2020 Annual Performance Report

Aberthaw Ash Disposal Site

Permit Number: DP3432SW

March 2021

RWE
The energy to lead

Summary

This document gives details on the performance of RWE Generation UK plc's Aberthaw Ash Disposal Site throughout 2020, as required by condition 4.2.1 of the site's Environmental Permit (EP), DP3432SW.

CONTENTS

1. Operational Update

Aberthaw Ash Disposal Site historically reached its maximum allowable height and has been restored as per plans approved by the Local Authorities.

In 2020 the associated 'Short Tip' sales area was reprofiled as part of the main Aberthaw Power Station closure and decommissioning process. Otherwise there were no changes to the operational activities and no Environmental Permit variations associated with the Ash Mound. It is expected that the Ash Disposal Site will apply for formal closure later this year.

2. Review of Results for Emission Monitoring

Monitoring has continued where possible during 2020, however the site has had to manage sampling visits within the evolving Coronavirus Pandemic restrictions. The first country wide lockdown resulted in the complete suspension of all site works by our appointed external contractor and difficulties accessing external laboratories for accredited analysis. This resulted in the Quarter 2 sampling round being missed and only three sets of 2020 monitoring results being available for the site. The scheduling of external contractor monitoring visits remains a concern due to the evolving early 2021 lockdown situation.

2.1. Hydrogeological Risk Assessment Review

In accordance with Environmental Permit DP3432SW there is the requirement to undertake a 6-yearly review of the HRA. This was last completed in early 2018 by an external specialist consultant and concluded that whilst there was a discernible effect from the ash on groundwater & surface water, this effect has stabilised over time with little change in quality over the review period.

2.2. Groundwater Quality Review

Monitoring Objective

To carry out routine monitoring of groundwater to monitor the performance of the ash disposal site by measurement of absolute levels and concentrations and trends relative to relevant criteria including background levels and concentrations, control levels and compliance limits.

Number and Location of Monitoring Points

A summary of the monitoring boreholes is provided in Table 1 below and the locations are shown in Appendix A. There are 7 boreholes in natural ground, of which 5 are completed in the Porthkerry Member limestone and 2 in the Alluvium (clay). There are 2 shallow boreholes in fill material, BH7A with a response zone partly in clay fill and BH11A with a response zone partly in fill containing coal ash.

Groundwater flow beneath the ash disposal site is directed towards the River Thaw to the west and the sea to the south. Due to the ash disposal site's contact with the sea, the southern boundary of the site is a downgradient boundary. There are 4 boreholes on this boundary, BH10B, BH11B, BH7B and BH9B, with an average spacing of approximately 250m. The two shallow boreholes, BH7A and BH11A are situated close to boreholes BH7B and BH11B respectively. There is also 1 borehole, BH3B on the western downgradient boundary. Borehole BH8B was found damaged in Q2 2017 and a representative sample was unable to be obtained for the remainder of 2017. Following the outcome of the HRA review in 2018, sampling of BH8B was suspended. Please note that a replacement for BH8A & BH8B was installed in February 2021, at the time of writing RWE are still awaiting the final CQA report for the installation.

BH6 and BH5 are located on the eastern boundary with an average spacing of approximately 750m and as both response zones are overlain by PFA they cannot be considered truly upgradient. Upgradient monitoring boreholes at the nearby Aberthaw Quarry Ash Disposal Site (Environmental Permit BP3339BH) are used as an indication of upgradient groundwater quality data for the limestone aquifer (Details of these boreholes are in italic in Table 1).

Table 1: Summary of Monitoring Boreholes

Monitoring Borehole	Formation Sampled	Lithology Type – Natural (N) Imported Fill (F)	Response Zone Depth (m b GL)	Geological Barrier Thickness above Response Zone (m)	Other Lithology above Response Zone
BH3B	Limestone	N	13.5-23.0	6	PFA: 6m
BH5	Limestone	N	2.5-11.5	0	PFA: 1.5m
BH6	Limestone	N	13.0-20.5	0	PFA: 12.2m
BH7A	Clay fill and Gravelly clay	F/N	2.0-9.5	8	PFA: 1.5m
BH7B	Limestone	N	17.0-26.0	3.9	Fill: 7.4m Sand & gravel: 5.7
BH9B	Limestone	N	6.0-13.0	0	PFA: 3m
BH10B	Clay	N	23.0-30.0	6.6	Fill: 2.8m Sand: 13m
BH11A	Fill – ash and clay	F	1.5-5.0	0	N/A
BH11B	Clay	N	9.5–19.0	4.5	Fill: 4.9m
E09-01A	*Limestone*	*N*	*18-24*		
E09-01B	*Limestone*	*N*	*24-30*		
E09-02A	*Limestone*	*N*	*21-27*		
E09-02B	*Limestone*	*N*	*27-33*		

Note: mb GL – metres below ground level

Monitoring Measurements

The groundwater monitoring analytical suite contains a range of parameters which are monitored on a quarterly basis along with groundwater level and standard field measurements in accordance with the Environmental Permit. RWE employ the services of an independent external contractor for the sampling of groundwater boreholes and an independent external laboratory is used for the analysis of those samples.

Figure 1 shows recorded groundwater elevations for the previous 14 years. These vary between +0.5 (BH9A) to +14m OD (BH6) with groundwater elevations in limestone boreholes being characterised by seasonal cyclic water level fluctuations associated with annual winter influxes of rainfall recharge.

Figure 1: Groundwater Hydrograph

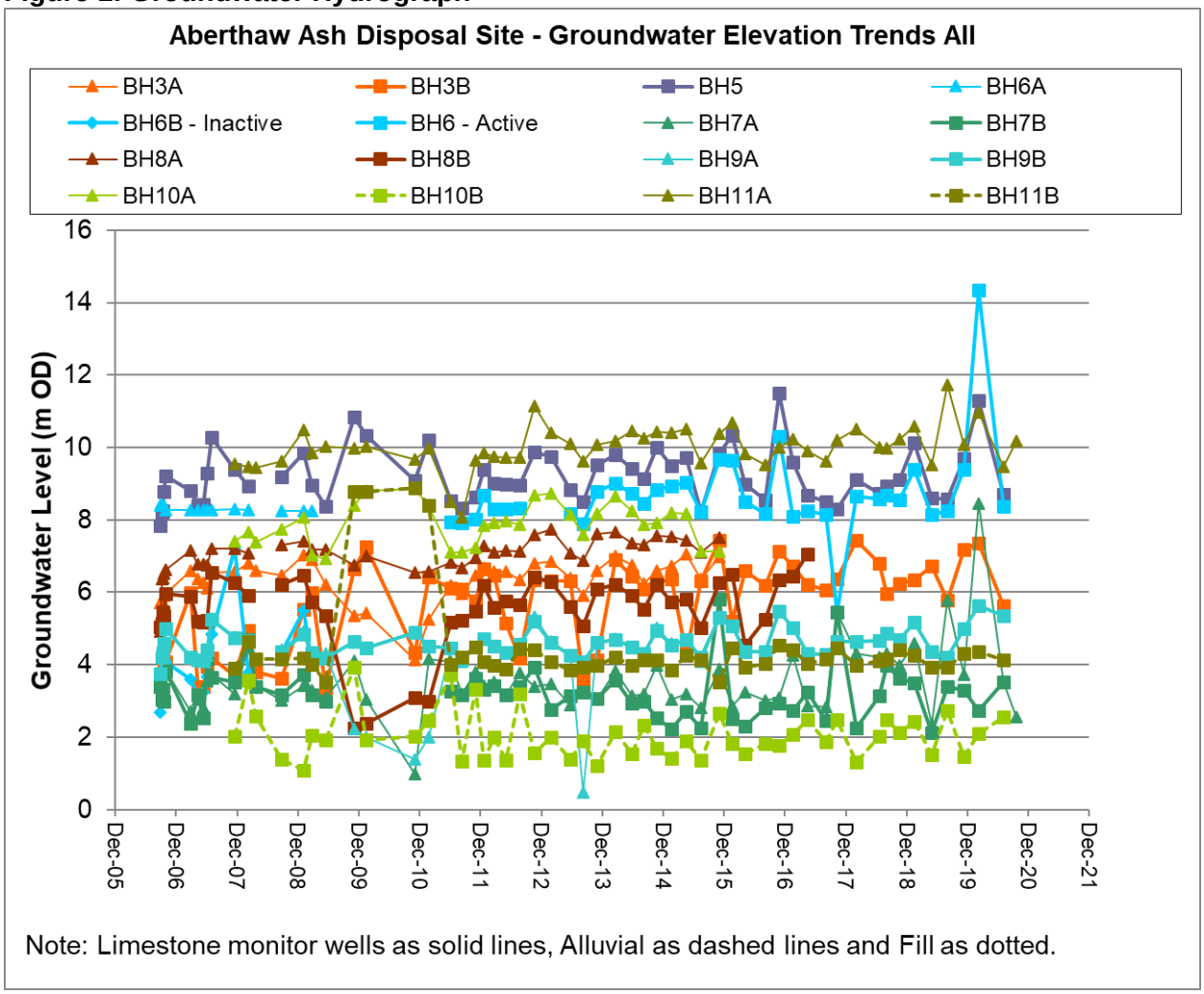


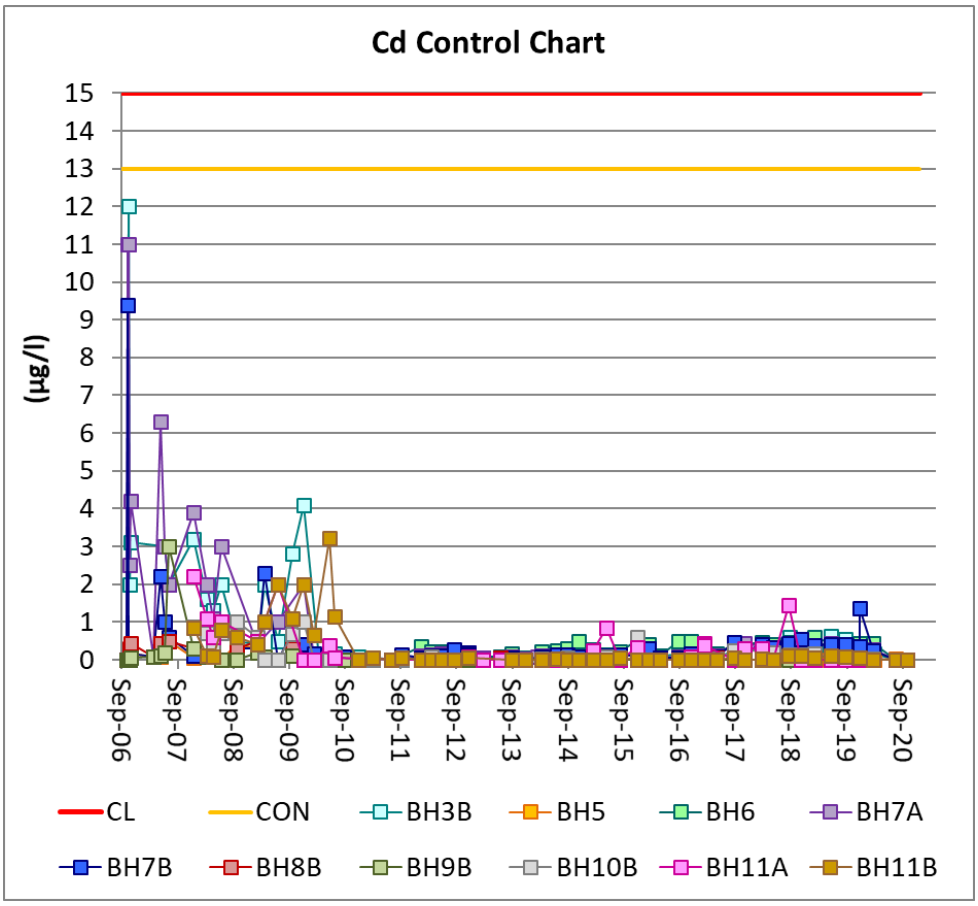
Figure 2 shows the groundwater control charts with concentrations of all boreholes plotted. It should be noted that the compliance limits and control levels (where defined) apply to boreholes BH3B and BH7B. An exceedance is defined as a result above the compliance limit or control level for 3 consecutive sampling events.

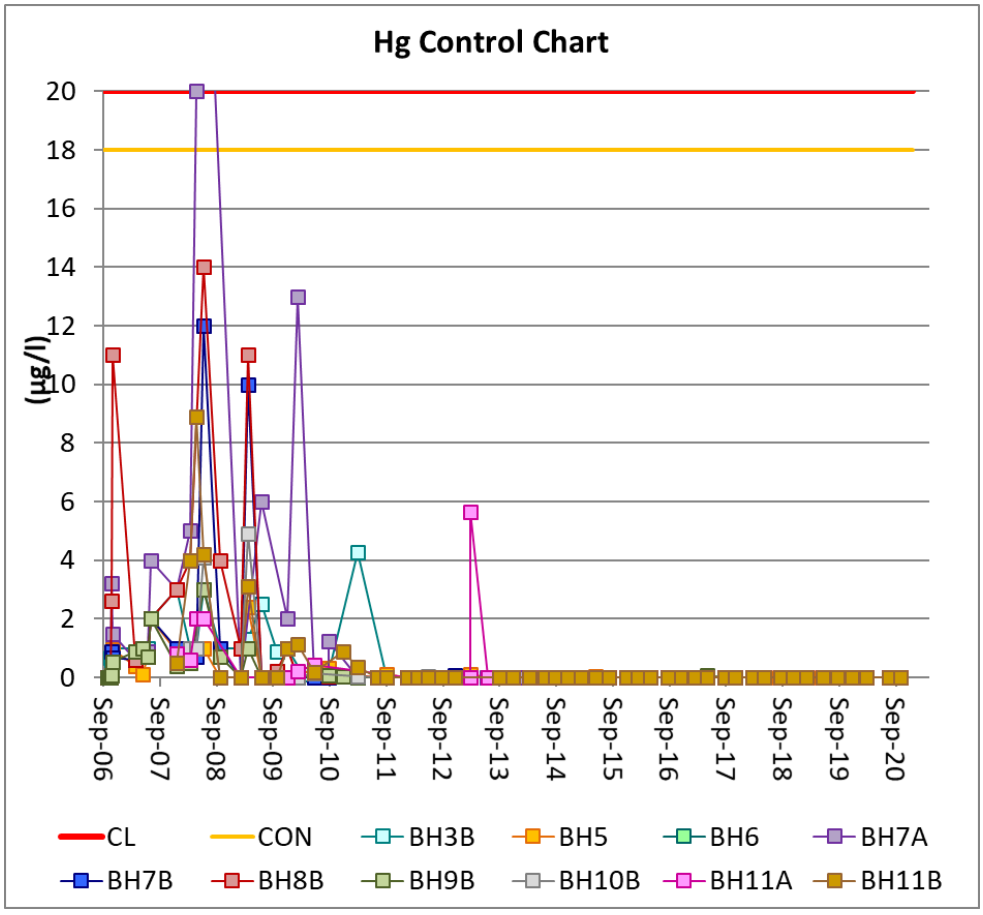
In 2020, there were no exceedances of the compliance limit or control level for any critical parameters for either of the compliance boreholes. As in 2019, elevated concentrations in BH3B of arsenic, boron, molybdenum, sulphate and vanadium were observed. In BH7B elevated concentrations of boron, molybdenum, sulphate and ammoniacal-nitrogen were observed.

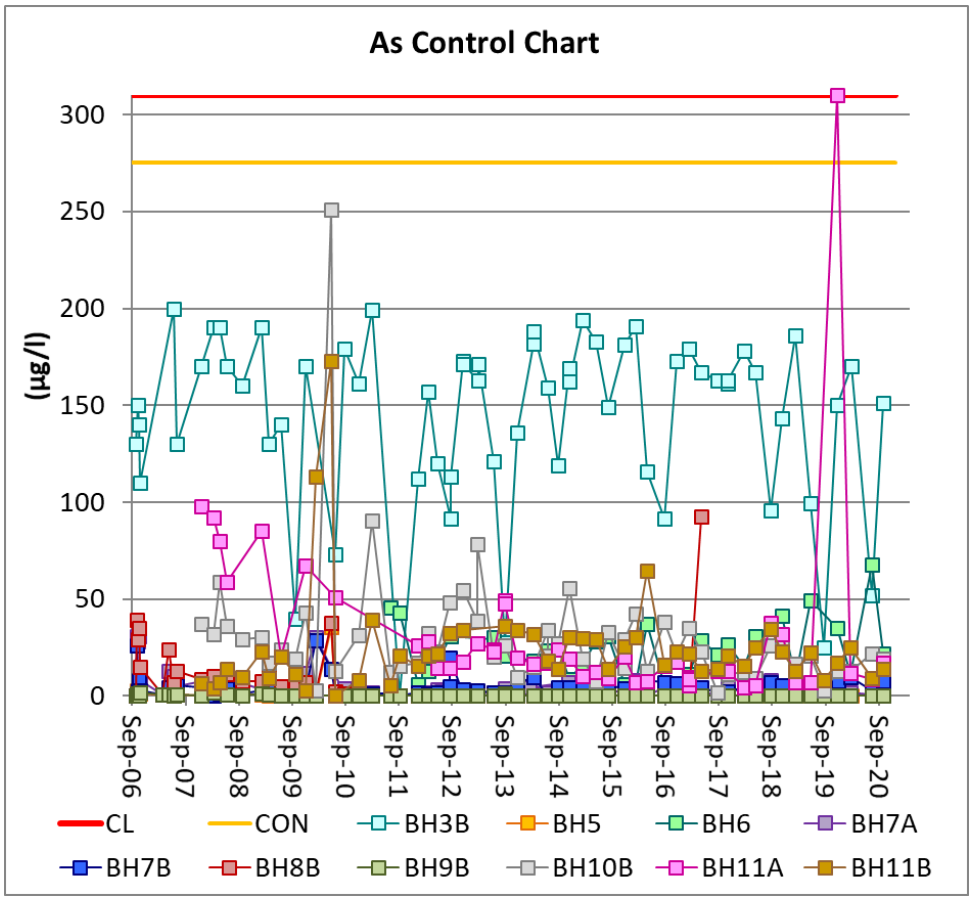
The control charts show there are no increasing trends in critical parameter concentrations. Other key points to note are:

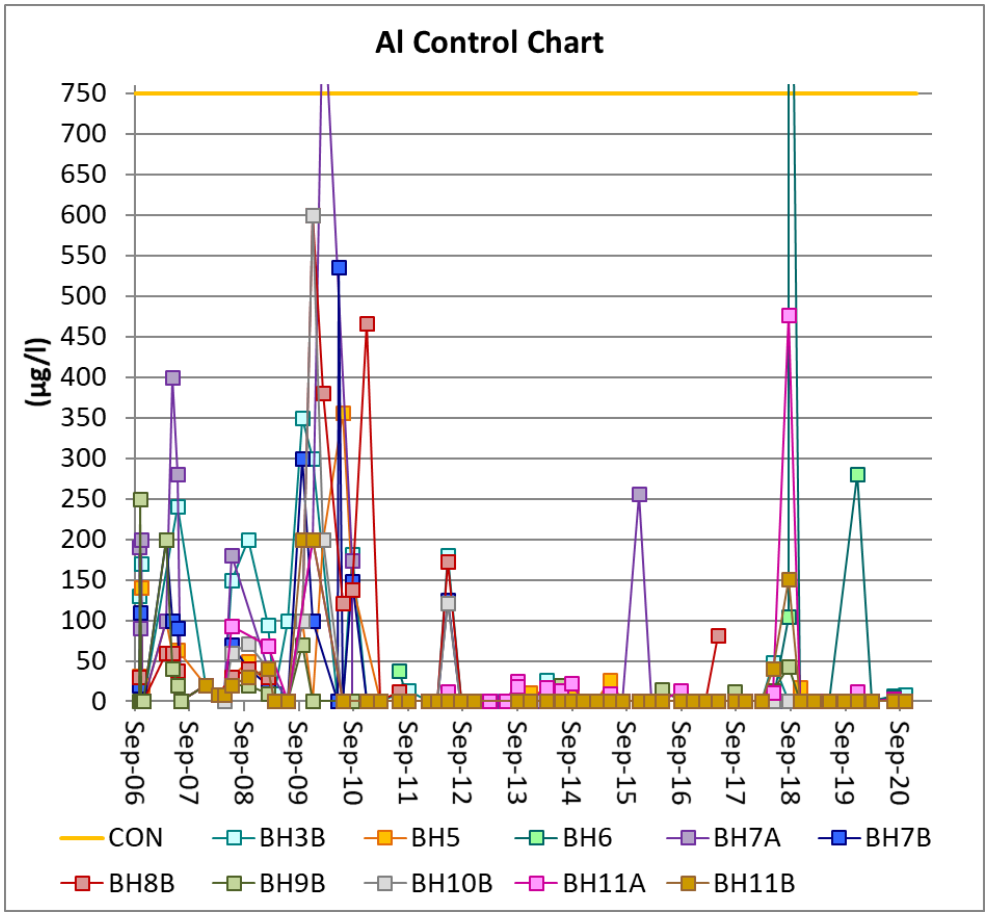
- Decreasing and generally stable trends for cadmium, mercury, aluminium and chromium since sampling began;
- Highly variable ammoniacal nitrogen concentrations in BH10B and;
- Elevated sulphate, boron and molybdenum in most boreholes. These will continue to be monitored during 2020.
- Selenium appears to have been dropped in error off the analysis requirements list by the sampling contractor. This has been raised with them and should be included in any future works. Historically selenium has always been well below the control level for all locations.

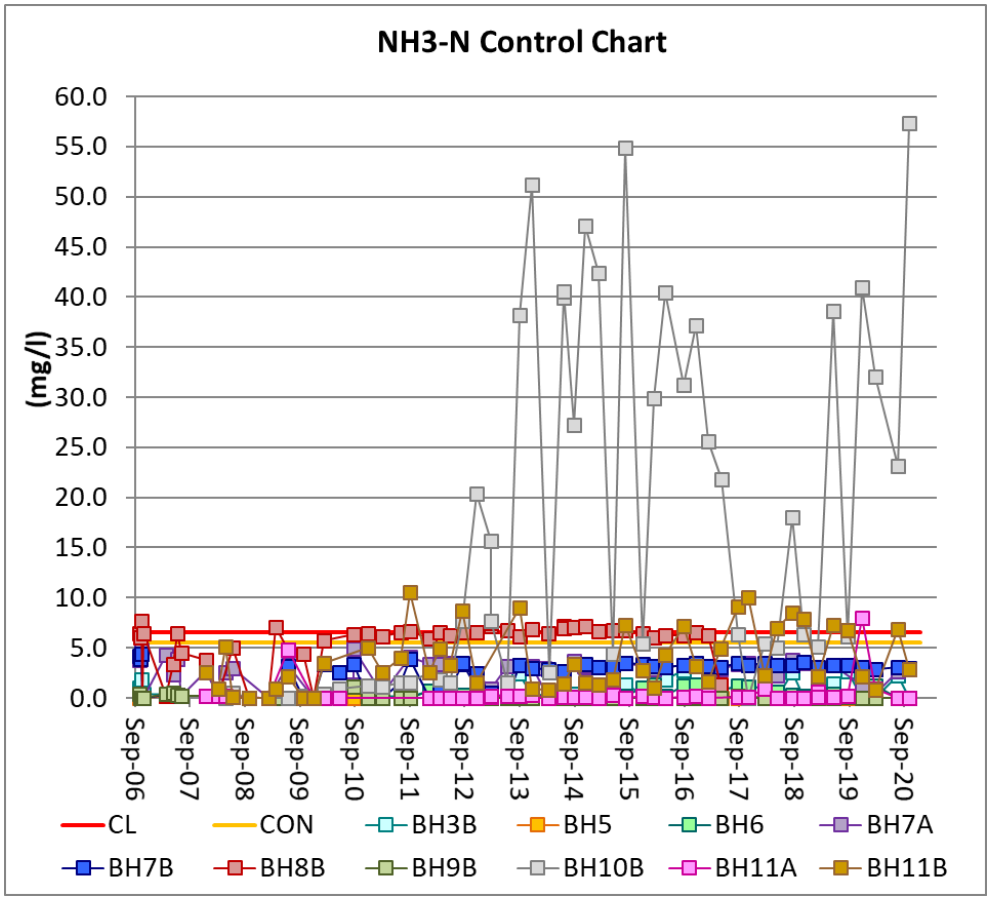
Figure 2: Control charts for groundwater boreholes
(CL – Compliance Limit, CON – Control Level, 0 – result at Method Detection Limit)

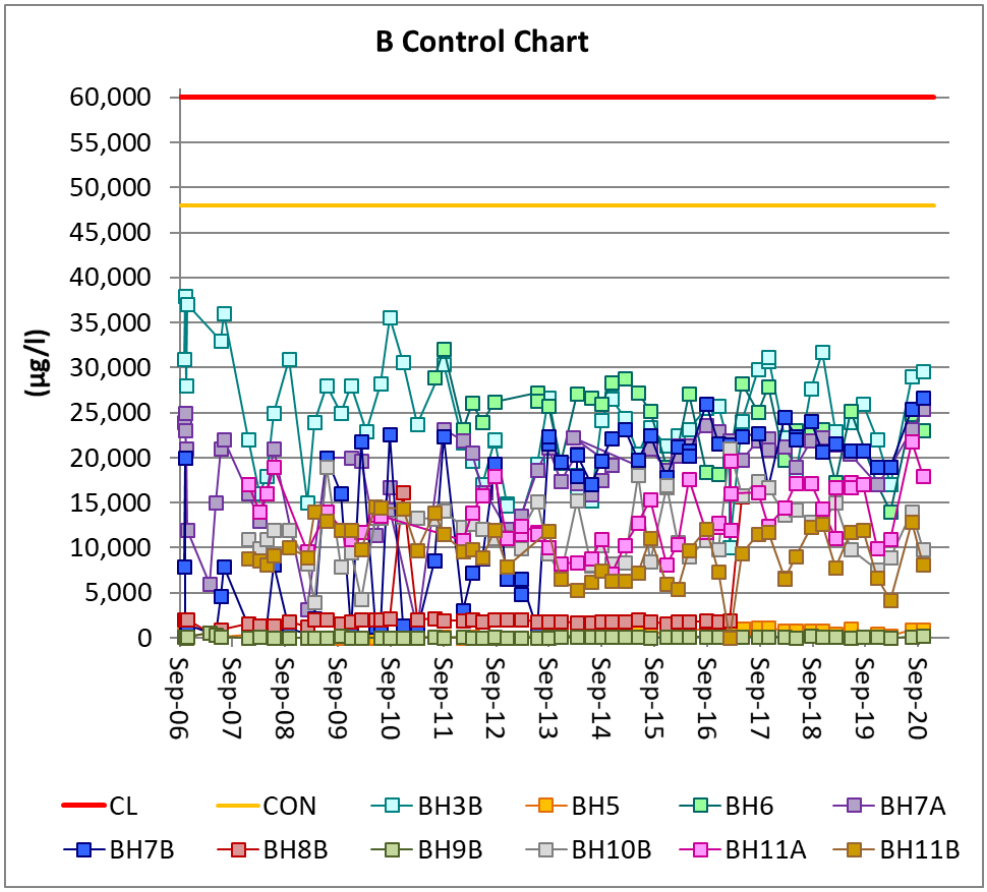


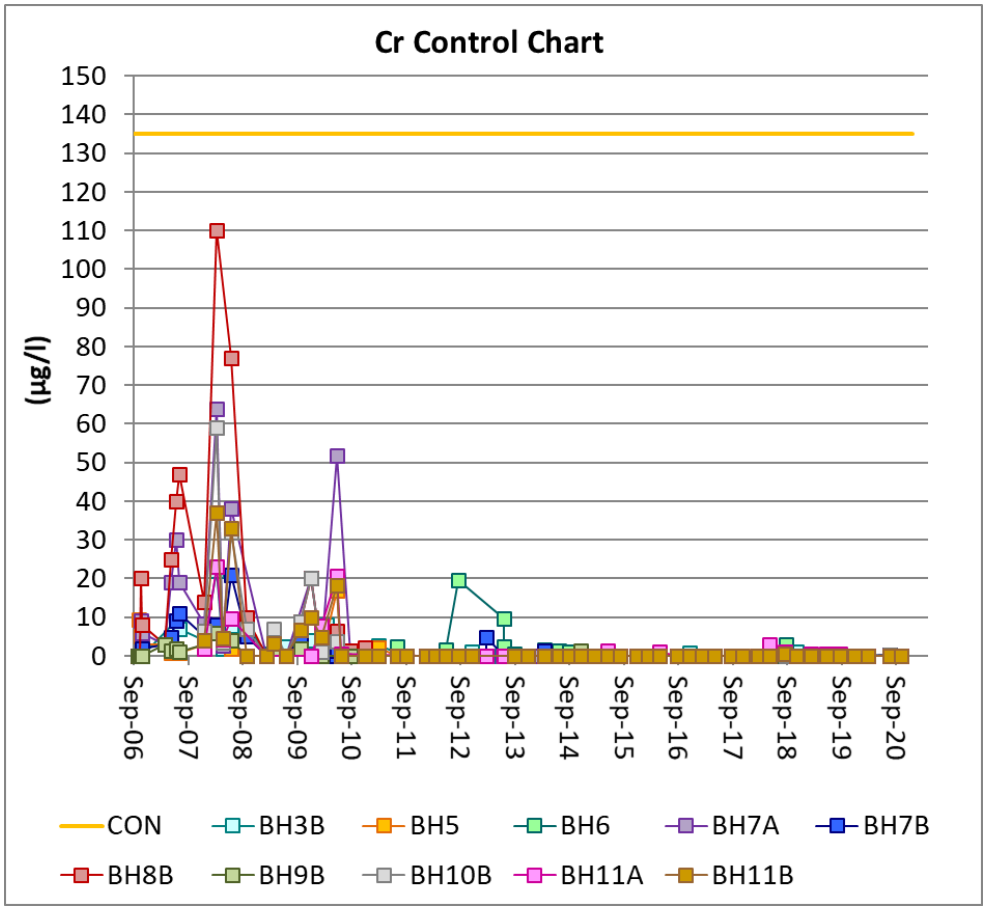

Hg Control Chart
20
18
16
14
12
10
8
6
4
2
0
(µg/l)
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
CL
CON
BH3B
BH5
BH6
BH7A
BH7B
BH8B
BH9B
BH10B
BH11A
BH11B

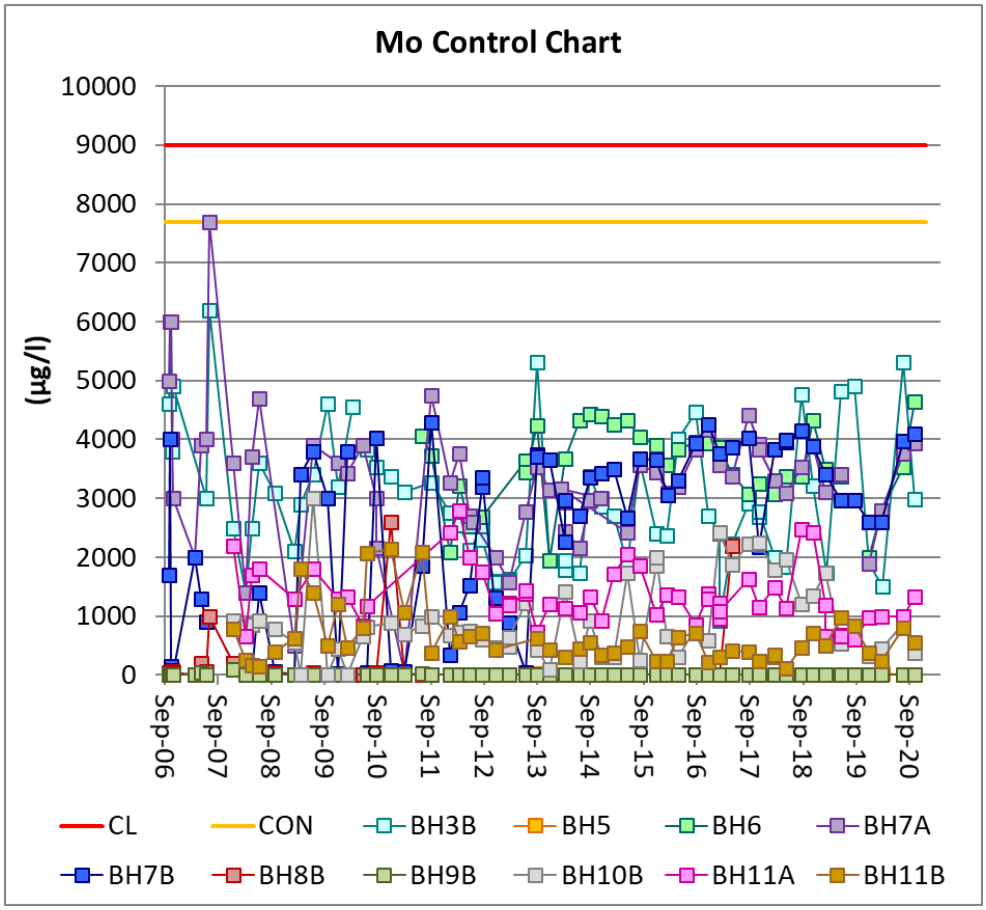

As Control Chart
300
250
200
150
100
50
0
(µg/l)
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
CL
CON
BH3B
BH5
BH6
BH7A
BH7B
BH8B
BH9B
BH10B
BH11A
BH11B

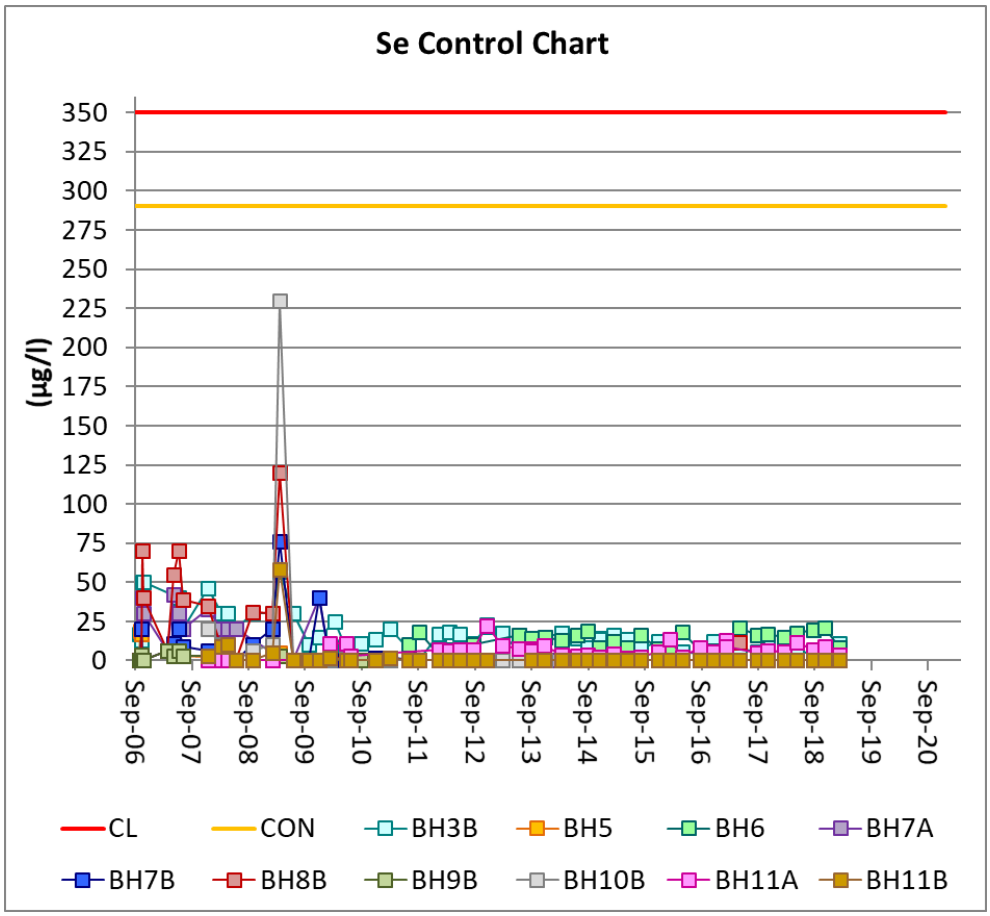

Al Control Chart
(µg/l)
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
CON
BH3B
BH5
BH6
BH7A
BH7B
BH8B
BH9B
BH10B
BH11A
BH11B

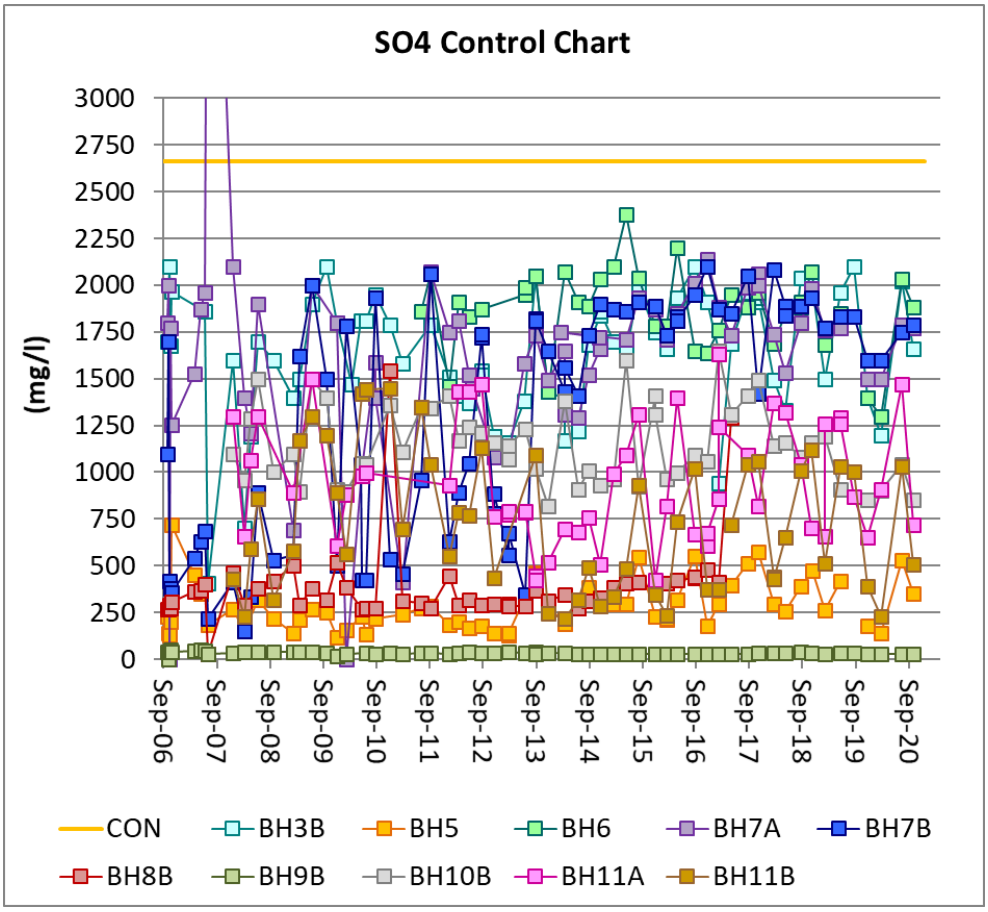

NH3-N Control Chart
(mg/l)
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
CL
CON
BH3B
BH5
BH6
BH7A
BH7B
BH8B
BH9B
BH10B
BH11A
BH11B

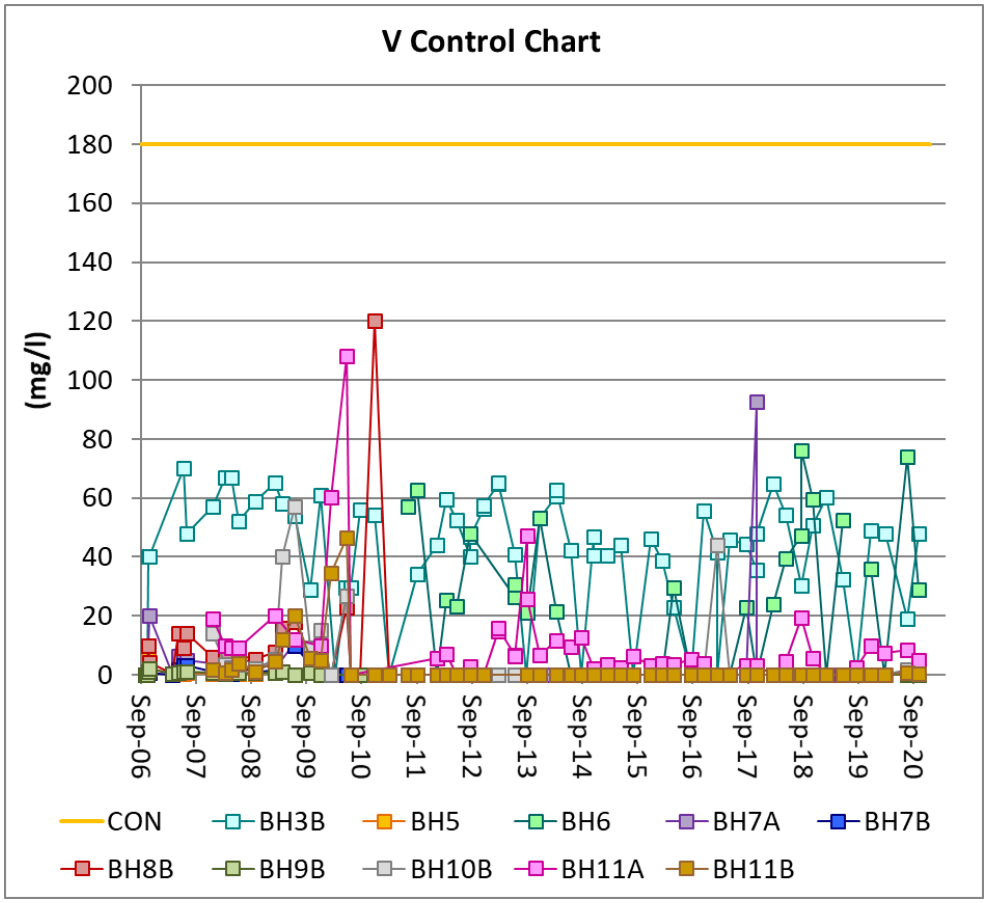

B Control Chart
60,000
55,000
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
(µg/l)
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
CL
CON
BH3B
BH5
BH6
BH7A
BH7B
BH8B
BH9B
BH10B
BH11A
BH11B


Cr Control Chart
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
(µg/l)
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
CON
BH3B
BH5
BH6
BH7A
BH7B
BH8B
BH9B
BH10B
BH11A
BH11B


Mo Control Chart
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
(µg/l)
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
CL
CON
BH3B
BH5
BH6
BH7A
BH7B
BH8B
BH9B
BH10B
BH11A
BH11B


Se Control Chart
350
325
300
275
250
225
200
175
150
125
100
75
50
25
0
(µg/l)
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
CL
CON
BH3B
BH5
BH6
BH7A
BH7B
BH8B
BH9B
BH10B
BH11A
BH11B


SO4 Control Chart
(mg/l)
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
CON
BH3B
BH5
BH6
BH7A
BH7B
BH8B
BH9B
BH10B
BH11A
BH11B


V Control Chart
(mg/l)
200
180
160
140
120
100
80
60
40
20
0
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
CON
BH3B
BH5
BH6
BH7A
BH7B
BH8B
BH9B
BH10B
BH11A
BH11B

2.3. Surface Water Quality Review

Monitoring Objective

To carry out routine monitoring of surface water to;

- monitor the performance of the ash disposal site by measurement of absolute levels and concentrations and trends relative to relevant criteria including background concentrations and control levels; and;
- identify and quantify effects on surface water receptors.

Number and Location of Monitoring Points

A summary of the surface water monitoring points is provided in Table 3 below and the locations are shown in Appendix A.

Table 3: Summary of Surface water monitoring points

Monitoring Point	Description	Direction from site	Remarks
Eastern Perimeter Drain (EPD)	Western bank of drainage ditch	East	
Brackish Lagoon (BL)	Saline lagoon	South-east	Surface water Receptor
River Thaw (S3)	Eastern bank, tidal mudflats below rail bridge	North upgradient	Surface water Receptor
Group 5 Spring (S1)	Wetland area adjacent to spring within ash disposal site	West	
Mouth of River Thaw	At the mouth of the river as it meets the sea	South West	Surface water receptor (added after suggestion by HRA review 2018)

Monitoring Measurements

The surface water monitoring analytical suite contains a range of parameters which are monitored on a quarterly basis in accordance with the Environmental Permit. A trained RWE operative is responsible for the sampling of the surface water locations and an independent external laboratory is used for the analysis of the samples.

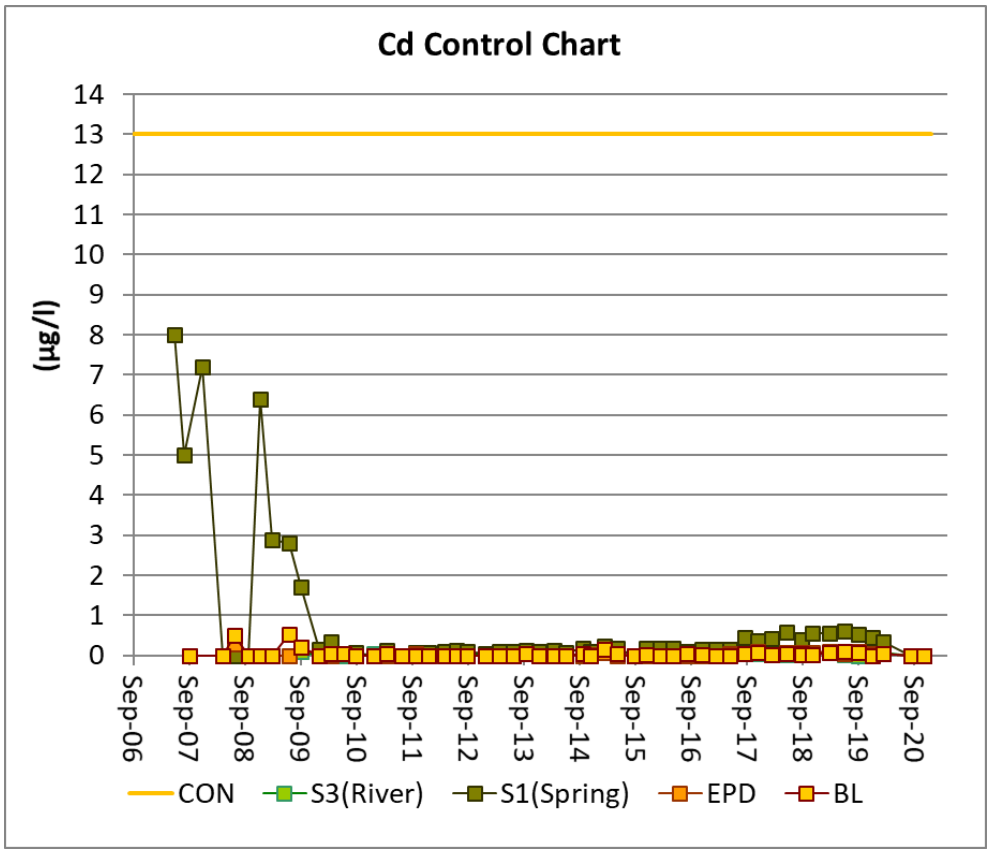
Figure 3 shows the surface water control charts for the associated monitoring points. It should be noted that the control levels apply to all surface water monitoring points and are identical to the respective groundwater control levels. An exceedance is defined as a result above the control level for 3 consecutive sampling events.

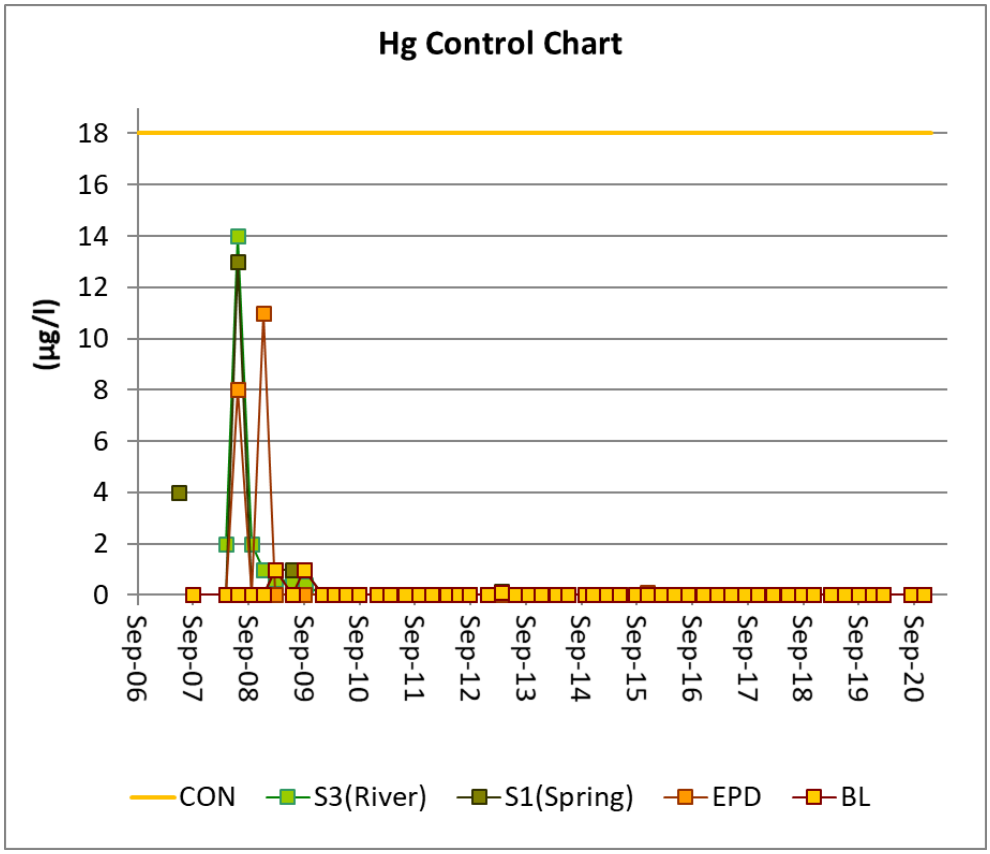
In 2020, there were no exceedances of the control level for any critical parameter and the control charts show there are no increasing trends in critical parameter concentrations.

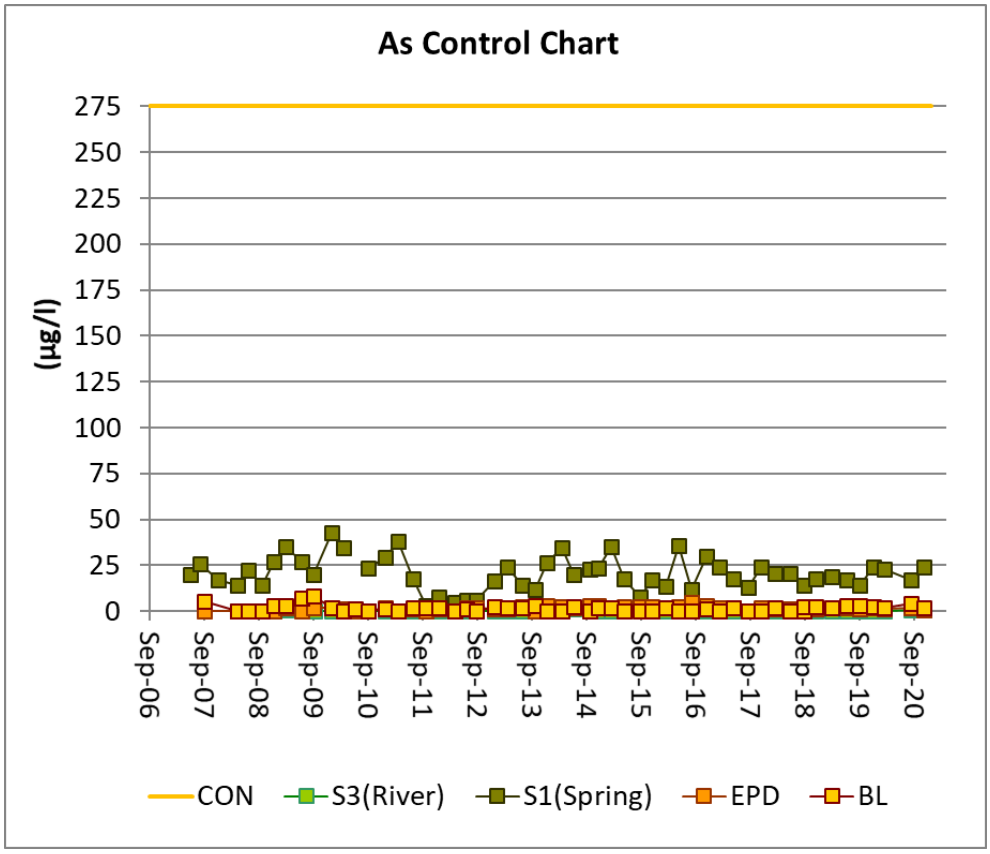
Ammoniacal-nitrogen levels remain highly variable in Group 5 Spring (S1) with 2 elevated results recorded for Q1 and Q4 2020. This will continue to be monitored during 2021.

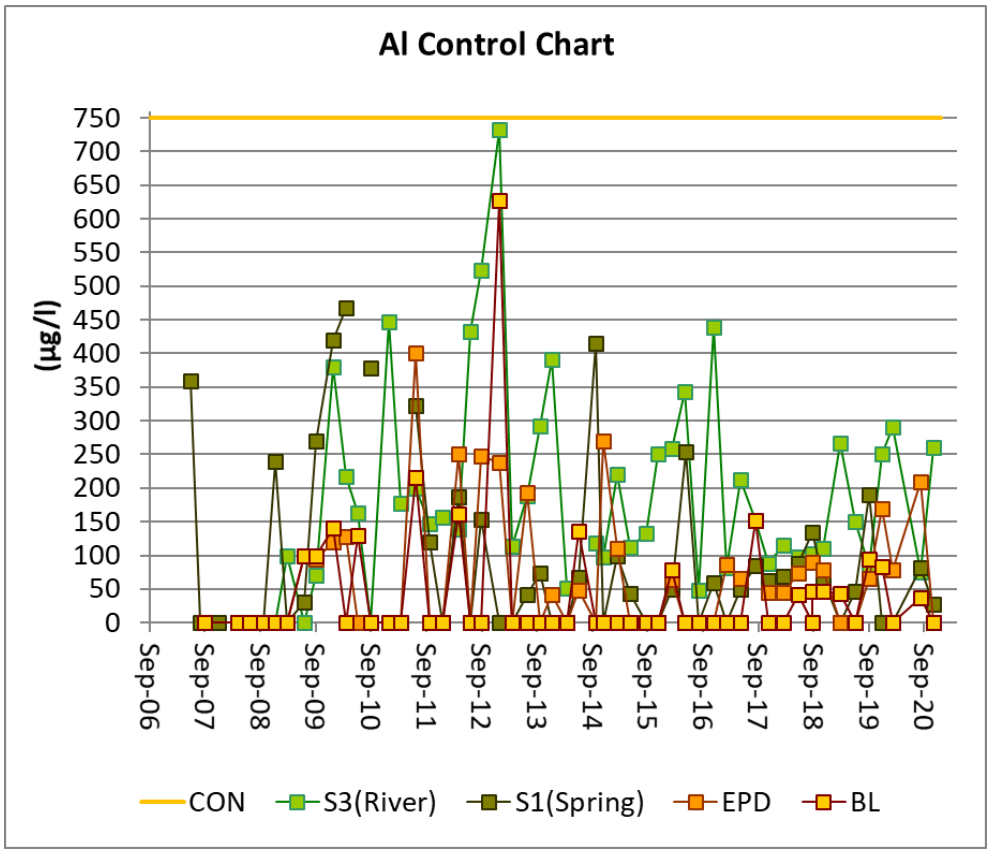
Group 5 Spring (S1) also displays the highest concentrations of other critical parameters, in particular boron, molybdenum and sulphate, which does suggest that it is affected by PFA leachate. However, it should be noted the spring discharges into a stagnant pond surrounded by wetland with water only lost by evapotranspiration or seepage. Therefore, the samples taken from the pond may not be representative of the spring discharge from the ash mound nor considered as a discharge from the ash disposal site.

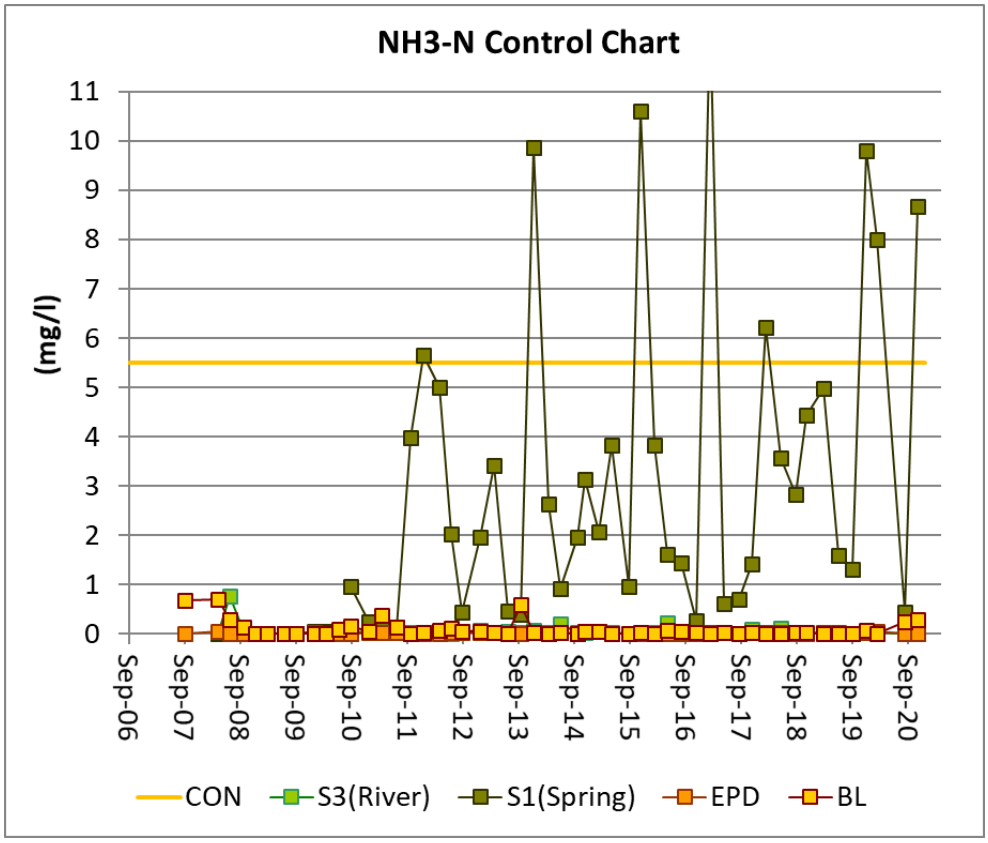
Figure 3: Control charts for surface water monitoring points
(CON – Control Level, 0 – result at Method Detection Limit)

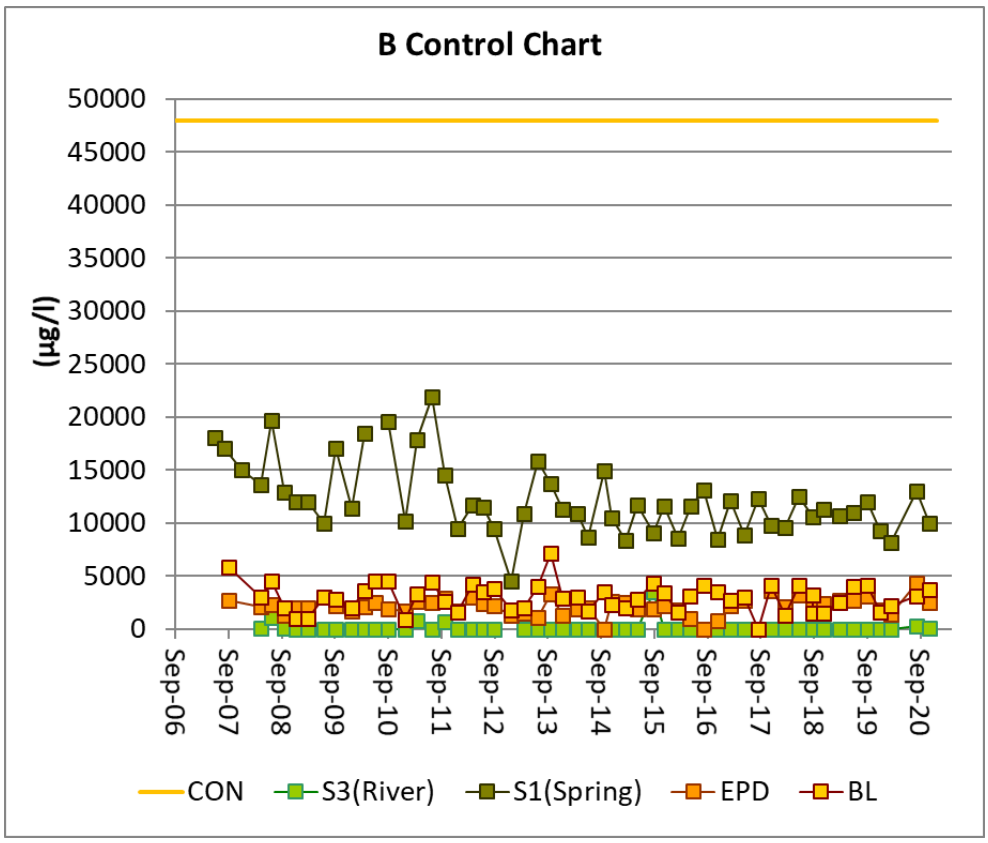


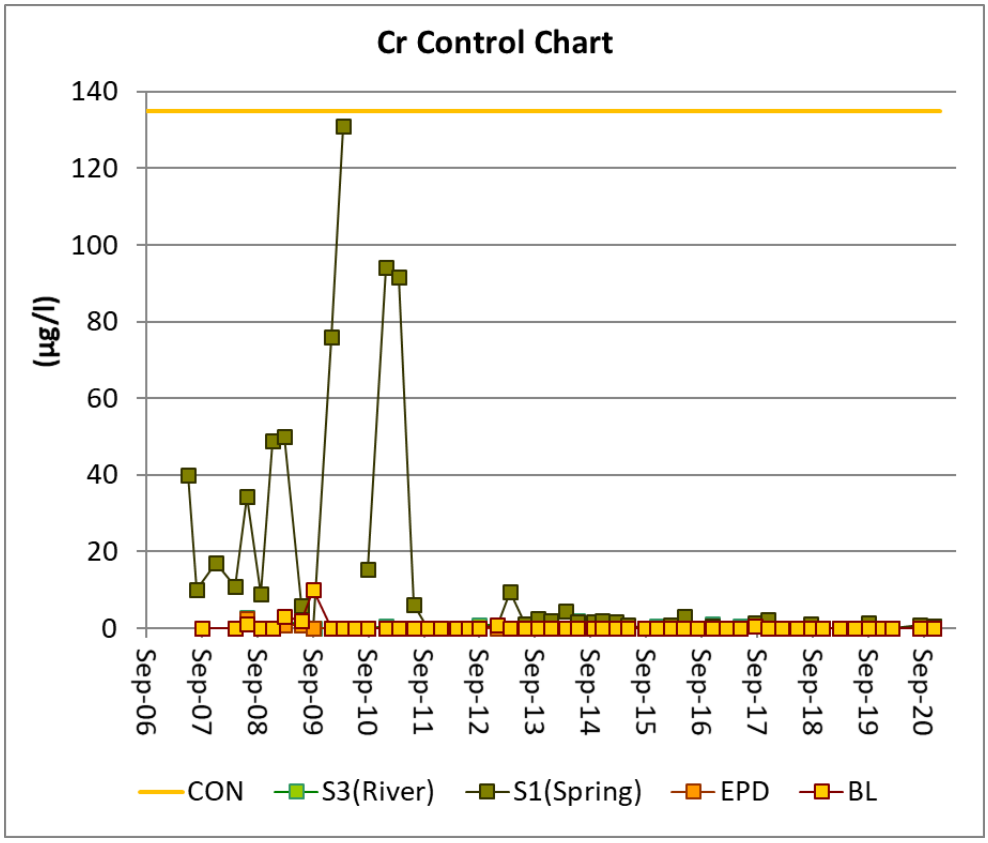


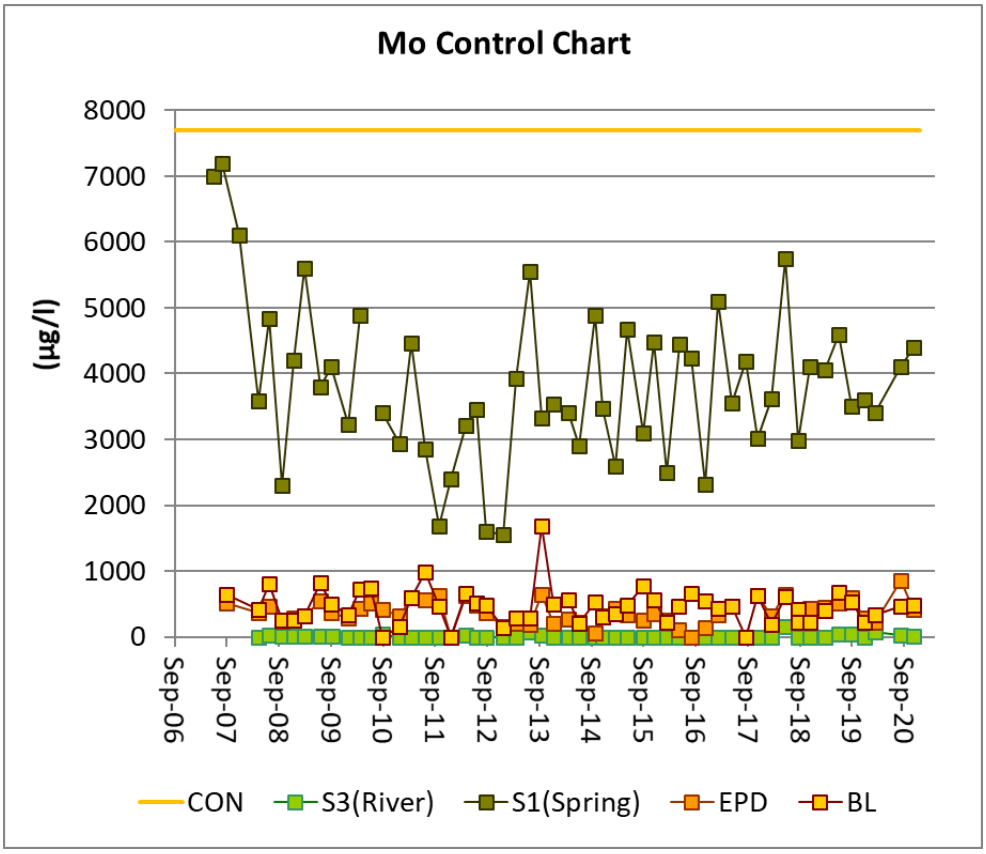

As Control Chart
275
250
225
200
175
150
125
100
75
50
25
0
(µg/l)
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
CON
S3(River)
S1(Spring)
EPD
BL

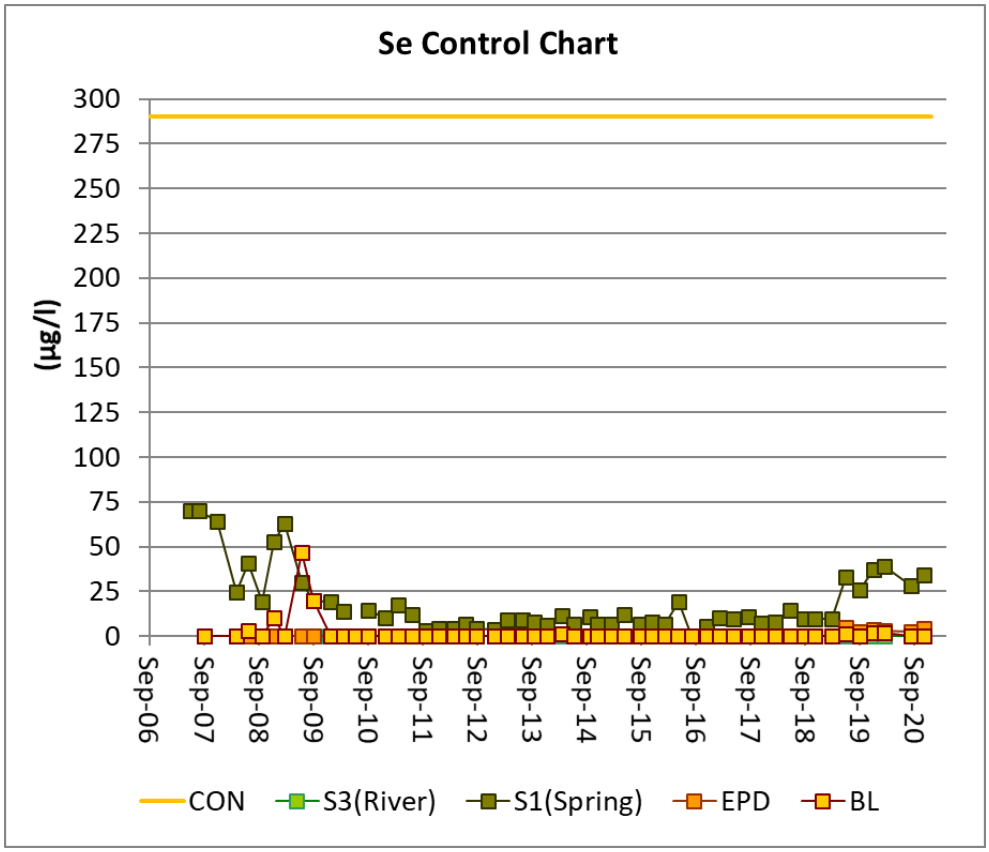

Al Control Chart
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
(µg/l)
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
CON
S3(River)
S1(Spring)
EPD
BL

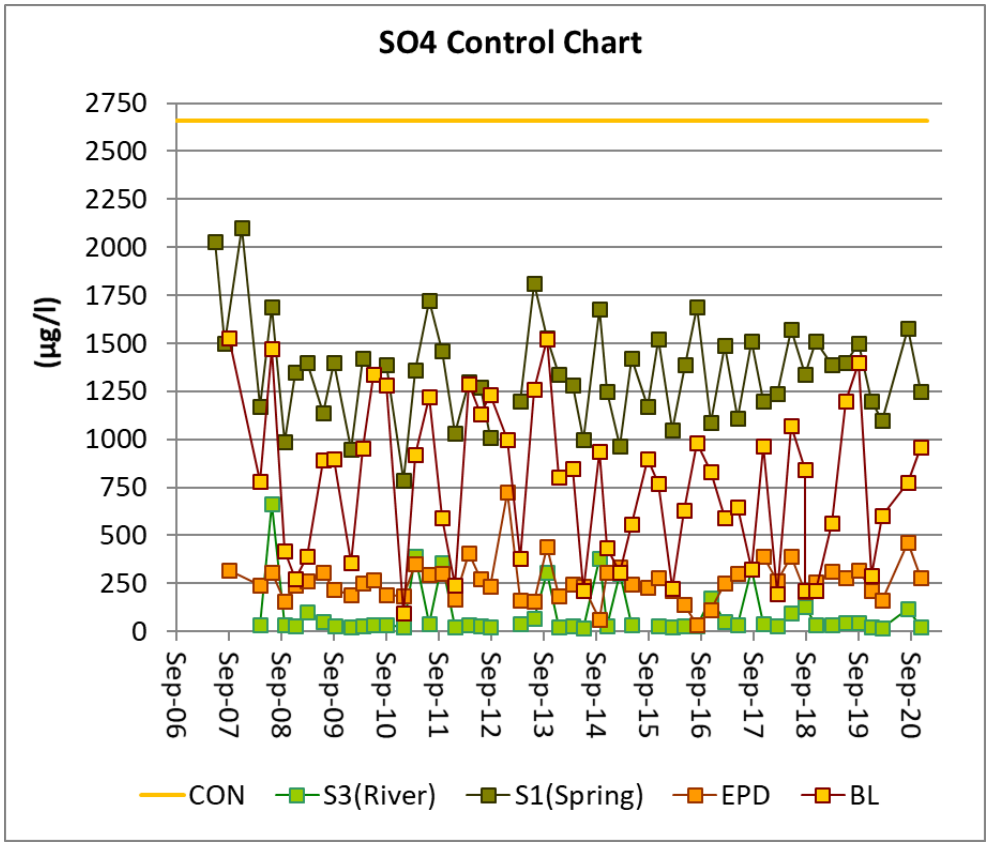

NH3-N Control Chart
(mg/l)
11
10
9
8
7
6
5
4
3
2
1
0
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
CON
S3(River)
S1(Spring)
EPD
BL

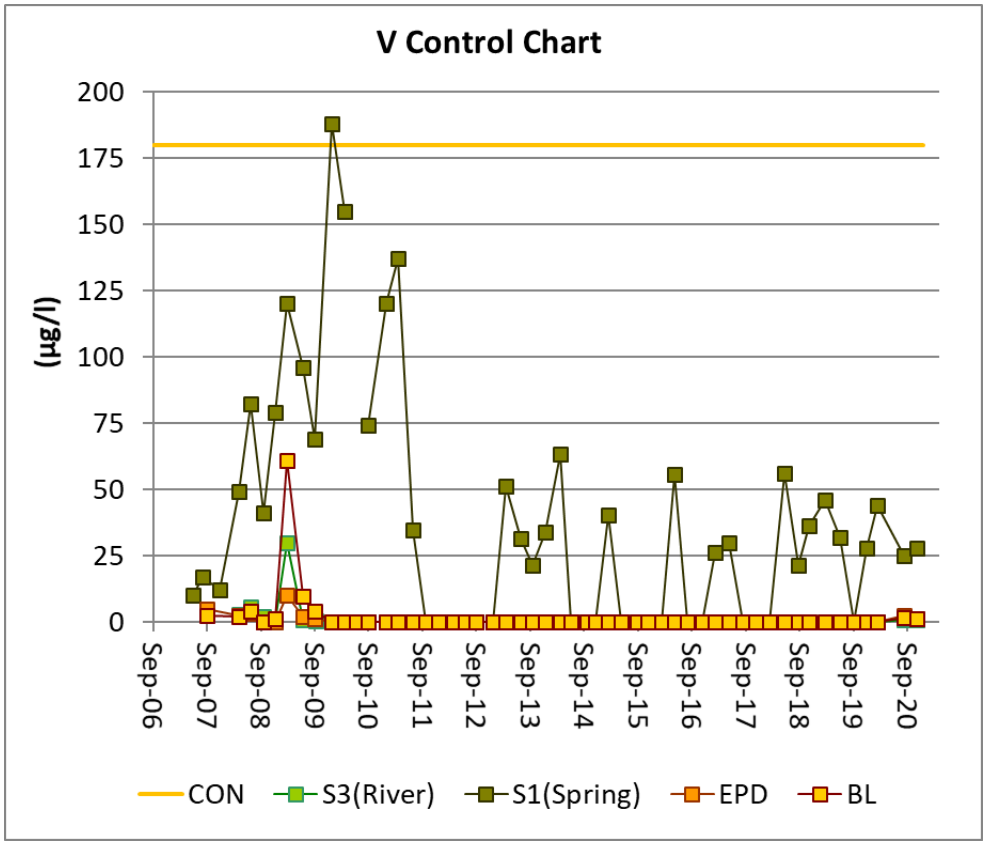

B Control Chart
(µg/l)
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
CON
S3(River)
S1(Spring)
EPD
BL


Cr Control Chart
140
120
100
80
60
40
20
0
(µg/l)
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
CON
S3(River)
S1(Spring)
EPD
BL


Mo Control Chart
8000
7000
6000
5000
4000
3000
2000
1000
0
(µg/l)
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
CON
S3(River)
S1(Spring)
EPD
BL


Se Control Chart
300
275
250
225
200
175
150
125
100
75
50
25
0
(µg/l)
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
CON
S3(River)
S1(Spring)
EPD
BL


SO4 Control Chart
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
(µg/l)
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
CON
S3(River)
S1(Spring)
EPD
BL



3. Annual Production/Treatment Data 2020

Table 5: Annual Production/Treatment Data(Table S5.2 EP)

Parameter	Value	Unit
Surface water disposed off site	0	m^3/yr
Groundwater disposed off site	0	m^3/yr

4. Contamination/Decontamination of Site

There have been no incidents or emissions which may have caused any site contamination during 2020, and, therefore, no requirement to decontaminate the site during 2020.

5. Topographical Surveys

The last topographical survey to ordnance datum was carried out in May 2009 following closure of the ash disposal site. The site is currently in the process of being surveyed as part of the 2021 wider Aberthaw Power Station survey works.

6. Landfill Capacity

Aberthaw Ash Disposal Site historically reached its maximum permissible height and the only area used for depositing Pulverised Fuel Ash (PFA) over the last few years has been the temporary 'short tip' storage area on the western side (utilised for ash sales). This was reprofiled as part of the main Aberthaw Power Station closure and decommissioning process during 2020. The WRA calculations and associate payment, associated with the restoration of the area, was made in early 2021. The total weight of PFA utilised was estimated at 8,044 tonnes.

Table 6 below, represents the total reported to Natural Resource Wales via the Waste Return form route, the Q4 form being submitted before the calculation process had been completed. The Q1 2021 form will be used to capture the final tonnage within the restoration/reprofiling area.

Table 6: PFA Deposited

Reporting Period	PFA Deposited (tonnes)
1st January – 31st December 2020	0 tonnes (as reported)

7. Waste Acceptance Compliance Testing

Aberthaw Ash Disposal Site is a mono-landfill site under the direct operational control of Aberthaw Power Station. All ash was transported directly from the Power Station to the Ash Disposal Site.

The exact composition of PFA was dependent upon the composition of the fuel utilised by the Power Station. RWE has well established procedures which control the quality of fuel supplied to its stations. Analytical data was obtained from leachate tests performed on composite samples of conditioned PFA from Aberthaw Power Station between 2012 and 2017. The CEN two-stage method for leachate analysis was used (BS EN 12457-3:2002 Characterisation of waste – Leaching – Compliance test for leaching of granular waste materials and sludges of which Part 3). A summary of this data can be seen in the historical annual performance reports for the site.

Appendix A. Groundwater and Surface Water Monitoring Locations