REPORT ON

VULCAN COMPLEX PROJECT
GROUNDWATER QUALITY TRIGGER ASSESSMENT

For: Vitrinite Pty Ltd

Project number: 4080
Date: 07/04/2021

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Vulcan Complex Project – Groundwater Quality Trigger Assessment

Prepared for

Vitrinite Pty Ltd

1. Introduction

Mining & Energy Technical Services Pty Ltd (METServe) has been engaged by Queensland Coking Coal Pty Ltd (Vitrinite) to manage the environmental approvals process for the Vulcan Complex Project (VCP, or the project). The project is located approximately 15 km south of Moranbah, Queensland.

hydrogeologist.com.au was engaged by METServe, on behalf of Vitrinite, to develop triggers for groundwater levels and groundwater quality for inclusion in the environmental authority (EA) application for the project.

2. Groundwater monitoring bores

The monitoring bore network installed at the project is detailed below in Table 2.1, and shown in Figure 2.1.

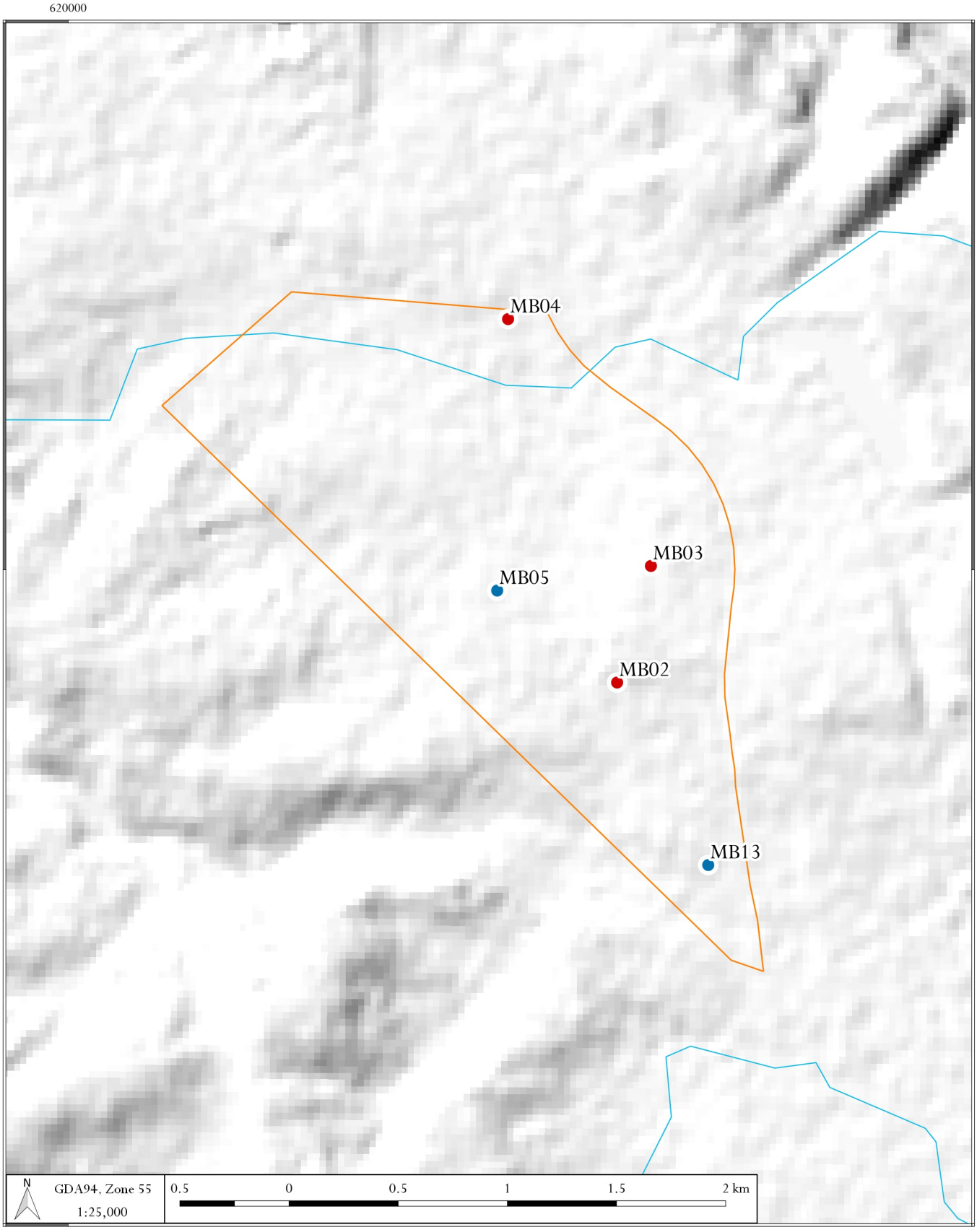
Table 2.1 Details of the VCP groundwater monitoring bore network

Bore	Latitude (GDA94)	Longitude (GDA94)	Aquifer	Monit. Unit	Surface RL (mAHD)	Depth (mbGL)	Monitoring frequency
MB02	-22.29096	148.1893	Moranbah CM	DLL coal seam[1]	254.69	12.0	N/A (removed)
MB03	-22.28611	148.1907	Moranbah CM	DLL coal seam[1]	257.68	33.8	N/A (dry)
MB04	-22.27597	148.1843	Moranbah CM	DLL coal seam[1]	243.28	21.5	Daily (groundwater levels) Quarterly (groundwater quality)
MB05	-22.28721	148.1839	Back Creek Group	MAT coal seam[2]	252.70	40.9	Daily (groundwater levels) Quarterly (groundwater quality)
MB13	-22.29849	148.1934	Back Creek Group	MAT coal seam[2]	223.13	35	Daily (groundwater levels) Quarterly (groundwater quality)

1 - DLL Seam – Dysart Lower Lower seam

2 - MAT – Matilda seam

MB02 has since been removed and is no longer part of the groundwater monitoring network. MB02 was replaced by MB13 in February 2021. Monitoring bore MB03 has been consistently dry since installation, and as such, no trigger limits have been developed for groundwater levels or groundwater quality for this bore.



LEGEND

- MAT seam
- DLL seam
- Mining lease application area

DATE
06/04/2021

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Vulcan Complex Project - Groundwater Quality Trigger Assessment (4080)

Groundwater monitoring bore network

FIGURE No.
2.1

©2021 Oasis Hydrogeology Pty Ltd - trading as hydrogeologist.com.au
Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.
Based on or contains data provided by the State of Queensland [2019]
Z:\4000_Projects\4080_METServe_VCP Triggers\3_GIS\3_11_Workspaces_QGIS\01_4080_Groundwater monitoring bore network.qgz

3. Groundwater levels

3.1. Methodology

The methodology to determine the proposed groundwater level trigger thresholds included:

- determining the pre-mining baseline level for each monitoring bore;
- calculating the seasonal variation in the groundwater levels for each monitoring bore; and
- extracting the predicted groundwater drawdown for each monitoring bore from the numerical model.

Groundwater level trigger thresholds were not developed for MB03 due to this monitoring bore being consistently dry since installation.

The pre-mining baseline for each bore was determined as the groundwater level seen in the most recent round of groundwater level measurements, which was conducted over late February to early March 2021. The seasonal variation in groundwater levels seen in each bore was also calculated as the variation seen in groundwater levels over the pre-mining data collection period (June 2019 to February 2021). This was not done for MB13, as the bore was installed in February 2021. Instead, the seasonality calculated for MB05 (also screened within the Matilda coal seam) was applied to MB13.

The predicted drawdown seen in the numerical model developed for the project (**hydrogeologist.com.au**, 2020) was extracted for the location of each monitoring bore. As the locations of the monitoring bores are predicted to have little to no drawdown, a minimum 0.2 m drawdown value was applied. The groundwater level trigger threshold was then calculated as the pre-mining baseline level minus the seasonal variation and predicted drawdown.

3.2. Proposed groundwater level trigger values

The proposed groundwater level trigger thresholds are listed below in Table 3.1.

Table 3.1 Proposed groundwater level trigger thresholds

Monitoring location	Aquifer	Pre-mining baseline level (mAHD)	Groundwater level trigger threshold (mAHD)
MB04	DLL coal seam[1]	237.70	236.27
MB05	MAT coal seam[2]	237.13	234.86
MB13*	MAT coal seam[2]	202.71	200.44

** Threshold for MB13 to be reviewed once construction details are provided. 0.7 m stick-up assumed.*

1 - DLL Seam – Dysart Lower Lower seam

2 - MAT – Matilda seam

4. Groundwater quality

4.1. Methodology

The methodology to determine the proposed groundwater quality trigger levels included:

- collating the available groundwater quality data from the groundwater monitoring bores;
- analysing the available groundwater data and developing summary statistics for each individual bore listed in the UWMP, and each aquifer or geological formation monitored by the groundwater monitoring bores (i.e., Dysart Lower Lower (DLL) coal seam and the Matilda (MAT) coal seam);
- comparing the summary statistics to published groundwater quality objectives that are designed to protect environmental values associated with the local groundwater regime; and
- developing groundwater quality triggers that address the environmental protection requirements of an EA condition.

The following sections provide additional information on methodology.

4.1.1. Data collation and statistical analysis

A total of four groundwater monitoring bores are currently installed in and around the project (as shown above in Figure 2.1). Of the four bores, one (MB03) is consistently dry and no groundwater quality samples have been collected from this bore. MB13 was installed in February 2021 and has only one sample result available to date. Groundwater samples were regularly collected from the remaining two bores (initially at monthly intervals for the six months after bore installation, and at quarterly (3 monthly) intervals since). A total of 11 sampling events have been conducted at VCP.

Twenty-three (23) groundwater quality samples were collected from 11 sampling events at the project between June 2019 and February 2021. Each sample was measured in the field for pH and electrical conductivity (EC) and submitted for laboratory analysis for major ions and total and dissolved metals. Total petroleum hydrocarbons (TPH) were added to the analysis suite from December 2020.

Duplicate sample results were removed from the dataset prior to analysis. Where groundwater quality sample results were below the relevant limit of reporting (LOR), a value of one half the relevant LOR was instead substituted for the statistical analysis. Summary statistics for each analyte (per bore and per aquifer) are shown in Appendix A.

4.1.2. Review of applicable water quality objectives

The *Environmental Protection Act* (EP Act) establishes an Environmental Protection Policy (EPP) for water. The Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (Qld) (EPP Water) provides a framework for the protection of environmental values (i.e. surface water uses) associated with Queensland rivers, streams, wetlands, lakes, aquifer, estuaries and coastal areas. Under this framework, environmental values for specific catchments and drainage basins have been formalised through a process of statutory declaration. Environmental values formalised in this way are listed in Schedule 1 of the EPP Water. The published groundwater environmental values for the Isaac River sub-basin include aquatic ecosystems, recreational use, agriculture (irrigation, farm supply, stock water), drinking water supply and cultural values.

The EPP Water provides groundwater quality objectives for the protection of high ecological value groundwater ecosystems and drinking water. However, it should be noted that there are no high ecological value groundwater ecosystems present within the vicinity of the project.

While the VCP is located outside the extent of the Fitzroy Basin groundwater zones, box and whisker plots comparing the measured groundwater quality of the bores against the aquatic ecology groundwater quality objectives for Zone 34 are shown in Appendix B for comparative purposes. The boxes represent the 25th to 75th percentile and medians of the data, while the whiskers represent the minimum or maximum value that falls within 1.5 times the interquartile range (75th percentile minus the 25th percentile). The results for the monitoring bores are compared against the regional groundwater quality objectives for deep groundwater (greater than 30 m below surface), in line with the depth at which groundwater is intersected in the monitoring bores. While groundwater in MB04 is within 30 m of the surface ("shallow"), it was considered appropriate to apply the deep groundwater quality objectives.

Groundwater in the monitoring bores is consistently more acidic that the relevant regional values, and MB05 exceeds the regional groundwater quality objectives for bicarbonate (HCO_3). On this basis, the application of the regional groundwater quality objectives is not considered appropriate.

4.1.3. Water quality characteristics

The groundwater quality characteristics of the monitoring bores are illustrated below in Figure 4.1. The Piper diagram indicates that groundwater is generally of a sodium chloride type. There does not appear to be an obvious relationship between the aquifer and groundwater quality, with each bore plotting in different locations in the Piper diagram. Monitoring bores MB05 and MB13, which both target the MAT seam, show differing groundwater characteristics which indicates a low degree of connectivity between bores screened within the same aquifer.

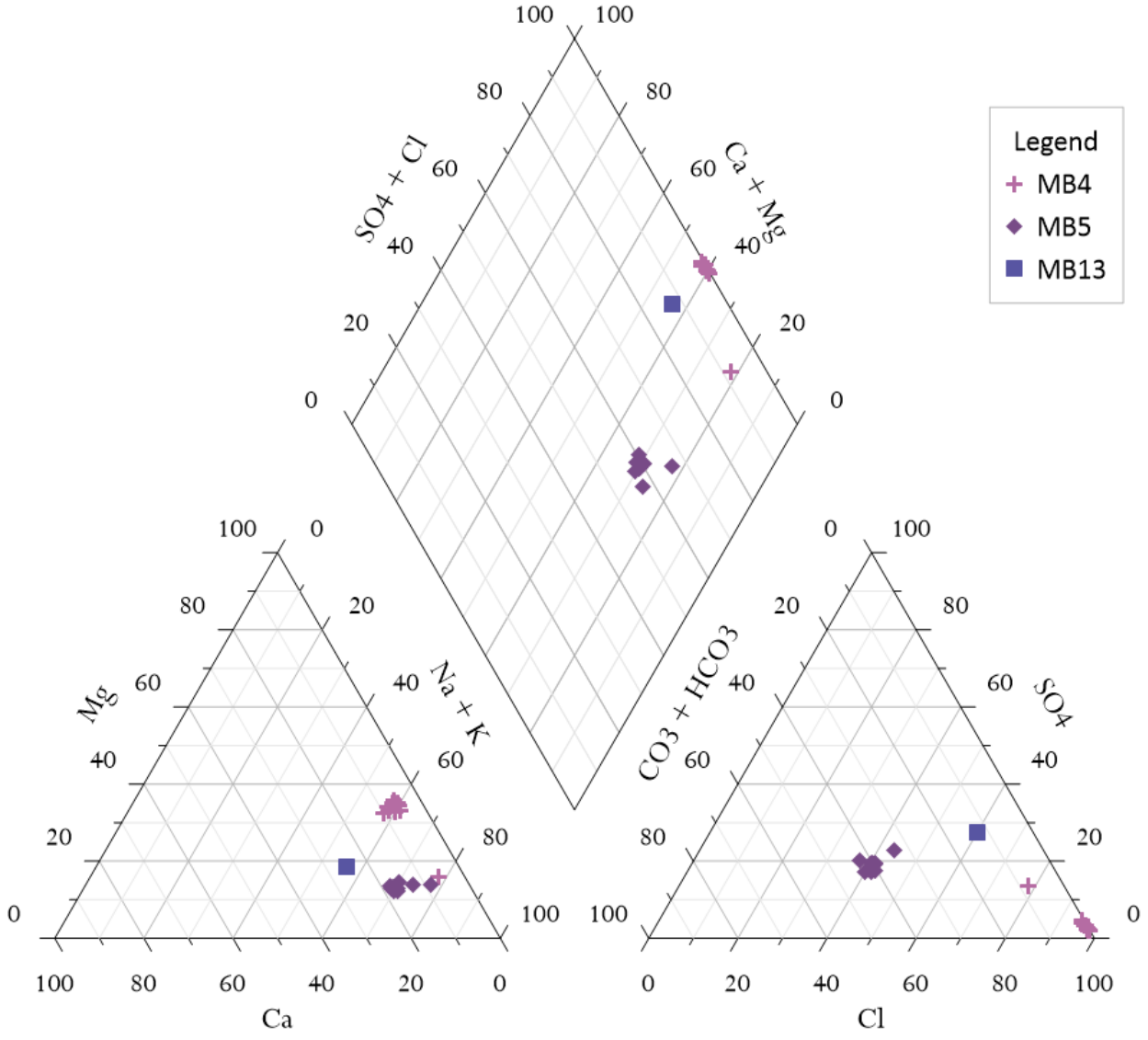


Figure 4.1 Piper diagram for groundwater monitoring bores

4.1.4. Development of groundwater quality triggers

Reference bores were not considered in determining the compliance approach, as pre-mining baseline data is not available for multiple bores within each aquifer. Additionally, the ionic composition between bores, both within the same aquifer and between different aquifers, varies. For these reasons, comparison between compliance and reference bores is not considered feasible. Instead, the recommended compliance approach outlined in DES (2021) was followed. Individual intra-bore control limits were derived for each bore.

Trigger values were not developed for MB03 due to this monitoring bore being consistently dry over the data collection period. Proposed trigger values were not developed for MB13 due to the collection of only a single sample from the monitoring bore to date. However, trigger values for MB13 can be developed once sufficient water quality data becomes available. Groundwater quality trigger vales for MB13 are listed as 'to be confirmed' (TBC).

Proposed trigger values for MB04 and MB05 were developed for field pH and EC, sulphate, aluminium, arsenic, iron, lead, mercury, molybdenum, selenium and total petroleum hydrocarbons (both TPH C6-C9 and TPH C10-C36). Trigger values were not developed for every groundwater quality parameter analysed. Parameters such as potassium, magnesium and calcium are not considered as contaminants to the local receiving environment, and the proposed trigger value for EC can instead be used as a proxy for these parameters. Additionally, some metals analysed for at VCP routinely return results below LOR and are not considered worthwhile to include in the proposed trigger values.

The proposed trigger values for EC, major ions and metals/metalloids are based on the applicable 80th percentile values and are assessed against a rolling median (50th percentile) of the last eight consecutive sample results exceeding the trigger values for each bore.

The proposed trigger values for pH are based on the applicable 5th/95th percentile values and are assessed against a rolling median (50th percentile) of the last eight consecutive sample results exceeding the trigger values for each bore. While **hydrogeologist.com.au** considered the use of the applicable 20th/80th percentile values, it was considered likely that the range of allowable pH values was too narrow to be practicable, and that the application of the 5th/95th percentile values were more appropriate.

4.2. Proposed groundwater quality trigger values

The proposed groundwater quality triggers are listed below in Table 4.1.

Table 4.1 Proposed groundwater quality trigger values

Analyte	Unit	MB04	MB05	MB13
pH (field)	-	5.41 – 5.92	6.76 – 7.30	TBC
EC (field)	µS/cm	12,741	2,754	TBC
SO_4	mg/L	175	262	TBC
Aluminium (total)	mg/L	4.15	4.16	TBC
Arsenic (total)	mg/L	0.002	0.001	TBC
Iron (total)	mg/L	262.60	2.28	TBC
Lead (total)	mg/L	0.008	0.008	TBC
Mercury (total)	mg/L	0.0006*	0.0006*	TBC
Molybdenum (total)	mg/L	0.034*	0.034*	TBC
Selenium (total)	mg/L	0.011*	0.011*	TBC
TPH C6-C9	µg/L	< 20	< 20	TBC
TPH C10-C36	µg/L	< 50	< 50	TBC

** Note: ANZG (2018) guideline values.*

Appendix C presented the control charts for each monitoring bore. Each control chart comprises the available data for each bore, the rolling median and the proposed trigger values for each groundwater quality parameter. The control charts show that the groundwater quality is typically within (in relation to pH) or below the proposed trigger values. Where exceedances occur, this is due to the influence of elevated groundwater quality parameter results due to the bore installation process.

In line with the DES guidelines (2021), where metalloid analytes have consistently returned values below the LOR, the ANZG (2018) guideline values for the 95% level of species protection have been applied. For TPH (both C6-C9 and C10-C32), the LOR has been applied as the proposed trigger value, due to the ANZG (2018) guideline value for TPH (7 µg/L) being significantly lower than can currently be detected. It is recommended that once enough results above the LOR have been collected for mercury, molybdenum, selenium and TPH, site specific trigger values can be calculated.

5. Impacts of EA application changes

Optimisation of the open cut pit shell has resulted in an increase of the pit extent to the north and south and a reduction in the pit footprint to the east and west, in comparison to the previously proposed pit shells that were incorporated into the numerical groundwater model developed for the project (**hydrogeologist.com.au**, 2020). The changes to the open pit shell also resulted in revisions to the site layout (altering the locations of various ancillary infrastructure such as offices, workshops and ROM location).

The drawdown seen in the numerical model in the vicinity of the project is considered to be minor (<2 m drawdown) and is heavily influenced by the presence of the adjoining Saraji Mine. **hydrogeologist.com.au** considers that the changes to the mine footprint proposed are unlikely to result in greater levels of inflow into the mine than were initially predicted in the numerical model. As such, **hydrogeologist.com.au** considers that there is a negligible risk that the changes to the mine footprint result in greater levels of groundwater drawdown than were initially predicted in the numerical model.

Additionally, the changes in the proposed mine footprint are unlikely to affect groundwater system to the extent that groundwater quality will be negatively impacted. As such, **hydrogeologist.com.au** consider that there is negligible risk to the groundwater quality as a result of the changes to the mine footprint.

6. Trigger suitability for mine closure

The proposed interim groundwater quality triggers have been designed to detect change in groundwater quality that has the potential to impact the environmental values associated with groundwater in the region. As the proposed triggers are based on information collected prior to any mining activity occurring, they represent the baseline groundwater quality conditions currently present within the VCP. Assuming that there is no impact to groundwater quality from the project, the proposed groundwater triggers would be considered suitable to apply in mine closure.

However, the triggers should be reviewed in the future, as future sampling may indicate changes in groundwater quality that require the trigger values as proposed to be amended or altered as required. The installation or addition of new bores to the groundwater monitoring network would also warrant review of the proposed groundwater trigger values.

7. Conclusion

The proposed groundwater quality trigger values for the Vulcan Complex Project are based on the results of long-term groundwater monitoring across the installed monitoring bores. The proposed trigger values are robust, technically justifiable and have been derived in consideration of government guidelines (DSITI, 2017 and DES, 2021). In addition, the observed groundwater quality lies within or below the predicted trigger values.

Adoption of the proposed groundwater quality trigger values will:

- prevent groundwater quality results consistent with, or better than long-term groundwater quality from exceeding the proposed trigger values, and
- allow any changes in groundwater quality to be identified, assessed and investigated in accordance with any EA requirements imposed.

8. References

ANZG (2018). Australian and New Zealand guidelines for fresh and marine water quality. Accessed from www.waterquality.gov.au/anz-guidelines. Australian and New Zealand Governments and Australia state and territory governments, Canberra.

DES (2021). Using monitoring data to assess groundwater quality and potential environmental impacts. Version 2. Department of Environment and Science (DES), Queensland Government, Brisbane.

hydrogeologist.com.au (2020). Vulcan Mine Extension – Groundwater Impact Assessment. Prepared for Vitrinite Pty Ltd. October 2020.

Appendix A Observed water quality – Statistical summary

MB4 (DLL Seam) – statistical summary for observed water quality parameters

	unit	LOR	# val	min	5th perc.	10th perc.	20th perc.	50th perc.	mean	80th perc.	90th perc.	95th perc.	max	σ
pH (field)	-	0.01	9	5.33	5.41	5.50	5.61	5.75	5.72	5.86	5.91	5.92	5.93	0.19
EC (field)	µS/cm	1	9	9346	9412	9477	10049	11709	11347	12741	12784	12849	12913	1398
Ca	mg/L	1	11	26	67	108	122	132	131	158	160	161	162	39
Mg	mg/L	1	11	43	174	304	344	441	387	484	488	489	490	130
Na	mg/L	1	11	389	691	992	1050	1380	1263	1520	1540	1555	1570	355
K	mg/L	1	11	16	32	47	49	60	54	62	63	65	67	14
Bicarb. alkal. as $CaCO_3$	mg/L	1	11	8	10	12	21	27	34	33	53	81	108	27
SO_4	mg/L	1	11	113	115	116	131	152	149	175	176	176	176	23
Cl	mg/L	1	11	603	1617	2630	3270	4190	3656	4360	4550	4565	4580	1178
Al total	mg/L	0.01	10	2.23	2.35	2.47	2.53	3.02	3.35	4.15	4.44	4.78	5.11	0.97
As total	mg/L	0.001	11	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.003	0.004	0.001
Fe total	mg/L	0.05	10	151.00	156.85	162.70	198.40	231.50	228.60	262.60	269.10	287.55	306.00	47.07
Pb total	mg/L	0.001	10	0.004	0.004	0.005	0.006	0.007	0.007	0.008	0.011	0.013	0.015	0.003
Hg total	mg/L	0.00010	11	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000
Mo total	mg/L	0.001	11	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000
Se total	mg/L	0.01	11	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
TPH (C6-C9)	µg/L	20	1	10	10	10	10	10	10	10	10	10	10	-
TPH (C10-C36)	µg/L	50	1	25	25	25	25	25	25	25	25	25	25	-

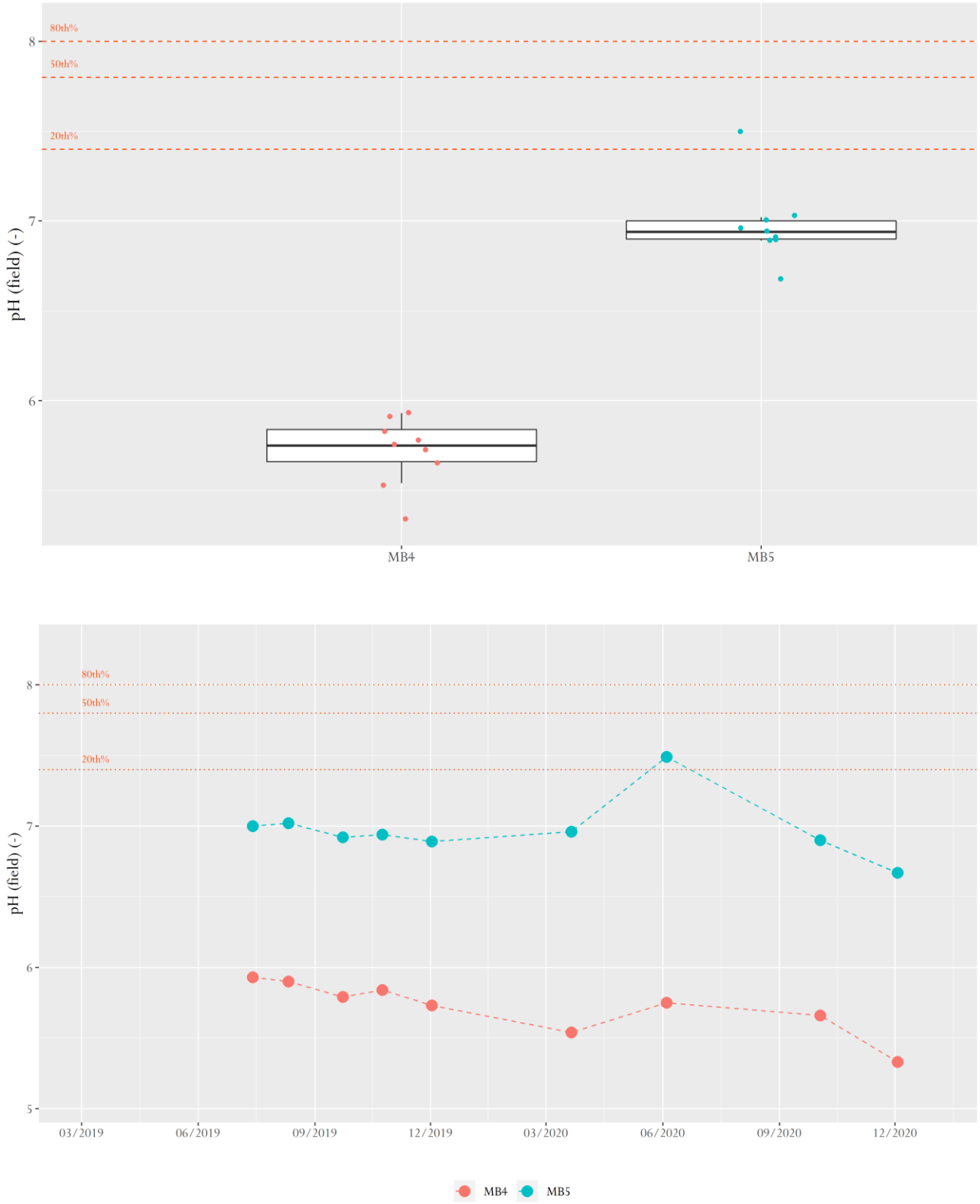
MB5 – statistical summary for observed water quality parameters

	unit	LOR	# val	min	5th perc.	10th perc.	20th perc.	50th perc.	mean	80th perc.	90th perc.	95th perc.	max	σ
pH (field)	-	0.01	9	6.67	6.76	6.85	6.90	6.94	6.98	7.01	7.11	7.30	7.49	0.22
EC (field)	µS/cm	1	8	2719	2719	2720	2720	2738	2737	2754	2755	2756	2757	16
Ca	mg/L	1	11	54	61	68	94	99	92	102	102	103	104	16
Mg	mg/L	1	11	39	42	44	44	45	46	48	51	54	57	5
Na	mg/L	1	11	416	421	426	435	445	457	467	513	524	534	36
K	mg/L	1	11	15	16	16	16	17	17	17	18	18	18	1
Bicarb. alkal. as $CaCO_3$	mg/L	1	11	550	574	597	637	676	671	720	734	750	766	62
SO_4	mg/L	1	11	196	210	224	240	251	250	262	274	284	293	26
Cl	mg/L	1	11	348	361	373	376	404	396	416	416	426	436	25
Al total	mg/L	0.01	11	0.65	1.04	1.43	2.03	2.52	3.11	4.16	4.66	6.21	7.76	1.92
As total	mg/L	0.001	11	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000
Fe total	mg/L	0.05	11	0.78	0.98	1.17	1.25	2.00	1.90	2.28	2.56	2.86	3.16	0.67
Pb total	mg/L	0.001	11	0.002	0.003	0.003	0.004	0.006	0.006	0.008	0.009	0.010	0.011	0.003
Hg total	mg/L	0.00010	11	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000
Mo total	mg/L	0.001	11	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000
Se total	mg/L	0.01	11	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
TPH (C6-C9)	µg/L	20	1	10	10	10	10	10	10	10	10	10	10	-
TPH (C10-C36)	µg/L	50	1	25	25	25	25	25	25	25	25	25	25	-

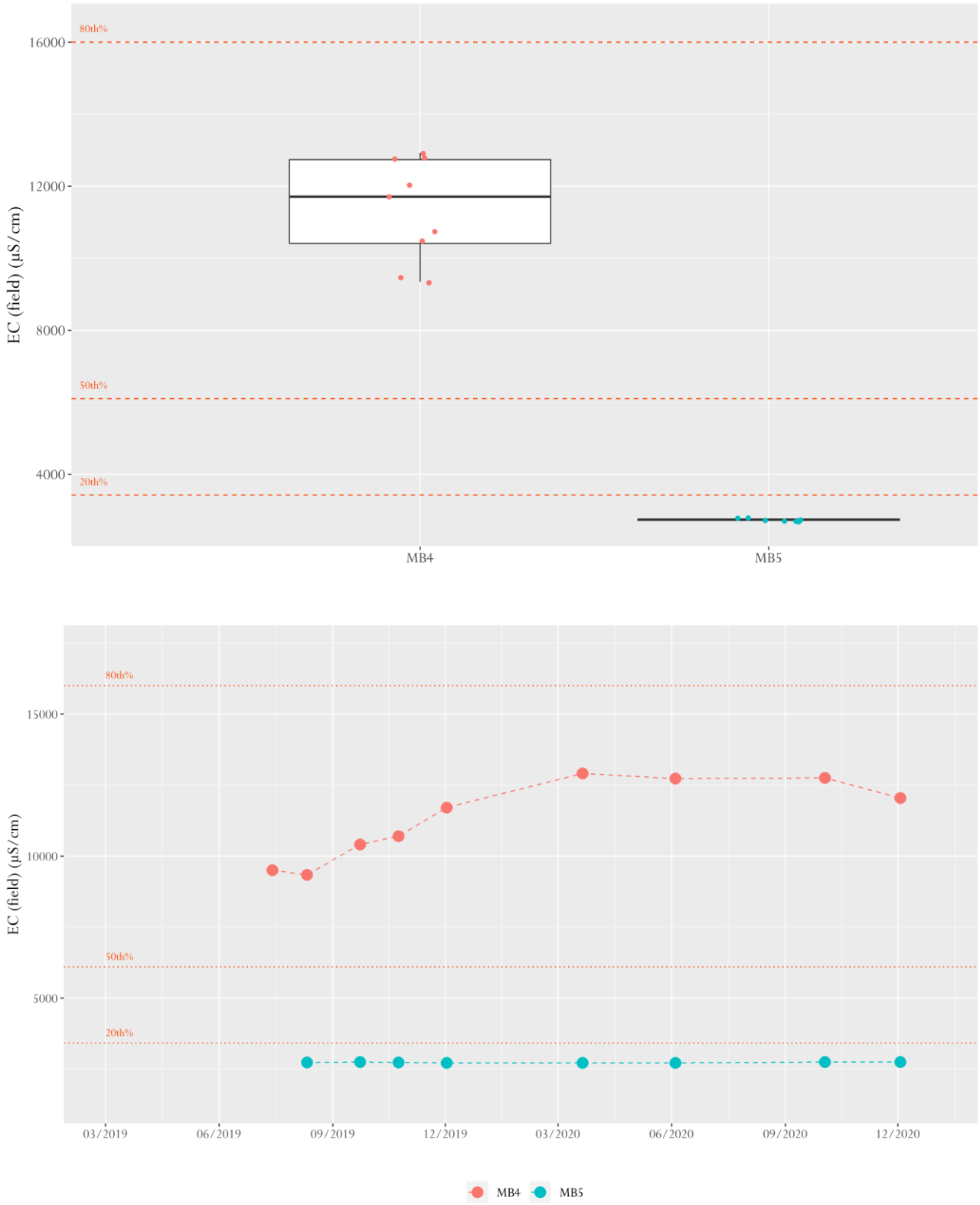
MAT seam (MB5, MB13) – statistical summary for observed water quality parameters

	unit	LOR	# val	min	5th perc.	10th perc.	20th perc.	50th perc.	mean	80th perc.	90th perc.	95th perc.	max	σ
pH (field)	-	0.01	9	6.67	6.76	6.85	6.90	6.94	6.98	7.01	7.11	7.30	7.49	0.22
EC (field)	µS/cm	1	8	2719	2719	2720	2720	2738	2737	2754	2755	2756	2757	16
Ca	mg/L	1	12	54	62	71	94	99	102	102	104	154	216	39
Mg	mg/L	1	12	39	42	44	44	46	50	50	56	75	96	15
Na	mg/L	1	12	416	422	427	435	451	465	504	532	539	545	43
K	mg/L	1	12	15	15	15	16	17	17	17	18	18	18	1
Bicarb. alkal. as $CaCO_3$	mg/L	1	12	338	455	555	605	676	643	716	733	748	766	113
SO_4	mg/L	1	12	196	211	226	240	255	277	272	291	422	579	98
Cl	mg/L	1	12	348	362	373	376	406	441	416	434	663	940	159
Al total	mg/L	0.01	12	0.44	0.56	0.73	1.55	2.48	2.88	4.03	4.61	6.06	7.76	1.99
As total	mg/L	0.001	12	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.003	0.001
Fe total	mg/L	0.05	12	0.78	0.84	0.92	1.19	1.96	1.82	2.25	2.53	2.83	3.16	0.70
Pb total	mg/L	0.001	12	0.001	0.001	0.002	0.003	0.006	0.006	0.008	0.009	0.010	0.011	0.003
Hg total	mg/L	0.0001	12	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000
Mo total	mg/L	0.001	12	0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.024	0.053	0.015
Se total	mg/L	0.01	12	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
TPH (C6-C9)	µg/L	20	2	10	10	10	10	10	10	10	10	10	10	-
TPH (C10-C36)	µg/L	50	2	25	25	25	25	25	25	25	25	25	25	-

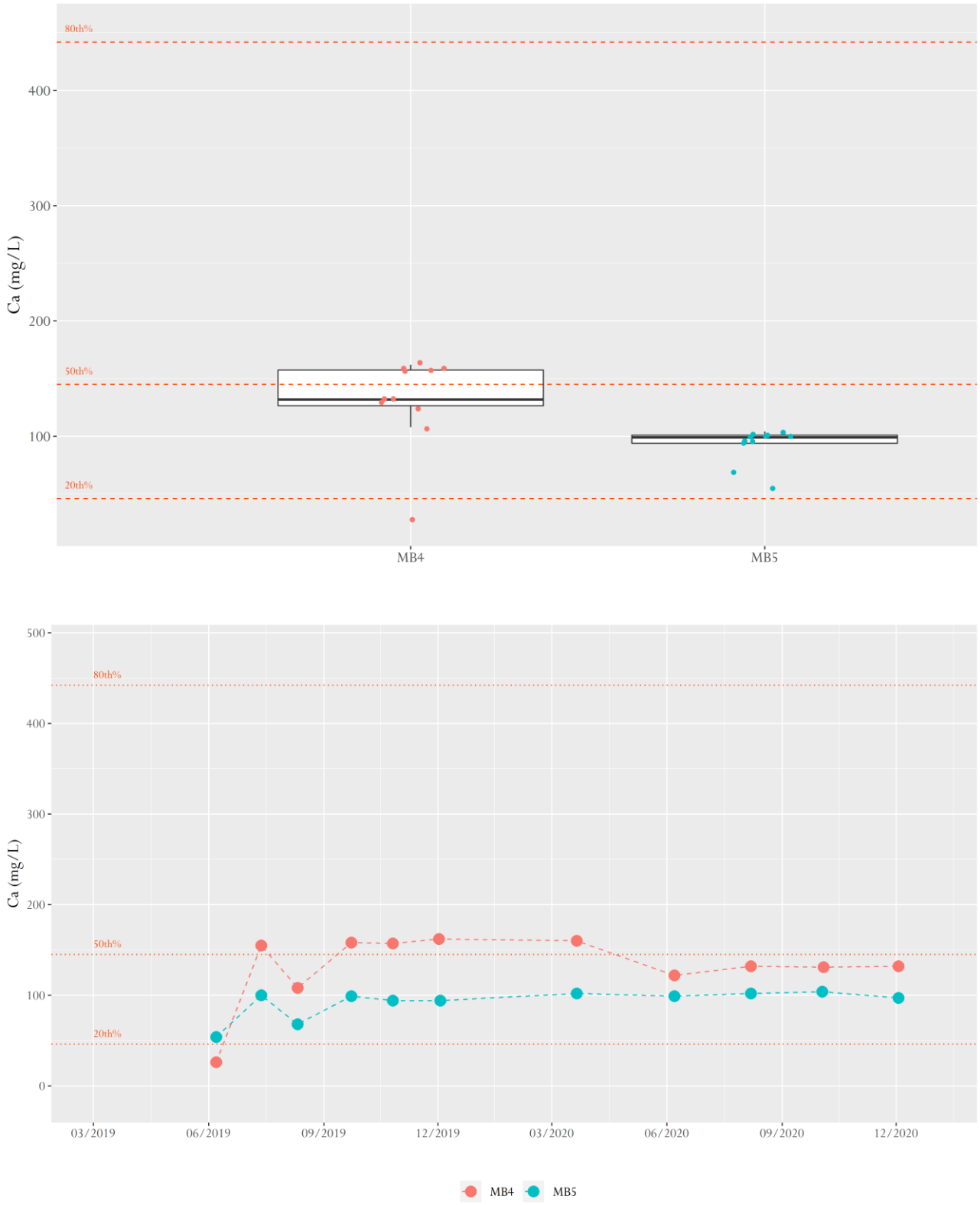
Appendix B Observed water quality plots



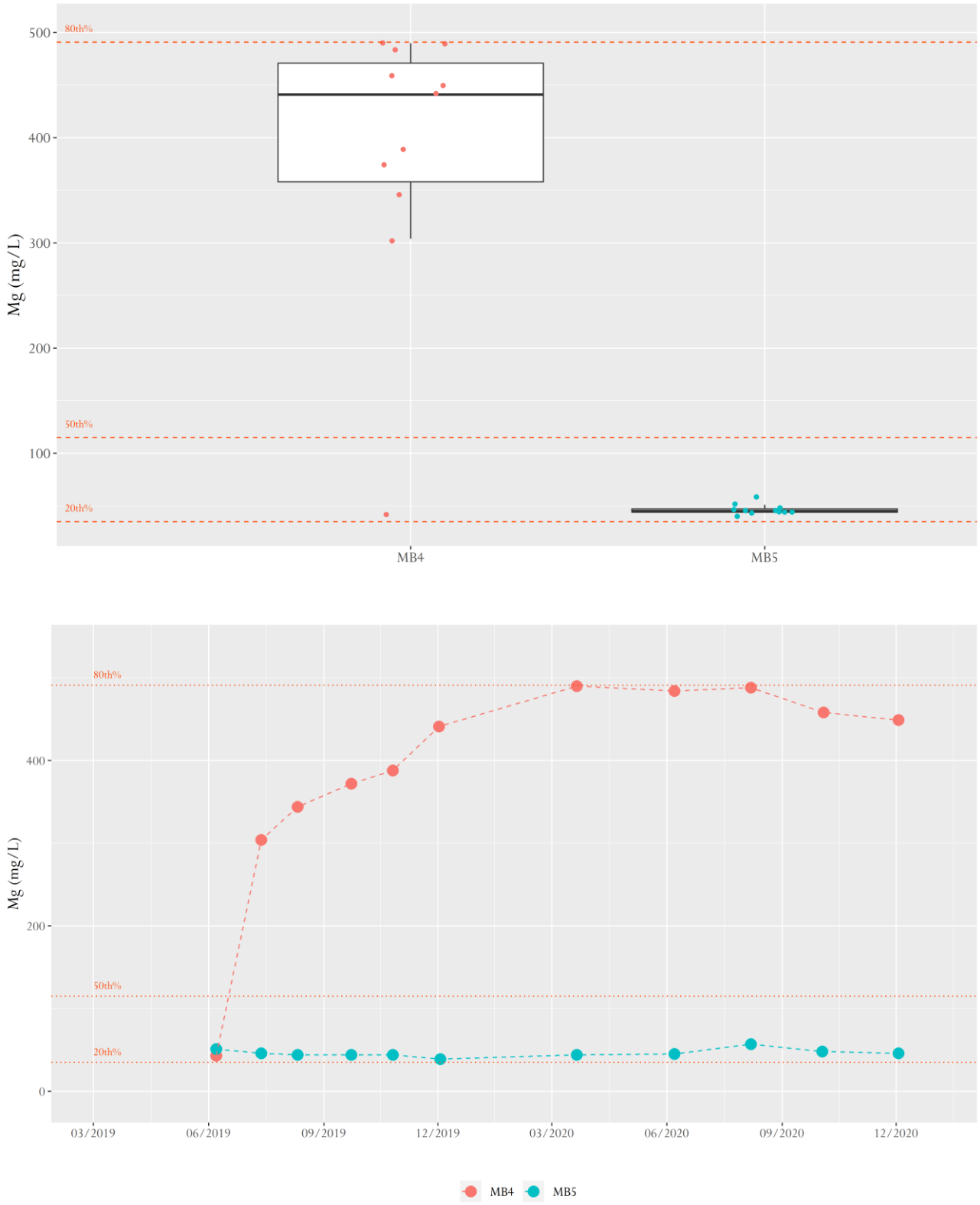
Field measured pH – boxplot and time series



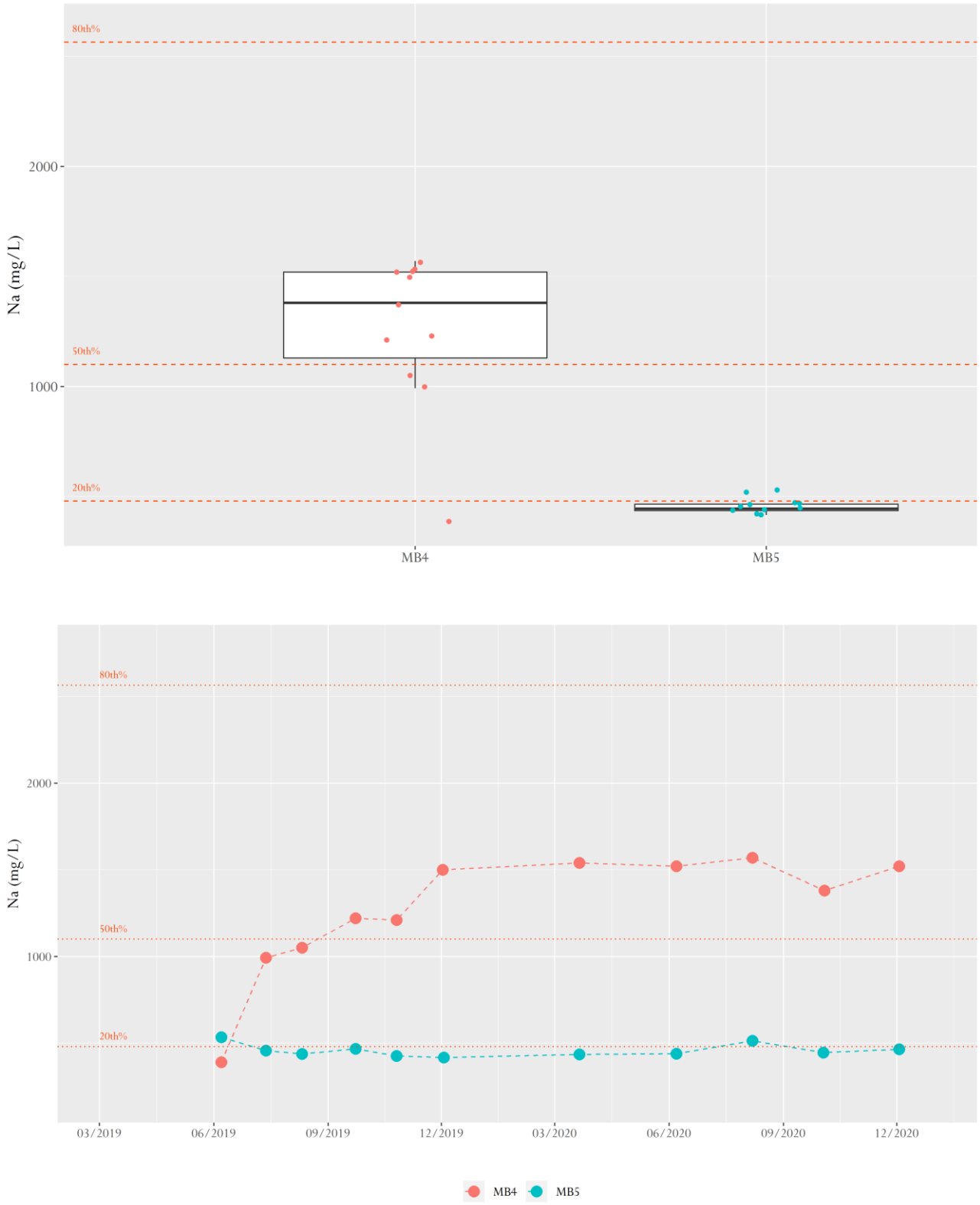
Field measured electric conductivity (EC) – boxplot and time series



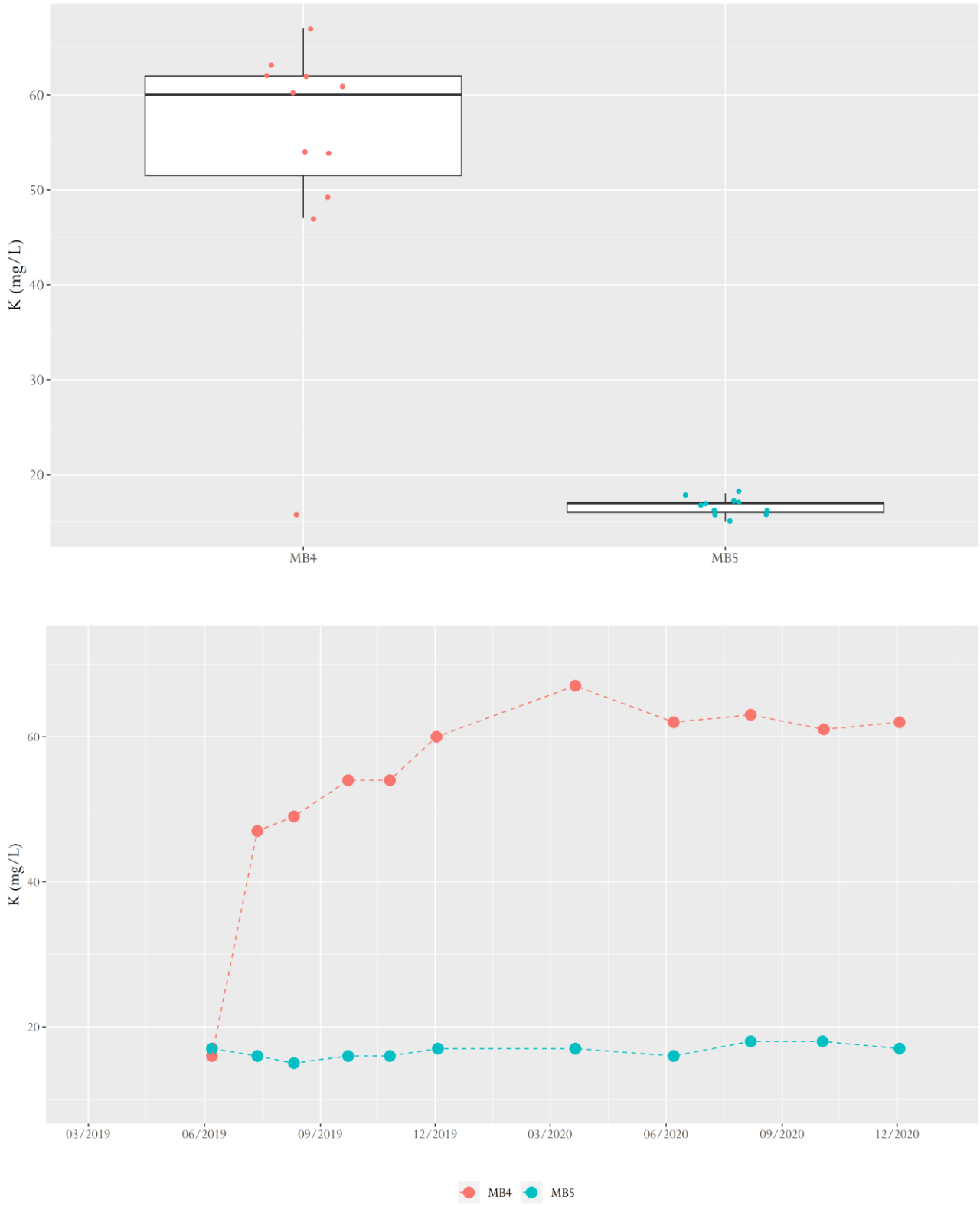
Calcium (Ca) – boxplot and time series



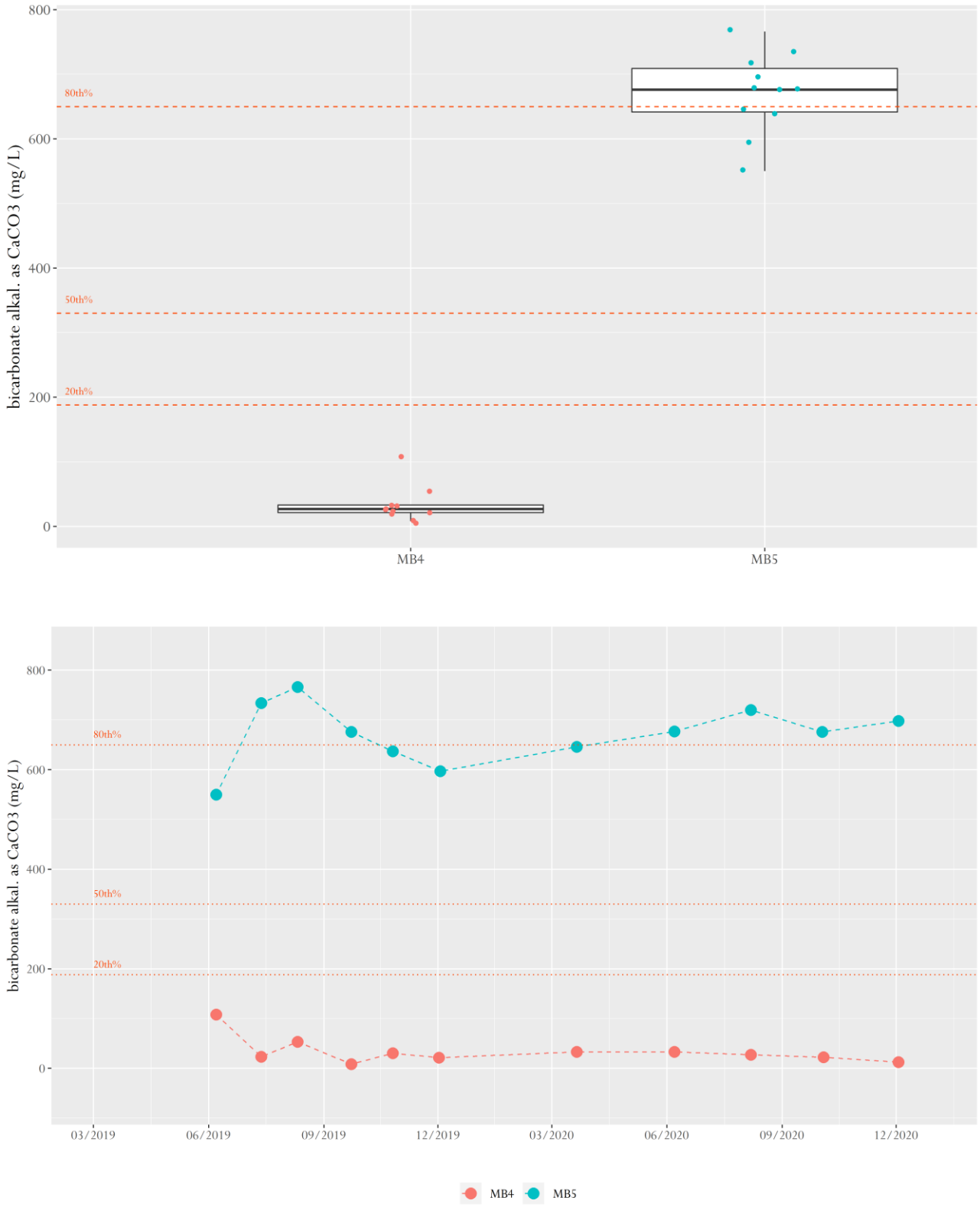
Magnesium (Mg) – boxplot and time series



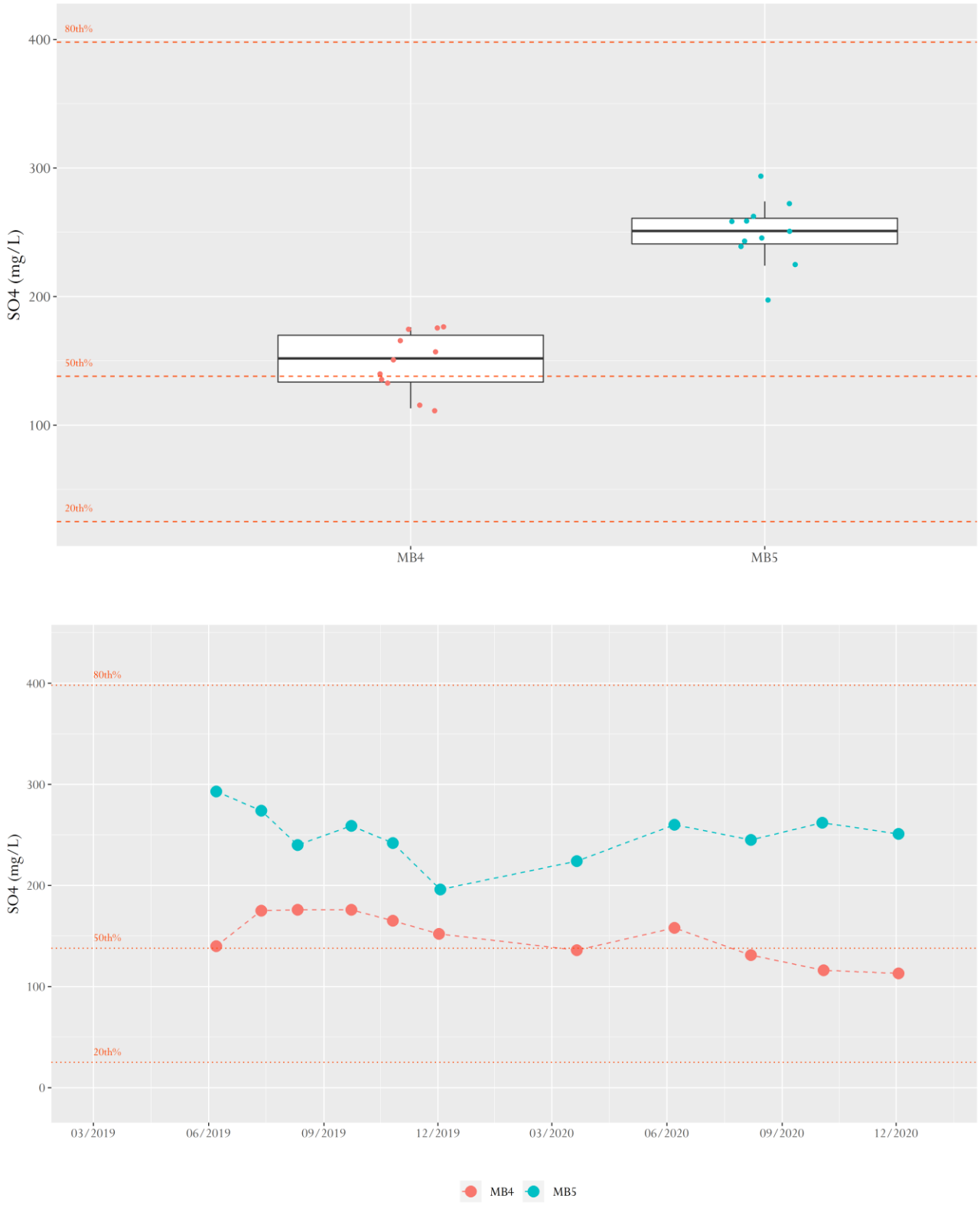
Sodium (Na) – boxplot and time series



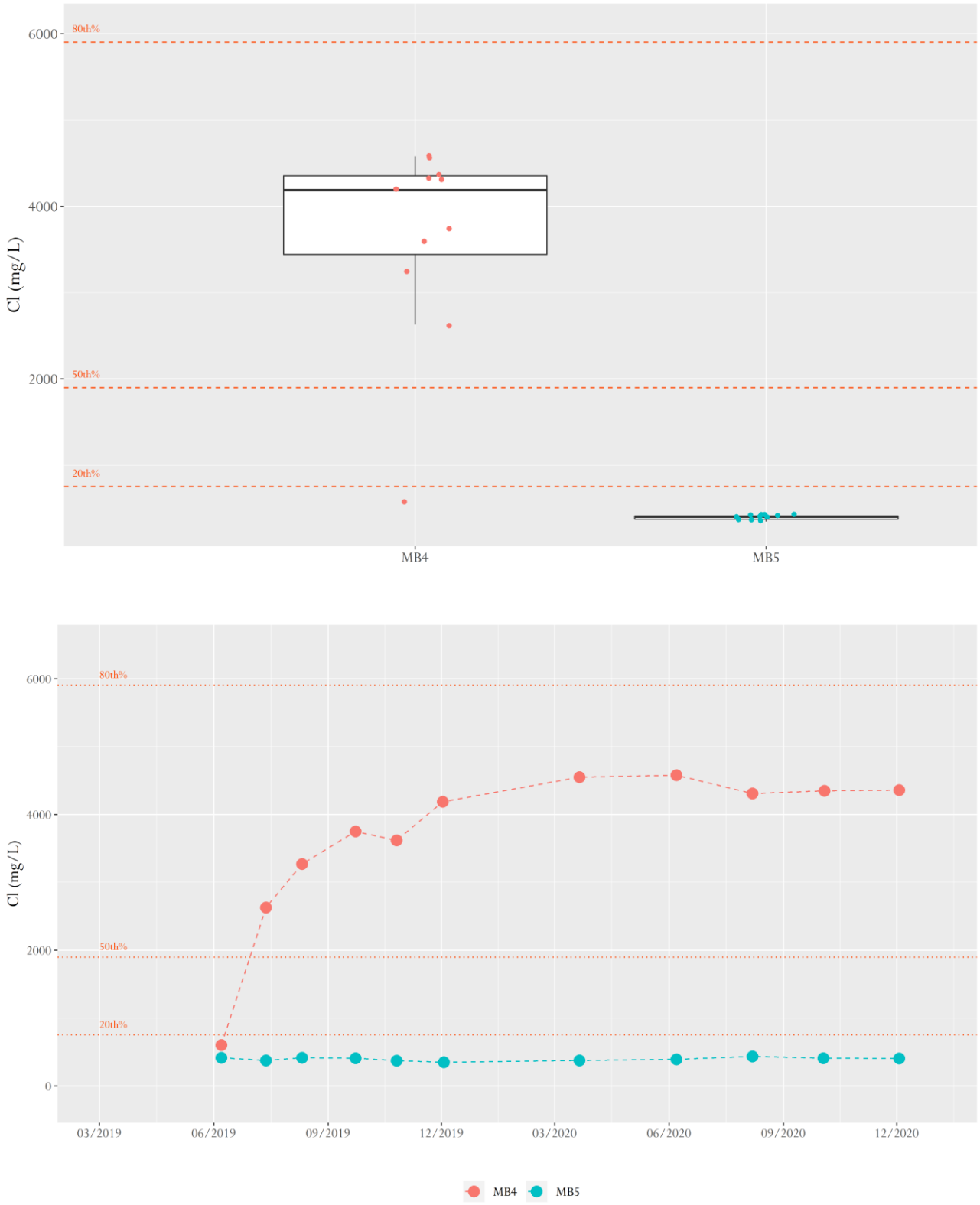
Potassium (K) – boxplot and time series



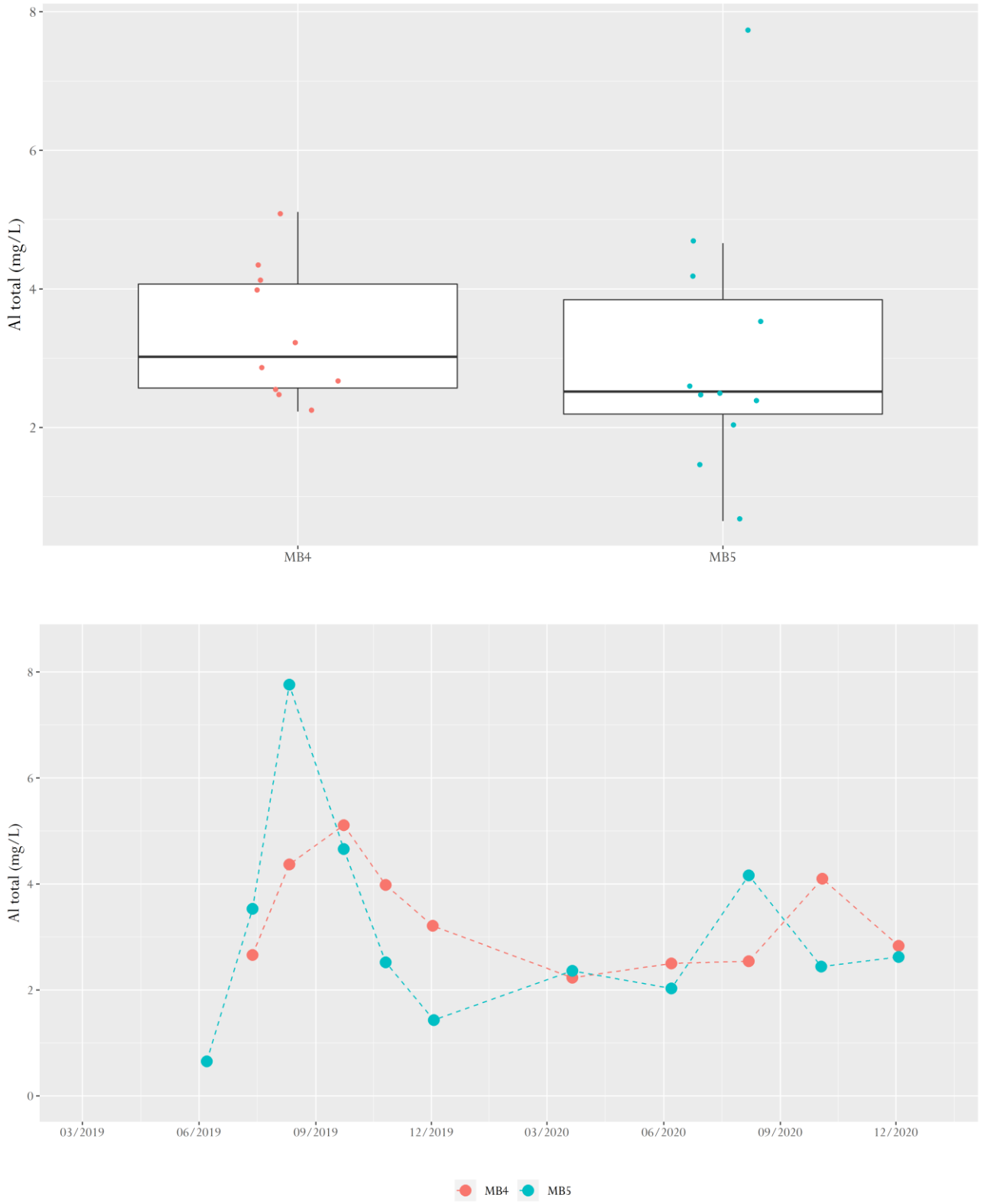
Bicarbonate alkalinity as $CaCO_3$ (HCO_3^-) – boxplot and time series



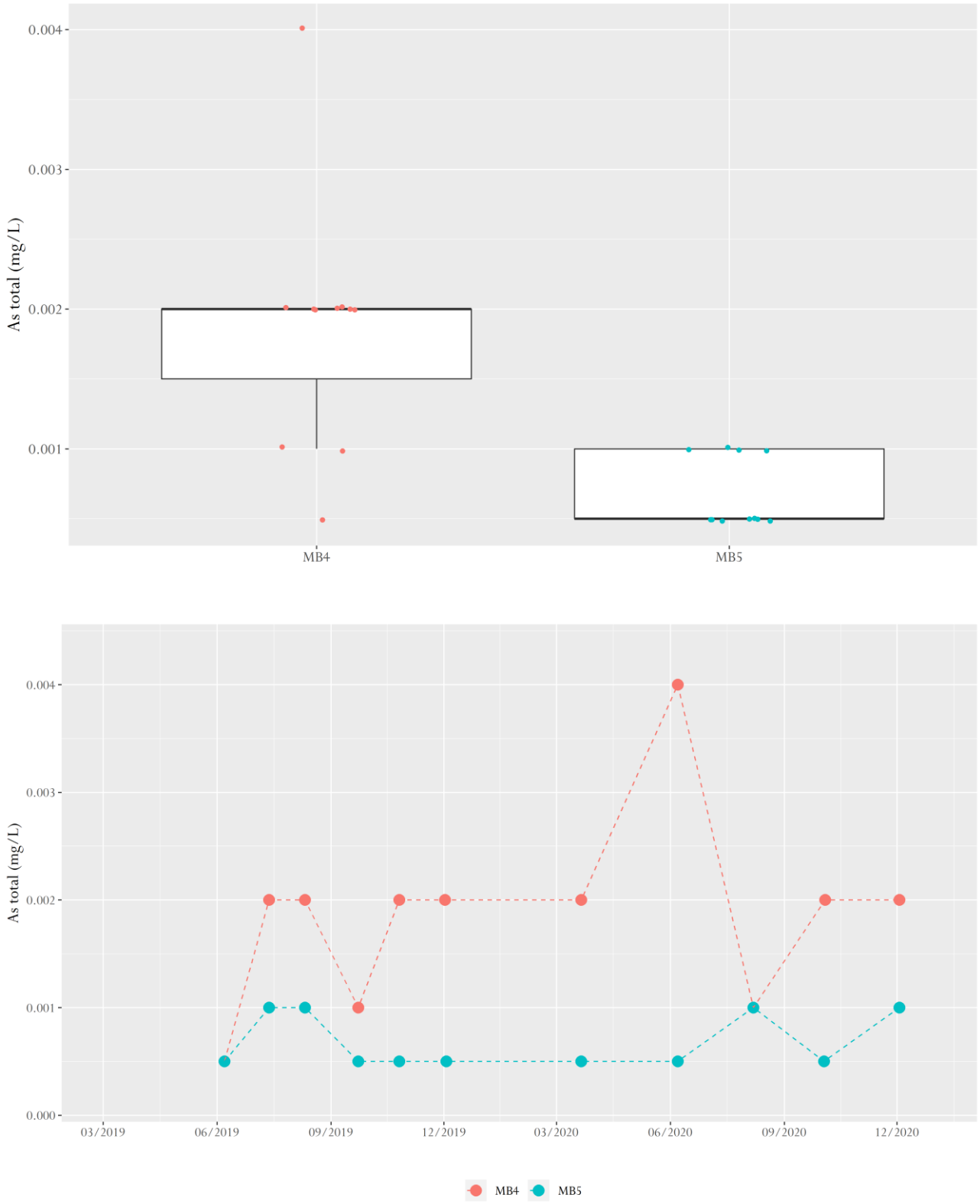
Sulphate (SO_4^-) – boxplot and time series



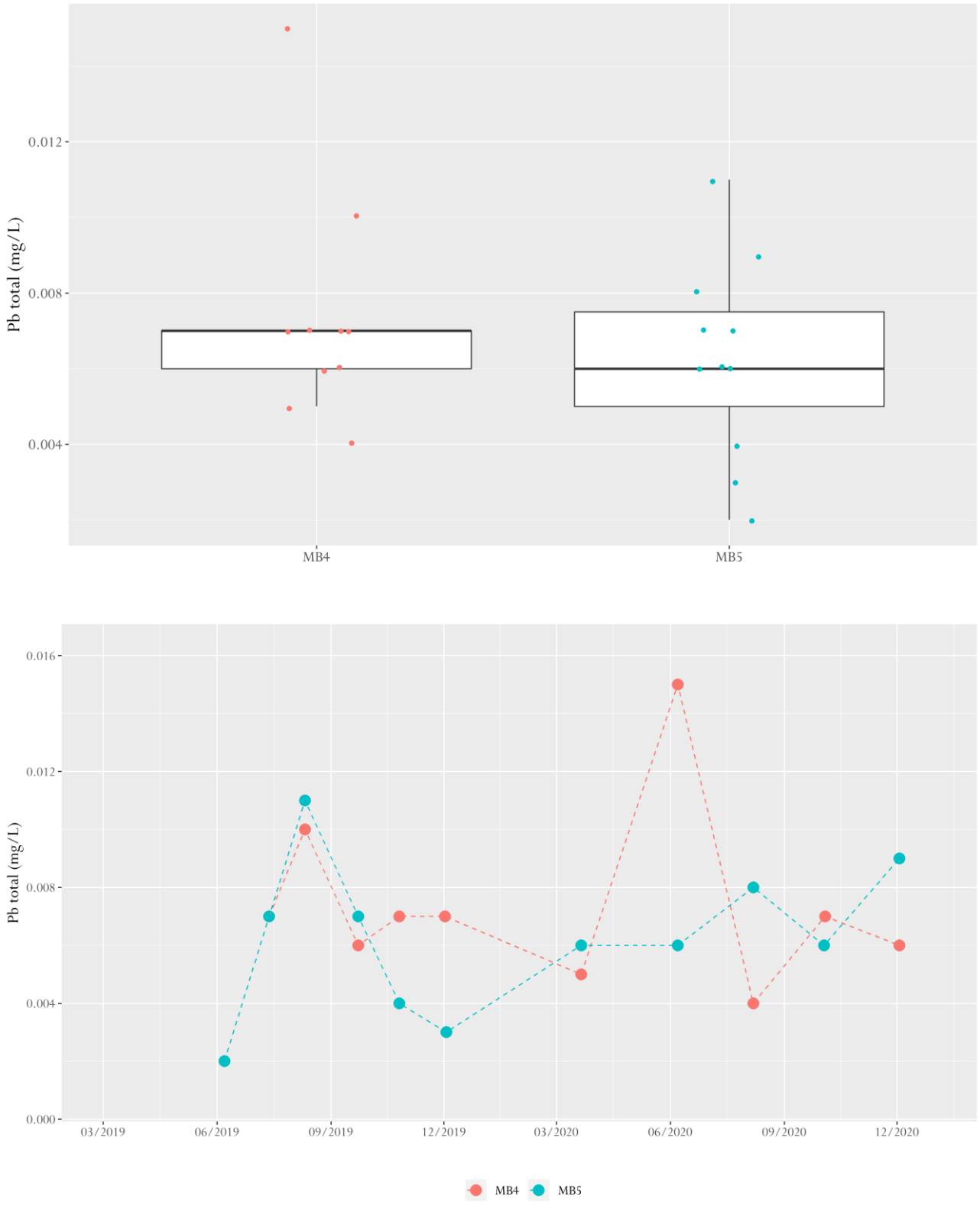
Chloride (Cl^-) – boxplot and time series



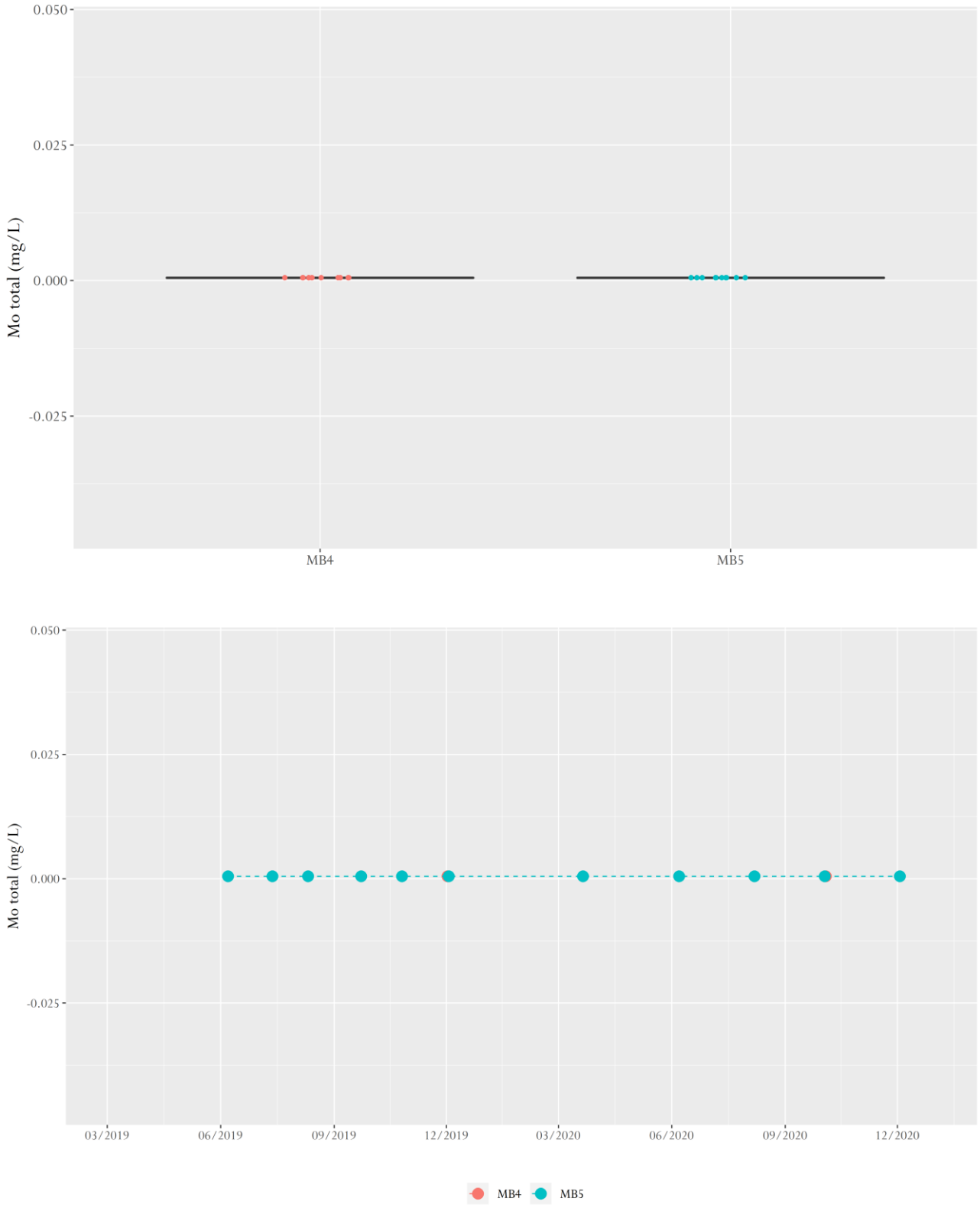
Total aluminium (Al) – boxplot and time series



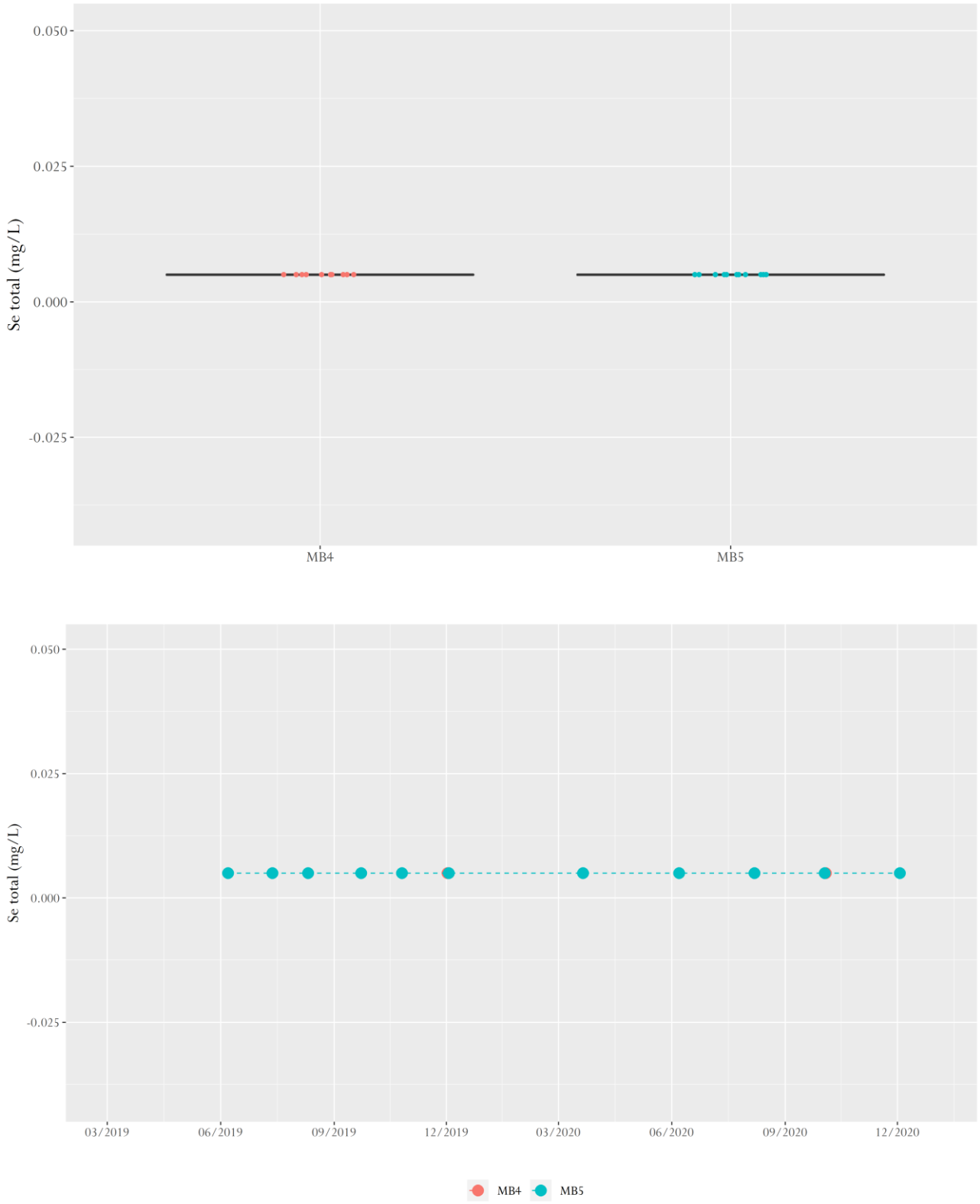
Total arsenic (As) – boxplot and time series



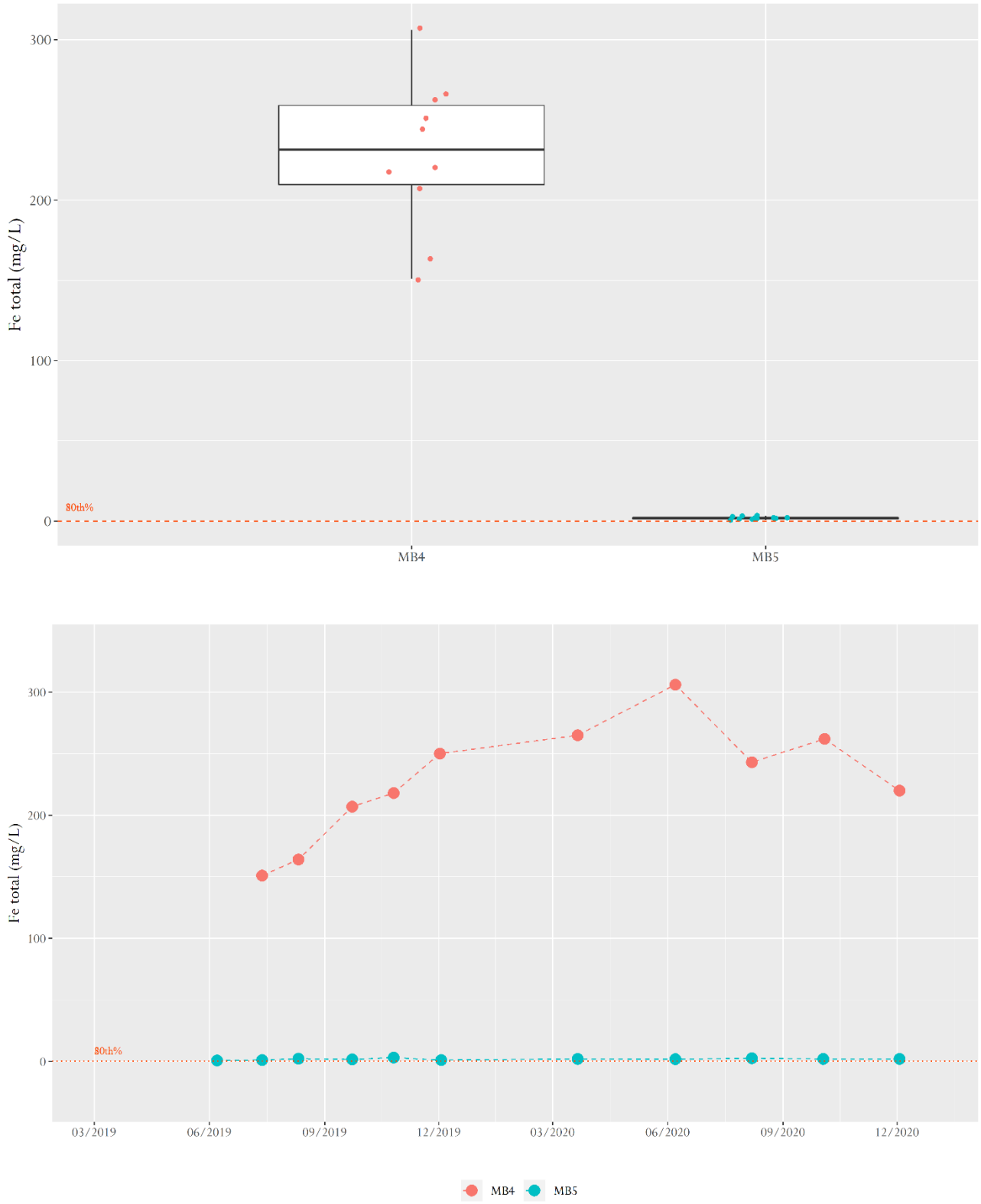
Total lead (Pb) – boxplot and time series



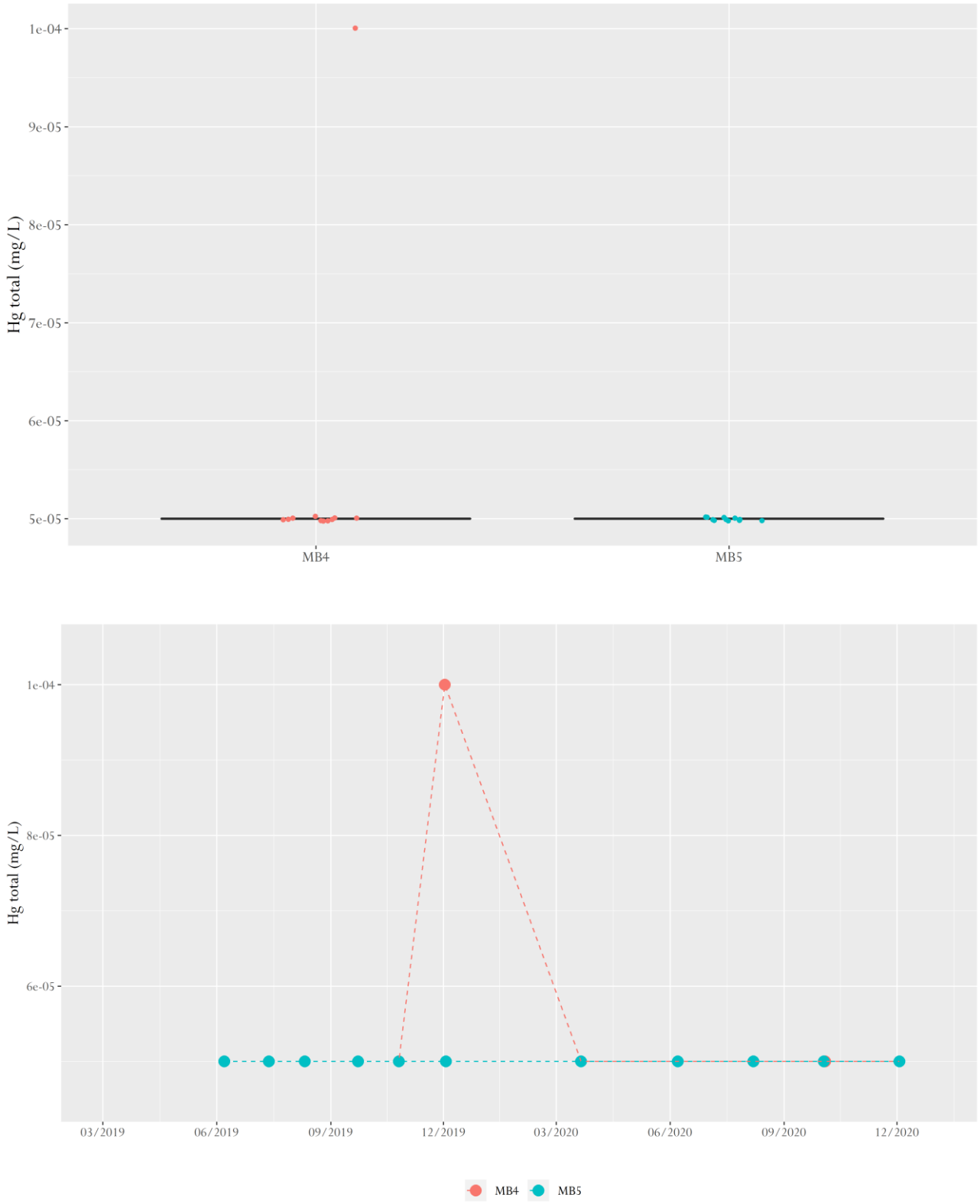
Total molybdenum (Mo) – boxplot and time series



Total selenium (Se) – boxplot and time series

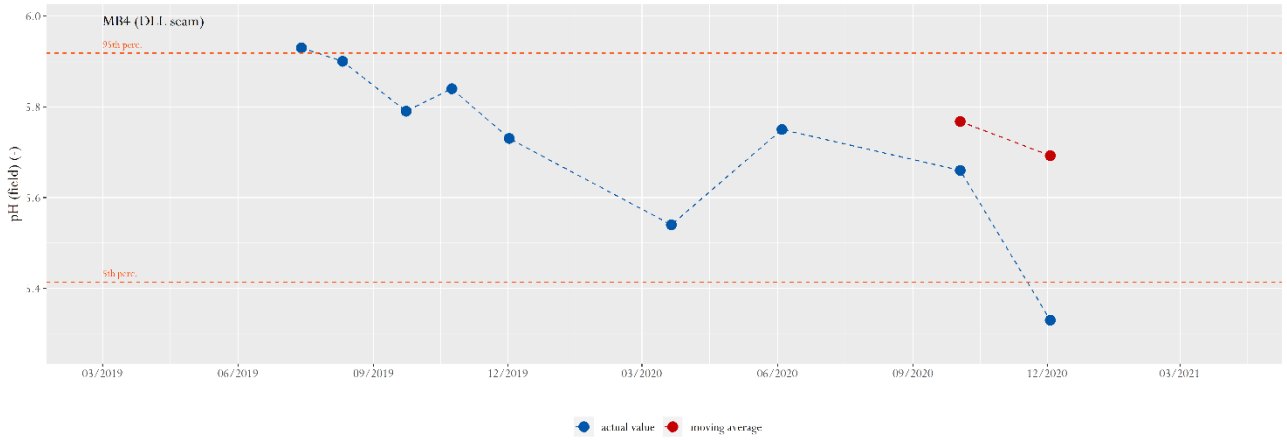


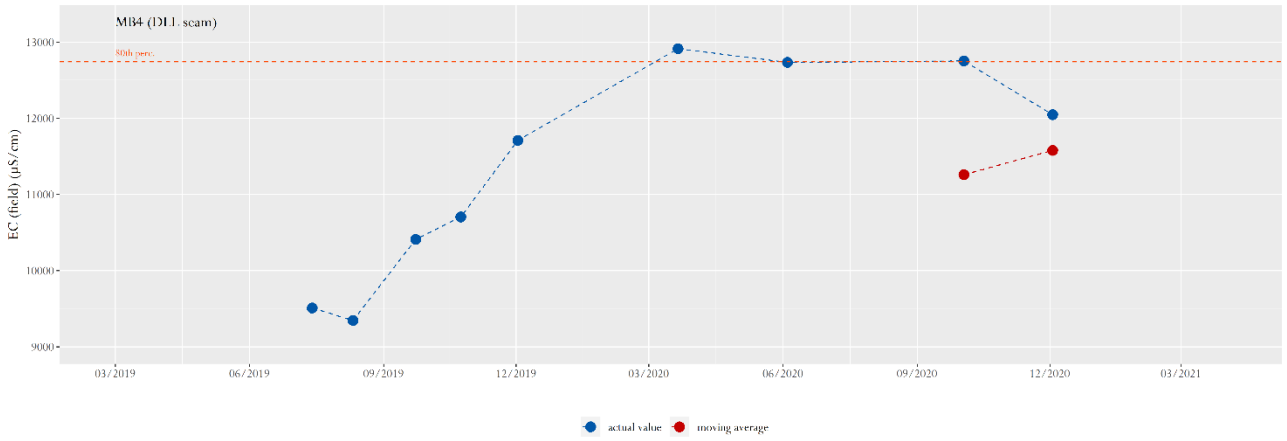
Total iron (Fe) – boxplot and time series

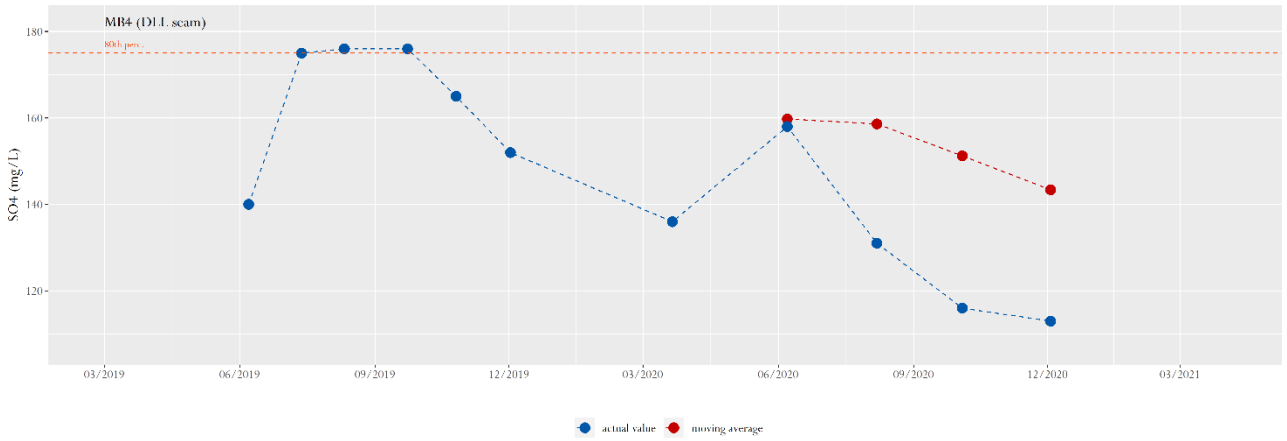


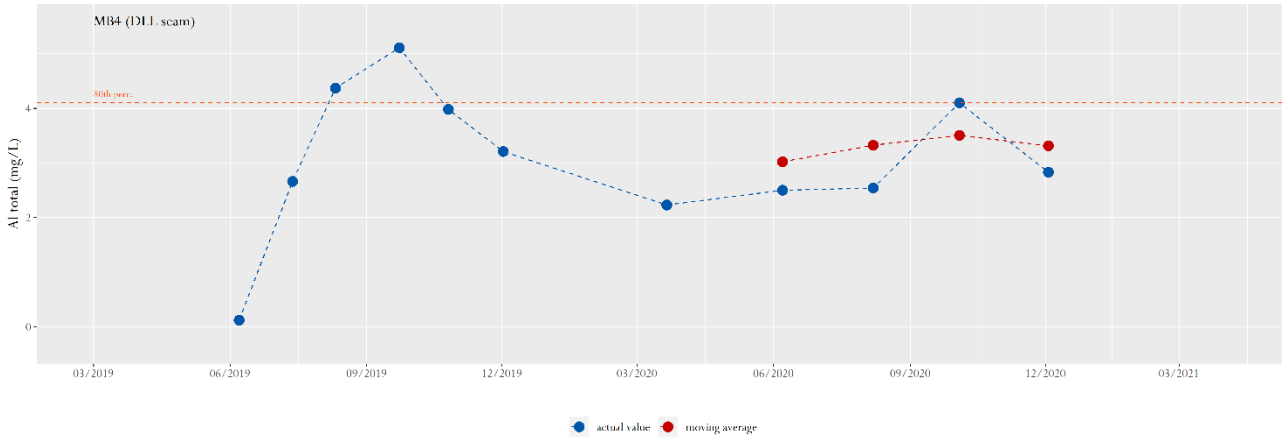
Total mercury (Hg) – boxplot and time series

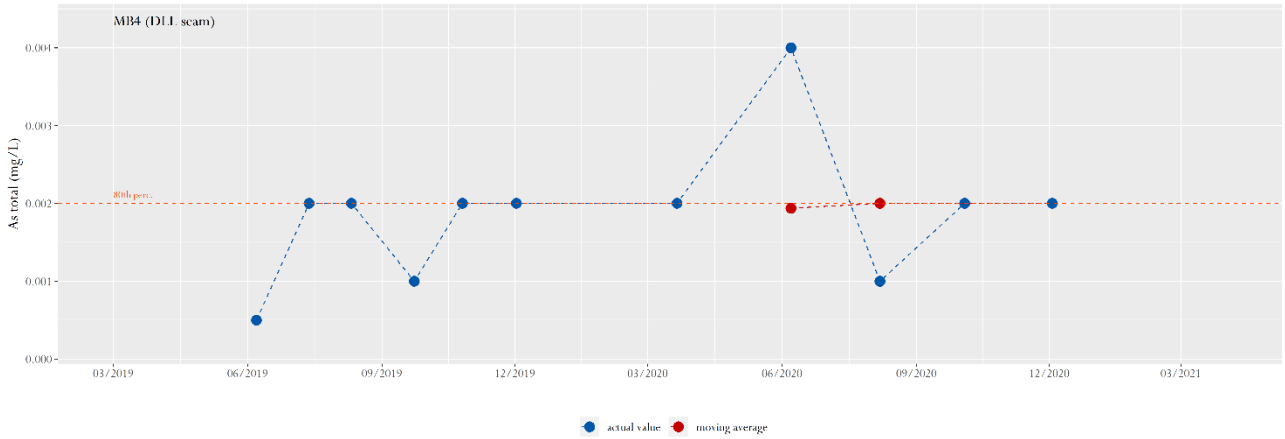
Appendix C Proposed control charts

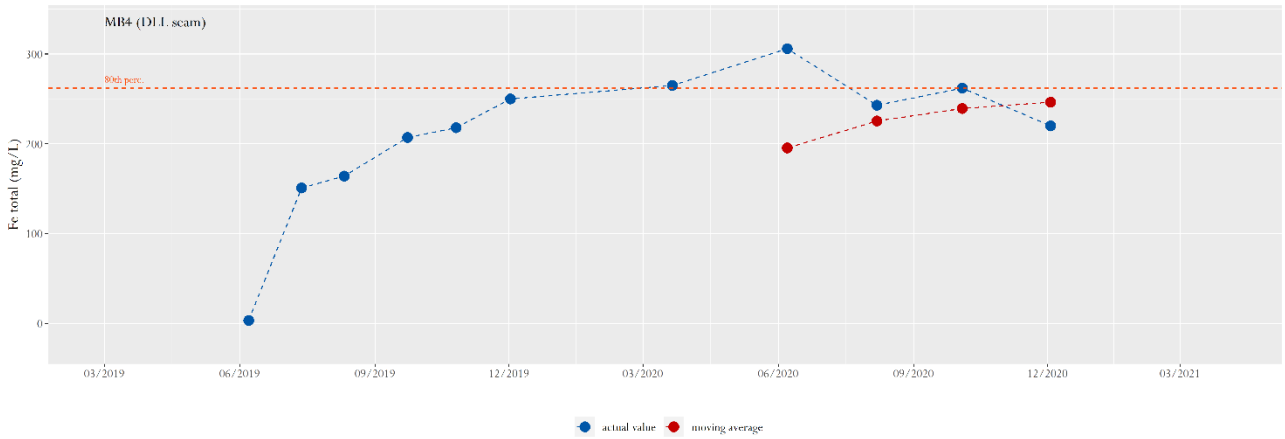

MB4 (DLL scam)
95th perc.
5th perc.
pH (field) (-)
6.0
5.8
5.6
5.4
03/2019
06/2019
09/2019
12/2019
03/2020
06/2020
09/2020
12/2020
03/2021
actual value
moving average

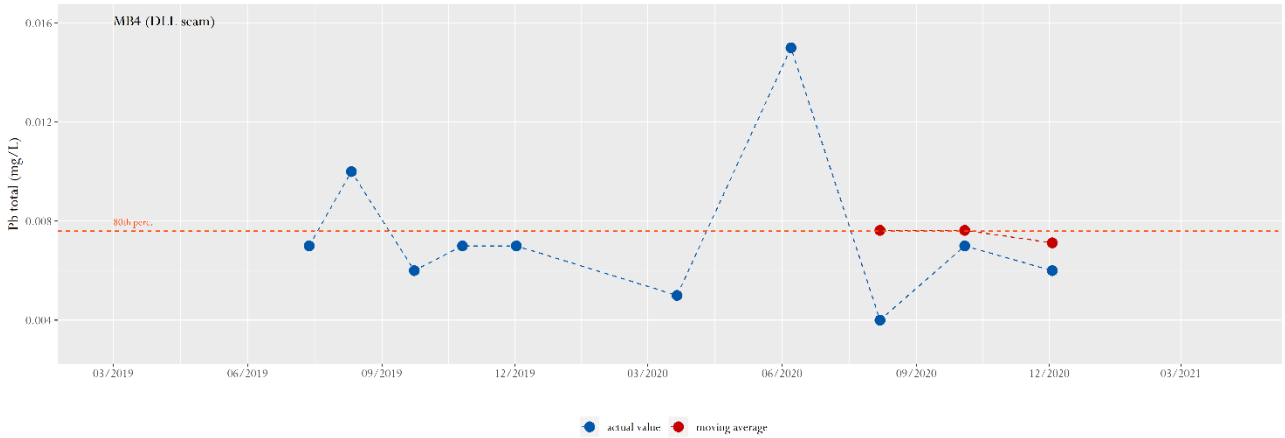

MB4 (DLL scam)
80th perc.
EC (field) (µS/cm)
13000
12000
11000
10000
9000
03/2019
06/2019
09/2019
12/2019
03/2020
06/2020
09/2020
12/2020
03/2021
actual value
moving average

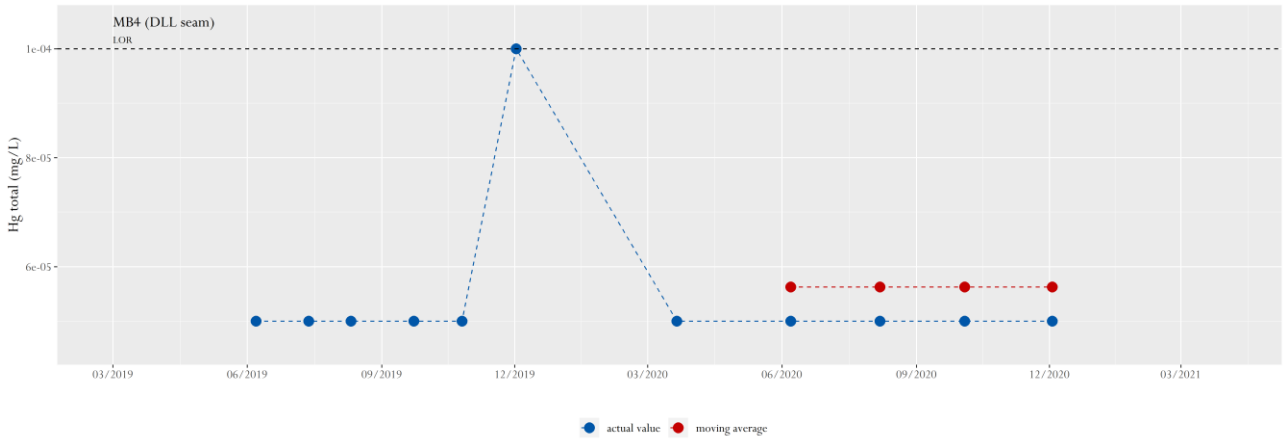

MB4 (DLL scam)
80th perc.
SO4 (mg/L)
180
160
140
120
03/2019
06/2019
09/2019
12/2019
03/2020
06/2020
09/2020
12/2020
03/2021
actual value
moving average

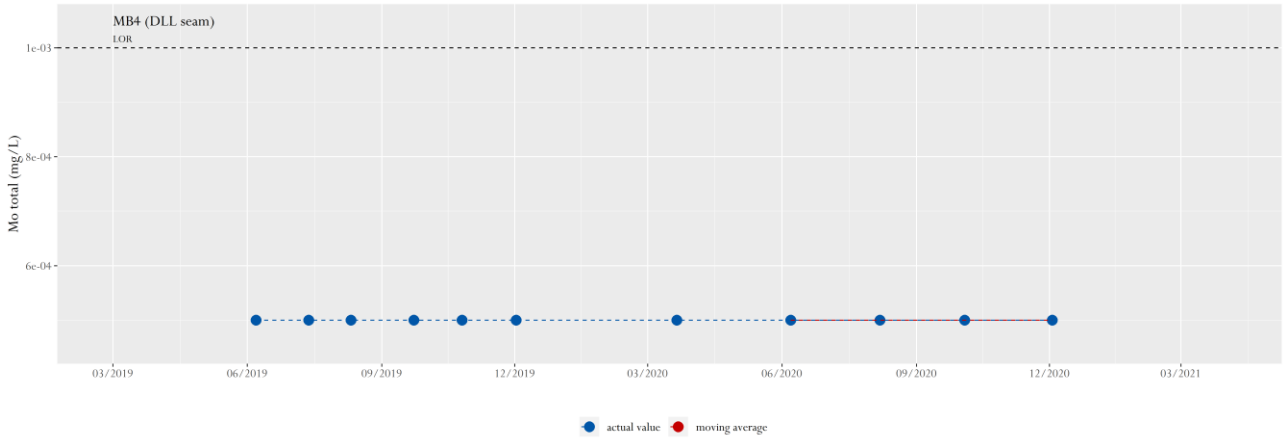

MB4 (DLL scam)
80th perc.
Al total (mg/L)
4
2
0
03/2019
06/2019
09/2019
12/2019
03/2020
06/2020
09/2020
12/2020
03/2021
actual value
moving average

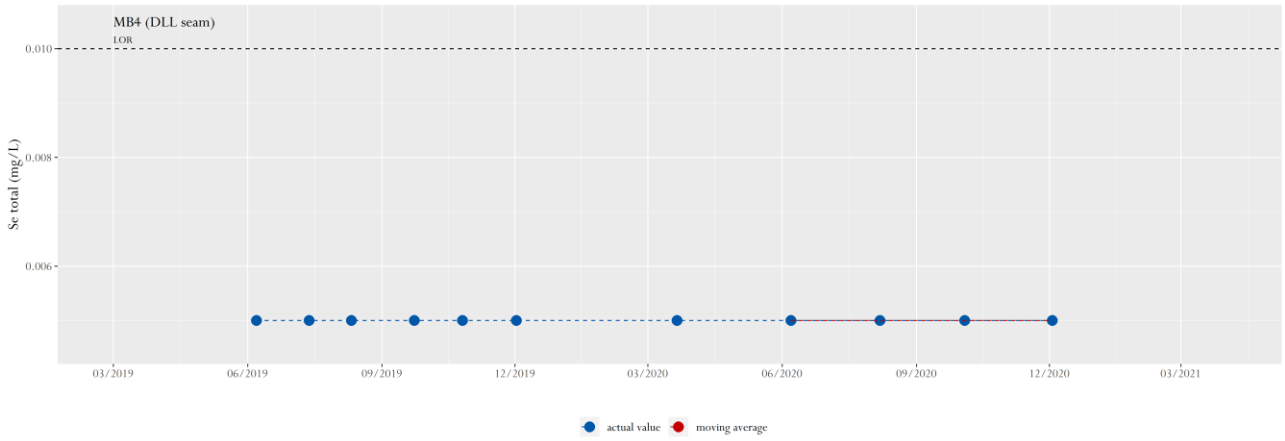

MB4 (DLL seam)
As total (mg/L)
0.004
0.003
0.002
0.001
0.000
80th perc.
03/2019
06/2019
09/2019
12/2019
03/2020
06/2020
09/2020
12/2020
03/2021
actual value
moving average


MB4 (DLL seam)
Fe total (mg/L)
300
200
100
0
80th perc.
03/2019
06/2019
09/2019
12/2019
03/2020
06/2020
09/2020
12/2020
03/2021
actual value
moving average

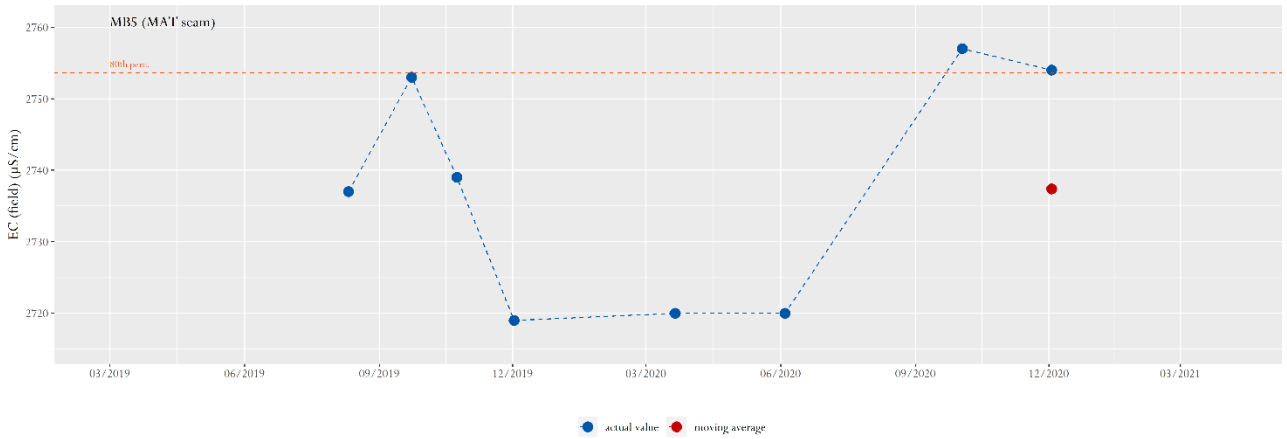

MB4 (DLL seam)
Pb total (mg/L)
0.016
0.012
0.008
0.004
80th perc.
03/2019
06/2019
09/2019
12/2019
03/2020
06/2020
09/2020
12/2020
03/2021
actual value
moving average

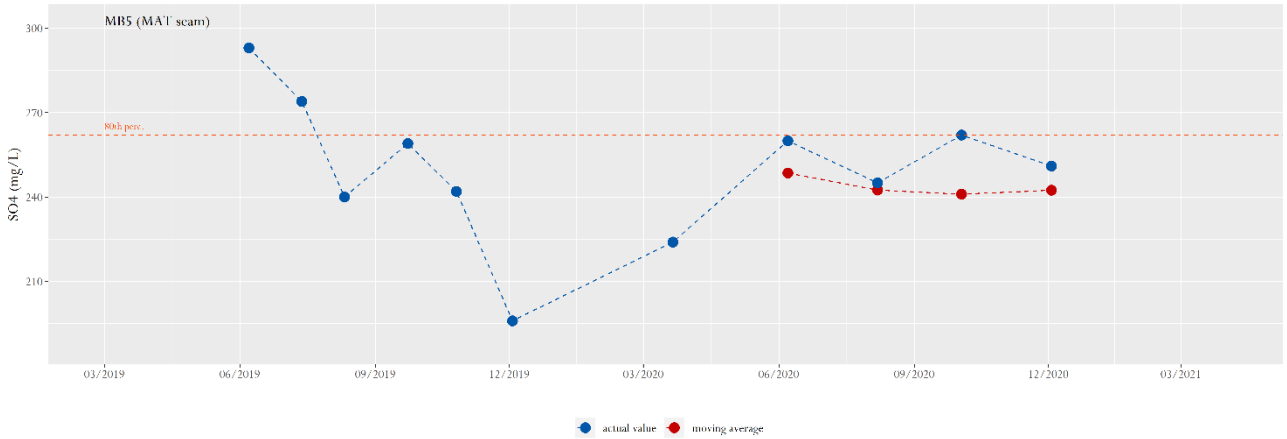

MB4 (DLL seam)
LOR
Hg total (mg/L)
1e-04
8e-05
6e-05
03/2019
06/2019
09/2019
12/2019
03/2020
06/2020
09/2020
12/2020
03/2021
actual value
moving average

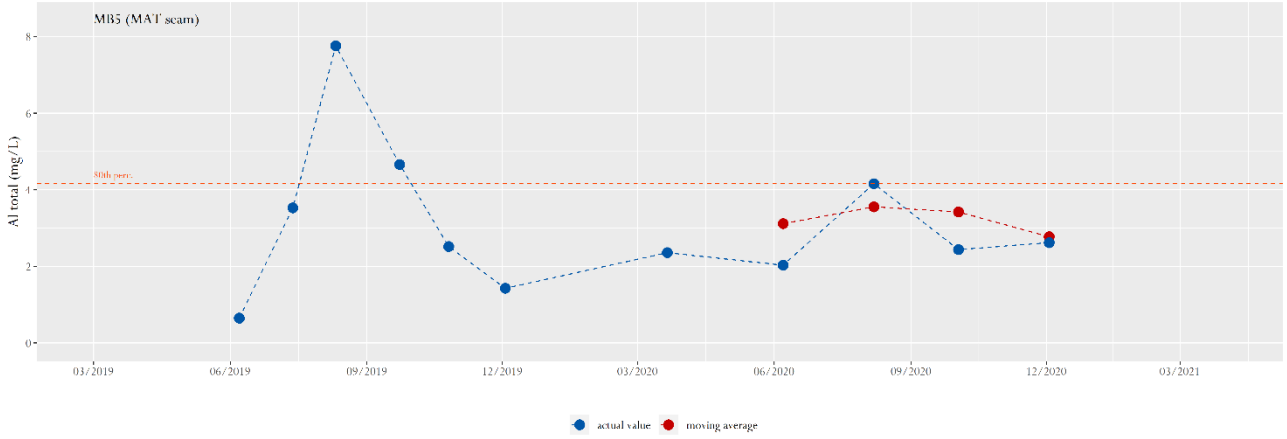

MB4 (DLL seam)
LOR
1e-03
8e-04
6e-04
Mo total (mg/L)
03/2019
06/2019
09/2019
12/2019
03/2020
06/2020
09/2020
12/2020
03/2021
actual value
moving average

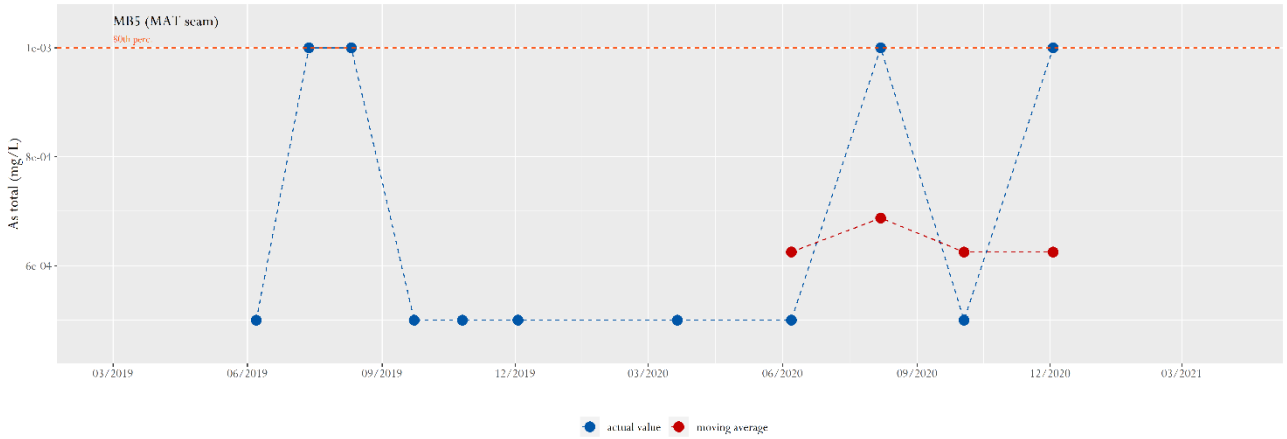

MB4 (DLL seam)
LOR
0.010
0.008
0.006
Se total (mg/L)
03/2019
06/2019
09/2019
12/2019
03/2020
06/2020
09/2020
12/2020
03/2021
actual value
moving average

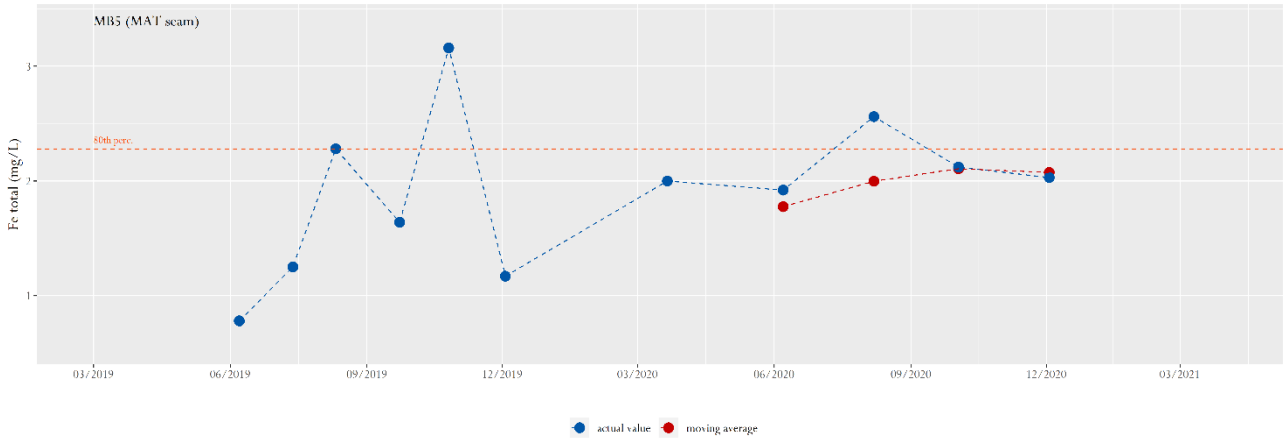

MB5 (MAT scam)
95th perc.
50th perc.
pH (field) (-)
7.6
7.4
7.2
7.0
6.8
6.6
03/2019
06/2019
09/2019
12/2019
03/2020
06/2020
09/2020
12/2020
03/2021
actual value
moving average

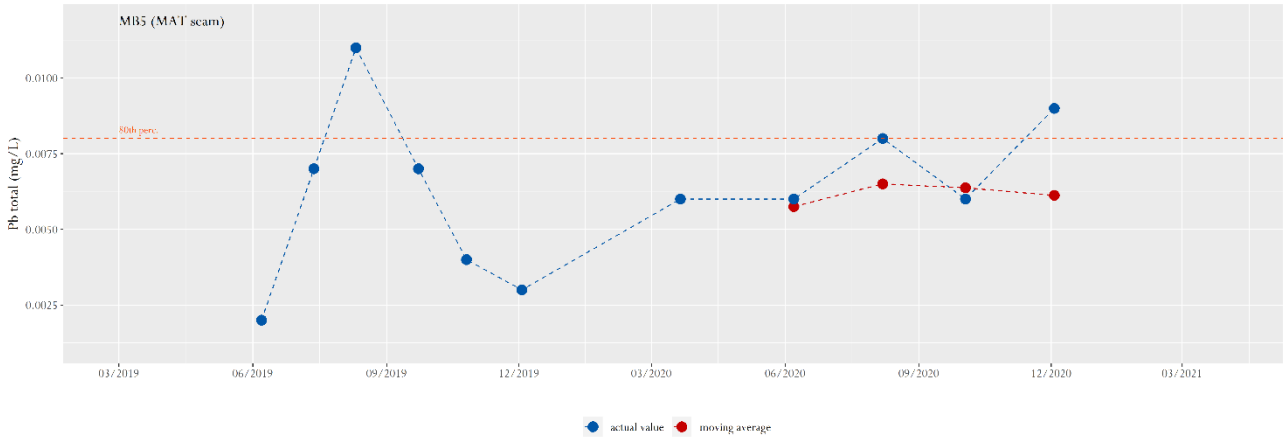

MB5 (MAT scam)
80th perc.
EC (field) (µS/cm)
2760
2750
2740
2730
2720
03/2019
06/2019
09/2019
12/2019
03/2020
06/2020
09/2020
12/2020
03/2021
actual value
moving average

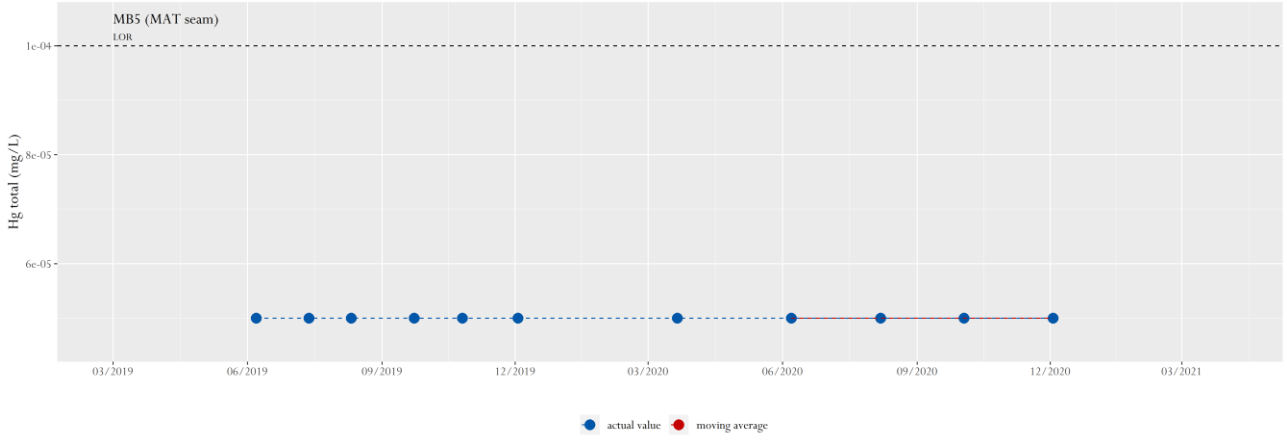

MB5 (MAT scam)
80th perc.
SO4 (mg/L)
300
270
240
210
03/2019
06/2019
09/2019
12/2019
03/2020
06/2020
09/2020
12/2020
03/2021
actual value
moving average

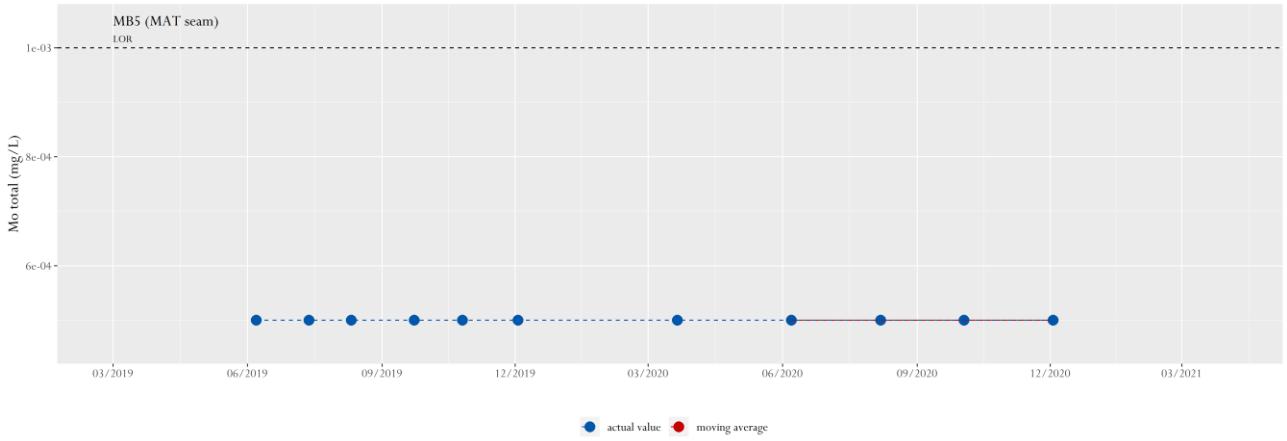

MB5 (MAT scam)
80th perc.
Al total (mg/L)
8
6
4
2
0
03/2019
06/2019
09/2019
12/2019
03/2020
06/2020
09/2020
12/2020
03/2021
actual value
moving average

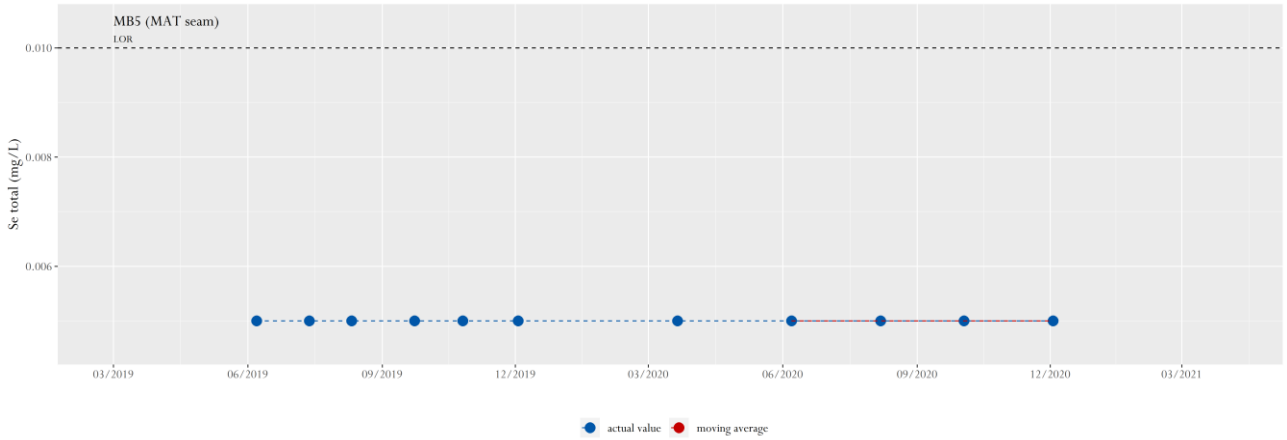

MB5 (MAT seam)
80th perc.
1e-03
8e-04
6e-04
As total (mg/L)
03/2019
06/2019
09/2019
12/2019
03/2020
06/2020
09/2020
12/2020
03/2021
actual value
moving average


MB5 (MAT seam)
80th perc.
3
2
1
Fe total (mg/L)
03/2019
06/2019
09/2019
12/2019
03/2020
06/2020
09/2020
12/2020
03/2021
actual value
moving average


MB5 (MAT seam)
80th perc.
0.0100
0.0075
0.0050
0.0025
Pb total (mg/L)
03/2019
06/2019
09/2019
12/2019
03/2020
06/2020
09/2020
12/2020
03/2021
actual value
moving average


MB5 (MAT seam)
LOR
1e-04
8e-05
6e-05
Hg total (mg/L)
03/2019
06/2019
09/2019
12/2019
03/2020
06/2020
09/2020
12/2020
03/2021
actual value
moving average


MB5 (MAT seam)
LOR
1e-03
8e-04
6e-04
Mo total (mg/L)
03/2019
06/2019
09/2019
12/2019
03/2020
06/2020
09/2020
12/2020
03/2021
actual value
moving average


MB5 (MAT seam)
LOR
0.010
0.008
0.006
Se total (mg/L)
03/2019
06/2019
09/2019
12/2019
03/2020
06/2020
09/2020
12/2020
03/2021
actual value
moving average