Manganese Dissolved (mg/L)	Sodium Dissolved (mg/L)	Sulfate as SO4 - Turbidimetric	Zinc Dissolved (mg/L)	Arsenic Dissolved (mg/L)	Cadmium Dissolved (mg/L)	Chromium Dissolved (mg/L)	Cobalt Dissolved (mg/L)	Copper Dissolved (mg/L)	Lead Dissolved (mg/L)	Mercury Dissolved (mg/L)	Nickel Dissolved (mg/L)	Selenium Dissolved (mg/L)	Silver Dissolved (mg/L)
Water quality Guidelines																				
Isacc River Sub-basin - ANZECC 2000 - Aquatic 95% spp	6.5-8.5	-	0.055	-	-	-	1.9	-	-	0.008	0.024	0.0002	0.001	-	0.0014	0.0034	0.0006	0.011	0.011	0.00005
ADWG Guidelines - Aesthetic	6.5-8.5	900	0.2	-	250	-	0.1	180	250	3	-	-	-	-	1	-	-	-	-	-
ADWG Guidelines - Health	-	-	-	-	-	-	0.5	-	-	-	0.01	0.002	0.05	-	2	0.01	0.001	0.02	0.01	0.1
Isacc River Sub-basin - Irrigation	-	-	20	-	-	-	10	-	-	5	2	0.05	1	0.1	5	5	0.002	2	0.05	-
Isacc River Sub-basin - Stock	-	7500	5	1000	-	2000	-	-	1000	20	0.5	0.01	1	1	1	0.1	0.002	1	0.02	-
Statistics																				
Count	14	19	19	19	19	19	18	19	19	17	17	19	19	19	19	19	19	17	19	19
Percent of LOR	0	0	100	0	0	0	0	0	0	71	59	100	100	100	95	100	100	100	100	100
Date from	01-04-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-05-2019	01-03-2019	01-03-2019
Date to	01-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022
Minimum	6.5	11100	0.01	136	3840	295	0.01	2100	55	0.005	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
5th percentile	6.6	11460	0.01	151	3993	296	0.01	2154	65	0.005	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
20th percentile	6.7	13500	0.01	192	4724	352	0.01	2404	81	0.005	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Median	6.7	15100	0.01	276	5170	407	0.02	2510	107	0.005	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
80th percentile	6.8	16240	0.01	365	5674	475	0.02	2696	118	0.007	0.002	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
95th percentile	6.9	16940	0.01	416	5863	494	0.02	2868	127	0.007	0.002	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Maximum	6.9	17300	0.01	483	5980	496	0.02	2940	143	0.007	0.002	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Trigger derivation considerations																				
Trigger Development not possbile due less than 8 samples																				
Trigger Development not possbile due to more than 15% of values <LOR			x							x	x	x	x	x	x	x	x	x	x	x
Trend (after outlier removal)		decreasing		decreasing	decreasing	decreasing		decreasing	decreasing		decreasing									
Proposed Trigger Limits																				
Limit A (80th Percentile)																				
Limit B (95th Percentile) or applicable guidleline	6.5-8.5	16940	0.055	416	5863	494	0.02	2868	127	0.008	0.01	0.0002	0.001	0.1	0.0014	0.0034	0.0006	0.011	0.01	0.1

G2304R

	Field pH	Electrical Conductivity (µS/cm)	Aluminium Dissolved (mg/L)	Calcium Dissolved (mg/L)	Chloride Dissolved (mg/L)	Magnesium Dissolved (mg/L)	Manganese Dissolved (mg/L)	Sodium Dissolved (mg/L)	Sulfate as SO4 - Turbidimetric	Zinc Dissolved (mg/L)	Arsenic Dissolved (mg/L)	Cadmium Dissolved (mg/L)	Chromium Dissolved (mg/L)	Cobalt Dissolved (mg/L)	Copper Dissolved (mg/L)	Lead Dissolved (mg/L)	Mercury Dissolved (mg/L)	Nickel Dissolved (mg/L)	Selenium Dissolved (mg/L)	Silver Dissolved (mg/L)
Water quality Guidelines																				
Isacc River Sub-basin - ANZECC 2000 - Aquatic 95% spp	6.5-8.5	-	0.055	-	-	-	1.9	-	-	0.008	0.024	0.0002	0.001	-	0.0014	0.0034	0.0006	0.011	0.011	0.00005
ADWG Guidelines - Aesthetic	6.5-8.5	900	0.2	-	250	-	0.1	180	250	3	-	-	-	-	1	-	-	-	-	-
ADWG Guidelines - Health	-	-	-	-	-	-	0.5	-	-	-	0.01	0.002	0.05	-	2	0.01	0.001	0.02	0.01	0.1
Isacc River Sub-basin - Irrigation	-	-	20	-	-	-	10	-	-	5	2	0.05	1	0.1	5	5	0.002	2	0.05	-
Isacc River Sub-basin - Stock	-	7500	5	1000	-	2000	-	-	1000	20	0.5	0.01	1	1	1	0.1	0.002	1	0.02	-
Statistics																				
Count	9	9	10	11	11	11	9	10	9	10	9	10	10	9	10	10	11	9	10	10
Percent of LOR	0	0	100	0	0	0	0	0	78	10	100	100	100	89	100	100	100	100	100	100
Date from	01-01-2020	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-11-2019	23-01-2020	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-11-2019
Date to	01-09-2022	27-01-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022
Minimum	6.6	28200	0.05	488	9970	600	0.07	4740	1	0.025	0.005	0.0005	0.005	0.005	0.005	0.005	0.0001	0.005	0.05	0.005
5th percentile	6.6	28240	0.05	506.5	9985	621	0.08	4821	1	0.026	0.005	0.0005	0.005	0.005	0.005	0.005	0.0001	0.005	0.05	0.005
20th percentile	6.6	28480	0.05	583	10200	651	0.09	4936	1	0.031	0.005	0.0005	0.005	0.005	0.005	0.005	0.0001	0.005	0.05	0.005
Median	6.8	28800	0.05	672	10400	682	0.10	5025	1	0.037	0.005	0.0005	0.005	0.005	0.005	0.005	0.0001	0.005	0.05	0.005
80th percentile	7.0	29280	0.05	738	10500	710	0.15	5182	1	0.048	0.005	0.0005	0.005	0.005	0.005	0.005	0.0001	0.005	0.05	0.005
95th percentile	7.2	29760	0.05	750.5	10700	748	0.32	5190	1	0.049	0.005	0.0005	0.005	0.005	0.005	0.005	0.0001	0.005	0.05	0.005
Maximum	7.2	30000	0.05	763	10800	772	0.44	5190	1	0.049	0.005	0.0005	0.005	0.005	0.005	0.005	0.0001	0.005	0.05	0.005
Trigger derivation considerations																				
Trigger Development not possbile due less than 8 samples																				
Trigger Development not possbile due to more than 15% of values <LOR			x						x		x	x	x	x	x	x	x	x	x	x
Trend (after outlier removal)																				
Proposed Trigger Limits																				
Limit A (80th Percentile)																				
Limit B (95th Percentile) or applicable guidleline	6.5-8.5	29760	0.055	751	10700	748	0.32	5190	250	0.05	0.01	0.002	0.05	0.1	1	0.01	0.0006	0.011	0.05	0.1

G2307

	Field pH	Electrical Conductivity (µS/cm)	Aluminium Dissolved (mg/L)	Calcium Dissolved (mg/L)	Chloride Dissolved (mg/L)	Magnesium Dissolved (mg/L)	Manganese Dissolved (mg/L)	Sodium Dissolved (mg/L)	Sulfate as SO4 - Turbidimetric	Zinc Dissolved (mg/L)	Arsenic Dissolved (mg/L)	Cadmium Dissolved (mg/L)	Chromium Dissolved (mg/L)	Cobalt Dissolved (mg/L)	Copper Dissolved (mg/L)	Lead Dissolved (mg/L)	Mercury Dissolved (mg/L)	Nickel Dissolved (mg/L)	Selenium Dissolved (mg/L)	Silver Dissolved (mg/L)
Water quality Guidelines																				
Isacc River Sub-basin - ANZECC 2000 - Aquatic 95% spp	6.5-8.5	-	0.055	-	-	-	1.9	-	-	0.008	0.024	0.0002	0.001	-	0.0014	0.0034	0.0006	0.011	0.011	0.00005
ADWG Guidelines - Aesthetic	6.5-8.5	900	0.2	-	250	-	0.1	180	250	3	-	-	-	-	1	-	-	-	-	-
ADWG Guidelines - Health	-	-	-	-	-	-	0.5	-	-	-	0.01	0.002	0.05	-	2	0.01	0.001	0.02	0.01	0.1
Isacc River Sub-basin - Irrigation	-	-	20	-	-	-	10	-	-	5	2	0.05	1	0.1	5	5	0.002	2	0.05	-
Isacc River Sub-basin - Stock	-	7500	5	1000	-	2000	-	-	1000	20	0.5	0.01	1	1	1	0.1	0.002	1	0.02	-
Statistics																				
Count	15	19	19	19	19	18	19	18	19	19	18	18	18	18	18	18	19	18	18	18
Percent of LOR	0	0	95	0	0	0	0	0	95	11	100	100	100	100	100	100	100	100	100	100
Date from	01-04-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019	01-03-2019
Date to	01-12-2022	16-12-2022	16-12-2022	16-12-2022	16-12-2022	16-12-2022	16-12-2022	16-12-2022	16-12-2022	16-12-2022	16-12-2022	16-12-2022	16-12-2022	16-12-2022	16-12-2022	16-12-2022	16-12-2022	16-12-2022	16-12-2022	16-12-2022
Minimum	6.9	14500	0.01	199	5200	221	0.03	2680	1	0.005	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
5th percentile	6.9	14590	0.01	213	5245	230	0.03	2757	1	0.005	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
20th percentile	7.0	15060	0.01	231	5390	237	0.03	2840	1	0.008	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Median	7.1	15500	0.01	261	5540	250	0.03	2905	1	0.012	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
80th percentile	7.2	15840	0.01	309	5698	256	0.04	2966	1	0.019	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
95th percentile	7.2	16110	0.01	337	5819	259	0.04	3040	1	0.025	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Maximum	7.2	16200	0.01	377	5900	262	0.05	3040	1	0.030	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Trigger derivation considerations																				
Trigger Development not possbile due less than 8 samples																				
Trigger Development not possbile due to more than 15% of values <LOR			x						x		x	x	x	x	x	x	x	x	x	x
Trend (after outlier removal)				decreasing		increasing		increasing												
Proposed Trigger Limits																				
Limit A (80th Percentile)																				
Limit B (95th Percentile) or applicable guidleline	6.5-8.5	16110	0.055	338	5819	259	0.04	3040	250	0.03	0.01	0.0002	0.001	0.1	0.0014	0.0034	0.0006	0.011	0.01	0.1

Knob Hill 1

	Field pH	Electrical Conductivity (µS/cm)	Aluminium Dissolved (mg/L)	Calcium Dissolved (mg/L)	Chloride Dissolved (mg/L)	Magnesium Dissolved (mg/L)	Manganese Dissolved (mg/L)	Sodium Dissolved (mg/L)	Sulfate as SO4 - Turbidimetric	Zinc Dissolved (mg/L)	Arsenic Dissolved (mg/L)	Cadmium Dissolved (mg/L)	Chromium Dissolved (mg/L)	Cobalt Dissolved (mg/L)	Copper Dissolved (mg/L)	Lead Dissolved (mg/L)	Mercury Dissolved (mg/L)	Nickel Dissolved (mg/L)	Selenium Dissolved (mg/L)	Silver Dissolved (mg/L)
Water quality Guidelines																				
Isacc River Sub-basin - ANZECC 2000 - Aquatic 95% spp	6.5-8.5	-	0.055	-	-	-	1.9	-	-	0.008	0.024	0.0002	0.001	-	0.0014	0.0034	0.0006	0.011	0.011	0.00005
ADWG Guidelines - Aesthetic	6.5-8.5	900	0.2	-	250	-	0.1	180	250	3	-	-	-	-	1	-	-	-	-	-
ADWG Guidelines - Health	-	-	-	-	-	-	0.5	-	-	-	0.01	0.002	0.05	-	2	0.01	0.001	0.02	0.01	0.1
Isacc River Sub-basin - Irrigation	-	-	20	-	-	-	10	-	-	5	2	0.05	1	0.1	5	5	0.002	2	0.05	-
Isacc River Sub-basin - Stock	-	7500	5	1000	-	2000	-	-	1000	20	0.5	0.01	1	1	1	0.1	0.002	1	0.02	-
Statistics																				
Count	14	16	16	16	15	15	13	15	16	13	15	16	16	9	15	16	16	16	16	15
Percent of LOR	0	0	100	0	0	0	0	0	0	85	87	100	100	0	53	100	100	19	100	100
Date from	01-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019
Date to	01-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	25-01-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	25-01-2022	16-09-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022
Minimum	6.5	5470	0.01	188	1520	182	0.54	707	303	0.005	0.001	0.0001	0.001	0.002	0.001	0.001	0.0001	0.001	0.01	0.001
5th percentile	6.5	5905	0.01	189	1653	206	0.57	776	347	0.005	0.001	0.0001	0.001	0.002	0.001	0.001	0.0001	0.001	0.01	0.001
20th percentile	6.6	6420	0.01	231	1786	219	0.60	871	393	0.005	0.001	0.0001	0.001	0.002	0.001	0.001	0.0001	0.001	0.01	0.001
Median	6.7	7235	0.01	250	1980	238	0.65	958	452	0.005	0.001	0.0001	0.001	0.002	0.001	0.001	0.0001	0.002	0.01	0.001
80th percentile	6.8	7850	0.01	273	2140	251	0.69	1052	507	0.005	0.001	0.0001	0.001	0.002	0.002	0.001	0.0001	0.002	0.01	0.001
95th percentile	6.9	8208	0.01	302	2312	267	0.71	1069	582	0.005	0.001	0.0001	0.001	0.002	0.0023	0.001	0.0001	0.003	0.01	0.001
Maximum	6.9	8890	0.01	312	2410	292	0.72	1090	626	0.005	0.001	0.0001	0.001	0.002	0.003	0.001	0.0001	0.003	0.01	0.001
Trigger derivation considerations																				
Trigger Development not possbile due less than 8 samples																				
Trigger Development not possbile due to more than 15% of values <LOR			x							x	x	x	x		x	x	x	x	x	x
Trend (after outlier removal)																				
Proposed Trigger Limits																				
Limit A (80th Percentile)																				
Limit B (95th Percentile) or applicable guidleline	6.5-8.5	8208	0.055	302	2312	267	0.71	1069	582	0.008	0.01	0.0002	0.001	0.002	1	0.0034	0.0006	0.011	0.01	0.1

Knob Hill 2

	Field pH	Electrical Conductivity (µS/cm)	Aluminium Dissolved (mg/L)	Calcium Dissolved (mg/L)	Chloride Dissolved (mg/L)	Magnesium Dissolved (mg/L)	Manganese Dissolved (mg/L)	Sodium Dissolved (mg/L)	Sulfate as SO4 - Turbidimetric	Zinc Dissolved (mg/L)	Arsenic Dissolved (mg/L)	Cadmium Dissolved (mg/L)	Chromium Dissolved (mg/L)	Cobalt Dissolved (mg/L)	Copper Dissolved (mg/L)	Lead Dissolved (mg/L)	Mercury Dissolved (mg/L)	Nickel Dissolved (mg/L)	Selenium Dissolved (mg/L)	Silver Dissolved (mg/L)
Water quality Guidelines																				
Isacc River Sub-basin - ANZECC 2000 - Aquatic 95% spp	6.5-8.5	-	0.055	-	-	-	1.9	-	-	0.008	0.024	0.0002	0.001	-	0.0014	0.0034	0.0006	0.011	0.011	0.00005
ADWG Guidelines - Aesthetic	6.5-8.5	900	0.2	-	250	-	0.1	180	250	3	-	-	-	-	1	-	-	-	-	-
ADWG Guidelines - Health	-	-	-	-	-	-	0.5	-	-	-	0.01	0.002	0.05	-	2	0.01	0.001	0.02	0.01	0.1
Isacc River Sub-basin - Irrigation	-	-	20	-	-	-	10	-	-	5	2	0.05	1	0.1	5	5	0.002	2	0.05	-
Isacc River Sub-basin - Stock	-	7500	5	1000	-	2000	-	-	1000	20	0.5	0.01	1	1	1	0.1	0.002	1	0.02	-
Statistics																				
Count	13	16	16	16	16	16	16	16	16	12	16	16	16	16	16	16	16	16	16	16
Percent of LOR	0	0	100	0	0	0	0	0	0	100	0	100	94	0	100	100	100	81	100	100
Date from	01-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019	27-05-2019
Date to	01-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022
Minimum	6.8	517	0.01	21	61	16	0.53	63	13	0.005	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
5th percentile	6.8	529	0.01	23	61	17	0.53	66	13	0.005	0.002	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
20th percentile	6.8	583	0.01	26	87	18	0.57	74	14	0.005	0.002	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Median	7.0	833	0.01	40	125	28	0.88	96	17	0.005	0.003	0.0001	0.001	0.002	0.001	0.001	0.0001	0.001	0.01	0.001
80th percentile	7.0	929	0.01	45	145	31	1.08	107	20	0.005	0.003	0.0001	0.001	0.003	0.001	0.001	0.0001	0.001	0.01	0.001
95th percentile	7.1	995	0.01	51	154	36	1.21	116	21	0.005	0.003	0.0001	0.001	0.004	0.001	0.001	0.0001	0.001	0.01	0.001
Maximum	7.2	1050	0.01	52	160	36	1.22	117	21	0.005	0.003	0.0001	0.001	0.004	0.001	0.001	0.0001	0.001	0.01	0.001
Trigger derivation considerations																				
Trigger Development not possbile due less than 8 samples																				
Trigger Development not possbile due to more than 15% of values <LOR			x							x		x	x		x	x	x	x	x	x
Trend (after outlier removal)		decreasing		decreasing	decreasing	decreasing	decreasing	decreasing	decreasing					decreasing						
Proposed Trigger Limits																				
Limit A (80th Percentile)																				
Limit B (95th Percentile) or applicable guidleline	6.5-8.5	995	0.055	51	154	36	1.21	116	21	0.008	0.003	0.0002	0.001	0.004	0.0014	0.0034	0.0006	0.011	0.01	0.1

R2008

	Field pH	Electrical Conductivity (µS/cm)	Aluminium Dissolved (mg/L)	Calcium Dissolved (mg/L)	Chloride Dissolved (mg/L)	Magnesium Dissolved (mg/L)	Manganese Dissolved (mg/L)	Sodium Dissolved (mg/L)	Sulfate as SO4 - Turbidimetric	Zinc Dissolved (mg/L)	Arsenic Dissolved (mg/L)	Cadmium Dissolved (mg/L)	Chromium Dissolved (mg/L)	Cobalt Dissolved (mg/L)	Copper Dissolved (mg/L)	Lead Dissolved (mg/L)	Mercury Dissolved (mg/L)	Nickel Dissolved (mg/L)	Selenium Dissolved (mg/L)	Silver Dissolved (mg/L)
Water quality Guidelines																				
Isacc River Sub-basin - ANZECC 2000 - Aquatic 95% spp	6.5-8.5	-	0.055	-	-	-	1.9	-	-	0.008	0.024	0.0002	0.001	-	0.0014	0.0034	0.0006	0.011	0.011	0.00005
ADWG Guidelines - Aesthetic	6.5-8.5	900	0.2	-	250	-	0.1	180	250	3	-	-	-	-	1	-	-	-	-	-
ADWG Guidelines - Health	-	-	-	-	-	-	0.5	-	-	-	0.01	0.002	0.05	-	2	0.01	0.001	0.02	0.01	0.1
Isacc River Sub-basin - Irrigation	-	-	20	-	-	-	10	-	-	5	2	0.05	1	0.1	5	5	0.002	2	0.05	-
Isacc River Sub-basin - Stock	-	7500	5	1000	-	2000	-	-	1000	20	0.5	0.01	1	1	1	0.1	0.002	1	0.02	-
Statistics																				
Count	13	15	18	19	15	15	17	15	18	17	18	19	18	19	18	19	19	17	19	19
Percent of LOR	0	0	100	0	0	0	0	0	94	6	89	100	100	100	94	100	100	100	100	84
Date from	01-04-2019	27-05-2019	28-02-2019	25-02-2019	27-05-2019	27-05-2019	27-03-2019	27-05-2019	25-02-2019	25-02-2019	25-02-2019	25-02-2019	25-02-2019	25-02-2019	25-02-2019	25-02-2019	25-02-2019	25-02-2019	25-02-2019	25-02-2019
Date to	01-06-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022
Minimum	6.8	14500	0.01	31	5150	176	0.02	2920	1	0.005	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
5th percentile	6.9	14710	0.01	36	5255	176	0.02	3053	1	0.005	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
20th percentile	6.9	15580	0.01	111	5452	185	0.04	3208	1	0.010	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Median	7.0	16000	0.01	145	5530	193	0.04	3310	1	0.013	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
80th percentile	7.2	16520	0.01	221	5726	204	0.04	3394	1	0.021	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
95th percentile	7.3	16730	0.01	259	5784	209	0.05	3485	1	0.028	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Maximum	7.4	16800	0.01	293	5840	220	0.06	3520	1	0.032	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Trigger derivation considerations																				
Trigger Development not possbile due less than 8 samples																				
Trigger Development not possbile due to more than 15% of values <LOR			x						x		x	x	x	x	x	x	x	x	x	x
Trend (after outlier removal)		decreasing								increasing										
Proposed Trigger Limits																				
Limit A (80th Percentile)																				
Limit B (95th Percentile) or applicable guidleline	6.5-8.5	16730	0.055	259	5784	210	0.05	3485	250	0.03	0.01	0.0002	0.001	0.1	0.0014	0.0034	0.0006	0.011	0.01	0.1

R2009R

	Field pH	Electrical Conductivity (µS/cm)	Aluminium Dissolved (mg/L)	Calcium Dissolved (mg/L)	Chloride Dissolved (mg/L)	Magnesium Dissolved (mg/L)	Manganese Dissolved (mg/L)	Sodium Dissolved (mg/L)	Sulfate as SO4 - Turbidimetric	Zinc Dissolved (mg/L)	Arsenic Dissolved (mg/L)	Cadmium Dissolved (mg/L)	Chromium Dissolved (mg/L)	Cobalt Dissolved (mg/L)	Copper Dissolved (mg/L)	Lead Dissolved (mg/L)	Mercury Dissolved (mg/L)	Nickel Dissolved (mg/L)	Selenium Dissolved (mg/L)	Silver Dissolved (mg/L)
Water quality Guidelines																				
Issac River Sub-basin - ANZECC 2000 - Aquatic 95% spp	6.5-8.5	-	0.055	-	-	-	1.9	-	-	0.008	0.024	0.0002	0.001	-	0.0014	0.0034	0.0006	0.011	0.011	0.00005
ADWG Guidelines - Aesthetic	6.5-8.5	900	0.2	-	250	-	0.1	180	250	3	-	-	-	-	1	-	-	-	-	-
ADWG Guidelines - Health	-	-	-	-	-	-	0.5	-	-	-	0.01	0.002	0.05	-	2	0.01	0.001	0.02	0.01	0.1
Isaac River Sub-basin - Irrigation	-	-	20	-	-	-	10	-	-	5	2	0.05	1	0.1	5	5	0.002	2	0.05	-
Isaac River Sub-basin - Stock	-	7500	5	1000	-	2000	-	-	1000	20	0.5	0.01	1	1	1	0.1	0.002	1	0.02	-
Statistics																				
Count	9	6	7	8	6	6	8	6	9	6	8	8	7	8	7	8	8	7	8	8
Percent of LOR	0	0	100	0	0	0	0	0	0	67	0	88	100	25	100	100	100	0	100	100
Date from	01-01-2020	11-12-2020	19-06-2020	19-06-2020	11-12-2020	11-12-2020	23-11-2019	11-12-2020	23-11-2019	19-06-2020	23-11-2019	23-11-2019	23-11-2019	23-11-2019	23-11-2019	23-11-2019	23-11-2019	19-06-2020	23-11-2019	23-11-2019
Date to	01-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022
Minimum	7.0	11000	0.01	40	3740	58	0.08	2430	13	0.005	0.007	0.0001	0.001	0.001	0.001	0.001	0.0001	0.004	0.01	0.001
5th percentile	7.0	11050	0.01	41	3755	58	0.08	2433	28	0.005	0.008	0.0001	0.001	0.001	0.001	0.001	0.0001	0.0046	0.01	0.001
20th percentile	7.1	11200	0.01	56	3800	59	0.10	2440	52	0.005	0.012	0.0001	0.001	0.0014	0.001	0.001	0.0001	0.006	0.01	0.001
Median	7.2	11800	0.01	100	4010	60	0.21	2555	80	0.005	0.017	0.0001	0.001	0.002	0.001	0.001	0.0001	0.006	0.01	0.001
80th percentile	7.6	12200	0.01	120	4180	66	0.34	2650	136	0.007	0.024	0.0001	0.001	0.0058	0.001	0.001	0.0001	0.0092	0.01	0.001
95th percentile	7.7	12725	0.01	131	4233	67	0.42	2695	155	0.00775	0.026	0.0001	0.001	0.007	0.001	0.001	0.0001	0.0156	0.01	0.001
Maximum	7.8	12900	0.01	133	4250	67	0.44	2710	168	0.008	0.027	0.0001	0.001	0.007	0.001	0.001	0.0001	0.018	0.01	0.001
Trigger derivation considerations																				
Trigger Development not possbile due less than 8 samples		x	x		x	x		x		x			x		x			x		
Trigger Development not possbile due to more than 15% of values <LOR			x							x		x	x	x	x	x	x		x	x
Trend (after outlier removal)																				
Proposed Trigger Limits																				
Limit A (80th Percentile)																				
Limit B (95th Percentile) or applicable guidleline	6.5-8.5	12725	0.055	131	4233	67	0.42	2695	155	0.008	0.03	0.0002	0.001	0.1	0.0014	0.0034	0.0006	0.011	0.01	0.1

R2010R

	Field pH	Electrical Conductivity (µS/cm)	Aluminium Dissolved (mg/L)	Calcium Dissolved (mg/L)	Chloride Dissolved (mg/L)	Magnesium Dissolved (mg/L)	Manganese Dissolved (mg/L)	Sodium Dissolved (mg/L)	Sulfate as SO4 - Turbidimetric	Zinc Dissolved (mg/L)	Arsenic Dissolved (mg/L)	Cadmium Dissolved (mg/L)	Chromium Dissolved (mg/L)	Cobalt Dissolved (mg/L)	Copper Dissolved (mg/L)	Lead Dissolved (mg/L)	Mercury Dissolved (mg/L)	Nickel Dissolved (mg/L)	Selenium Dissolved (mg/L)	Silver Dissolved (mg/L)
Water quality Guidelines																				
Isacc River Sub-basin - ANZECC 2000 - Aquatic 95% spp	6.5-8.5	-	0.055	-	-	-	1.9	-	-	0.008	0.024	0.0002	0.001	-	0.0014	0.0034	0.0006	0.011	0.011	0.00005
ADWG Guidelines - Aesthetic	6.5-8.5	900	0.2	-	250	-	0.1	180	250	3	-	-	-	-	1	-	-	-	-	-
ADWG Guidelines - Health	-	-	-	-	-	-	0.5	-	-	-	0.01	0.002	0.05	-	2	0.01	0.001	0.02	0.01	0.1
Isacc River Sub-basin - Irrigation	-	-	20	-	-	-	10	-	-	5	2	0.05	1	0.1	5	5	0.002	2	0.05	-
Isacc River Sub-basin - Stock	-	7500	5	1000	-	2000	-	-	1000	20	0.5	0.01	1	1	1	0.1	0.002	1	0.02	-
Statistics																				
Count	8	9	8	8	10	8	9	9	8	8	10	8	8	7	8	8	10	9	8	9
Percent of LOR	0	0	100	0	0	0	11	0	88	88	0	100	100	100	100	100	100	56	100	89
Date from	01-01-2020	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-11-2019	21-01-2020	21-11-2019	21-01-2020	21-11-2019	21-11-2019	21-11-2019	21-11-2019	19-06-2020	21-11-2019	21-11-2019	21-11-2019	21-01-2020	21-11-2019	21-11-2019
Date to	01-06-2022	16-06-2022	18-09-2022	18-09-2022	18-09-2022	16-06-2022	18-09-2022	16-06-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022	18-09-2022
Minimum	6.7	24500	0.05	331	9370	424	0.005	4940	1	0.025	0.006	0.0005	0.005	0.005	0.005	0.005	0.0001	0.004	0.05	0.005
5th percentile	6.7	25100	0.05	332	9375	424	0.014	5068	1	0.025	0.015	0.0005	0.005	0.005	0.005	0.005	0.0001	0.004	0.05	0.005
20th percentile	6.7	26600	0.05	344	9572	431	0.028	5260	1	0.025	0.028	0.0005	0.005	0.005	0.005	0.005	0.0001	0.005	0.05	0.005
Median	6.8	27300	0.05	372	9700	446	0.035	5380	1	0.025	0.036	0.0005	0.005	0.005	0.005	0.005	0.0001	0.005	0.05	0.005
80th percentile	7.0	27620	0.05	397	10020	459	0.046	5562	1	0.025	0.052	0.0005	0.005	0.005	0.005	0.005	0.0001	0.006	0.05	0.005
95th percentile	7.1	27860	0.05	403	10155	466	0.059	5754	1	0.025	0.057	0.0005	0.005	0.005	0.005	0.005	0.0001	0.009	0.05	0.005
Maximum	7.2	27900	0.05	406	10200	469	0.062	5830	1	0.025	0.060	0.0005	0.005	0.005	0.005	0.005	0.0001	0.009	0.05	0.005
Trigger derivation considerations																				
Trigger Development not possbile due less than 8 samples														x						
Trigger Development not possbile due to more than 15% of values <LOR			x						x	x		x	x	x	x	x	x	x	x	x
Trend (after outlier removal)		decreasing									decreasing									
Proposed Trigger Limits																				
Limit A (80th Percentile)																				
Limit B (95th Percentile) or applicable guidleline	6.5-8.5	27860	0.055	403	10155	466	0.59	5754	250	3	0.06	0.002	0.05	0.1	1	0.01	0.0006	0.011	0.05	0.1

R2032

	Field pH	Electrical Conductivity (µS/cm)	Aluminium Dissolved (mg/L)	Calcium Dissolved (mg/L)	Chloride Dissolved (mg/L)	Magnesium Dissolved (mg/L)	Manganese Dissolved (mg/L)	Sodium Dissolved (mg/L)	Sulfate as SO4 - Turbidimetric	Zinc Dissolved (mg/L)	Arsenic Dissolved (mg/L)	Cadmium Dissolved (mg/L)	Chromium Dissolved (mg/L)	Cobalt Dissolved (mg/L)	Copper Dissolved (mg/L)	Lead Dissolved (mg/L)	Mercury Dissolved (mg/L)	Nickel Dissolved (mg/L)	Selenium Dissolved (mg/L)	Silver Dissolved (mg/L)
Water quality Guidelines																				
Isacc River Sub-basin - ANZECC 2000 - Aquatic 95% spp	6.5-8.5	-	0.055	-	-	-	1.9	-	-	0.008	0.024	0.0002	0.001	-	0.0014	0.0034	0.0006	0.011	0.011	0.00005
ADWG Guidelines - Aesthetic	6.5-8.5	900	0.2	-	250	-	0.1	180	250	3	-	-	-	-	1	-	-	-	-	-
ADWG Guidelines - Health	-	-	-	-	-	-	0.5	-	-	-	0.01	0.002	0.05	-	2	0.01	0.001	0.02	0.01	0.1
Isacc River Sub-basin - Irrigation	-	-	20	-	-	-	10	-	-	5	2	0.05	1	0.1	5	5	0.002	2	0.05	-
Isacc River Sub-basin - Stock	-	7500	5	1000	-	2000	-	-	1000	20	0.5	0.01	1	1	1	0.1	0.002	1	0.02	-
Statistics																				
Count	14	17	19	19	17	18	18	19	18	19	19	19	18	19	19	19	19	18	19	19
Percent of LOR	0	0	100	0	0	0	0	0	100	0	100	100	100	100	89	95	100	100	100	100
Date from	01-04-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019
Date to	01-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-09-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022
Minimum	6.9	11200	0.01	129	3640	105	0.002	2020	1	0.005	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
5th percentile	6.9	11200	0.01	141	3712	108	0.002	2065	1	0.009	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
20th percentile	6.9	11400	0.01	181	3792	111	0.002	2110	1	0.011	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Median	7.1	11500	0.01	214	3830	117	0.003	2190	1	0.019	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
80th percentile	7.1	11780	0.01	286	3990	120	0.004	2270	1	0.030	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
95th percentile	7.2	11820	0.01	323	4086	124	0.004	2346	1	0.044	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Maximum	7.3	11900	0.01	382	4110	124	0.005	2400	1	0.049	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Trigger derivation considerations																				
Trigger Development not possbile due less than 8 samples																				
Trigger Development not possbile due to more than 15% of values <LOR			x						x		x	x	x	x	x	x	x	x	x	x
Trend (after outlier removal)				decreasing																
Proposed Trigger Limits																				
Limit A (80th Percentile)																				
Limit B (95th Percentile) or applicable guidleline	6.5-8.5	11820	0.055	324	4086	124	0.004	2346	250	0.040	0.01	0.0002	0.001	0.1	0.0014	0.0034	0.0006	0.011	0.01	0.1

R2034R

	Field pH	Electrical Conductivity (µS/cm)	Aluminium Dissolved (mg/L)	Calcium Dissolved (mg/L)	Chloride Dissolved (mg/L)	Magnesium Dissolved (mg/L)	Manganese Dissolved (mg/L)	Sodium Dissolved (mg/L)	Sulfate as SO4 - Turbidimetric	Zinc Dissolved (mg/L)	Arsenic Dissolved (mg/L)	Cadmium Dissolved (mg/L)	Chromium Dissolved (mg/L)	Cobalt Dissolved (mg/L)	Copper Dissolved (mg/L)	Lead Dissolved (mg/L)	Mercury Dissolved (mg/L)	Nickel Dissolved (mg/L)	Selenium Dissolved (mg/L)	Silver Dissolved (mg/L)
Water quality Guidelines																				
Isacc River Sub-basin - ANZECC 2000 - Aquatic 95% spp	6.5-8.5	-	0.055	-	-	-	1.9	-	-	0.008	0.024	0.0002	0.001	-	0.0014	0.0034	0.0006	0.011	0.011	0.00005
ADWG Guidelines - Aesthetic	6.5-8.5	900	0.2	-	250	-	0.1	180	250	3	-	-	-	-	1	-	-	-	-	-
ADWG Guidelines - Health	-	-	-	-	-	-	0.5	-	-	-	0.01	0.002	0.05	-	2	0.01	0.001	0.02	0.01	0.1
Isacc River Sub-basin - Irrigation	-	-	20	-	-	-	10	-	-	5	2	0.05	1	0.1	5	5	0.002	2	0.05	-
Isacc River Sub-basin - Stock	-	7500	5	1000	-	2000	-	-	1000	20	0.5	0.01	1	1	1	0.1	0.002	1	0.02	-
Statistics																				
Count	9	9	8	9	9	9	8	9	9	9	8	8	7	9	7	7	9	8	8	7
Percent of LOR	0	0	100	0	0	0	0	0	0	11	13	100	86	11	71	100	100	0	100	100
Date from	01-06-2020	19-06-2020	19-06-2020	19-06-2020	19-06-2020	19-06-2020	15-09-2020	19-06-2020	19-06-2020	19-06-2020	15-09-2020	19-06-2020	15-09-2020	19-06-2020	19-06-2020	15-09-2020	19-06-2020	15-09-2020	19-06-2020	19-06-2020
Date to	01-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022
Minimum	6.7	10600	0.01	166	3840	165	0.403	2420	246	0.005	0.003	0.0001	0.001	0.002	0.001	0.001	0.0001	0.006	0.01	0.001
5th percentile	6.8	11240	0.01	175	3852	169	0.404	2464	281.6	0.009	0.003	0.0001	0.001	0.002	0.001	0.001	0.0001	0.007	0.01	0.001
20th percentile	6.8	12320	0.01	220	3894	178	0.410	2536	407.6	0.021	0.003	0.0001	0.001	0.002	0.001	0.001	0.0001	0.012	0.01	0.001
Median	6.9	14200	0.01	310	3960	226	0.539	2990	1360	0.047	0.008	0.0001	0.001	0.005	0.001	0.001	0.0001	0.019	0.01	0.001
80th percentile	7.0	16600	0.01	520	4300	414	1.014	3500	3452	0.093	0.021	0.0001	0.001	0.017	0.0018	0.001	0.0001	0.029	0.01	0.001
95th percentile	7.1	18640	0.01	630	4360	465	1.475	3842	3980	0.108	0.033	0.0001	0.001	0.024	0.002	0.001	0.0001	0.040	0.01	0.001
Maximum	7.1	19600	0.01	699	4400	496	1.640	4030	4280	0.114	0.037	0.0001	0.001	0.028	0.002	0.001	0.0001	0.046	0.01	0.001
Trigger derivation considerations																				
Trigger Development not possbile due less than 8 samples													x		x	x				x
Trigger Development not possbile due to more than 15% of values <LOR			x									x	x		x	x	x		x	x
Trend (after outlier removal)		decreasing		decreasing		decreasing	decreasing	decreasing	decreasing		decreasing			decreasing						
Proposed Trigger Limits																				
Limit A (80th Percentile)																				
Limit B (95th Percentile) or applicable guidleline	6.5-8.5	18640	0.055	630	4360	465	1.48	3842	3980	0.11	0.03	0.0002	0.001	0.02	1	0.0034	0.0006	0.04	0.01	0.1

R2035

	Field pH	Electrical Conductivity (µS/cm)	Aluminium Dissolved (mg/L)	Calcium Dissolved (mg/L)	Chloride Dissolved (mg/L)	Magnesium Dissolved (mg/L)	Manganese Dissolved (mg/L)	Sodium Dissolved (mg/L)	Sulfate as SO4 - Turbidimetric	Zinc Dissolved (mg/L)	Arsenic Dissolved (mg/L)	Cadmium Dissolved (mg/L)	Chromium Dissolved (mg/L)	Cobalt Dissolved (mg/L)	Copper Dissolved (mg/L)	Lead Dissolved (mg/L)	Mercury Dissolved (mg/L)	Nickel Dissolved (mg/L)	Selenium Dissolved (mg/L)	Silver Dissolved (mg/L)
Water quality Guidelines																				
Isacc River Sub-basin - ANZECC 2000 - Aquatic 95% spp	6.5-8.5	-	0.055	-	-	-	1.9	-	-	0.008	0.024	0.0002	0.001	-	0.0014	0.0034	0.0006	0.011	0.011	0.00005
ADWG Guidelines - Aesthetic	6.5-8.5	900	0.2	-	250	-	0.1	180	250	3	-	-	-	-	1	-	-	-	-	-
ADWG Guidelines - Health	-	-	-	-	-	-	0.5	-	-	-	0.01	0.002	0.05	-	2	0.01	0.001	0.02	0.01	0.1
Isacc River Sub-basin - Irrigation	-	-	20	-	-	-	10	-	-	5	2	0.05	1	0.1	5	5	0.002	2	0.05	-
Isacc River Sub-basin - Stock	-	7500	5	1000	-	2000	-	-	1000	20	0.5	0.01	1	1	1	0.1	0.002	1	0.02	-
Statistics																				
Count	15	19	18	19	16	19	19	19	16	16	15	19	19	19	19	19	19	17	19	19
Percent of LOR	0	0	100	0	0	0	0	0	25	38	60	100	95	95	100	100	100	94	100	100
Date from	01-04-2019	28-02-2019	26-03-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-05-2019	26-03-2019	01-05-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	26-03-2019	28-02-2019	28-02-2019
Date to	01-12-2022	17-12-2022	17-12-2022	17-12-2022	14-06-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-09-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022	17-12-2022
Minimum	7.0	4100	0.01	44	1060	27	0.042	818	1	0.005	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
5th percentile	7.0	4208	0.01	45	1113	30	0.046	838	1	0.005	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
20th percentile	7.1	4290	0.01	66	1130	36	0.058	858	1	0.005	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Median	7.3	4680	0.01	77	1170	49	0.085	874	2	0.005	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
80th percentile	7.6	4828	0.01	127	1190	65	0.112	910	3	0.007	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
95th percentile	7.7	4884	0.01	144	1240	68	0.136	919	4	0.009	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Maximum	7.8	5100	0.01	170	1270	69	0.140	937	5	0.010	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Trigger derivation considerations																				
Trigger Development not possbile due less than 8 samples																				
Trigger Development not possbile due to more than 15% of values <LOR			x						x	x	x	x	x	x	x	x	x	x	x	x
Trend (after outlier removal)	increasing	decreasing		decreasing	decreasing	decreasing	decreasing		decreasing											
Proposed Trigger Limits																				
Limit A (80th Percentile)																				
Limit B (95th Percentile) or applicable guidleline	6.5-8.5	4884	0.055	144	1240	68	0.14	919	250	0.008	0.01	0.0002	0.001	0.1	0.0014	0.0034	0.0006	0.011	0.01	0.1

R2054

	Field pH	Electrical Conductivity (µS/cm)	Aluminium Dissolved (mg/L)	Calcium Dissolved (mg/L)	Chloride Dissolved (mg/L)	Magnesium Dissolved (mg/L)	Manganese Dissolved (mg/L)	Sodium Dissolved (mg/L)	Sulfate as SO4 - Turbidimetric	Zinc Dissolved (mg/L)	Arsenic Dissolved (mg/L)	Cadmium Dissolved (mg/L)	Chromium Dissolved (mg/L)	Cobalt Dissolved (mg/L)	Copper Dissolved (mg/L)	Lead Dissolved (mg/L)	Mercury Dissolved (mg/L)	Nickel Dissolved (mg/L)	Selenium Dissolved (mg/L)	Silver Dissolved (mg/L)
Water quality Guidelines																				
Isacc River Sub-basin - ANZECC 2000 - Aquatic 95% spp	6.5-8.5	-	0.055	-	-	-	1.9	-	-	0.008	0.024	0.0002	0.001	-	0.0014	0.0034	0.0006	0.011	0.011	0.00005
ADWG Guidelines - Aesthetic	6.5-8.5	900	0.2	-	250	-	0.1	180	250	3	-	-	-	-	1	-	-	-	-	-
ADWG Guidelines - Health	-	-	-	-	-	-	0.5	-	-	-	0.01	0.002	0.05	-	2	0.01	0.001	0.02	0.01	0.1
Isacc River Sub-basin - Irrigation	-	-	20	-	-	-	10	-	-	5	2	0.05	1	0.1	5	5	0.002	2	0.05	-
Isacc River Sub-basin - Stock	-	7500	5	1000	-	2000	-	-	1000	20	0.5	0.01	1	1	1	0.1	0.002	1	0.02	-
Statistics																				
Count	15	17	17	18	16	17	15	18	17	16	18	18	18	18	18	18	18	18	18	18
Percent of LOR	0	0	100	0	0	0	0	0	100	6	94	100	100	100	94	100	100	100	100	100
Date from	01-03-2019	28-02-2019	26-03-2019	28-02-2019	28-02-2019	28-02-2019	26-03-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019
Date to	01-12-2022	19-09-2022	19-09-2022	19-09-2022	19-09-2022	19-09-2022	19-09-2022	19-09-2022	19-09-2022	19-09-2022	19-09-2022	19-09-2022	19-09-2022	19-09-2022	19-09-2022	19-09-2022	19-09-2022	19-09-2022	19-09-2022	19-09-2022
Minimum	7.1	7650	0.01	81	2420	32	0.002	1460	1	0.005	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
5th percentile	7.1	7786	0.01	81	2458	33	0.002	1503	1	0.007	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
20th percentile	7.2	7954	0.01	88	2500	34	0.002	1548	1	0.007	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Median	7.3	8100	0.01	103	2545	35	0.002	1610	1	0.010	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
80th percentile	7.3	8244	0.01	136	2640	36	0.002	1666	1	0.012	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
95th percentile	7.3	8422	0.01	156	2673	36	0.003	1733	1	0.016	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Maximum	7.4	8470	0.01	179	2740	37	0.003	1750	1	0.017	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Trigger derivation considerations																				
Trigger Development not possbile due less than 8 samples																				
Trigger Development not possbile due to more than 15% of values <LOR			x						x		x	x	x	x	x	x	x	x	x	x
Trend (after outlier removal)				decreasing																
Proposed Trigger Limits																				
Limit A (80th Percentile)																				
Limit B (95th Percentile) or applicable guidleline	6.5-8.5	8422	0.055	156	2673	36	0.003	1733	250	0.02	0.01	0.0002	0.001	0.1	0.0014	0.0034	0.0006	0.011	0.01	0.1

R2055

	Field pH	Electrical Conductivity (µS/cm)	Aluminium Dissolved (mg/L)	Calcium Dissolved (mg/L)	Chloride Dissolved (mg/L)	Magnesium Dissolved (mg/L)	Manganese Dissolved (mg/L)	Sodium Dissolved (mg/L)	Sulfate as SO4 - Turbidimetric	Zinc Dissolved (mg/L)	Arsenic Dissolved (mg/L)	Cadmium Dissolved (mg/L)	Chromium Dissolved (mg/L)	Cobalt Dissolved (mg/L)	Copper Dissolved (mg/L)	Lead Dissolved (mg/L)	Mercury Dissolved (mg/L)	Nickel Dissolved (mg/L)	Selenium Dissolved (mg/L)	Silver Dissolved (mg/L)
Water quality Guidelines																				
Isacc River Sub-basin - ANZECC 2000 - Aquatic 95% spp	6.5-8.5	-	0.055	-	-	-	1.9	-	-	0.008	0.024	0.0002	0.001	-	0.0014	0.0034	0.0006	0.011	0.011	0.00005
ADWG Guidelines - Aesthetic	6.5-8.5	900	0.2	-	250	-	0.1	180	250	3	-	-	-	-	1	-	-	-	-	-
ADWG Guidelines - Health	-	-	-	-	-	-	0.5	-	-	-	0.01	0.002	0.05	-	2	0.01	0.001	0.02	0.01	0.1
Isacc River Sub-basin - Irrigation	-	-	20	-	-	-	10	-	-	5	2	0.05	1	0.1	5	5	0.002	2	0.05	-
Isacc River Sub-basin - Stock	-	7500	5	1000	-	2000	-	-	1000	20	0.5	0.01	1	1	1	0.1	0.002	1	0.02	-
Statistics																				
Count	14	19	19	19	18	18	18	19	19	17	19	19	19	19	19	19	19	18	19	19
Percent of LOR	0	0	100	0	0	0	0	0	100	12	100	100	100	100	95	100	100	100	100	100
Date from	01-04-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019	28-02-2019
Date to	01-12-2022	18-12-2022	18-12-2022	18-12-2022	18-12-2022	18-12-2022	18-12-2022	18-12-2022	18-12-2022	18-12-2022	18-12-2022	18-12-2022	18-12-2022	18-12-2022	18-12-2022	18-12-2022	18-12-2022	18-12-2022	18-12-2022	18-12-2022
Minimum	6.9	7660	0.01	86	2440	105	0.007	1390	1	0.005	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
5th percentile	6.9	7687	0.01	91	2449	108	0.008	1399	1	0.005	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
20th percentile	6.9	7990	0.01	119	2498	109	0.008	1446	1	0.008	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Median	7.0	8200	0.01	138	2585	113	0.010	1480	1	0.011	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
80th percentile	7.1	8358	0.01	192	2646	117	0.011	1544	1	0.017	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
95th percentile	7.2	8447	0.01	218	2675	121	0.012	1593	1	0.027	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Maximum	7.2	8600	0.01	250	2700	122	0.013	1620	1	0.037	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Trigger derivation considerations																				
Trigger Development not possbile due less than 8 samples																				
Trigger Development not possbile due to more than 15% of values <LOR			x						x		x	x	x	x	x	x	x	x	x	x
Trend (after outlier removal)				decreasing				increasing												
Proposed Trigger Limits																				
Limit A (80th Percentile)																				
Limit B (95th Percentile) or applicable guidleline	6.5-8.5	8447	0.055	218	2675	121	0.01	1593	250	0.03	0.01	0.0002	0.001	0.1	0.0014	0.0034	0.0006	0.011	0.01	0.1

Winnet Bore

	Field pH	Electrical Conductivity (µS/cm)	Aluminium Dissolved (mg/L)	Calcium Dissolved (mg/L)	Chloride Dissolved (mg/L)	Magnesium Dissolved (mg/L)	Manganese Dissolved (mg/L)	Sodium Dissolved (mg/L)	Sulfate as SO4 - Turbidimetric	Zinc Dissolved (mg/L)	Arsenic Dissolved (mg/L)	Cadmium Dissolved (mg/L)	Chromium Dissolved (mg/L)	Cobalt Dissolved (mg/L)	Copper Dissolved (mg/L)	Lead Dissolved (mg/L)	Mercury Dissolved (mg/L)	Nickel Dissolved (mg/L)	Selenium Dissolved (mg/L)	Silver Dissolved (mg/L)
Water quality Guidelines																				
Isacc River Sub-basin - ANZECC 2000 - Aquatic 95% spp	6.5-8.5	-	0.055	-	-	-	1.9	-	-	0.008	0.024	0.0002	0.001	-	0.0014	0.0034	0.0006	0.011	0.011	0.00005
ADWG Guidelines - Aesthetic	6.5-8.5	900	0.2	-	250	-	0.1	180	250	3	-	-	-	-	1	-	-	-	-	-
ADWG Guidelines - Health	-	-	-	-	-	-	0.5	-	-	-	0.01	0.002	0.05	-	2	0.01	0.001	0.02	0.01	0.1
Isacc River Sub-basin - Irrigation	-	-	20	-	-	-	10	-	-	5	2	0.05	1	0.1	5	5	0.002	2	0.05	-
Isacc River Sub-basin - Stock	-	7500	5	1000	-	2000	-	-	1000	20	0.5	0.01	1	1	1	0.1	0.002	1	0.02	-
Statistics																				
Count	15	14	14	15	14	13	15	13	15	15	16	15	15	15	14	16	16	15	15	15
Percent of LOR	0	0	100	0	0	0	0	0	0	40	88	100	93	67	93	94	100	0	100	100
Date from	01-05-2019	28-07-2019	28-05-2019	28-05-2019	28-07-2019	28-05-2019	28-05-2019	26-09-2019	28-05-2019	28-05-2019	28-05-2019	28-05-2019	28-05-2019	28-05-2019	28-05-2019	28-05-2019	28-05-2019	28-05-2019	28-05-2019	28-05-2019
Date to	01-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022	15-12-2022
Minimum	6.5	2420	0.01	94	481	97	0.11	297	70	0.005	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
5th percentile	6.5	2466	0.01	94	506	97	0.11	302	71	0.005	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
20th percentile	6.6	2524	0.01	102	527	100	0.16	315	76	0.005	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.001	0.01	0.001
Median	6.8	2765	0.01	111	576	104	0.24	338	84	0.008	0.001	0.0001	0.001	0.001	0.001	0.001	0.0001	0.002	0.01	0.001
80th percentile	6.9	2906	0.01	118	658	109	0.36	366	94	0.0152	0.001	0.0001	0.001	0.002	0.001	0.001	0.0001	0.002	0.01	0.001
95th percentile	7.1	3111	0.01	124	774	115	0.45	374	99	0.0173	0.001	0.0001	0.001	0.0023	0.001	0.001	0.0001	0.003	0.01	0.001
Maximum	7.2	3260	0.01	132	790	122	0.53	378	102	0.018	0.001	0.0001	0.001	0.003	0.001	0.001	0.0001	0.004	0.01	0.001
Trigger derivation considerations																				
Trigger Development not possbile due less than 8 samples																				
Trigger Development not possbile due to more than 15% of values <LOR			x							x	x	x	x	x	x	x	x		x	x
Trend (after outlier removal)																				
Proposed Trigger Limits																				
Limit A (80th Percentile)																				
Limit B (95th Percentile) or applicable guidleline	6.5-8.5	3111	0.055	124	774	115	0.45	374	99	0.02	0.01	0.0002	0.001	0.1	0.0014	0.0034	0.0006	0.003	0.01	0.1

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