Murray Timber Group

Environmental Monitoring Quarter 4 2020: Surface Water & Groundwater

Murray Timber Products Ballon, County Carlow Licence: P0556-01

December 2020

MURRAY TIMBER GROUP

CDM Smith

Document Control Sheet

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Section 1 Introduction

Murray Timber Group Ltd (MTG) carries out groundwater and surface water monitoring as specified in its Integrated Pollution Prevention Control Licence (IPPC Reg. No. P0556-01).

Murray Timber Group Ltd (MTG) appointed CDM Smith to conduct the groundwater and surface water monitoring programme at its Timber Treatment Facility in Ballon, County Carlow.

This report presents the results of the quarter 4 (Q-4) groundwater monitoring (quarterly suite) and surface water monitoring (quarterly suite) carried out in November 2020 by Dr. Laura Foley.

1.1 Monitoring and Reporting Requirements

The monitoring and reporting requirements which have been agreed with the Environmental Protection Agency (Agency) are presented in **Appendix 1**.

This report was prepared by Ms. Áine O' Shea and reviewed and checked by Dr. Laura Foley. The report is accurate, and representative of the monitoring completed in Q-4 2020.

Section 2 Site Description

2.1 Site Location and Surrounding Landuse

The site is located approximately 1 km east of the village of Ballon as shown on **Figure 1.** Ballon is located approximately 16 km to the south-east of Carlow town. The dominant landuse surrounding the site is agricultural, primarily for tillage.

2.2 Site Layout

The site layout is shown in **Figure 2**. It covers an area of approximately 25,000 m^2 and includes a car park, administration offices, plaining line, debarking area, milling areas, kilns, boiler area, treated timber storage area and a high and low-pressure timber treatment area which is fully contained within a bunded building. The entire site is concrete paved.

A stream, which is a tributary of the Douglas River, flows from south to north along the eastern boundary of the site. The stream discharges into the Douglas River 150 m to the north of the site. The Douglas River joins the River Slaney approximately 3 km to the north-east of the site.

The treatment plant is located in the south-eastern section of the site, approximately 40 m to the west of the stream. The treated timber is stored in various concrete paved areas across the site. Following remedial works carried out after a spill incident in 2005, surface water run-off from the entire site is directed to oil interceptors located in the north-eastern and south-eastern corners of the site. After passing through the interceptors, the water are discharges to the stream.

There are five on-site groundwater monitoring wells (GW-1, 2, 4, 5 and 6). These wells were installed in July 2004 as part of MTG's environmental monitoring programme. GW-5 and GW-6 are downgradient of the treatment unit; the remaining wells are either up or side gradient of the treatment unit.

There are seven surface water monitoring points on site: SW-1; Upstream; Downstream; Downstream 10 meters (DS 10 meters), MP1, MP2 and MP3. SW-1 is the point where the surface water drainage system for the site discharges to the stream at the north-eastern corner of the facility. The "Upstream" sample is collected from the stream approximately 100 m upstream of the site. The "Downstream" sample is taken from the stream, approximately 100 m downstream of the site, and "DS 10 meters" is 10 m downstream of the site, just upstream of an offsite discharge pipe. Surface water monitoring points MP1, MP2 and MP3 are located adjacent to the facility and were first sampled in Q-3 2020 at the request of the EPA. The locations of all monitoring points are shown in Figure 2.

2.3 Facility History

It is understood that the facility began operations as a saw mill in the 1970's and was purchased by the current owners, MTG, in 2000. At the time, timber treatment was not carried out and to the best of MTG's knowledge, no such treatment was carried out at the site before 2000. MTG began high pressure timber treatment using 'Tanalith E' in 2000 and is still using this product. MTG also uses Vacsol Aqua for low pressure treatment.

CDM Smith understands that the treatment unit has always been located in its current position and that both the treatment area and the treated timber storage area were paved with concrete before treatment started. CDM Smith understands that the treatment chemicals have always been stored in paved areas that drain back to the treatment vessel.

On 29 June 2005, blue foam was observed in the stream to the east of the site. MTG immediately informed the EPA and an EPA inspector was on site within two hours. The source of the foam was traced to the eastern side of the treatment unit, where two tanks of Tanalith E were located. As a precautionary measure, the contents of the tanks were pumped to the main treatment vessel. An examination of the tanks identified a leak in one of them. The leak had entered a land drain running between the treatment area and the stream. This land drain was originally installed to aid site drainage, with an outfall to the stream.

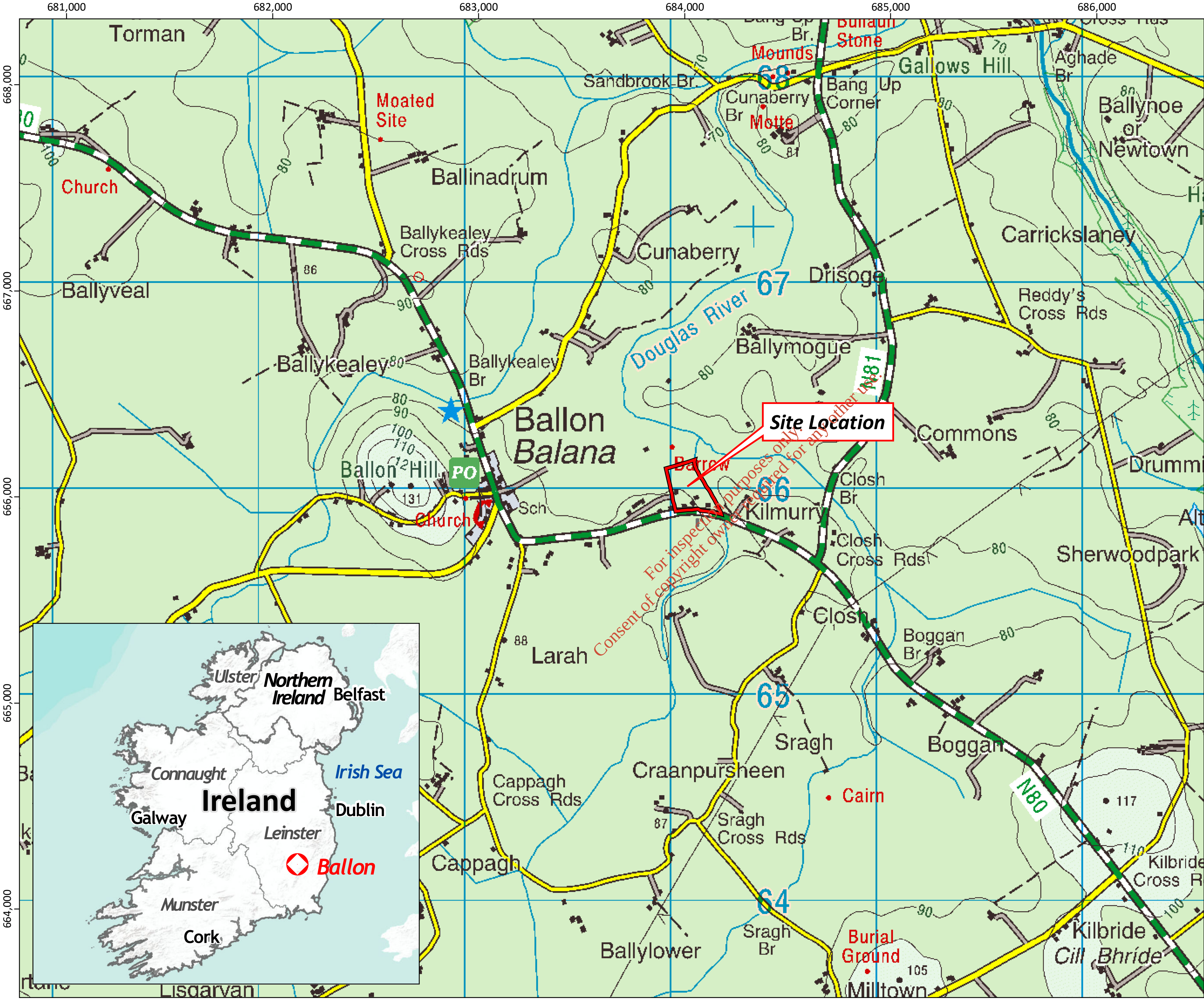
MTG subsequently appointed an independent environmental consultant to carry out an assessment of the subsoils downgradient of the treatment area in 2005. This involved the installation of boreholes and collection of soil samples which were tested for arsenic, chromium and copper. With the exception of copper, the analysis did not include the main chemical constituents of 'Tanalith' E i.e. organic pesticides such as propiconazole or tebuconazole. Elevated copper (up to 3,383 mg/kg), arsenic (up to 110 mg/kg) and chromium (up to 2,130 mg/kg) were detected in the upper 50 cm of the subsoil. Arsenic, copper and chromium are not constituents of 'Tanalith E', but are constituents of another treatment product, 'CCA'. It was at the time of the investigation assumed that 'CCA' was used on site at some time before 2000.

MTG designed and implemented a remediation programme recommended by the environmental consultant, which included the removal of the tanks, the excavation of the floor of the treatment unit and removal of the contaminated subsoils, as well as removal of contaminated subsoil from the land drain. The two leaking tanks were replaced by new tanks positioned adjacent to the treatment unit. These tanks are bunded and are routinely integrity tested in accordance with the IPPC Licence requirements. It is understood that the drain outfall to the stream was plugged with concrete and the land drain was backfilled and then covered with concrete. The nature to the fill material is not known.

CDM Smith understand that removal of the impacted soil was based solely on a visual assessment of the extent of the impacted area and validation testing of the underlying soils was not conducted to confirm that all the contaminated soils had been removed. The depth of subsoil removed is not known.

Groundwater monitoring, which was carried out in groundwater wells downgradient of the treatment unit in July 2005, did not detect arsenic, copper or chromium at levels that exceeded their respective Interim Guideline Values (IGV). The analysis did not include organic pesticides. Since Q-1 of 2008, the regular groundwater and surface water monitoring programmes have included propiconazole and tebuconazole, which are the main pesticides in 'Tanalith E'.

Elevated levels of Tebuconazole and Propiconazole were detected in the wells GW-5 and GW-6 in 2008. These levels of pesticides detected fell significantly between 2008 and 2013. The levels of pesticides detected at GW-5 and GW-6 since 2013 have ranged from very low levels to non-detection.



0 250 500 m

N W E S

Legend

Site Boundary

Source:
OSi Discovery Series 1:50,000.
Ordnance Survey Ireland
Licence No AR 0095919
© Ordnance Survey Ireland/Government of Ireland
Coordinates are in Irish Transverse Mercator

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Consultant: CDM Smith

Project Code: 118496

Project: Monitoring Report

Drawing Title:

FIGURE 1 SITE LOCATION

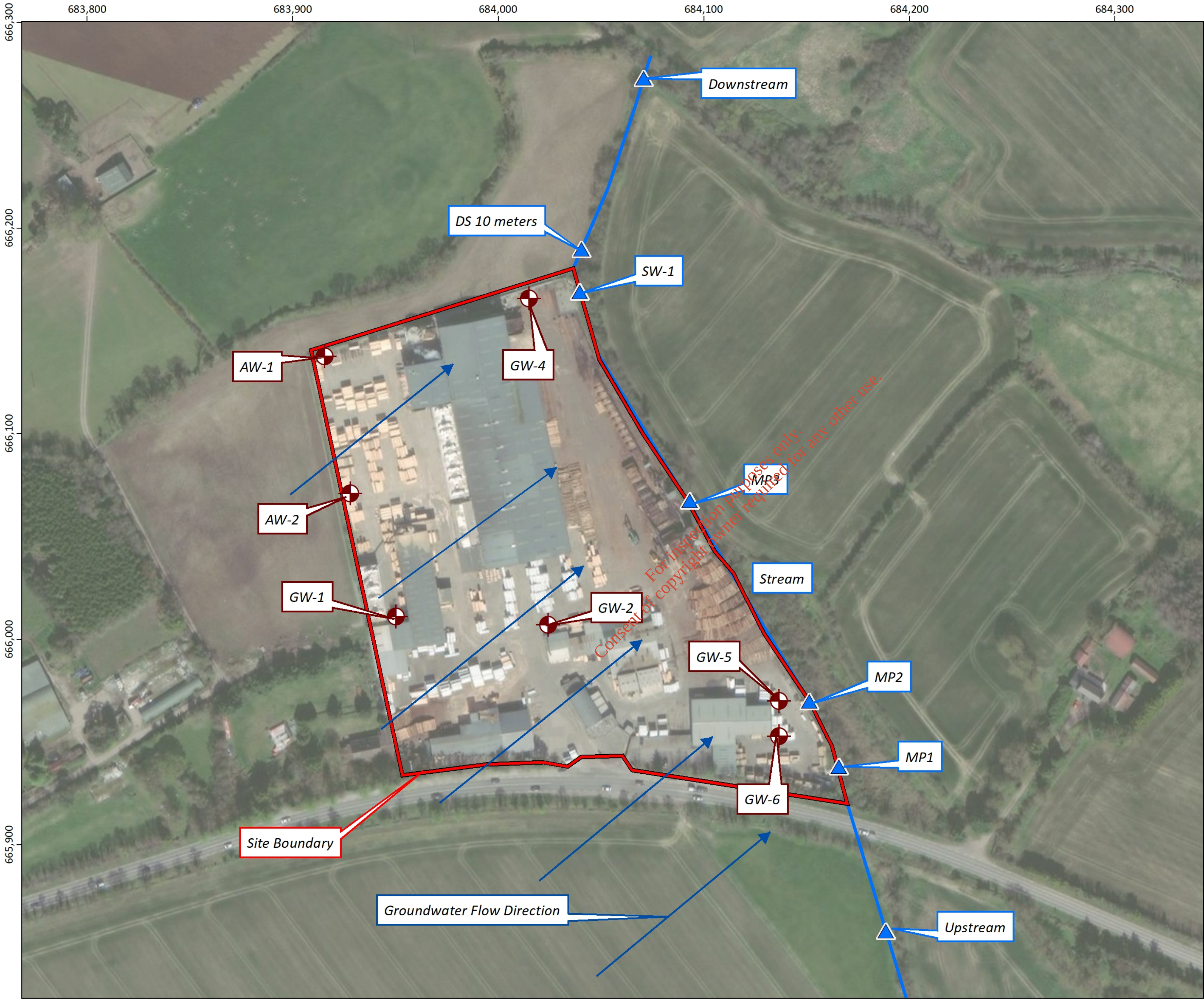
Drawn By: SM/OC

Date: 05/03/2019

Internal Path Reference: Q:\118000-118499\118496\40 Documents Generated\GIS\02_GIS_Tasks\04_CSM_Ballon\MXD\Figure_1_Site_Location.mxd

Drawing Number: 118496/04/01

A subsoil quality investigation of the spill area was undertaken by an independent in July 2009. This included the installation of 13 boreholes and the collection of subsoil samples. These samples were analysed for heavy metals and the pesticides which are constituents of the treatment product (Tanalith E), which leaked in 2005. The investigation concluded that there was no significant source of contamination in the subsoils because of the spill and the site did not pose an environmental risk to any local receptors.



0 50 100 m

N W E S

Legend

- Surface Water Locations
- Boreholes
- Groundwater Flow
- Site Boundary
- River

Source:

ESRI World Imagery.
© ESRI (Vivid-UK imagery courtesy of Maxar, acquired on 21/04/2018)

Coordinates are in Irish Transverse Mercator

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Consultant: CDM Smith

Project Code: 118496

Project: MURRAY TIMBER GROUP BALLON

Drawing Title:

FIGURE 2: ENVIRONMENTAL MONITORING LOCATIONS

Drawn By:	Date:
SM	11/08/2020

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Drawing Number: 118496/Ballon/02

Section 3 Groundwater Monitoring

3.1 Groundwater wells

3.1.1 Locations

Two of the wells (GW-5 and GW-6) are downgradient of the treatment unit and drying area. GW-5 and GW-6 are situated at the eastern boundary of the treatment and drying building and are the closest downgradient wells to the building. GW-5 and GW-6 are positioned between the treatment and drying building and the stream on the eastern site boundary.

GW-1 is next to the plaining line in the western section of the site and GW-2 is adjacent to the mill in the center of the site. These wells are upgradient of all timber treatment, drying and storage activities. GW-4 is in the northern section of the site and is considered to be hydraulically down gradient of all site activities.

Groundwater monitoring was carried out on 24 November 2020 by Dr. Laura Foley at the five monitoring wells (GW-1, GW-2, GW-4, GW-5 and GW-6), as shown on Figure 2.

3.2 Groundwater Levels and Flow Direction

Groundwater levels were measured to the nearest centimeter relative to the top of the steel casing using a standard dip meter probe that emits a high pitch signal upon contact with water. In addition to the monitored wells, groundwater levels were measured in two historic supply wells (AW01 and AW02).

Using the groundwater level data, the site and local area topography and the presence of the stream which flows along the eastern site boundary CDM Smith established that groundwater flow across the site is from the southwest to northeast with shallow groundwater discharging into the stream (see report DG30_2019 Ballon Q1 for full details of piezometric survey completed as part of the CSM). The generalised groundwater flow direction is illustrated on Figure 2.

A summary of the water levels between 2010 and 2020 is contained in the Appendix 2.

3.3 Groundwater Quality

3.3.1 Sampling Method

Wells were either purged a minimum of 3 well volumes or purged dry and allowed to refill before sample collection. The purge volumes were calculated on-site from the average static water level, the borehole diameter and total depth of the well pipe. It was not possible to purge the wells GW-2, GW-5 and GW-6 of three times their volume due to the very poor recovery in these wells. The samples were decanted into laboratory designated containers and stored in a cooler box to maintain the sample temperature at approximately 4°C. Temperature, pH and electrical conductivity were not recorded in the field as the field probe malfunctioned on the day of sampling. The field measurements and observations recorded are presented in Table 1. The samples for chemical analysis were submitted to Element Laboratories within 24 hours of sampling. The methodologies used were all ISO/CEN approved or equivalent.

Table 1 In-situ monitoring and Field Observations

Well	Well depth (mBTOC)	Water level (mBTOC)	Recovery
GW-1	4.25	1.93	Very good
GW-2	3.33	*	Poor
GW-4	12.41	1.54	Very good
GW-5	3.28	2.45	Poor
GW-6	3.15	1.985	Poor
AW01	90**	1.68	na
AW02	108**	1.38	na

NB: Field data not collected due to probe malfunctioning on day of sampling
*data not available due to device malfunction
** taken from borehole log

3.3.2 Laboratory Results

Groundwater samples were analysed for the quarterly parameter list agreed with the Agency. This included the parameters; copper, chromium, arsenic, boron, tebuconazole and propiconazole.

The laboratory results are presented in full in Appendix 3 and summarised in Table 2. Table 2 includes Interim Guideline Values (IGV) published by the EPA. The IGVs are not statutory, however they were developed to assist in the assessment of impacts on groundwater quality in the context of the implementation of the EU Water Framework Directive. The guidelines are based on, but are more conservative than, the Drinking Water quality standards. The table also includes for comparative purposes the limits set out in the European Communities Environmental Objectives (Groundwater) Regulations (S.I. 9 of 2010).

The results are also compared to the Groundwater Regulations Threshold Value (GTV), which were introduced in 2010 (S.I. 9 of 2010) on foot of requirements from the Water Framework Directive and have evolved from the IGVs. It should be noted however, that while the GTVs provide an indication of potential contamination, they are not generally applicable to small unpumped well water quality data. They were developed to assess groundwater quality for large water bodies using large drinking water supply wells which are generally more representative of larger areas of aquifers/groundwater bodies.

3.3.3 Upgradient Monitoring Wells

GW-1 and GW-2 are located upgradient of the treatment unit. The compound propiconazole was not detected in GW-1 or GW-2. The compound tebuconazole was not detected in GW-1, but was detected in GW-2 at a concentration of tebuconazole was 0.2 µg/L which is above the IGV of 0.1 µg/L.

All other parameters were either below their detection limits or respective IGVs and GTVs.

3.3.4 Downgradient Monitoring Well

Pesticides were detected in GW-5 and GW-6 in Q-4 2020. The concentration of tebuconazole in GW-5 and GW-6 was 6.4 µg/L and 3.6 µg/L, respectively, and the concentration of propiconazole in GW-5 and GW-6 was 4.7 µg/L and 2.7 µg/L, respectively.

The concentration of copper in GW-5 and GW-6 were 0.068 mg/L and 0.035 mg/L respectively, which is higher than the IGV (0.03 mg/l) but below the GTV (1.5 mg/l). The concentration of arsenic in GW-6 was 0.0139 mg/L, which is higher than the IGV (0.01 mg/l) and the GTV (0.0075 mg/l).

No other parameter exceeded its IGV or GTV in GW-5 or GW-6 in Q-4 2020.

No pesticides were detected in GW-4 in Q-4 2020. The concentration of chloride in GW-4 was 32.7 mg/l, which is higher than the IGV threshold (30 mg/l) and within the GTV threshold (24-187.5 mg/l). The concentration of phosphorus in GW-4 was 0.079 mg/l, which is higher than both the IGV (0.030 mg/l) and GTV (0.035 mg/l). Excluding chloride and phosphorus, no other monitored parameter exceeded their IGV or GTV in the furthest down-hydraulic-gradient monitoring well, GW-4, in Q-4 2020.

Table 2 Results of laboratory analysis for groundwater monitoring for Q-4 2020.

Parameter	Units	GW-1	GW-2	GW-4	GW-5	GW-6	IGV	GTV
Chromium	mg/L	0.0049	0.0015	0.0024	0.0064	0.0109	0.030	0.0375
Copper	mg/L	<0.007	<0.007	<0.007	0.068	0.035	0.030	1.5
Arsenic	mg/L	<0.0025	<0.0025	<0.0025	<0.0025	0.0139	0.010	0.0075
Boron	mg/L	0.024	<0.012	0.021	0.087	0.089	1	0.75
Cadmium	mg/L	*	*	<0.0005	*	*	0.005	0.00375
Hexavalent Chromium	mg/L	*	*	<0.006	*	*	0.03	0.0375**
Manganese	mg/L	*	*	<0.002	*	*	0.050	-
Nickel	mg/L	*	*	<0.002	*	*	0.020	0.015
Lead	mg/L	*	*	<0.005	*	*	0.010	0.01875
Zinc	mg/L	*	*	<0.003	*	*	0.100	-
Mercury	mg/L	*	*	<0.001	*	*	0.001	0.00075
Calcium	mg/L	*	*	152.7	*	*	200	-
Phosphorus	mg/L	*	*	0.079	*	*	0.030	0.035
Potassium	mg/L	*	*	1.8	*	*	5	-
Sodium	mg/L	*	*	16.7	*	*	150	150
Chloride	mg/L	*	*	32.7	*	*	30	24-187.5
Ammoniacal Nitrogen	mg/L	*	*	0.11	*	*	0.15	0.065-0.175
Sulphate	mg/L	*	*	56.3	*	*	200	187.5
Sulphide	mg/L	*	*	0.01	*	*	-	-
Nitrite	mg/L	*	*	<0.02	*	*	0.15	0.175
Total alkalinity as $CaCO_3$	mg/L	*	*	382	*	*	No abnormal change	
[1]Tebuconazole	µg/L	<0.1	0.2	<0.1	6.4	3.6	0.1	0.375***
[1]Propiconazole	µg/L	<0.1	<0.1	<0.1	4.7	2.7	0.1	
[1]Permethrin	µg/L	*	*	<0.1	*	*	20	
[1]Ethanolamine	µg/L	*	*	<100	*	*	-	-
Anionic surfactants	mg/L	*	*	<0.2	*	*	-	-

*Sampling not required **Limit for chromium ***Total pesticides [1]Pesticide

Section 4 Surface Water Data

4.1 Surface Water Monitoring Locations

There are seven surface water monitoring locations on site; SW-1, upstream, downstream, downstream 10 meters (DS 10 meters) MP1, MP2 and MP3. All sampling locations are shown in Figure 2.

The surface water drainage system for the site discharges to the stream to the east of the facility at SW-1. The surface water passes through an interceptor prior to discharging to the river. Water is sampled at the outfall pipe of this interceptor. There were initially two interceptors, SW-1, located at the north-eastern corner of the site, and SW-2, located directly to the east of the treatment unit building in the south-eastern corner of the site. A new treatment compound was constructed in 2015 at the interceptor associated with SW-1. The surface water collected in the interceptor SW-2 is diverted to the holding tank at SW-1 and discharges through SW-1.

The upstream monitoring point is located on the stream, approximately 100 m upstream of the site. The downstream monitoring point is located on the same stream, approximately 100 m downstream of the site.

During an EPA site visit in October 2018, an EPA inspector noted discharge from an offsite pipe located approximately 10 meters downstream of SW1 and 90 meters upstream of the downstream monitoring location. The inspector recommended an additional sampling location, just upstream of the pipe discharge, which is sampling point "downstream 10 meters".

In a correspondence in May 2020, the EPA requested samples be taken at three locations (approx. 80 meters apart) between the stream meeting the boundary of the site and upstream of SW1. These locations, MP1, MP2 and MP3, are shown in Figure 2.

The Agency requested MTG to undertake measures on-site to address surface water discharge quality after elevated COD levels were recorded in SW-1 and SW-2. Following consultation with the Agency in 2013 a number of measures were proposed to, and approved by, the Agency for immediate implementation. These included;

- The use of a yard Sweeper to remove debris from the logging yard;
- Increased frequency of inspection and cleaning of the yard, silt traps and interceptors;
- Diversion of Roof Water from the Mill Building around the logging yard directly to SW-1; and,
- Installation of an upgraded interceptor and tank at SW-1.

All the above measures have been implemented.

4.2 Surface Water Quality

4.2.1 Sampling Method

Sampling was conducted on 24 November 2020 by Dr. Laura Foley. Sampling was carried out by full submergence of the sample container into the surface water body. During submergence, every effort was made to keep the container steady to prevent disturbing the sediment. Temperature, pH and electrical conductivity were not recorded in the field as the field probe malfunctioned on the day of sampling. The samples were stored in a cooler box to maintain sample temperature at approximately 4°C. All the samples were submitted to Element (formerly Jones Exova) within 24 hours of sampling. The methodologies were all ISO/CEN approved or equivalent.

4.2.2 Results

The river samples were analysed for the quarterly suite (the parameters list is contained in Appendix 1), and MP1, MP2 and MP3 were analysed for tebuconazole and propiconazole.

The field physico-chemical data are contained in Table 3. The complete laboratory results are presented in Appendix 3 and summarised in Table 4. Table 4 also includes, for comparative purposes, the limits set out in the Surface Water Environmental Objectives (Surface Water) Regulations 2009 (SI 272 of 2009) (EQS).

4.2.3 Surface Water Drainage System Sample

It was not possible to sample SW-1 in Q-4 2020. Rain is required in order for water to collect in the interceptor and divert to the holding tank at SW-1. Rain was forecast for the sampling day, however it did not occur, therefore it was not possible to sample SW-1

4.2.4 River Samples

DS 10 meters was not sampled as the offsite drainage pipe was not flowing, thus is was not necessary to determine the impact of/contribution from this pipe on the downstream monitoring location.

Chromium, copper and arsenic were all lower than the AA-EQS in all samples. There was no significant change in BOD, TSS or COD between the upstream and downstream monitoring locations Table 3.

No pesticides were detected in the upstream river sample. Pesticides were detected in MP2, MP3 and downstream, in Q-4 2020. The concentration of tebuconazole in MP2, MP3, and downstream, were 0.3 µg/L, 0.2 µg/L, and 0.2 µg/L respectively. The concentration of propiconazole in MP2, MP3, and downstream was 0.2 µg/L, 0.1 µg/L and 0.1µg/L, respectively.

All other parameters were present at levels either below the detection limits or their respective environmental quality standards (EQS) in the upstream and downstream samples.

Table 3: Surface water Q-4 2020 monitoring laboratory data

Parameter	Units	SW-1	Upstream	MP1	MP2	MP3	Downstream	AA-EQS*
Chromium	mg/l	-	<0.0015	-	-	-	<0.0015	0.0047
Copper	mg/l	-	<0.007	-	-	-	<0.007	0.030
Arsenic	mg/l	-	0.0098	-	-	-	0.0033	0.025
Ortho- phosphate	mg/l	-	0.03	-	-	-	<0.03	≤0.035 (mean) - ≤0.075 (95%ile)
COD	mg/l	-	12	-	-	-	14	-
BOD	mg/l	-	<1	-	-	-	<1	1.5(mean) 2.6 (95%ile)
pH	pH Units	-	-	-	-	-	-	-
Electrical Conductivity	uS/cm	-	-	-	-	-	-	-
Nitrite as NO_2	mg/l	-	0.06	-	-	-	0.06	-
Nitrate as NO_3	mg/l	-	44.8	-	-	-	41.7	-
Total Suspended Solids	mg/l	-	<10	-	-	-	<10	-
Tebuconazole	µg/l	-	<0.1	<0.1	0.3	0.2	0.2	0.01
Propiconazole	µg/l	-	<0.1	<0.1	0.2	0.1	0.1	0.01

*Where AA-EQS means that for each representative monitoring point within the waterbody, the arithmetic mean of the concentrations measured over a twelve-month monitoring period does not exceed the standard

Section 5 Analytical Trend Data

As requested by the Agency, the analytical data collected by CDM Smith and previous environmental consultants between Q-2 2007 and Q-4 2020 are contained in **Appendix 2**. Data are both tabulated and presented graphically.

5.1 Metals

5.1.1 Groundwater

The tabulated trend data shows that, in general, the levels of metals have fallen across the site since Q-3 2007.

The concentrations of metals have decreased between Q-4 of 2015 and the current quarter, indicating natural attenuation.

5.1.2 Surface Water

All metals were below their AA-EQS in Q-4 2020.

5.2 Pesticides

5.2.1 Groundwater

Tebuconazole was detected at low concentrations in GW-2, GW-5 and GW-6, and propiconazole was detected at low concentrations in GW-5 and GW-6. The concentrations of tebuconazole in GW-2, GW-5 and GW-6 were 0.2 µg/L, 6.4 µg/L and 3.6 µg/L respectively, and the concentration of propiconazole in GW-5 and GW-6 were 4.7 µg/L and 2.7 µg/L, respectively, in Q-4 2020.

There have on occasion been sporadic low-level detections of pesticides in the upgradient monitoring well GW-2, including tebuconazole and propiconazole detections in Q-3 2020 (0.2 µg/L, 0.2 µg/L) and Q3-2019 (0.7 µg/L, 0.6 µg/L) respectively.

There has been a significant decrease in the concentrations of pesticides detected at GW-5 and GW-6 since 2007. The peak concentrations of tebuconazole detected in GW-5 (Q-4 2008) and GW-6 (Q-3 2007) were 645 µg/L and 96 µg/L, respectively. The peak concentrations of propiconazole detected in GW-5 (Q-4 2008) and GW-6 (Q-3 2007) were 395 µg/L and 39 µg/L, respectively. Monitoring of the soils in the vicinity, and particularly down-hydraulic-gradient of, the wells during the 2009 site investigation to assess the impact of the 2005 spill incident, indicated that there is no impact in the subsoil in this area. The historical presence of pesticides in GW-5 and GW-6 is considered to be insignificant given they are generally not detected in any other monitoring well and or in the surface water down stream of the facility.

Overall the quality of groundwater has remained consistent over the monitoring period.

5.2.2 Surface Water

Tebuconazole and propiconazole were not detected in upstream river sample. Pesticides were detected at MP2, MP3 and downstream in Q-4 2020.

Section 6 Discussion

6.1 Groundwater

Tebuconazole was detected in GW-2, GW-5 and GW-6, and propiconazole was detected in GW-5 and GW-6. The low and decreasing concentrations of pesticides in GW-5 and GW-6 indicate that the residual impact associated with the 2005 spill is gradually being attenuated. Further monitoring is required to establish if pesticide levels remain at low levels or undetected in the future.

There have on occasion been sporadic detections of pesticides in the upstream monitoring well GW-2. It is noted that the site is surrounded by arable farmland, which is subject to normal farm practices, including the application of fertiliser and pesticide.

Elevated arsenic was detected in GW-6 in Q-4 2020 (13.9 µg/L). There have been sporadic detections of arsenic in GW-6 above the IGV/GTV, including in Q-4 2019 (13.7 µg/L), Q-1 2008 (9.5 µg/L) and Q-4 2015 (60 µg/L). Arsenic concentrations have decreased between Q-4 of 2015 and the current quarter, indicating natural attenuation. Elevated copper was detected at GW-5 and GW-6 in Q-4 2020 (0.068 mg/L and 0.035 mg/L, respectively). There have been sporadic detections of copper in GW-5 and GW-6 above the IGV/GTV, including Q-4 2019 (0.042 mg/l) and Q-2 2019 (0.05 mg/l) respectively. Neither arsenic or copper are a constituent of either Tanalith E or Vacsol Aqua, however, the 2005 site investigation found elevated copper levels in the upper 50 cm of subsoil (up to 3,383 mg/Kg). It is assumed that chromated copper arsenate (CCA) was used at the facility, historically, resulting in sporadic elevated copper and arsenic readings at GW-5 and GW-6.

None of propiconazole, tebuconazole, arsenic, copper or boron were detected at concentrations above their IGVs or GTVs in the downstream monitoring well (GW-4) in Q-4 2020.

Chloride and phosphate were detected at GW-4, the furthest downgradient monitoring well. Detections of chloride and phosphate have occurred in this well in previous quarters. These detections are likely due to local agricultural practices in the surrounding catchment as elevated chloride and phosphate concentrations can be associated with the application of manure and synthetic fertilizers. Chloride and phosphate are not elements of concern with respect to contamination from the operations at the facility and no pesticides associated with site activities were detected in GW-4; thus, the slightly elevated chloride and phosphate concentrations are not attributable to site activities.

6.2 Surface Water

6.2.1 Groundwater Contribution to Surface Water Quality

The shallow groundwater beneath the site is assumed to contribute to base flow of the river, entering it at the east. If the groundwater was impacted, the surface water quality would be expected to deteriorate between the upstream and downstream monitoring locations.

Propiconazole and tebuconazole were not detected in the downstream monitoring well, GW-4, in Q-4 2020. However, propiconazole and tebuconazole were detected in MP2, MP3 and downstream in Q-4 2020. Tebuconazole and propiconazole are on occasion detected in the stream samples. The site is surrounded by arable farming, including the fields adjacent to the stream. The on-site EHSO, Mr. Colin Crowley, has noted that spraying of the arable fields occurs very close to the stream and there appears to be negligible buffer between the stream and the crop in the field that runs adjacent to the stream and opposite the facility.

No other parameter was detected above the EQS, and most metal concentrations were below the laboratory detection limit.

Section 7 Conclusions and Recommendations

GW-4 is the furthest down-gradient monitoring well and it is understood that this well is most representative of groundwater quality at the facility. No pesticides or indicator parameters associated with site activities were detected above the IGV or GTV at this location.

There were detection of copper in GW-5 and GW-6 and arsenic in GW-6; however, these are not currently used on site and are thought to be associated with historic CCA use.

There were detections of tebuconazole in the upgradient groundwater monitoring well (GW-2), as well as GW-5 and GW-6, and detections of propiconazole in in GW-5 and GW-6. There were also detections of pesticides (tebuconazole and propiconazole) in the stream that runs adjacent to the facility. The facility is surrounded by arable land. Ongoing detections of other parameters associated with farming practices but not associated with the facility (ortho-phosphate and chloride) indicate an impact of the surrounding farming practices on the water in the vicinity of the facility. We continue to note however that further monitoring and trend analysis would allow an improved understanding of the underlying causes for the sporadic detections of pesticides. As outlined in our conceptual site model, CDM Smith recommends further investigation.

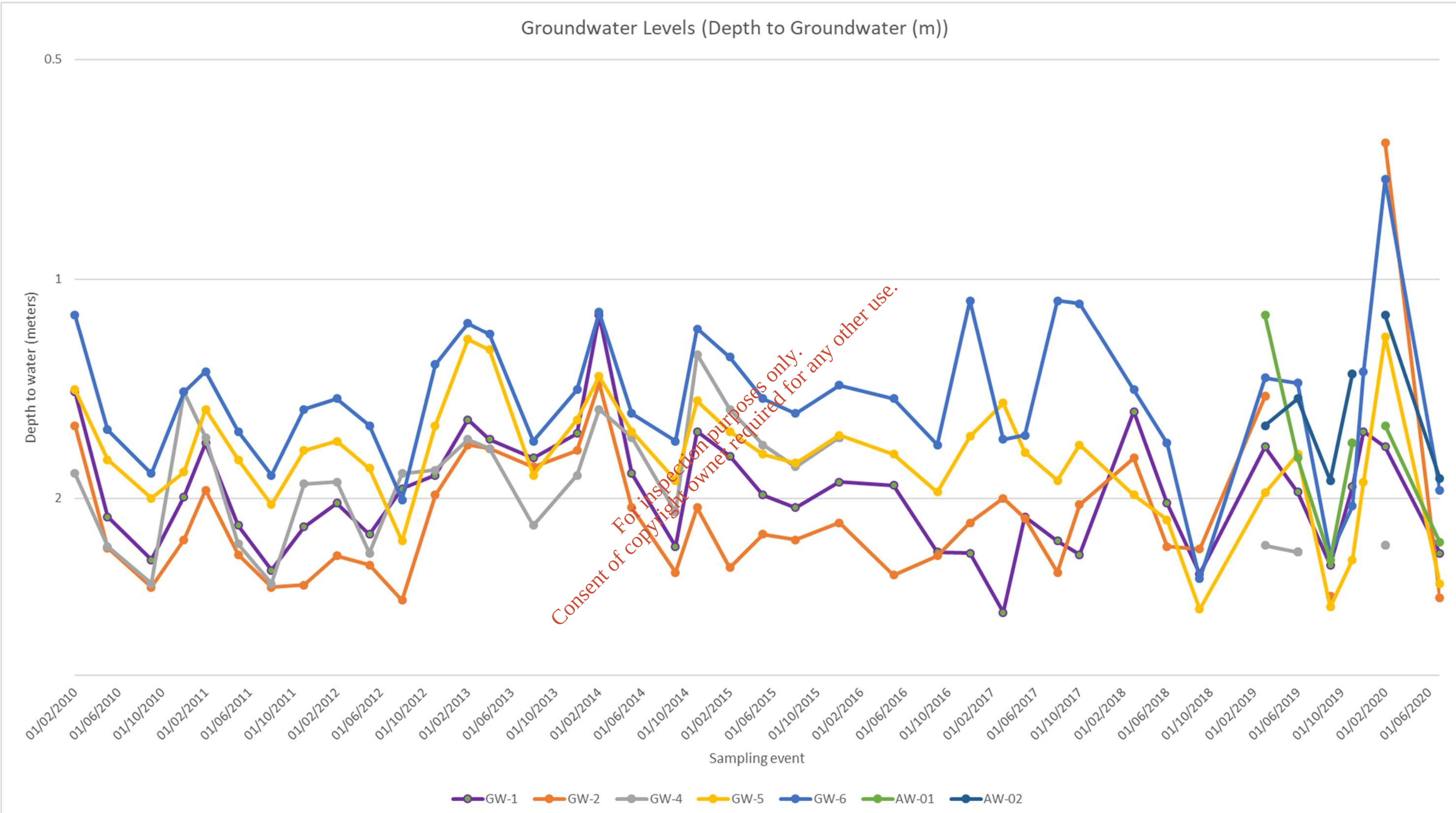
Appendix 1 Monitoring Requirements

Parameters for GW-4	Monitoring Frequency
Alkalinity	Quarterly
Ammonium	Quarterly
Arsenic	Quarterly
Boron	Quarterly
Cadmium	Quarterly
Calcium	Quarterly
Chloride	Quarterly
Chromium	Quarterly
Copper	Quarterly
Hexavalent Chromium	Quarterly
Lead	Quarterly
Manganese	Quarterly
Mercury	Quarterly
Nickel	Quarterly
Nitrite	Quarterly
Potassium	Quarterly
Sodium	Quarterly
Sulphate	Quarterly
Sulphide	Quarterly
Zinc	Quarterly
Benzalkonium Chloride	Quarterly
Tebuconazole	Quarterly
Propiconazole	Quarterly
Permethrin	Quarterly
Ethanolamine	Quarterly

Parameters for GW-1,2,5 & 6	Monitoring Frequency
Arsenic	Quarterly
Boron	Quarterly
Chromium	Quarterly
Copper	Quarterly
Tebuconazole	Quarterly
Propiconazole	Quarterly

Parameters for Upstream and Downstream	Monitoring Frequency	
Alkalinity	Annually	
Ammonium	Annually	
Arsenic	Annually	Quarterly
Boron	Annually	Quarterly
Cadmium	Annually	
Calcium	Annually	
Chloride	Annually	
Chromium	Annually	Quarterly
Copper	Annually	Quarterly
Hexavalent Chromium	Annually	
Lead	Annually	
Manganese	Annually	
Mercury	Annually	
Nickel	Annually	
Nitrate	Annually	
Nitrite	Annually	Quarterly
Phosphate	Annually	
Potassium	Annually	
Sodium	Annually	
Sulphate	Annually	
Sulphide	Annually	
Zinc	Annually	
COD	Annually	
TSS	Annually	
Benzalkonium Chloride (Surfactants)	Annually	
Tebuconazole	Annually	Quarterly
Propiconazole	Annually	Quarterly
Permethrin	Annually	
Ethanolamine	Annually	
Parameters for SW-1 and SW2	**Monitoring Frequency**	
Boron	Quarterly	
COD	Quarterly	
TSS	Quarterly	
Phosphate	Quarterly	
EC	Quarterly	
pH	Quarterly	
Tebuconazole	Quarterly	
Propiconazole	Quarterly	

Appendix 2 Trend Data



Groundwater Levels (Depth to Groundwater (m))
0.5
1
2
Depth to water (meters)
01/02/2010
01/06/2010
01/10/2010
01/02/2011
01/06/2011
01/10/2011
01/02/2012
01/06/2012
01/10/2012
01/02/2013
01/06/2013
01/10/2013
01/02/2014
01/06/2014
01/10/2014
01/02/2015
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01/02/2016
01/06/2016
01/10/2016
01/02/2017
01/06/2017
01/10/2017
01/02/2018
01/06/2018
01/10/2018
01/02/2019
01/06/2019
01/10/2019
01/02/2020
01/06/2020
Sampling event
GW-1
GW-2
GW-4
GW-5
GW-6
AW-01
AW-02

Sampling Event			Sampling Points							
			COD				TSS			
Year	Quarter	Units	Upstream	SW-1	SW-2	Downstream	Upstream2	SW - 1	SW - 2	Downstream5
2010	Q-1 2010	mg/l	8	2586	2882	8	4	369	509	6
	Q-2 2010	mg/l	-	Dry	Dry	-	-	Dry	Dry	-
	Q-3 2010	mg/l	-	607	1183	-	-	47	53	-
	Q-4 2010	mg/l	-	602	1375	-	-	64	115	-
2011	Q-1 2011	mg/l	-	423	1696	-	-	41	89	-
	Q-2 2011	mg/l	<7	1535	1209	<7	<10	294	30	<10
	Q-3 2011	mg/l	-	11	10	-	-	<10	<10	-
	Q-4 2011	mg/l	-	970	857	-	-	165	172	-
2012	Q-1 2012	mg/l	9	11	9	8	<10	<10	<10	<10
	Q-2 2012	mg/l	-	<7	<7	-	-	<10	<10	-
	Q-3 2012	mg/l	-	9	9	-	-	16	<10	-
	Q-4 2012	mg/l	-	1066	487	-	-	169	105	-
2013	Q-1 2013	mg/l	14	1620	1285	21	<10	462	90	<10
	Q-2 2013	mg/l	<7	865	449	26	<10	73	25	<10
	Q-3 2013	mg/l	<7	778	743	12	<10	49	138	<10
	Q-4 2013	mg/l	15	275	42	11	<10	102	96	16
2014	Q-1 2014	mg/l	20	13	49	26	<10	61	19	<10
	Q-2 2014	mg/l	mg/l	-	Dry	Dry	-	-	Dry	Dry
	Q-3 2014	mg/l	29	-	57	33	12		14	17
	Q-4 2014	mg/l	16	46	120	27	<10	29	16	<10
2015	Q-1 2015	mg/l	27	43	162	28	38	50	91	49
	Q-2 2015	mg/l	2	<1	<1	5	<10	<10	12	15
	Q-3 2015	mg/l	<7	<7	<7	<7	19	<10	27	<10
	Q-4 2015	mg/l	8	20	39	10	<10	<10	12	<10
2016	Q-1 2016	mg/l	11	18	25	12	<10	<10	10	10
	Q-2 2016	mg/l	-	Dry	-	-	-	Dry	-	-
	Q-3 2016	mg/l	-	Dry	-	-	-	Dry	-	-
	Q-4 2016	mg/l	-	Dry	-	-	-	Dry	-	-
2017	Q-1 2017	mg/l	-	Dry	-	-	-	Dry	-	-
	Q-2 2017	mg/l	<7	108	-	<7	<10	19	-	<10
	Q-3 2017	mg/l	14	24	-	14	<10	<10	-	<10
	Q-4 2017	mg/l	11	131	-	28	<10	25	-	<10
2018	Q-1 2018	mg/l	<7	82	-	<7	<10	74	-	<10
	Q-2 2018	mg/l	-	Dry	-			Dry	-	
	Q-3 2018	mg/l	-	Dry	-			Dry	-	
	Q-4 2018	mg/l	32	877	-	42	14	120	-	21
2019	Q-1 2019	mg/l	-	-	-	[illegible]	-	-	-	-
	Q-2 2019	mg/l	<7	27	-	7	<10	18	-	<10
	Q-3 2019	mg/l	-	<4	-	-	-	-	-	-
	Q-4 2019	mg/l	-	<5	-	-	-	-	-	-
2020	Q-1 2020	mg/l	8	27	-	32	<10	13	-	13
	Q-2 2020	mg/l	-	-		-	-	-	-	-
	Q-3 2020	mg/l	12	-	-	12	11	<10	-	<10
	Q-4 2020	mg/l	12	-	-	14	<10	<10	-	-

Chromium	SW-1	SW-2	Upstream	Downstream	GW-1	GW-2	GW-3	GW-4	GW-5	GW-6	IGV	EQS
Q-3 2007	-	-	-	-	-	-	-	-	-	0.005	0.03	0.03
Q-1 2008	0.001	N/S	<0.0005	<0.0005	0.009	0.053	N/S	0.008	0.098	0.074	0.03	0.03
Q-2 2008	N/R	N/R	<0.0005	0.001	<0.0005	0.0007	N/S	0.0008	0.0075	0.0061	0.03	0.03
Q-3 2008	N/R	N/S	<0.0005	<0.0005	0.002	N/S	N/S	0.002	0.018	0.023	0.03	0.03
Q-4 2008	N/R	N/S	<0.0005	<0.0005	<0.0005	N/S	N/S	0.017	0.005	0.002	0.03	0.03
Q-1 2009	N/S	N/S	0.008	0.0067	0.0466	0.254	N/S	0.0677	0.0738	0.134	0.03	0.03
Q-2 2009	N/S	N/S	0.02	0.002	0.006	0.04	N/S	0.039	0.005	<0.001	0.03	0.03
Q-3 2009	N/S	N/S	<0.001	0.003	0.012	<0.001	Blocked	<0.001	<0.001	<0.001	0.03	0.03
Q-4 2009	N/S	N/S	0.0128	0.0145	0.0171	0.0139	Blocked	0.0124	0.021	0.0172	0.03	0.03
Q-1 2010	0.0024	0.0055	<0.0015	<0.0015	<0.0015	<0.0015	Blocked	0.0033	<0.0015	<0.0015	0.03	0.03
Q-2 2010	Dry	Dry	<0.0015	<0.0015	<0.0015	<0.0015	Blocked	<0.0015	0.0017	<0.0015	0.03	0.03
Q-3 2010	*	*	<0.0015	<0.0015	<0.0015	<0.0015	Blocked	<0.0015	0.003	<0.0015	0.03	0.03
Q-4 2010	*	*	<0.0015	<0.0015	<0.0015	0.0024	Blocked	0.0025	0.0016	0.0015	0.03	0.03
Q-1 2011	*	*	<0.0015	<0.0015	<0.0015	<0.0015	Blocked	0.0039	0.0033	0.0021	0.03	0.03
Q-2 2011	*	*	<0.0015	<0.0015	<0.0015	<0.0015	Blocked	<0.0015	<0.0015	<0.0015	0.03	0.03
Q-3 2011	*	*	<0.0015	<0.0015	<0.0015	<0.0015	Blocked	<0.0015	0.002	<0.0015	0.03	0.03
Q-4 2011	*	*	<0.0015	<0.0015	<0.0015	<0.0015	Blocked	0.0036	0.002	0.0021	0.03	0.03
Q-1 2012	*	*	<0.0015	<0.0015	<0.0015	<0.0015	Blocked	0.004	<0.0015	0.002	0.03	0.03
Q-2 2012	*	*	<0.0015	<0.0015	<0.0015	<0.0015	Blocked	<0.0015	<0.0015	<0.0015	0.03	0.03
Q-3 2012	*	*	<0.0015	<0.0015	<0.0015	<0.0015	Blocked	<0.0015	<0.0015	0.002	0.03	0.03
Q-4 2012	*	*	<0.0015	<0.0015	<0.0015	<0.0015	Decommis	0.0016	0.0018	0.0024	0.03	0.03
Q-1 2013	*	*	<0.0015	<0.0015	<0.0015	<0.0015	Decommis	0.0025	0.002	0.0024	0.03	0.03
Q-2 2013	*	*	<0.0015	<0.0015	<0.0015	<0.0015	Decommis	<0.0015	<0.0015	<0.0015	0.03	0.03
Q-3 2013	*	*	<0.0015	<0.0015	<0.0015	<0.0015	Decommis	<0.0015	<0.0015	0.0021	0.03	0.03
Q-4 2013	*	*	<0.0015	<0.0015	<0.0015	<0.0015	Decommis	0.0031	<0.0015	0.004	0.03	0.03
Q-1 2014	*	*	<0.0015	<0.0015	<0.0015	<0.0015	Decommis	<0.0015	<0.0015	<0.0015	0.03	0.03
Q-2 2014			-	-	<0.0015	<0.0015	Decommis	0.0066	<0.0015	<0.0015	0.03	0.03
Q-3 2014	*	*	<0.0015	<0.0015	<0.0015	<0.0015	Decommis	0.0066	<0.0015	0.0034	0.03	0.03
Q-4 2014	*	*	<0.0015	<0.0015	<0.0015	<0.0015	Decommis	<0.0015	0.0017	0.004	0.03	0.03
Q-1 2015	*	*	0.0064	0.0066	<0.0015	<0.0015	Decommis	<0.0015	<0.0015	0.0038	0.03	0.03
Q-2 2015	*	*	<0.0015	<0.0015	<0.0015	<0.0015	Decommis	0.0018	<0.0015	0.0038	0.03	0.03
Q-3 2015	*	*	<0.0015	<0.0015	<0.0015	<0.0015	Decommis	<0.0015	<0.0015	0.0082	0.03	0.03
Q-4 2015	*	*	<0.0015	<0.0015	0.0068	0.0073	Decommis	<0.0015	0.0112	0.0048	0.03	0.03
Q-1 2016	*	*	<0.0015	<0.0015	0.0068	0.0073	Decommis	<0.0016	0.0112	0.0048	0.03	0.03
Q-2 2016	*	*	<0.0015	<0.0015	<0.0015	<0.0015	Decommis	<0.0017	<0.0017	0.00138	0.03	0.03
Q-3 2016	*	*	-	-	0.0052	0.0056	Decommis	<0.0014	0.0051	0.008	0.03	0.03
Q-4 2016	*	*	-	-	0.0056	0.0024	Decommis	<0.0015	0.0079	0.0107	0.03	0.03
Q-1 2017	*	*	-	-	0.0068	0.0073	Decommis	<0.0015	0.0097	0.0105	0.03	0.03
Q-2 2017	*	*	<0.0015	<0.0015	0.0085	0.0038	Decommis	<0.0015	0.0102	0.0131	0.03	0.03
Q-3 2017	*	*	<0.0015	<0.0015	0.0067	0.0037	Decommis	<0.0015	0.0103	0.0119	0.03	0.03
Q-4 2017	*	*	<0.0015	<0.0015	0.0062	0.0059	Decommis	<0.0015	0.0128	<0.0015	0.03	0.03
Q-1 2018	*	*	<0.0015	<0.0015	0.0023	0.0074	Decommis	0.0018	0.0118	0.0117	0.03	0.03
Q-2 2018	*	*	-	-	0.0064	<0.0015	Decommis	<0.0015	0.0088	0.0054	0.03	0.03
Q-3 2018	*	*	*	*	0.0043	<0.0015	Decommis	<0.0015	0.0099	0.0109	0.03	0.03
Q-4 2018	*	*	<0.0015	<0.0015	0.0074	0.0075	Decommis	<0.0015	0.0134	0.0113	0.03	0.03
Q-1 2019	*	*	-	-	0.0093	0.0063	Decommis	<0.0015	0.016	0.0146	0.03	0.03
Q-2 2019	*	*	<0.0015	<0.0015	<0.0015	0.0071	Decommis	<0.0015	0.0073	0.0094	0.03	0.03
Q-3 2019	*	*	<0.0015	<0.0015	<0.0015	<0.0015	Decommis	<0.0015	0.0131	0.012	0.03	0.03
Q-4 2019	*	*	<0.0015	0.0016	0.0078	0.0045	Decommis	<0.0015	0.0156	0.0073	0.03	0.03
Q-1 2020	*	*	<0.0015	0.0015	0.0094	0.0032	Decommis	<0.0015	0.0082	0.0068	0.03	0.03
Q-2 2020	*	*	-	-	-	-	Decommis	-	-	-	0.03	0.03
Q-3 2020	*	*	<0.0015	<0.0015	0.0028	0.002	Decommis	<0.0015	0.0064	0.0073	0.03	0.03
Q-4 2020	*	*	<0.0015	<0.0015	0.0049	<0.0015	Decommis	0.0024	0.0064	0.0109	0.03	0.03

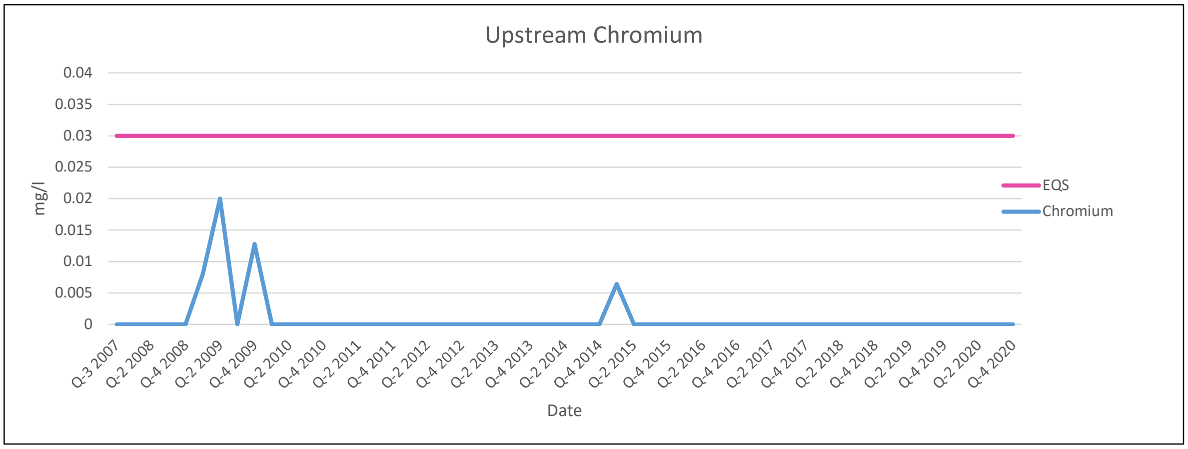
Arsenic	SW-1	SW-2	Upstream	Downstream	GW-1	GW-2	GW-3	GW-4	GW-5	GW-6	IGV	EQS
Q-3 2007			-	-	-	-		-	-	<0.001	0.01	0.025
Q-1 2008	0.001	N/S	<0.0005	0.0006	0.008	0.02	N/S	0.011	0.036	0.094	0.01	0.025
Q-2 2008	N/R	N/R	<0.0005	0.001	<0.0005	0.0005	N/S	0.0008	0.034	0.02	0.01	0.025
Q-3 2008	N/R	N/S	0.0006	0.0009	0.001	N/S	N/S	0.002	0.003	0.386	0.01	0.025
Q-4 2008	N/R	N/S	0.0006	0.0006	<0.0005	N/S	N/S	0.006	0.006	0.003	0.01	0.025
Q-1 2009	N/S	N/S	0.0011	<0.0009	0.0021	0.3954	N/S	0.0082	0.0136	0.0052	0.01	0.025
Q-2 2009	N/S	N/S	<0.00096	<0.015	<0.00096	0.0011	N/S	0.0011	<0.00096	<0.00096	0.01	0.025
Q-3 2009	N/S	N/S	<0.001	0.0014	0.0014	0.0012	Blocked	<0.001	<0.001	<0.00096	0.01	0.025
Q-4 2009	N/S	N/S	<0.00096	0.0014	0.0011	0.0012	Blocked	<0.00096	<0.00096	<0.00096	0.01	0.025
Q-1 2010	<0.0025	0.021	0.0039	0.0051	<0.0025	0.0032	Blocked	0.0076	0.0072	0.0078	0.01	0.025
Q-2 2010	Dry	Dry	0.0029	0.0035	<0.0025	<0.0025	Blocked	<0.0025	0.0118	0.0052	0.01	0.025
Q-3 2010	*	*	<0.0025	<0.0025	<0.0025	<0.0025	Blocked	<0.0025	0.0047	<0.0025	0.01	0.025
Q-4 2010	*	*	<0.0025	<0.0025	<0.0025	<0.0025	Blocked	0.0044	0.0085	0.005	0.01	0.025
Q-1 2011	*	*	0.0036	0.0035	0.0066	0.0072	Blocked	0.006	0.0119	0.0105	0.01	0.025
Q-2 2011	*	*	0.0036	0.0042	0.0061	0.006	Blocked	0.0051	0.015	0.0093	0.01	0.025
Q-3 2011	*	*	<0.0025	<0.0025	0.0026	0.0095	Blocked	<0.0025	0.0063	0.0087	0.01	0.025
Q-4 2011	*	*	<0.0025	<0.0025	<0.0025	<0.0025	Blocked	<0.0025	0.0074	0.0028	0.01	0.025
Q-1 2012	*	*	<0.0025	<0.0025	<0.0025	<0.0025	Blocked	<0.0025	0.0103	0.0077	0.01	0.025
Q-2 2012	*	*	<0.0025	<0.0025	<0.0025	<0.0025	Blocked	<0.0025	0.0116	0.0074	0.01	0.025
Q-3 2012	*	*	<0.0025	<0.0025	<0.0025	<0.0025	Blocked	0.0026	0.0231	0.0113	0.01	0.025
Q-4 2012	*	*	<0.0025	<0.0025	<0.0025	<0.0025	commissior	<0.0025	<0.0025	<0.0025	0.01	0.025
Q-1 2013	*	*	<0.0025	<0.0025	<0.0025	<0.0025	commissior	0.0035	0.0113	0.0083	0.01	0.025
Q-2 2013	*	*	<0.0025	<0.0025	<0.0025	<0.0025	commissior	<0.0025	<0.0025	0.0099	0.01	0.025
Q-3 2013	*	*	<0.0025	<0.0025	<0.0025	<0.0025	commissior	<0.0025	0.0032	0.0033	0.01	0.025
Q-4 2013	*	*	<0.0025	<0.0025	0.0029	0.0034	commissior	0.0051	0.0029	0.0101	0.01	0.025
Q-1 2014	*	*	<0.0025	<0.0025	<0.0025	<0.0025	commissior	<0.0025	<0.0025	0.0097	0.01	0.025
Q-2 2014			-	-	<0.0025	<0.0025	commissior	<0.0025	<0.0025	0.0121	0.01	0.025
Q-3 2014	*	*	<0.0025	<0.0025	<0.0025	0.0056	commissior	0.0038	0.0067	0.0078	0.01	0.025
Q-4 2014	*	*	<0.0025	<0.0025	<0.0025	<0.0025	commissior	<0.0025	<0.0025	0.0144	0.01	0.025
Q-1 2015	*	*	<0.0025	<0.0025	<0.0025	<0.0025	commissior	<0.0025	0.003	0.0077	0.01	0.025
Q-2 2015	-	-	<0.0025	<0.0025	<0.0025	<0.0025	commissior	<0.0025	<0.0025	0.0049	0.01	0.025
Q-3 2015	-	-	<0.0025	<0.0025	<0.0025	<0.0025	commissior	0.0107	<0.0025	<0.0025	0.01	0.025
Q-4 2015	-	-	<0.0025	<0.0025	0.003	<0.0025	commissior	<0.0025	0.0031	0.0602	0.01	0.025
Q-1 2016	*	*	<0.0025	<0.0025	0.004	<0.0025	commissior	<0.0025	<0.0025	0.0095	0.01	0.025
Q-2 2016	*	*	0.0034	0.0044	<0.0025	<0.0025	commissior	<0.0025	0.0058	0.0103	0.01	0.025
Q-3 2016	*	*	-	-	<0.0025	<0.0025	commissior	<0.0025	0.0191	0.0113	0.01	0.025
Q-4 2016	*	*	-	-	<0.0025	<0.0025	commissior	0.0042	0.0041	0.0041	0.01	0.025
Q-1 2017	*	*	-	-	<0.0025	<0.0025	commissior	<0.0025	<0.0025	<0.0025	0.01	0.025
Q-2 2017	*	*	<0.0025	<0.0025	<0.0025	0.0033	commissior	<0.0025	0.0031	0.0069	0.01	0.025
Q-3 2017	*	*	<0.0025	<0.0025	<0.0025	0.0047	commissior	0.0053	<0.0025	0.008	0.01	0.025
Q-4 2017	*	*	<0.0025	<0.0025	<0.0025	0.0031	commissior	<0.0025	<0.0025	0.0141	0.01	0.025
Q-1 2018	*	*	0.0071	0.0074	<0.0025	<0.0025	commissior	<0.0025	<0.0025	<0.0025	0.01	0.025
Q-2 2018	*	*	-	-	<0.0025	<0.0025	commissior	<0.0025	<0.0025	0.0072	0.01	0.025
Q-3 2018	*	*	-	-	<0.0025	<0.0025	commissior	<0.0025	<0.0025	0.0031	0.01	0.025
Q-4 2018	*	*	<0.0025	<0.0025	<0.0025	<0.0025	commissior	<0.0025	<0.0025	<0.0025	0.01	0.025
Q-1 2019	*	*	-	-	<0.0025	<0.0025	commissior	<0.0025	<0.0025	<0.0025	0.01	0.025
Q-2 2019	*	*	<0.0025	<0.0025	<0.0025	<0.0025	commissior	<0.0025	0.0054	<0.0025	0.01	0.025
Q-3 2019	*	*	<0.0025	<0.0025	<0.0025	<0.0025	commissior	<0.0025	<0.0025	0.0037	0.01	0.025
Q-4 2019	*	*	<0.0025	<0.0025	0.0035	<0.0025	commissior	<0.0025	0.0034	0.0137	0.01	0.025
Q-1 2020	<0.0012	*	<0.0025	<0.0025	<0.0025	<0.0025	commissior	<0.0025	<0.0025	<0.0025	0.01	0.025
Q-2 2020	-	-	-	-	-	-	commissior	-	-	-	0.01	0.025
Q-3 2020	*	*	0.0056	0.0023	<0.0025	<0.0025	commissior	<0.0025	<0.0025	0.0058	0.01	0.025
Q-4 2020	*	*	0.0098	0.0033	<0.0025	<0.0025	commissior	<0.0025	<0.0025	0.0139	0.01	0.025

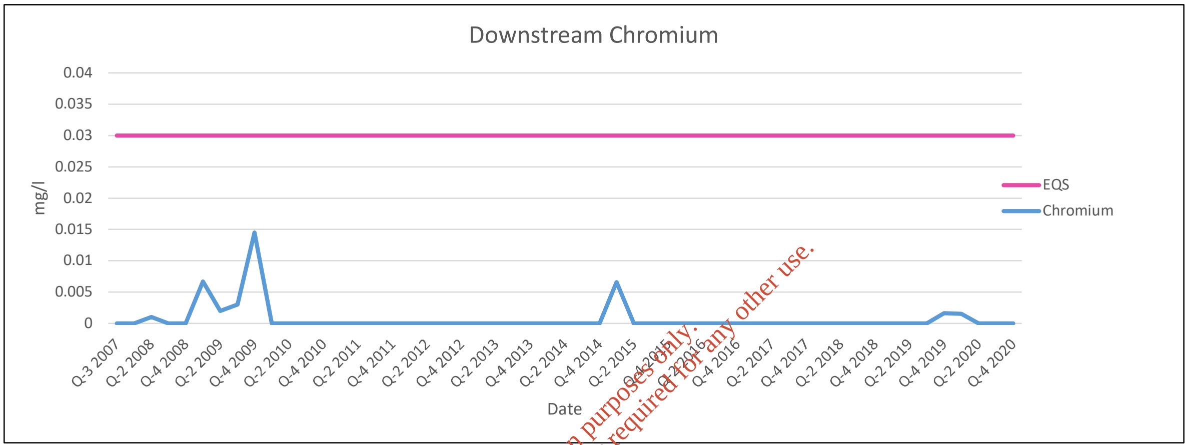
Boron	SW-1	SW-2	Upstream	Downstream	GW-1	GW-2	GW-3	GW-4	GW-5	GW-6	IGV	EQS
Q-3 2007	-	-	-	-	-	-	-	-	-	0.044	1	2
Q-1 2008	0.045	N/S	0.037	0.04	0.033	0.048	N/S	0.075	2.929	0.03	1	2
Q-2 2008	0.625	0.506	0.01	0.068	<0.01	0.025	N/S	0.213	0.2	0.4	1	2
Q-3 2008	0.659	N/S	0.038	0.058	0.085	N/S	N/S	0.085	2.24	1.065	1	2
Q-4 2008	0.835	N/S	0.0042	0.041	0.04	N/S	N/S	0.427	0.933	0.973	1	2
Q-1 2009	N/S	N/S	0.0042	0.0045	0.0422	0.5941	N/S	0.021	6.877	1.119	1	2
Q-2 2009	N/S	N/S	0.0042	0.0042	0.003	0.009	N/S	0.004	0.011	0.006	1	2
Q-3 2009	<1	<1	0.001	0.001	0.006	0.008	Blocked	<0.001	<0.001	<0.001	1	2
Q-4 2009	1.07	0.887	0.0061	0.0059	0.0089	0.0095	Blocked	0.0129	0.0222	0.0147	1	2
Q-1 2010	0.045	0.0139	0.024	0.025	0.025	<0.012	Blocked	0.068	4.305	1.066	1	2
Q-2 2010	Dry	Dry	0.033	0.013	0.022	<0.012	Blocked	0.121	10.84	0.97	1	2
Q-3 2010			0.06	0.029	0.022	0.021	Blocked	0.02	7.946	1.011	1	2
Q-4 2010	0.05	0.143	0.032	0.033	0.067	0.064	Blocked	0.067	0.895	0.509	1	2
Q-1 2011	0.035	0.166	0.04	0.054	0.029	0.029	Blocked	0.083	0.914	0.679	1	2
Q-2 2011	0.044	0.119	0.045	0.051	0.03	0.029	Blocked	0.92	0.413	0.344	1	2
Q-3 2011	0.097	0.094	0.082	0.025	0.03	0.028	Blocked	<0.012	4.329	0.0714	1	2
Q-4 2011	0.025	0.038	0.028	0.03	0.02	0.02	Blocked	0.17	0.092	0.304	1	2
Q-1 2012	0.034	0.033	0.031	0.036	0.023	0.023	Blocked	0.245	0.066	0.13	1	2
Q-2 2012	0.042	0.04	0.039	0.022	0.021	0.023	Blocked	0.251	0.81	0.197	1	2
Q-3 2012	0.02	0.028	0.028	0.03	<0.012	<0.012	Blocked	0.052	0.087	0.315	1	2
Q-4 2012	0.025	0.04	0.021	0.023	0.016	0.016	Decommis	0.04	0.063	0.156	1	2
Q-1 2013	0.048	0.073	0.015	0.015	0.029	0.017	Decommis	0.052	0.028	0.078	1	2
Q-2 2013	0.028	0.04	0.026	0.027	0.03	0.028	Decommis	0.092	1.51	2.18	1	2
Q-3 2013	0.022	0.03	0.047	0.016	0.015	0.013	Decommis	0.043	0.675	0.357	1	2
Q-4 2013	0.023	0.032	0.027	0.031	0.029	0.026	Decommis	0.075	0.074	0.18	1	2
Q-1 2014	<0.012	<0.012	<0.012	<0.012	0.024	0.027	Decommis	0.07	0.154	0.108	1	2
Q-2 2014			-	-	0.017	0.018	Decommis	0.053	0.047	0.124	1	2
Q-3 2014		0.029	0.024	0.022	0.031	0.03	Decommis	0.098	0.055	0.111	1	2
Q-4 2014	0.015	0.83	0.024	0.024	<0.012	<0.012	Decommis	0.067	0.136	0.247	1	2
Q-1 2015	0.021	0.021	0.017	0.017	0.031	0.032	Decommis	0.134	0.087	0.153	1	2
Q-2 2015	0.045	0.027	0.03	0.028	0.017	0.016	Decommis	0.104	0.133	0.197	1	2
Q-3 2015	<0.012	0.044	0.042	0.036	<0.012	0.015	Decommis	0.147	1.057	0.088	1	2
Q-4 2015	0.012	0.018	0.019	0.016	0.014	0.027	Decommis	<0.012	0.084	0.123	1	2
Q-1 2016	0.021	0.02	0.018	0.02	0.029	<0.012	Decommis	0.022	0.071	0.076	1	2
Q-2 2016	0.013	<0.12	0.038	0.025	0.023	0.012	Decommis	0.023	0.162	0.105	1	2
Q-3 2016	-	-	-	-	0.025	0.023	Decommis	0.022	0.254	0.14	1	2
Q-4 2016	-	-	-	-	<0.012	0.107	Decommis	0.03	0.076	0.084	1	2
Q-1 2017	-	-	-	-	0.032	<0.12	Decommis	0.026	0.072	0.087	1	2
Q-2 2017	0.031	-	0.035	0.035	0.021	<0.12	Decommis	0.022	0.076	0.087	1	2
Q-3 2017	0.04	-	0.034	0.032	0.024	0.022	Decommis	0.021	0.078	0.083	1	2
Q-4 2017	0.016	-	0.033	0.036	0.04	0.025	Decommis	0.03	0.086	0.086	1	2
Q-1 2018	0.031	*	0.029	0.027	0.029	<0.012	Decommis	0.026	0.065	0.066	1	2
Q-2 2018	*	*	-	-	0.126	0.093	Decommis	0.077	0.072	0.062	1	2
Q-3 2018	*	*	-	-	0.027	0.023	Decommis	0.021	0.089	0.095	1	2
Q-4 2018	0.028		<0.012	0.013	0.021	<0.012	Decommis	0.033	0.078	0.075	1	2
Q-1 2019	-		-	-	0.022	<0.012	Decommis	0.025	0.091	0.067	1	2
Q-2 2019	-	-	0.04	0.039	0.023	<0.012	Decommis	0.023	0.204	0.087	1	2
Q-3 2019	-	-	0.03	0.038	<0.012	<0.012	Decommis	0.026	0.078	0.076	1	2
Q-4 2019	0.025	-	0.03	0.28	0.015	<0.012	Decommis	0.019	0.051	0.088	1	2
Q-1 2020	<0.012	-	0.026	0.029	0.025	0.013	Decommis	0.025	0.061	0.063	1	2
Q-2 2020	-	-	-	-	-	-	Decommis	-	-	-	1	2
Q-3 2020	-	-	0.015	0.019	0.023	0.015	Decommis	0.032	0.087	0.08	1	2
Q-4 2020	-	-	0.027	0.026	0.024	<0.012	Decommis	0.021	0.087	0.089	1	2

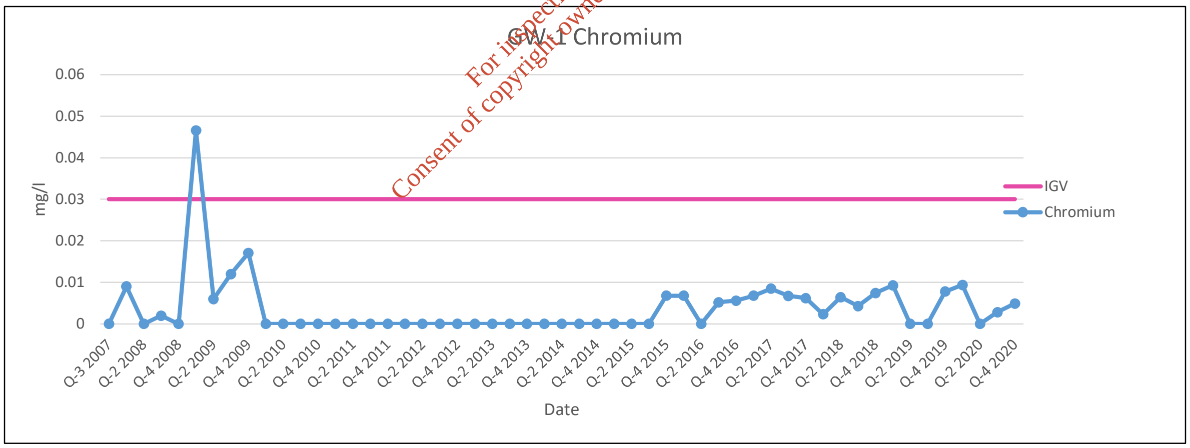
Copper	SW-1	SW-2	Upstream	Downstream	GW-1	GW-2	GW-3	GW-4	GW-5	GW-6	IGV	EQS
Q-3 2007	-	-	-	-	-	-	-	-	-	0.003	0.03	0.03
Q-1 2008	0.009	N/S	0.002	0.002	0.018	1.25	N/S	0.091	0.06	0.1	0.03	0.03
Q-2 2008	N/R	N/R	<0.001	0.004	0.0015	0.0023	N/S	0.0037	0.057	0.0064	0.03	0.03
Q-3 2008	N/R	N/S	0.002	0.003	0.003	N/S	N/S	0.007	0.067	0.013	0.03	0.03
Q-4 2008	N/R	N/S	0.001	0.001	0.002	N/S	N/S	0.004	0.006	0.003	0.03	0.03
Q-1 2009	N/S	N/S	0.01	<0.001	0.0075	0.3214	N/S	0.0118	0.382	0.0204	0.03	0.03
Q-2 2009	N/S	N/S	0.001	<0.00096	0.007	0.008	N/S	0.013	0.009	0.003	0.03	0.03
Q-3 2009	N/S	N/S	<0.001	0.027	<0.001	0.062	Blocked	0.004	0.007	0.007	0.03	0.03
Q-4 2009	N/S	N/S	0.1123	0.0012	0.0058	0.0971	Blocked	0.0058	0.0038	0.0067	0.03	0.03
Q-1 2010	<0.007	0.08	<0.007	<0.007	<0.007	<0.007	Blocked	<0.007	0.072	<0.007	0.03	0.03
Q-2 2010	Dry	Dry	<0.007	<0.007	<0.007	0.021	Blocked	<0.007	0.141	<0.007	0.03	0.03
Q-3 2010	*	*	<0.007	<0.007	<0.007	<0.007	Blocked	<0.007	0.037	<0.007	0.03	0.03
Q-4 2010	*	*	<0.007	<0.007	<0.007	<0.007	Blocked	<0.007	0.021	0.009	0.03	0.03
Q-1 2011	*	*	<0.007	<0.007	<0.007	<0.007	Blocked	<0.007	<0.007	<0.007	0.03	0.03
Q-2 2011	*	*	<0.007	<0.007	<0.007	<0.007	Blocked	<0.007	<0.007	<0.007	0.03	0.03
Q-3 2011	*	*	<0.007	<0.007	<0.007	<0.007	Blocked	0.014	0.016	<0.007	0.03	0.03
Q-4 2011	*	*	<0.007	<0.007	<0.007	<0.007	Blocked	<0.007	<0.007	<0.007	0.03	0.03
Q-1 2012	*	*	<0.007	<0.007	<0.007	<0.007	Blocked	<0.007	0.013	<0.007	0.03	0.03
Q-2 2012	*	*	<0.007	<0.007	<0.007	<0.007	Blocked	<0.007	<0.007	<0.007	0.03	0.03
Q-3 2012	*	*	<0.007	<0.007	<0.007	<0.007	Blocked	<0.007	0.011	0.011	0.03	0.03
Q-4 2012	*	*	0.011	0.014	<0.007	<0.007	Decommis	0.008	0.02	0.011	0.03	0.03
Q-1 2013	*	*	<0.007	<0.007	<0.007	<0.007	Decommis	<0.007	0.013	<0.007	0.03	0.03
Q-2 2013	*	*	<0.007	<0.007	<0.007	<0.007	Decommis	0.009	0.009	0.011	0.03	0.03
Q-3 2013	*	*	<0.007	<0.007	<0.007	<0.007	Decommis	<0.007	0.009	0.008	0.03	0.03
Q-4 2013	*	*	<0.007	0.013	<0.007	<0.007	Decommis	<0.007	0.013	0.028	0.03	0.03
Q-1 2014	*	*	<0.007	<0.007	<0.007	<0.007	Decommis	<0.007	0.017	0.024	0.03	0.03
Q-2 2014			-	-	<0.007	<0.007	Decommis	0.008	0.008	0.015	0.03	0.03
Q-3 2014	*	*	<0.007	<0.007	<0.007	<0.007	Decommis	<0.007	<0.007	0.008	0.03	0.03
Q-4 2014	*	*	<0.007	<0.007	<0.007	<0.007	Decommis	<0.007	0.02	0.04	0.03	0.03
Q-1 2015	*	*	<0.007	<0.007	<0.007	<0.007	Decommis	<0.007	0.017	0.051	0.03	0.03
Q-2 2015	-	-	<0.007	<0.007	<0.007	<0.007	Decommis	<0.007	0.011	0.05	0.03	0.03
Q-3 2015	-	-	<0.007	<0.007	<0.007	<0.007	Decommis	<0.007	0.009	0.018	0.03	0.03
Q-4 2015	-	-	<0.007	<0.007	<0.007	<0.007	Decommis	<0.007	<0.007	0.037	0.03	0.03
Q-1 2016	*	*	<0.007	<0.007	<0.007	<0.007	Decommis	<0.007	0.021	0.018	0.03	0.03
Q-2 2016	*	*	<0.007	<0.007	<0.007	<0.007	Decommis	<0.007	<0.007	0.021	0.03	0.03
Q-3 2016	*	*	-	-	<0.007	<0.007	Decommis	<0.007	<0.007	0.015	0.03	0.03
Q-4 2016	*	*	-	-	<0.007	<0.007	Decommis	<0.007	0.017	0.022	0.03	0.03
Q-1 2017	*	*	-	-	<0.007	<0.007	Decommis	<0.007	0.01	0.009	0.03	0.03
Q-2 2017	*	*	<0.007	<0.007	<0.007	<0.007	Decommis	<0.007	0.01	0.025	0.03	0.03
Q-3 2017	*	*	<0.007	<0.007	<0.007	<0.007	Decommis	<0.007	0.009	0.014	0.03	0.03
Q-4 2017	*	*	<0.007	<0.007	<0.007	<0.007	Decommis	<0.007	<0.007	<0.007	0.03	0.03
Q-1 2018	*	*	<0.007	<0.007	<0.007	<0.007	Decommis	<0.007	0.015	0.01	0.03	0.03
Q-2 2018	*	*	-	-	<0.007	<0.007	Decommis	<0.007	0.014	<0.007	0.03	0.03
Q-3 2018	*	*	-	-	<0.007	<0.007	Decommis	<0.007	<0.007	0.015	0.03	0.03
Q-4 2018	*	*	<0.007	<0.007	<0.007	<0.007	Decommis	<0.007	0.02	0.039	0.03	0.03
Q-1 2019	*	*	-	-	<0.007	<0.007	Decommis	<0.007	0.029	0.025	0.03	0.03
Q-2 2019	*	*	<0.007	<0.007	<0.007	0.013	Decommis	<0.007	<0.007	0.05	0.03	0.03
Q-3 2019	*	*	<0.007	<0.007	<0.007	<0.007	Decommis	<0.007	0.013	0.01	0.03	0.03
Q-4 2019	*	*	<0.007	<0.007	<0.007	<0.007	Decommis	<0.007	0.042	0.023	0.03	0.03
Q-1 2020	*	*	<0.007	<0.007	<0.007	<0.007	Decommis	<0.007	0.026	0.013	0.03	0.03
Q-2 2020	*	*	-	-	-	-	Decommis	-	-	-	0.03	0.03
Q-3 2020	*	*	<0.007	<0.007	<0.007	<0.007	Decommis	<0.007	0.027	0.013	0.03	0.03
Q-4 2020	*	*	<0.007	<0.007	<0.007	<0.007	Decommis	<0.007	0.068	0.035	0.03	0.03

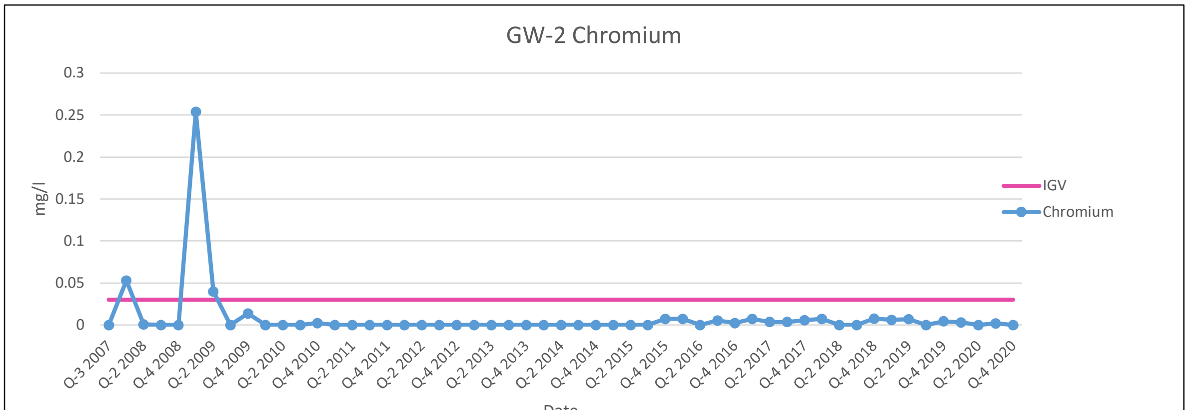
Tebuconazole	SW-1	SW-2	Upstream	Downstream	GW-1	GW-2	GW-3	GW-4	GW-5	GW-6	IGV
Q-3 2007			-	-	-	-		-	-	96	0.1
Q-1 2008	N/R	N/S	0.23	0.11	0.12	0.36	N/S	0.11	50	27.9	0.1
Q-2 2008	N/R	N/R	0.17	0.34	<0.02	<0.02	N/S	<0.02	16.8	8.7	0.1
Q-3 2008	N/R	N/S	<0.1	0.18	0.84	N/S	N/S	0.1	125	25	0.1
Q-4 2008	N/R	N/S	<0.2	<0.2	<0.2	N/S	N/S	<0.1	645	64	0.1
Q-1 2009	N/S	N/S	<5	<5	<5	<5	N/S	<5	<5	<5	0.1
Q-2 2009	N/S	N/S	<5	<0.100	<0.100	<0.100	N/S	<0.100	<0.100	<0.100	0.1
Q-3 2009	N/S	N/S	<5	<0.100	<0.100	<0.100	N/S	<0.100	<0.100	<0.100	0.1
Q-4 2009	N/S	N/S	<5	<0.100	<0.100	<0.100	N/S	<0.100	<0.100	<0.100	0.1
Q-1 2010	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	77.8	26.3	0.1
Q-2 2010	Dry	Dry	<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	178.7	12.9	0.1
Q-3 2010			<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	541.2	47.9	0.1
Q-4 2010	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	1	2.7	0.1
Q-1 2011	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	19.3	9.2	0.1
Q-2 2011	*	<0.1	<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	3.2	4.4	0.1
Q-3 2011	*	<0.1	<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	150.1	7.8	0.1
Q-4 2011	*	<0.1	<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	2	2.4	0.1
Q-1 2012	*	<0.1	<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	1.2	0.8	0.1
Q-2 2012	*	<0.1	<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	3.4	2	0.1
Q-3 2012	*	<0.1	<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	3.4	1.8	0.1
Q-4 2012	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-1 2013	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-2 2013	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	18	2	0.1
Q-3 2013	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	6	1.3	0.1
Q-4 2013	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-1 2014	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-2 2014			-	-	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-3 2014	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-4 2014	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	1.2	<0.1	0.1
Q-1 2105	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-2 2015	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-3 2015	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	22.8	3.3	0.1
Q-4 2015	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	<0.1	1.3	0.1
Q-1 2016	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	<0.1	<0.01	0.1
Q-2 2016	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	<0.1	<0.01	0.1
Q-3 2016	*	*	-	-	<0.1	<0.1	Decommis	<0.1	0.0108	0.0049	0.1
Q-4 2016	*	*	-	-	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-1 2017	*	*	-	-	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-2 2017	<0.1	*	<0.1	<0.4	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-3 2017	0.3	*	0.3	0.5	<0.1	0.4	Decommis	<0.1	3.3	4.6	0.1
Q-4 2017	<0.1	*	<0.1	0.3	<0.1	<0.1	Decommis	<0.1	4	7	0.1
Q-1 2018	<0.1	*	<0.1	0.4	<0.1	<0.1	Decommis	<0.1	8	5.7	0.1
Q-2 2018	-	*	-	-	<0.1	<0.1	Decommis	<0.1	0.1	0.2	0.1
Q-3 2018	-	*	-	-	<0.1	<0.1	Decommis	<0.1	0.4	0.2	0.1
Q-4 2018	0.3		<0.1	0.1	<0.1	0.1	Decommis	<0.1	0.3	1.2	0.1
Q-1 2019	-		-	-	<0.1	<0.1	Decommis	<0.1	2.9	3.9	0.1
Q-2 2019	-	-	<0.1	<0.1	<0.1	3.7	Decommis	<0.1	26.9	7	0.1
Q-3 2019	-	-	<0.1	0.13	<0.1	0.7	Decommis	<0.1	6	3.6	0.1
Q-4 2019	<0.1	-	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	5.5	4.9	0.1
Q-1 2020	<0.1	-	<0.1	1.3	<0.1	<0.1	Decommis	<0.1	10	13.1	0.1
Q-2 2020	-	-	-	-	-	-	Decommis	-	-	-	0.1
Q-3 2020	-	-	<0.1	1.1	<0.1	0.2	Decommis	<0.1	6.9	11.9	0.1
Q-4 2020	-	-	<0.1	0.2	<0.1	0.2	Decommis	<0.1	6.4	3.6	0.1

Propiconazole	SW-1	SW-2	Upstream	Downstream	GW-1	GW-2	GW-3	GW-4	GW-5	GW-6	IGV
Q-3 2007			-	-	-	-		-	-	39	0.1
Q-1 2008	N/R	N/S	0.11	0.07	0.07	0.39	N/S	0.21	N/A	20.4	0.1
Q-2 2008	N/R	N/R	0.33	0.14	<0.02	<0.02	N/S	<0.02	47.8	5.4	0.1
Q-3 2008	N/R	N/S	<0.1	0.14	0.49	N/S	N/S	<0.1	80	21	0.1
Q-4 2008	N/R	N/S	<0.2	<0.2	<0.2	N/S	N/S	<0.1	395	31	0.1
Q-1 2009	N/S	N/S	<5	<5	<5	<5	N/S	<5	<5	<5	0.1
Q-2 2009	N/S	N/S	<0.100	<0.100	<0.100	<0.100	N/S	<0.100	<0.100	<0.100	0.1
Q-3 2009	N/S	N/S	<0.100	<0.100	<0.100	<0.100	N/S	<0.100	<0.100	<0.100	0.1
Q-4 2009	N/S	N/S	<0.100	<0.100	<0.100	<0.100	N/S	<0.100	<0.100	<0.100	0.1
Q-1 2010	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	26.9	16.3	0.1
Q-2 2010	Dry	Dry	<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	81.3	7.9	0.1
Q-3 2010			<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	296.1	31.5	0.1
Q-4 2010	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	<0.1	1.7	0.1
Q-1 2011	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	11	6.5	0.1
Q-2 2011	*	<0.1	<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	6	7.9	0.1
Q-3 2011	*	<0.1	<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	315.5	14.4	0.1
Q-4 2011	*	<0.1	<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	0.6	1.5	0.1
Q-1 2012	*	<0.1	<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	0.5	0.4	0.1
Q-2 2012	*	<0.1	<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	2.4	1.7	0.1
Q-3 2012	*	<0.1	<0.1	<0.1	<0.1	<0.1	Blocked	<0.1	2.6	2.2	0.1
Q-4 2012	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-1 2013	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-2 2013	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	10.2	1.1	0.1
Q-3 2013	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	3	0.7	0.1
Q-4 2013	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-1 2014	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-2 2014			-	-	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-3 2014	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-4 2014	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	3.9	0.2	0.1
Q-1 2105	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-2 2015	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-3 2015	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	8	0.9	0.1
Q-4 2015	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-1 2016	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-2 2016	*	<0.1	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-3 2016	*	-	-	-	<0.1	<0.1	Decommis	<0.1	0.005	0.002	0.1
Q-4 2016	*	-	-	-	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-1 2017	*	-	-	-	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-2 2017	<0.1	-	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	<0.1	<0.1	0.1
Q-3 2017	0.2	-	0.1	0.3	<0.1	0.2	Decommis	<0.1	3.1	3.4	0.1
Q-4 2017	<0.1	-	<0.1	0.3	<0.1	<0.1	Decommis	<0.1	4.2	8	0.1
Q-1 2018	<0.1	*	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	4.3	5.7	0.1
Q-2 2018	-	*	-	-	<0.1	<0.1	Decommis	<0.1	<0.1	0.2	0.1
Q-3 2018	-	*	-	-	<0.1	<0.1	Decommis	<0.1	0.3	0.2	0.1
Q-4 2018	<0.1		<0.1	0.3	<0.1	0.3	Decommis	<0.1	0.3	1.2	0.1
Q-1 2019	-		-	-	<0.1	<0.1	Decommis	<0.1	2.9	3.8	0.1
Q-2 2019	-	-	<0.1	<0.1	<0.1	0.9	Decommis	<0.1	6.3	2.3	0.1
Q-3 2019	-	-	<0.1	0.7	<0.1	0.6	Decommis	<0.1	6.3	4.8	0.1
Q-4 2019	<0.1	-	<0.1	<0.1	<0.1	<0.1	Decommis	<0.1	4	7.1	0.1
Q-1 2020	<0.1	-	<0.1	1.5	<0.1	<0.1	Decommis	<0.1	10.7	12	0.1
Q-2 2020	-	-	-	-	-	-	Decommis	-	-	-	0.1
Q-3 2020	-	-	<0.1	0.5	<0.1	0.2	Decommis	<0.1	5.9	9	0.1
Q-4 2020	-	-	<0.1	0.1	<0.1	<0.1	Decommis	<0.1	4.7	2.7	0.1

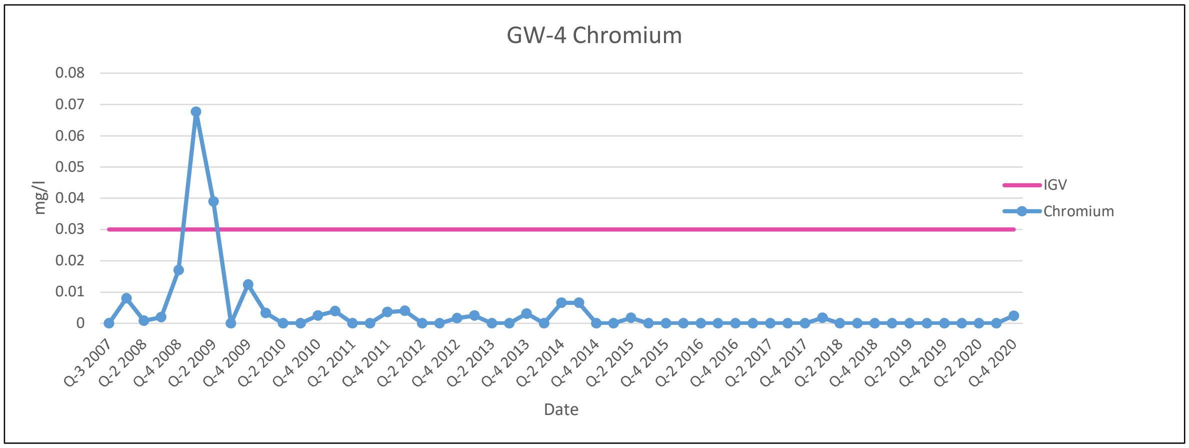

Upstream Chromium
mg/l
Date
EQS
Chromium

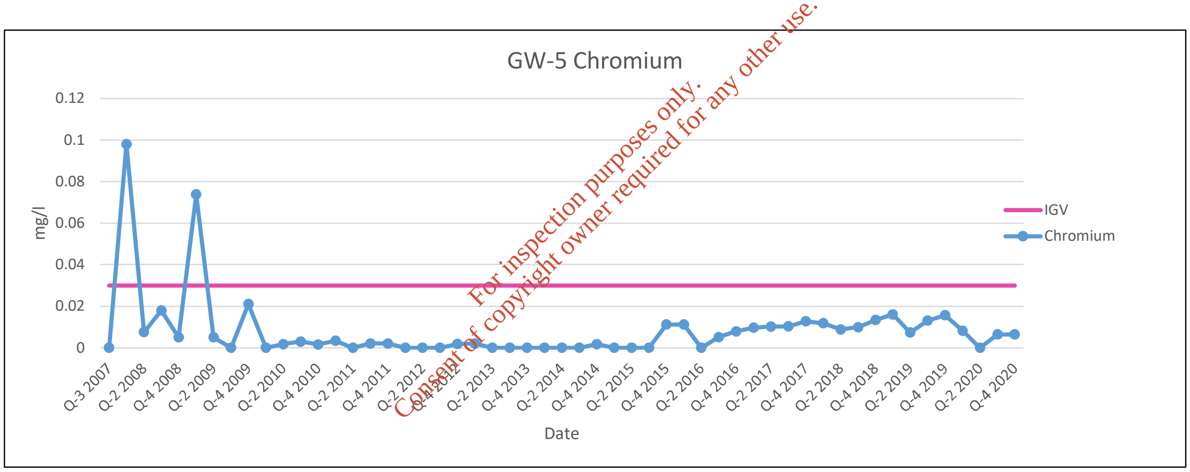

Downstream Chromium
mg/l
Date
EQS
Chromium

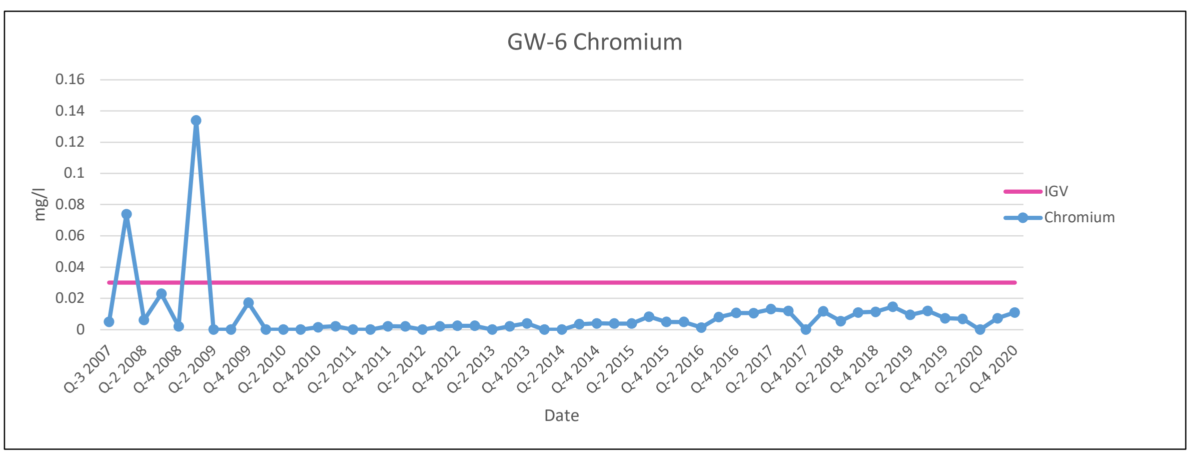

GW-1 Chromium
mg/l
Date
IGV
Chromium

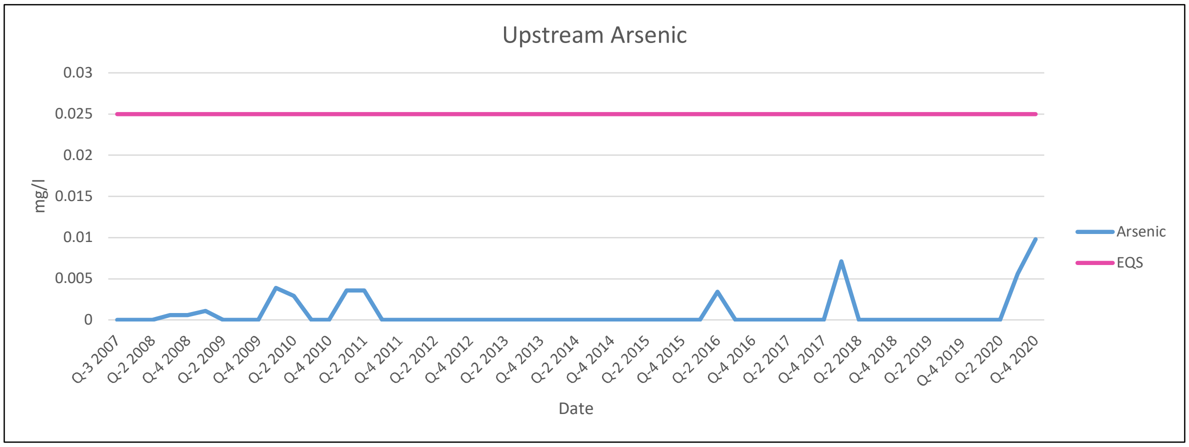

GW-2 Chromium
mg/l
IGV
Chromium

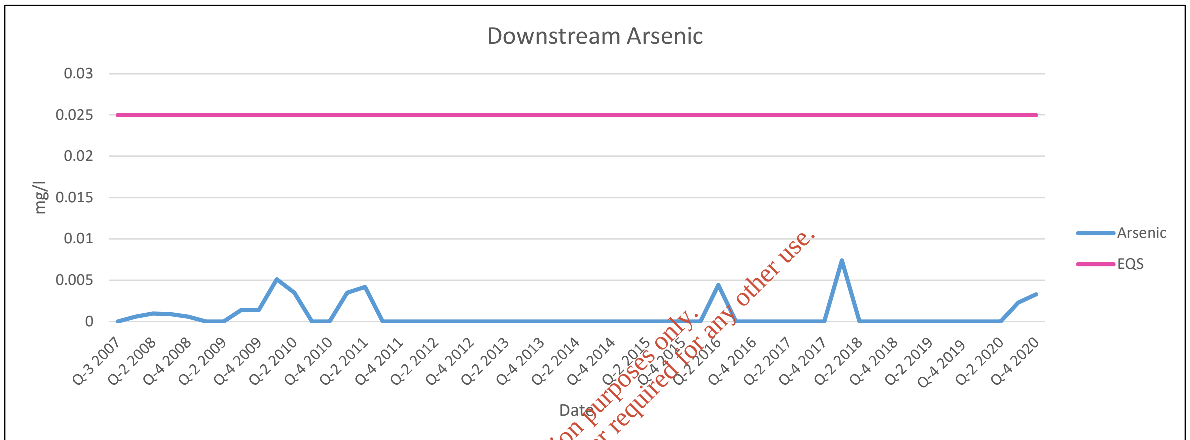

Date


GW-4 Chromium
mg/l
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
IGV
Chromium
Q-3 2007 Q-2 2008 Q-4 2008 Q-2 2009 Q-4 2009 Q-2 2010 Q-4 2010 Q-2 2011 Q-4 2011 Q-2 2012 Q-4 2012 Q-2 2013 Q-4 2013 Q-2 2014 Q-4 2014 Q-2 2015 Q-4 2015 Q-2 2016 Q-4 2016 Q-2 2017 Q-4 2017 Q-2 2018 Q-4 2018 Q-2 2019 Q-4 2019 Q-2 2020 Q-4 2020
Date


GW-5 Chromium
mg/l
0.12
0.1
0.08
0.06
0.04
0.02
0
IGV
Chromium
Q-3 2007 Q-2 2008 Q-4 2008 Q-2 2009 Q-4 2009 Q-2 2010 Q-4 2010 Q-2 2011 Q-4 2011 Q-2 2012 Q-4 2012 Q-2 2013 Q-4 2013 Q-2 2014 Q-4 2014 Q-2 2015 Q-4 2015 Q-2 2016 Q-4 2016 Q-2 2017 Q-4 2017 Q-2 2018 Q-4 2018 Q-2 2019 Q-4 2019 Q-2 2020 Q-4 2020
Date


GW-6 Chromium
mg/l
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
IGV
Chromium
Q-3 2007 Q-2 2008 Q-4 2008 Q-2 2009 Q-4 2009 Q-2 2010 Q-4 2010 Q-2 2011 Q-4 2011 Q-2 2012 Q-4 2012 Q-2 2013 Q-4 2013 Q-2 2014 Q-4 2014 Q-2 2015 Q-4 2015 Q-2 2016 Q-4 2016 Q-2 2017 Q-4 2017 Q-2 2018 Q-4 2018 Q-2 2019 Q-4 2019 Q-2 2020 Q-4 2020
Date


Upstream Arsenic
0.03
0.025
0.02
0.015
0.01
0.005
0
mg/l
Q-3 2007
Q-2 2008
Q-4 2008
Q-2 2009
Q-4 2009
Q-2 2010
Q-4 2010
Q-2 2011
Q-4 2011
Q-2 2012
Q-4 2012
Q-2 2013
Q-4 2013
Q-2 2014
Q-4 2014
Q-2 2015
Q-4 2015
Q-2 2016
Q-4 2016
Q-2 2017
Q-4 2017
Q-2 2018
Q-4 2018
Q-2 2019
Q-4 2019
Q-2 2020
Q-4 2020
Date
Arsenic
EQS


Downstream Arsenic
0.03
0.025
0.02
0.015
0.01
0.005
0
mg/l
Q-3 2007
Q-2 2008
Q-4 2008
Q-2 2009
Q-4 2009
Q-2 2010
Q-4 2010
Q-2 2011
Q-4 2011
Q-2 2012
Q-4 2012
Q-2 2013
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Q-2 2014
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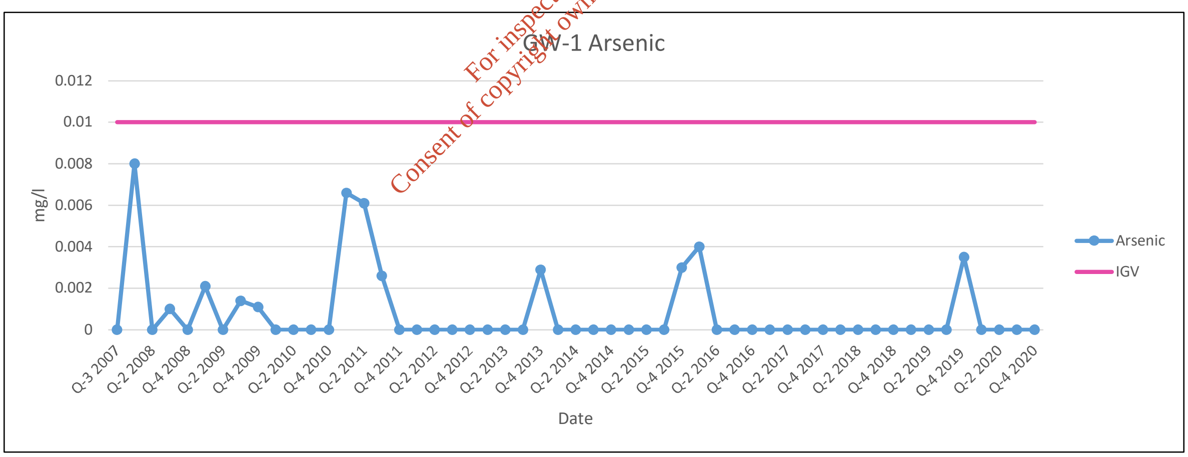
Q-2 2015
Q-4 2015
Q-2 2016
Q-4 2016
Q-2 2017
Q-4 2017
Q-2 2018
Q-4 2018
Q-2 2019
Q-4 2019
Q-2 2020
Q-4 2020
Date
Arsenic
EQS


GW-1 Arsenic
0.012
0.01
0.008
0.006
0.004
0.002
0
mg/l
Q-3 2007
Q-2 2008
Q-4 2008
Q-2 2009
Q-4 2009
Q-2 2010
Q-4 2010
Q-2 2011
Q-4 2011
Q-2 2012
Q-4 2012
Q-2 2013
Q-4 2013
Q-2 2014
Q-4 2014
Q-2 2015
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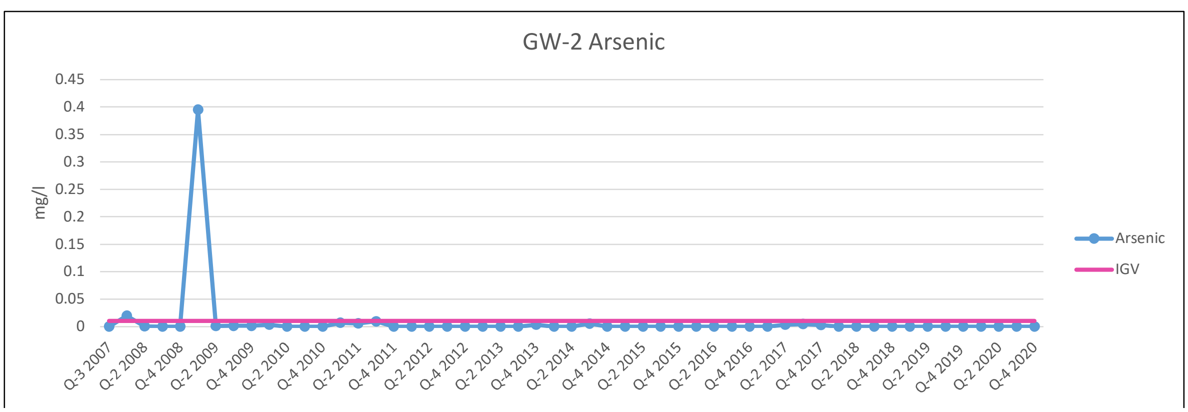
Q-2 2016
Q-4 2016
Q-2 2017
Q-4 2017
Q-2 2018
Q-4 2018
Q-2 2019
Q-4 2019
Q-2 2020
Q-4 2020
Date
Arsenic
IGV


GW-2 Arsenic
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
mg/l
Q-3 2007
Q-2 2008
Q-4 2008
Q-2 2009
Q-4 2009
Q-2 2010
Q-4 2010
Q-2 2011
Q-4 2011
Q-2 2012
Q-4 2012
Q-2 2013
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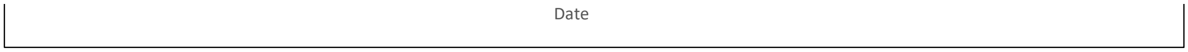
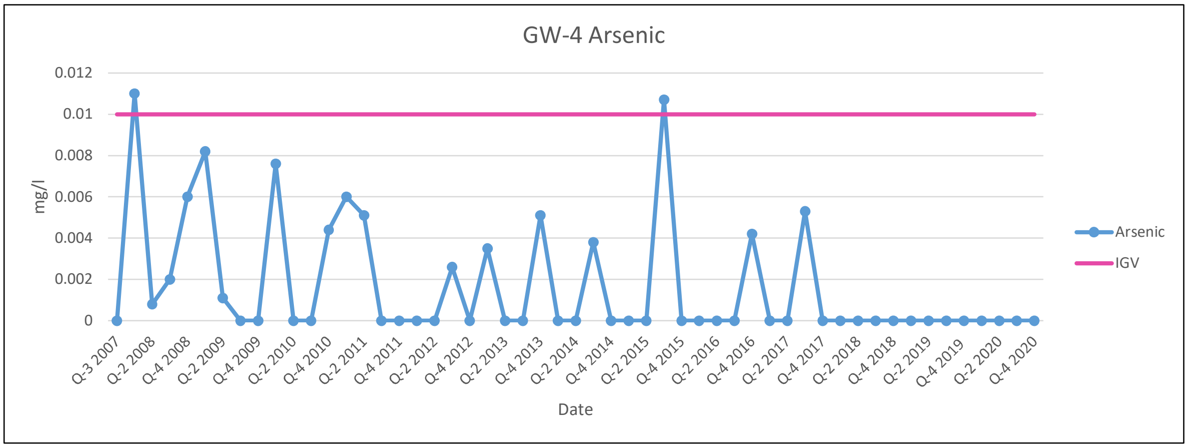
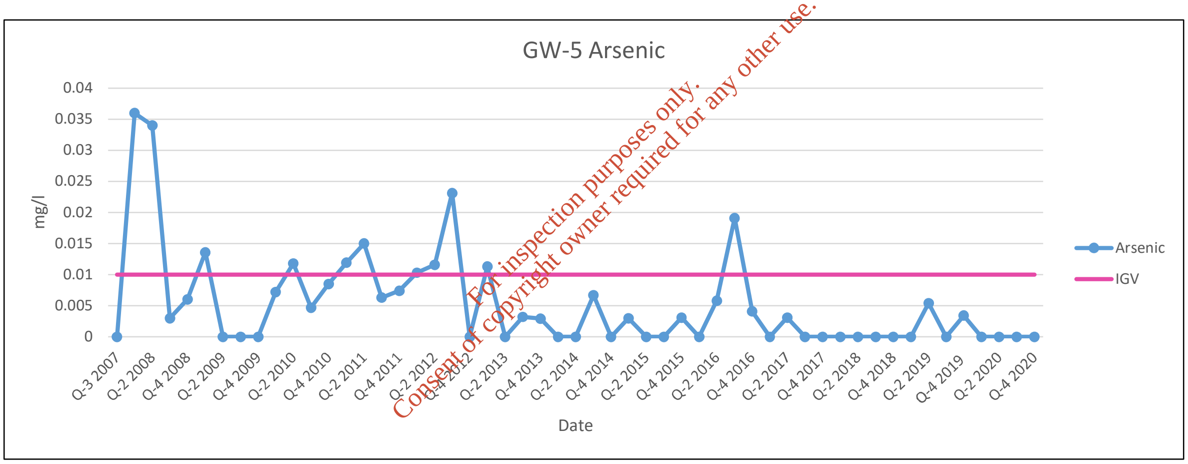
Q-4 2015
Q-2 2016
Q-4 2016
Q-2 2017
Q-4 2017
Q-2 2018
Q-4 2018
Q-2 2019
Q-4 2019
Q-2 2020
Q-4 2020
Arsenic
IGV


Date


GW-4 Arsenic
mg/l
0.012
0.01
0.008
0.006
0.004
0.002
0
Q-3 2007
Q-2 2008
Q-4 2008
Q-2 2009
Q-4 2009
Q-2 2010
Q-4 2010
Q-2 2011
Q-4 2011
Q-2 2012
Q-4 2012
Q-2 2013
Q-4 2013
Q-2 2014
Q-4 2014
Q-2 2015
Q-4 2015
Q-2 2016
Q-4 2016
Q-2 2017
Q-4 2017
Q-2 2018
Q-4 2018
Q-2 2019
Q-4 2019
Q-2 2020
Q-4 2020
Date
Arsenic
IGV


GW-5 Arsenic
mg/l
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
Q-3 2007
Q-2 2008
Q-4 2008
Q-2 2009
Q-4 2009
Q-2 2010
Q-4 2010
Q-2 2011
Q-4 2011
Q-2 2012
Q-4 2012
Q-2 2013
Q-4 2013
Q-2 2014
Q-4 2014
Q-2 2015
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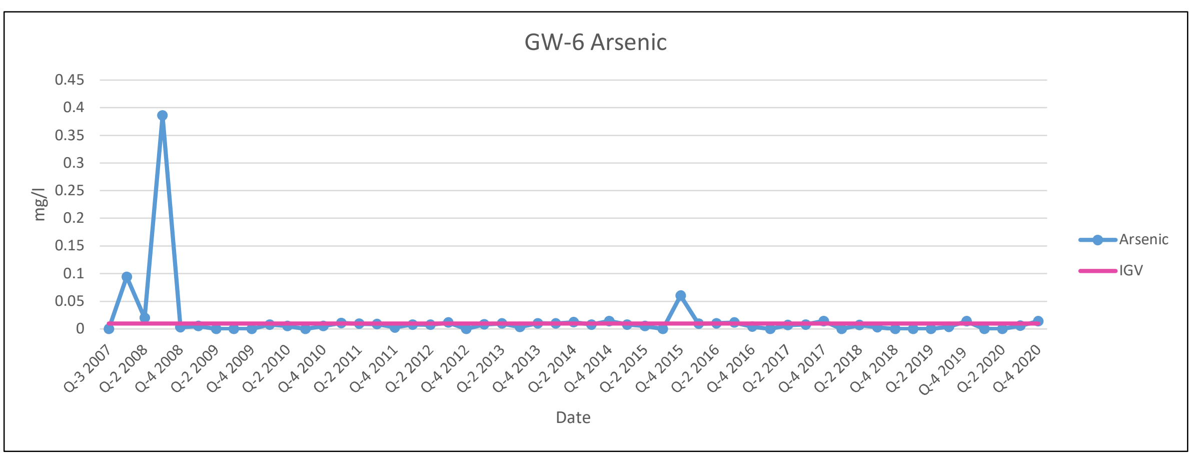
Q-2 2016
Q-4 2016
Q-2 2017
Q-4 2017
Q-2 2018
Q-4 2018
Q-2 2019
Q-4 2019
Q-2 2020
Q-4 2020
Date
Arsenic
IGV


GW-6 Arsenic
mg/l
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Q-3 2007
Q-2 2008
Q-4 2008
Q-2 2009
Q-4 2009
Q-2 2010
Q-4 2010
Q-2 2011
Q-4 2011
Q-2 2012
Q-4 2012
Q-2 2013
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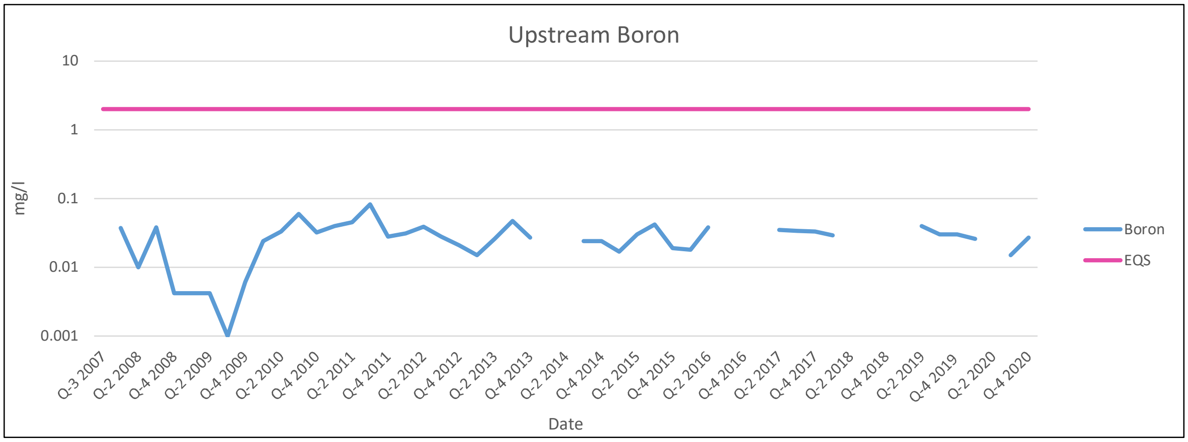
Q-2 2014
Q-4 2014
Q-2 2015
Q-4 2015
Q-2 2016
Q-4 2016
Q-2 2017
Q-4 2017
Q-2 2018
Q-4 2018
Q-2 2019
Q-4 2019
Q-2 2020
Q-4 2020
Date
Arsenic
IGV


Upstream Boron
mg/l
10
1
0.1
0.01
0.001
Q-3 2007
Q-2 2008
Q-4 2008
Q-2 2009
Q-4 2009
Q-2 2010
Q-4 2010
Q-2 2011
Q-4 2011
Q-2 2012
Q-4 2012
Q-2 2013
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Q-2 2015
Q-4 2015
Q-2 2016
Q-4 2016
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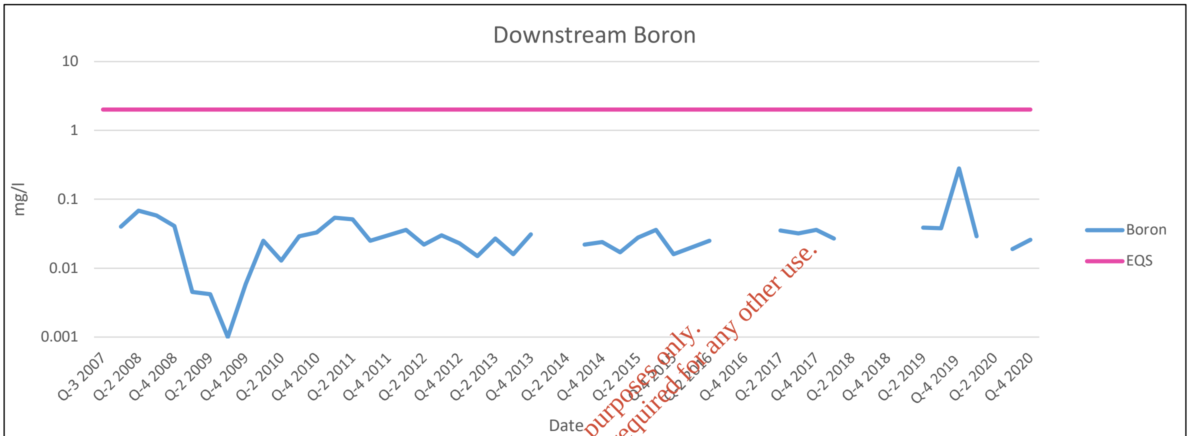
Q-2 2018
Q-4 2018
Q-2 2019
Q-4 2019
Q-2 2020
Q-4 2020
Date
Boron
EQS


Downstream Boron
mg/l
10
1
0.1
0.01
0.001
Q-3 2007
Q-2 2008
Q-4 2008
Q-2 2009
Q-4 2009
Q-2 2010
Q-4 2010
Q-2 2011
Q-4 2011
Q-2 2012
Q-4 2012
Q-2 2013
Q-4 2013
Q-2 2014
Q-4 2014
Q-2 2015
Q-4 2015
Q-2 2016
Q-4 2016
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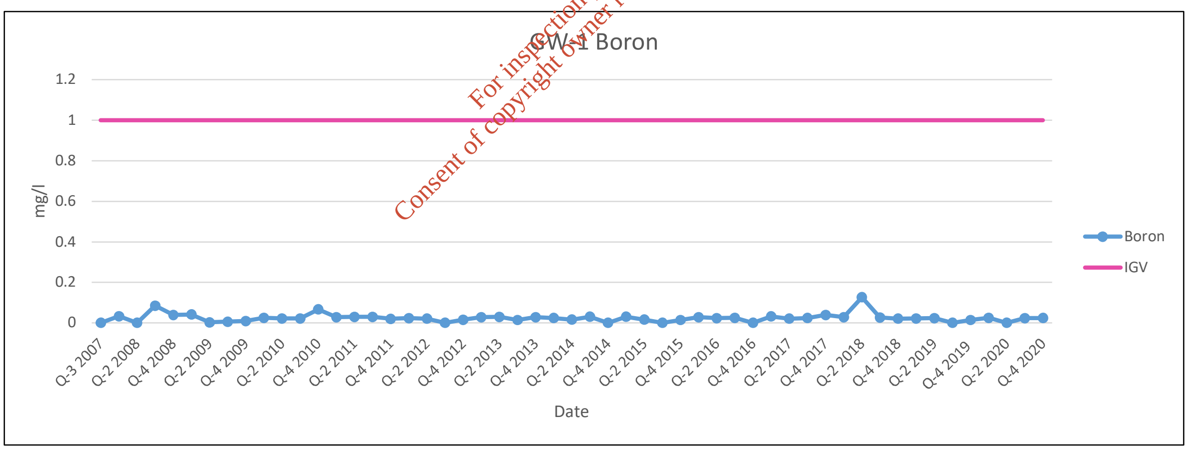
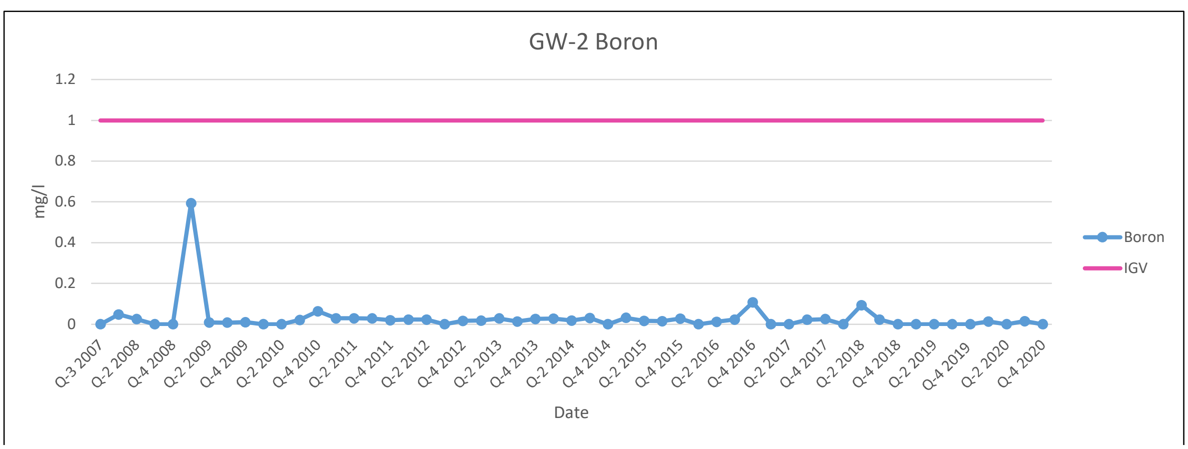
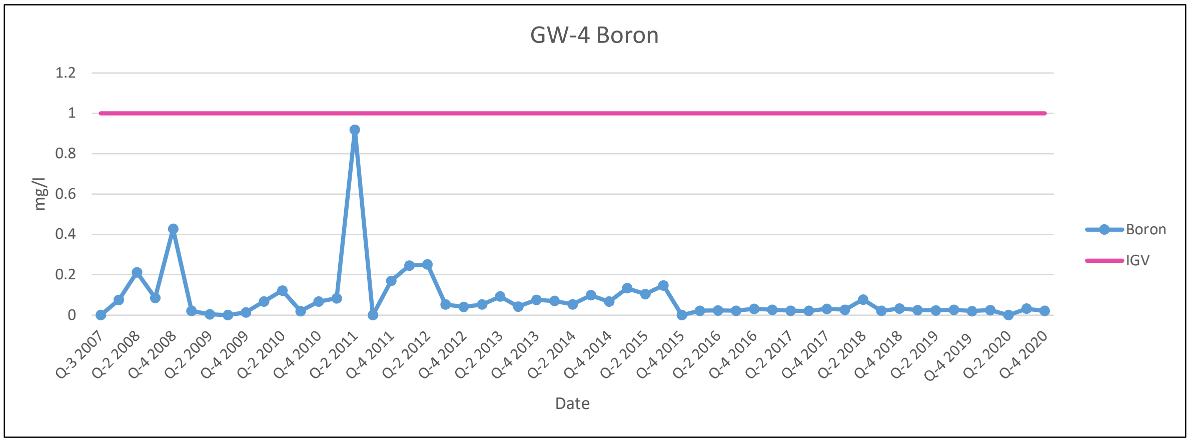
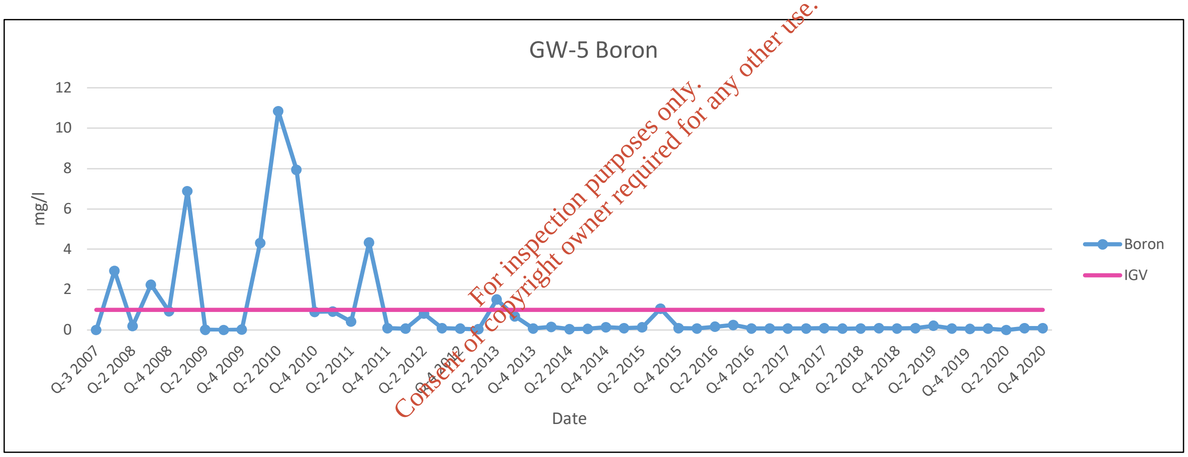
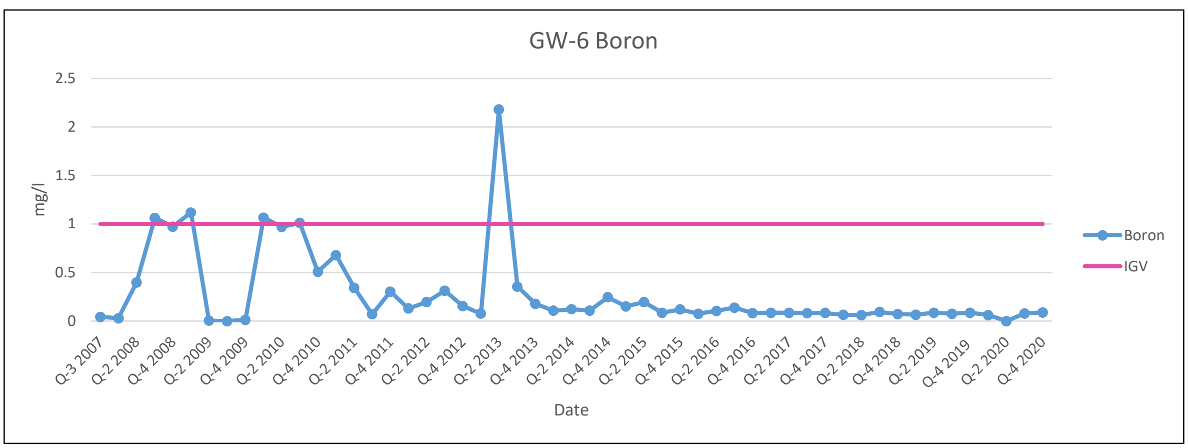
Q-2 2018
Q-4 2018
Q-2 2019
Q-4 2019
Q-2 2020
Q-4 2020
Date
Boron
EQS

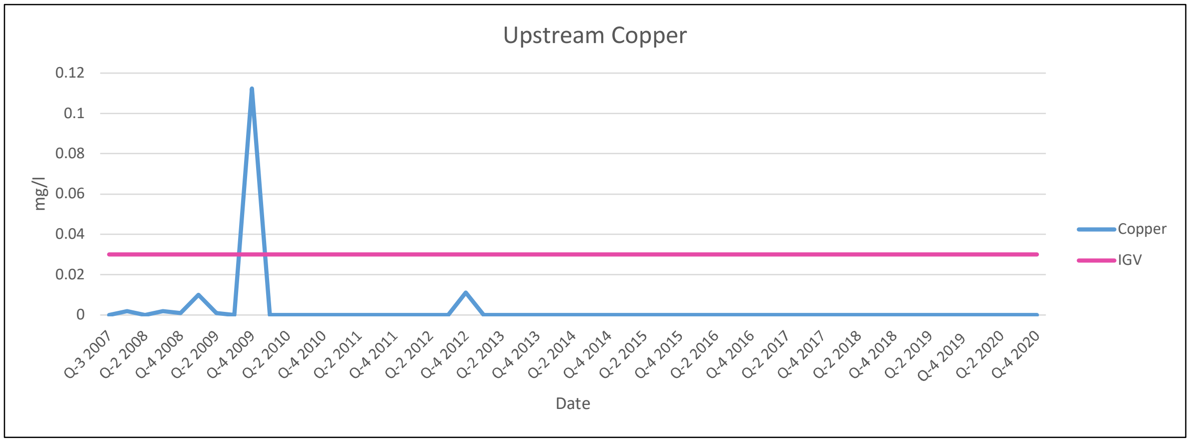

GW-1 Boron
mg/l
1.2
1
0.8
0.6
0.4
0.2
0
Q-3 2007
Q-2 2008
Q-4 2008
Q-2 2009
Q-4 2009
Q-2 2010
Q-4 2010
Q-2 2011
Q-4 2011
Q-2 2012
Q-4 2012
Q-2 2013
Q-4 2013
Q-2 2014
Q-4 2014
Q-2 2015
Q-4 2015
Q-2 2016
Q-4 2016
Q-2 2017
Q-4 2017
Q-2 2018
Q-4 2018
Q-2 2019
Q-4 2019
Q-2 2020
Q-4 2020
Date
Boron
IGV

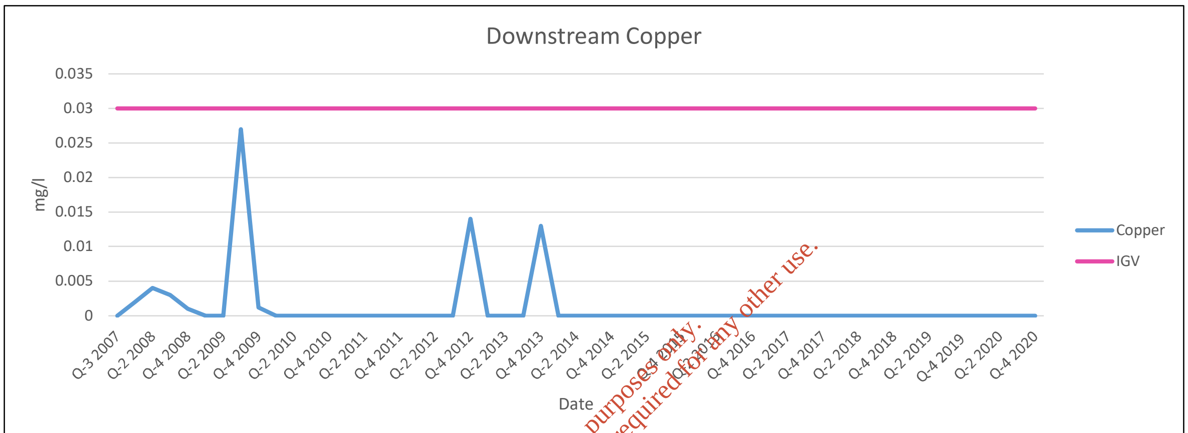

GW-2 Boron
mg/l
1.2
1
0.8
0.6
0.4
0.2
0
Q-3 2007
Q-2 2008
Q-4 2008
Q-2 2009
Q-4 2009
Q-2 2010
Q-4 2010
Q-2 2011
Q-4 2011
Q-2 2012
Q-4 2012
Q-2 2013
Q-4 2013
Q-2 2014
Q-4 2014
Q-2 2015
Q-4 2015
Q-2 2016
Q-4 2016
Q-2 2017
Q-4 2017
Q-2 2018
Q-4 2018
Q-2 2019
Q-4 2019
Q-2 2020
Q-4 2020
Date
Boron
IGV

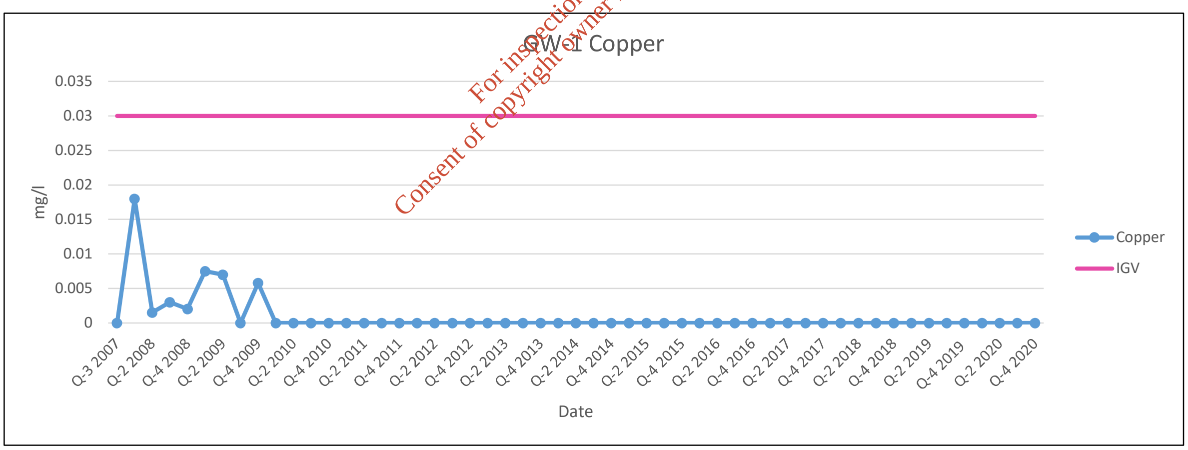

GW-4 Boron
mg/l
Date
Boron
IGV

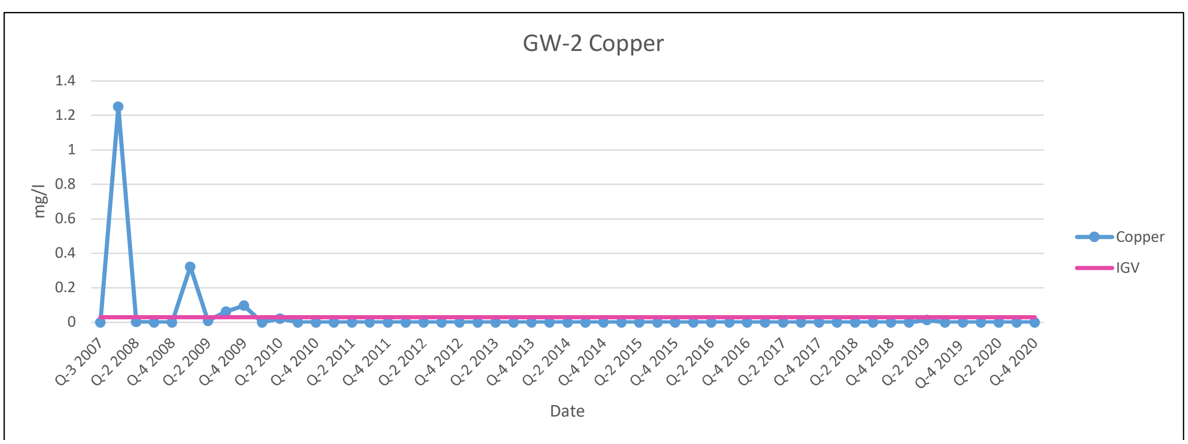

GW-5 Boron
mg/l
Date
Boron
IGV

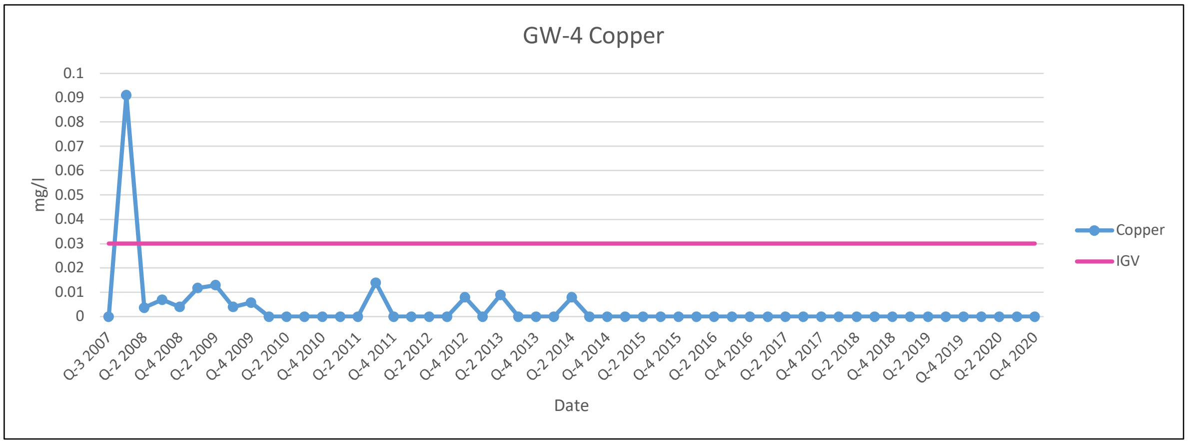

GW-6 Boron
mg/l
Date
Boron
IGV

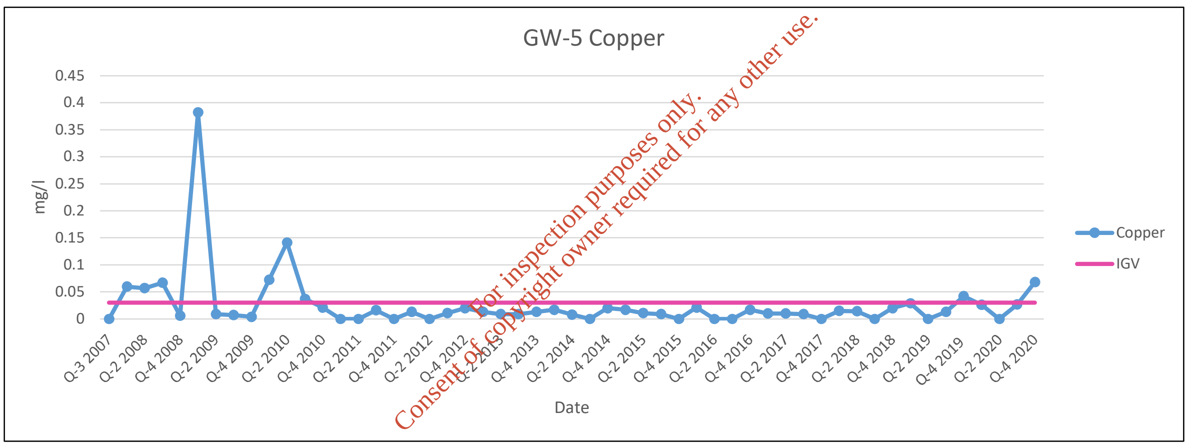

Upstream Copper
mg/l
Date
Copper
IGV

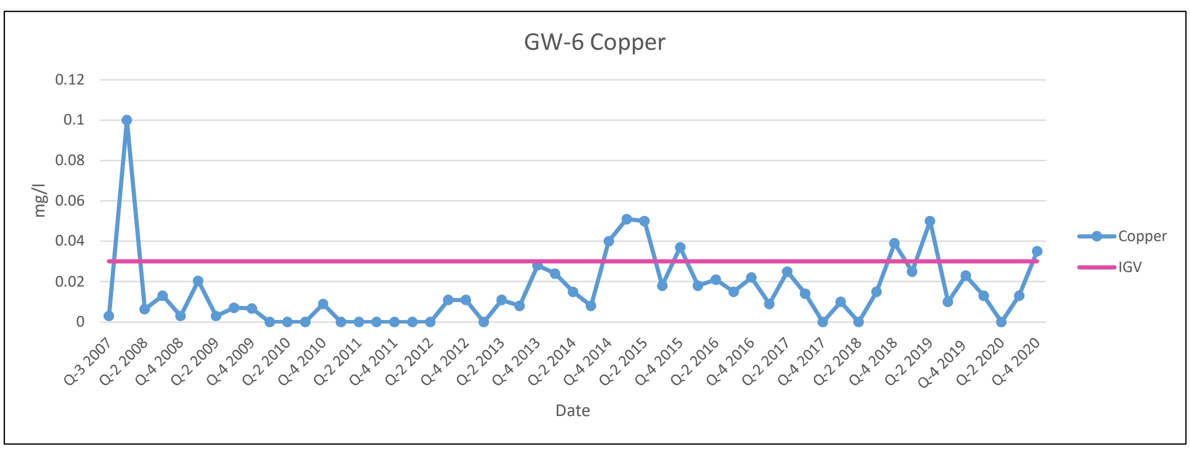

Downstream Copper
mg/l
Date
Copper
IGV

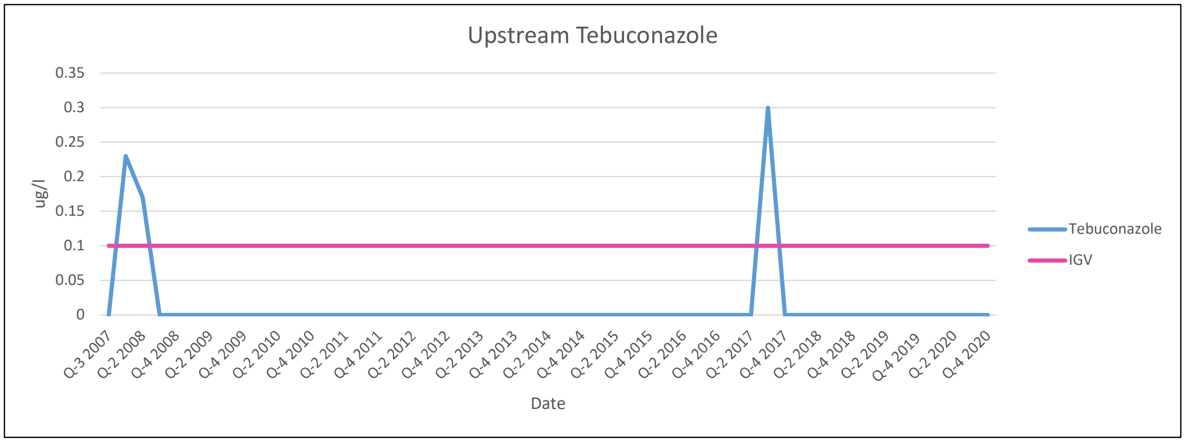

GW-1 Copper
mg/l
Date
Copper
IGV

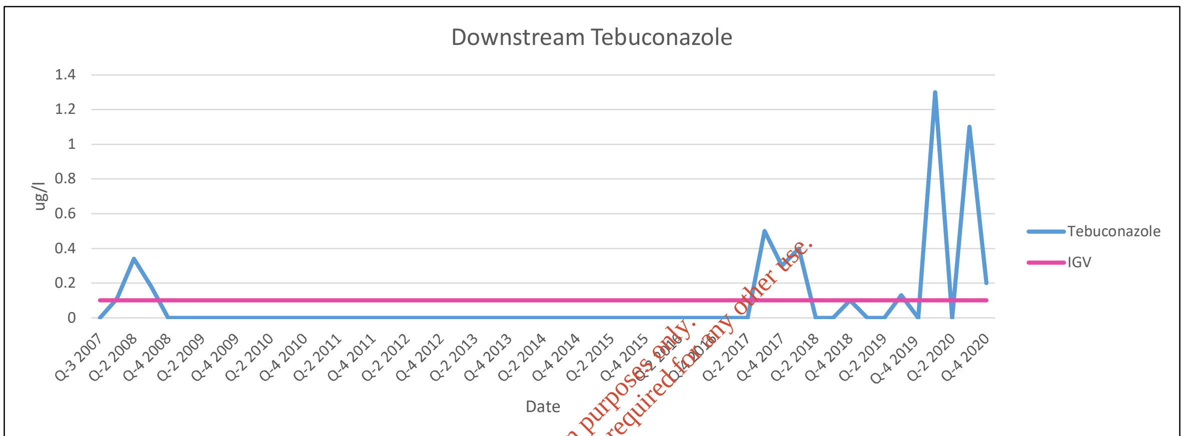

GW-2 Copper
mg/l
Date
Copper
IGV

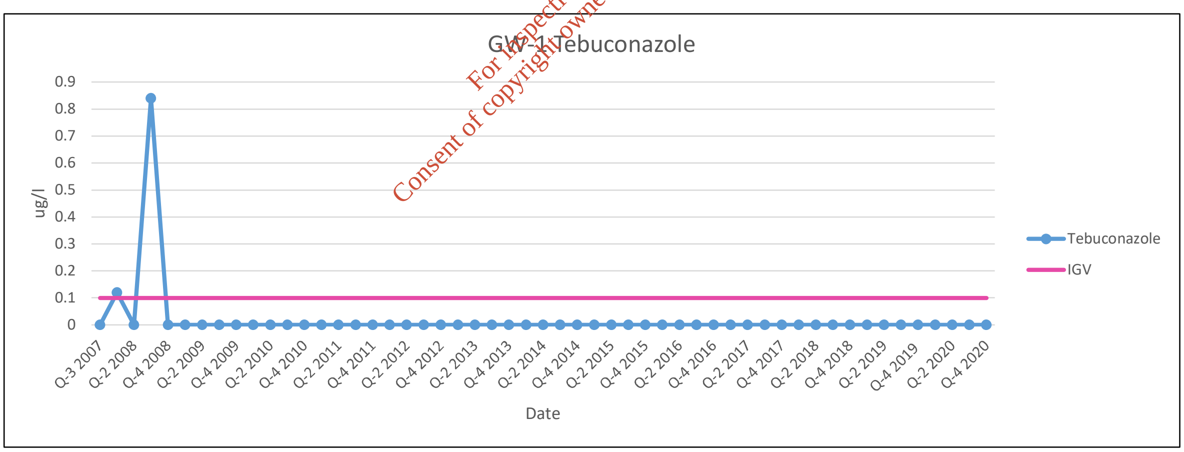

GW-4 Copper
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
mg/l
Q-3 2007
Q-2 2008
Q-4 2008
Q-2 2009
Q-4 2009
Q-2 2010
Q-4 2010
Q-2 2011
Q-4 2011
Q-2 2012
Q-4 2012
Q-2 2013
Q-4 2013
Q-2 2014
Q-4 2014
Q-2 2015
Q-4 2015
Q-2 2016
Q-4 2016
Q-2 2017
Q-4 2017
Q-2 2018
Q-4 2018
Q-2 2019
Q-4 2019
Q-2 2020
Q-4 2020
Date
Copper
IGV

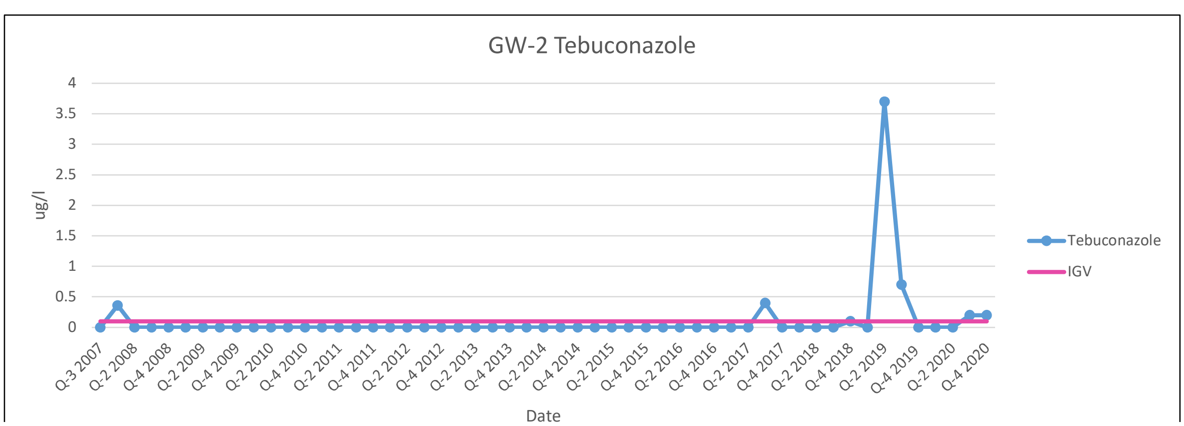

GW-5 Copper
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
mg/l
Q-3 2007
Q-2 2008
Q-4 2008
Q-2 2009
Q-4 2009
Q-2 2010
Q-4 2010
Q-2 2011
Q-4 2011
Q-2 2012
Q-4 2012
Q-2 2013
Q-4 2013
Q-2 2014
Q-4 2014
Q-2 2015
Q-4 2015
Q-2 2016
Q-4 2016
Q-2 2017
Q-4 2017
Q-2 2018
Q-4 2018
Q-2 2019
Q-4 2019
Q-2 2020
Q-4 2020
Date
Copper
IGV

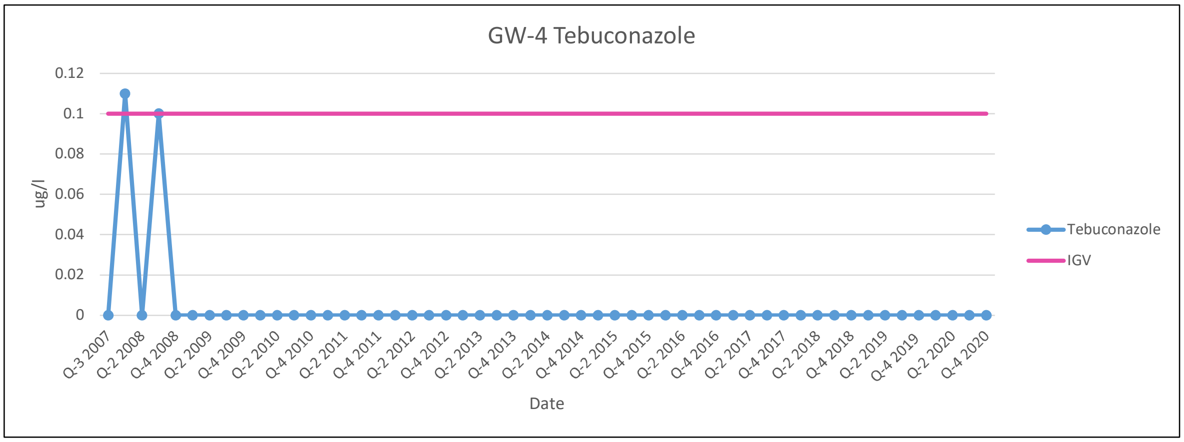

GW-6 Copper
0.12
0.1
0.08
0.06
0.04
0.02
0
mg/l
Q-3 2007
Q-2 2008
Q-4 2008
Q-2 2009
Q-4 2009
Q-2 2010
Q-4 2010
Q-2 2011
Q-4 2011
Q-2 2012
Q-4 2012
Q-2 2013
Q-4 2013
Q-2 2014
Q-4 2014
Q-2 2015
Q-4 2015
Q-2 2016
Q-4 2016
Q-2 2017
Q-4 2017
Q-2 2018
Q-4 2018
Q-2 2019
Q-4 2019
Q-2 2020
Q-4 2020
Date
Copper
IGV

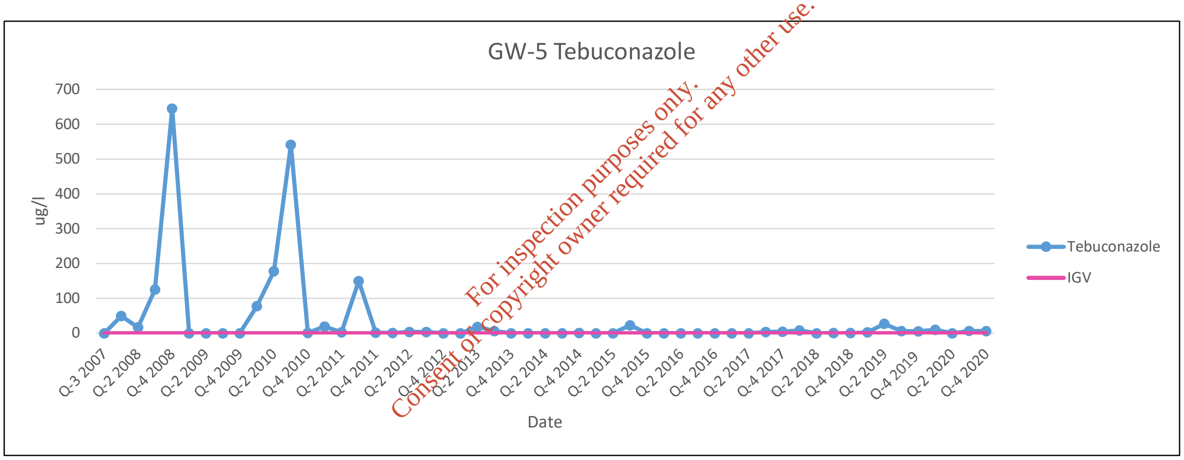

Upstream Tebuconazole
ug/l
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Q-3 2007 Q-2 2008 Q-4 2008 Q-2 2009 Q-4 2009 Q-2 2010 Q-4 2010 Q-2 2011 Q-4 2011 Q-2 2012 Q-4 2012 Q-2 2013 Q-4 2013 Q-2 2014 Q-4 2014 Q-2 2015 Q-4 2015 Q-2 2016 Q-4 2016 Q-2 2017 Q-4 2017 Q-2 2018 Q-4 2018 Q-2 2019 Q-4 2019 Q-2 2020 Q-4 2020
Date
Tebuconazole
IGV

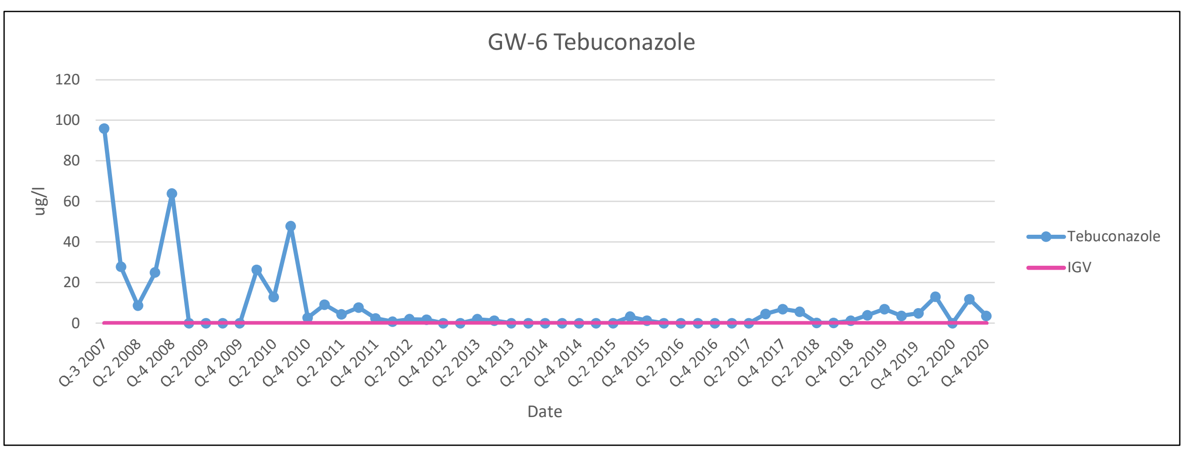

Downstream Tebuconazole
ug/l
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Q-3 2007 Q-2 2008 Q-4 2008 Q-2 2009 Q-4 2009 Q-2 2010 Q-4 2010 Q-2 2011 Q-4 2011 Q-2 2012 Q-4 2012 Q-2 2013 Q-4 2013 Q-2 2014 Q-4 2014 Q-2 2015 Q-4 2015 Q-2 2016 Q-4 2016 Q-2 2017 Q-4 2017 Q-2 2018 Q-4 2018 Q-2 2019 Q-4 2019 Q-2 2020 Q-4 2020
Date
Tebuconazole
IGV

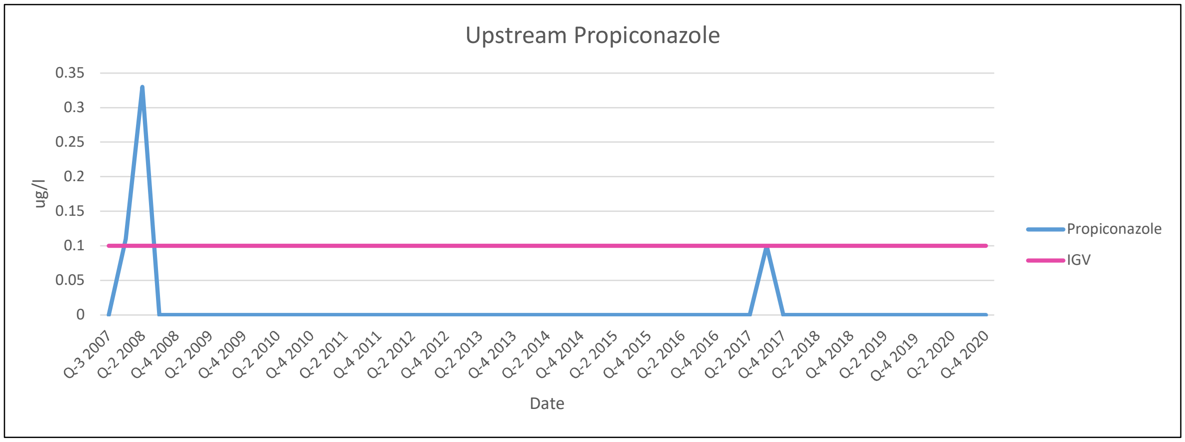

GW-1 Tebuconazole
ug/l
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Q-3 2007 Q-2 2008 Q-4 2008 Q-2 2009 Q-4 2009 Q-2 2010 Q-4 2010 Q-2 2011 Q-4 2011 Q-2 2012 Q-4 2012 Q-2 2013 Q-4 2013 Q-2 2014 Q-4 2014 Q-2 2015 Q-4 2015 Q-2 2016 Q-4 2016 Q-2 2017 Q-4 2017 Q-2 2018 Q-4 2018 Q-2 2019 Q-4 2019 Q-2 2020 Q-4 2020
Date
Tebuconazole
IGV

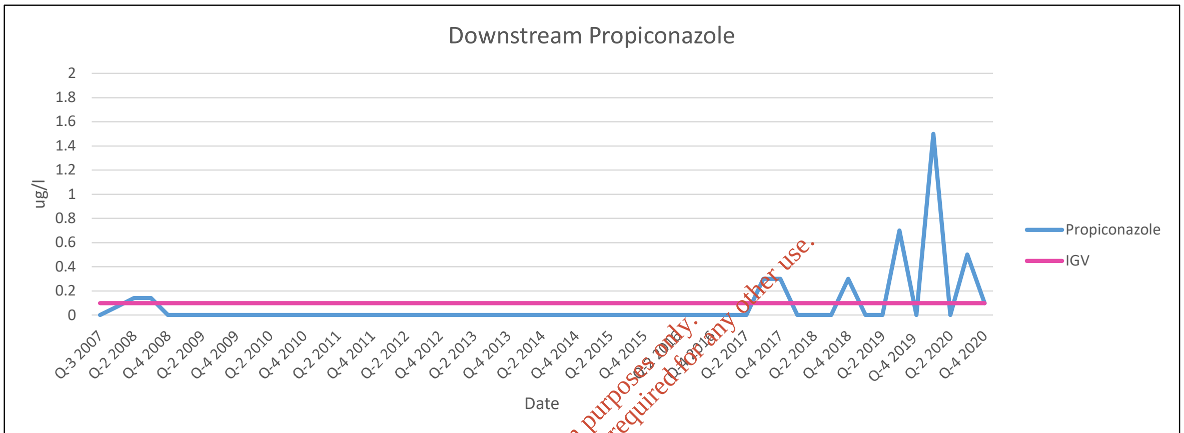

GW-2 Tebuconazole
ug/l
4
3.5
3
2.5
2
1.5
1
0.5
0
Q-3 2007 Q-2 2008 Q-4 2008 Q-2 2009 Q-4 2009 Q-2 2010 Q-4 2010 Q-2 2011 Q-4 2011 Q-2 2012 Q-4 2012 Q-2 2013 Q-4 2013 Q-2 2014 Q-4 2014 Q-2 2015 Q-4 2015 Q-2 2016 Q-4 2016 Q-2 2017 Q-4 2017 Q-2 2018 Q-4 2018 Q-2 2019 Q-4 2019 Q-2 2020 Q-4 2020
Date
Tebuconazole
IGV

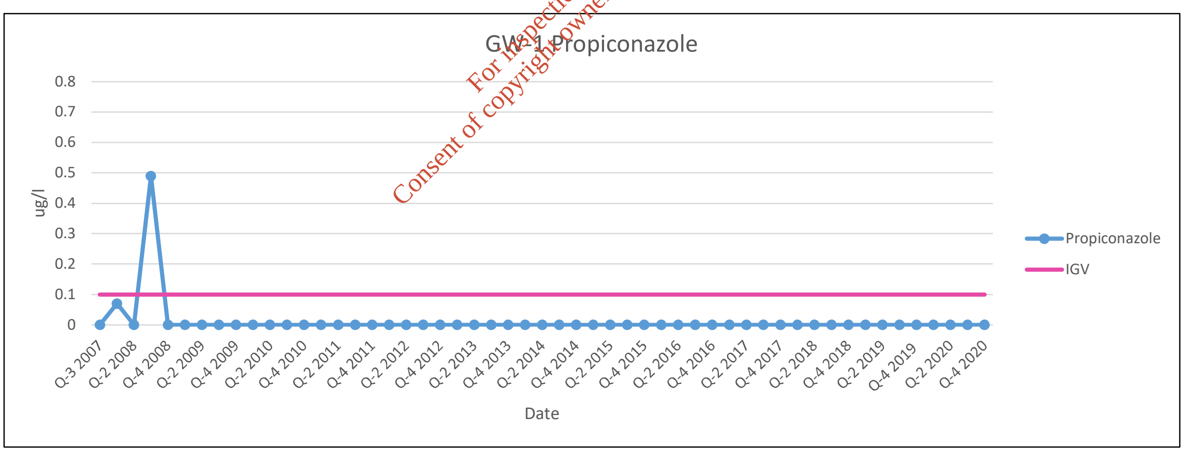

GW-4 Tebuconazole
ug/l
0.12
0.1
0.08
0.06
0.04
0.02
0
Q-3 2007
Q-2 2008
Q-4 2008
Q-2 2009
Q-4 2009
Q-2 2010
Q-4 2010
Q-2 2011
Q-4 2011
Q-2 2012
Q-4 2012
Q-2 2013
Q-4 2013
Q-2 2014
Q-4 2014
Q-2 2015
Q-4 2015
Q-2 2016
Q-4 2016
Q-2 2017
Q-4 2017
Q-2 2018
Q-4 2018
Q-2 2019
Q-4 2019
Q-2 2020
Q-4 2020
Date
Tebuconazole
IGV

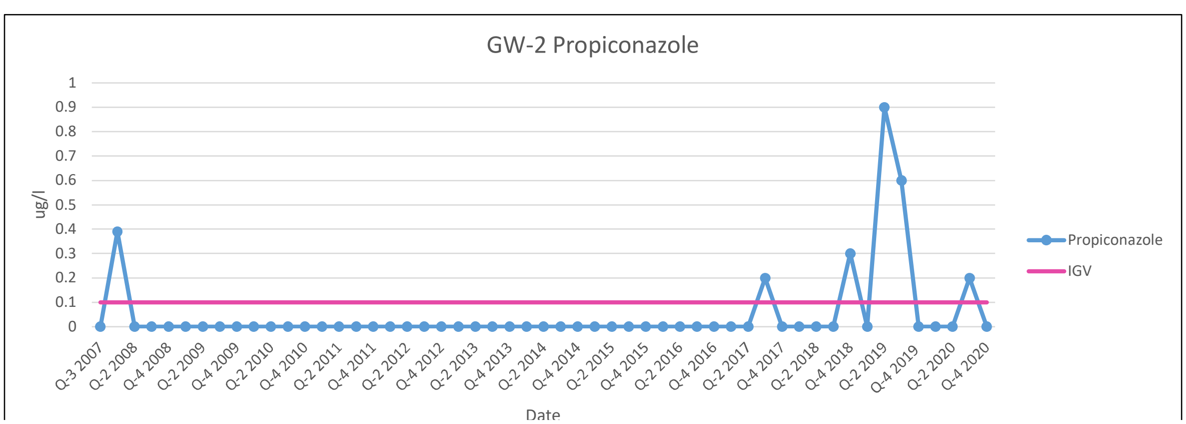

GW-5 Tebuconazole
ug/l
700
600
500
400
300
200
100
0
Q-3 2007
Q-2 2008
Q-4 2008
Q-2 2009
Q-4 2009
Q-2 2010
Q-4 2010
Q-2 2011
Q-4 2011
Q-2 2012
Q-4 2012
Q-2 2013
Q-4 2013
Q-2 2014
Q-4 2014
Q-2 2015
Q-4 2015
Q-2 2016
Q-4 2016
Q-2 2017
Q-4 2017
Q-2 2018
Q-4 2018
Q-2 2019
Q-4 2019
Q-2 2020
Q-4 2020
Date
Tebuconazole
IGV

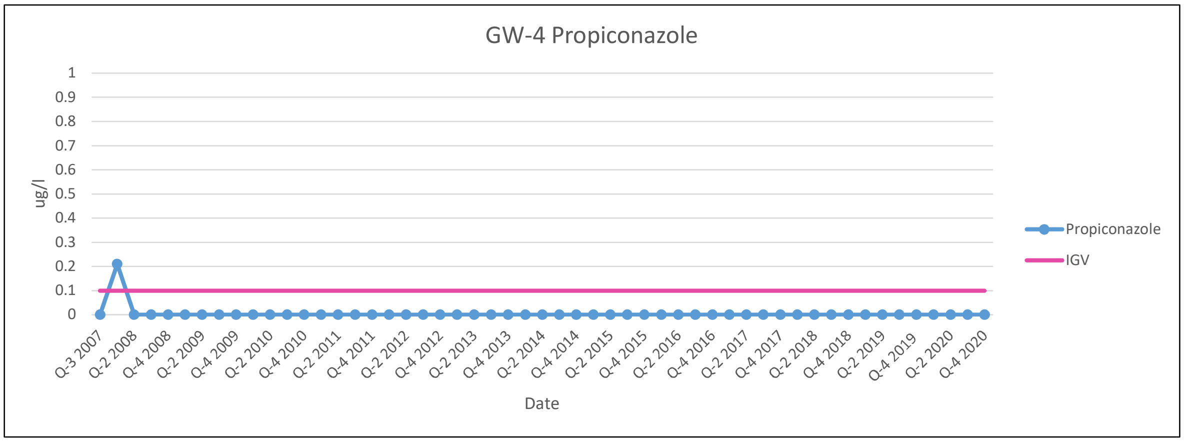

GW-6 Tebuconazole
ug/l
120
100
80
60
40
20
0
Q-3 2007
Q-2 2008
Q-4 2008
Q-2 2009
Q-4 2009
Q-2 2010
Q-4 2010
Q-2 2011
Q-4 2011
Q-2 2012
Q-4 2012
Q-2 2013
Q-4 2013
Q-2 2014
Q-4 2014
Q-2 2015
Q-4 2015
Q-2 2016
Q-4 2016
Q-2 2017
Q-4 2017
Q-2 2018
Q-4 2018
Q-2 2019
Q-4 2019
Q-2 2020
Q-4 2020
Date
Tebuconazole
IGV

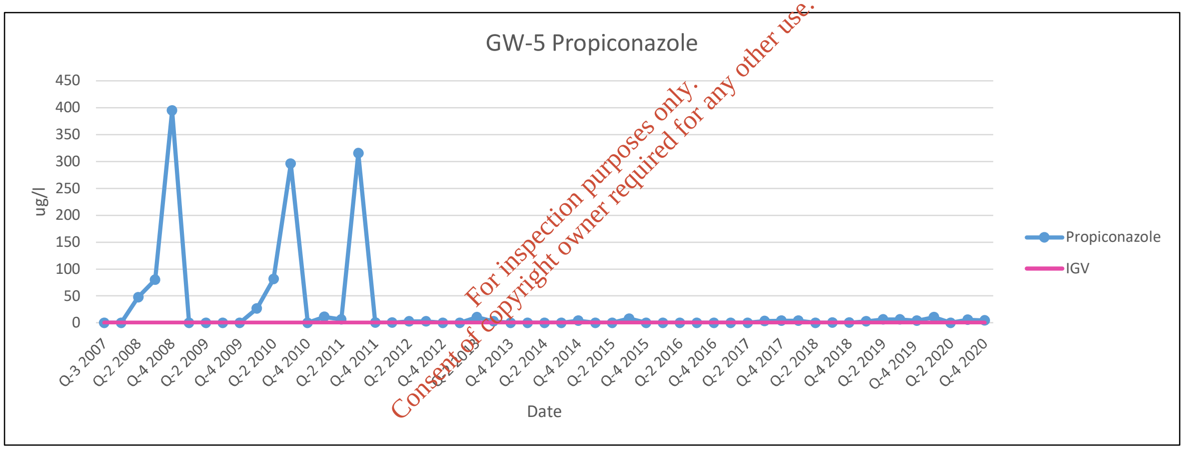

Upstream Propiconazole
ug/l
Date
Propiconazole
IGV

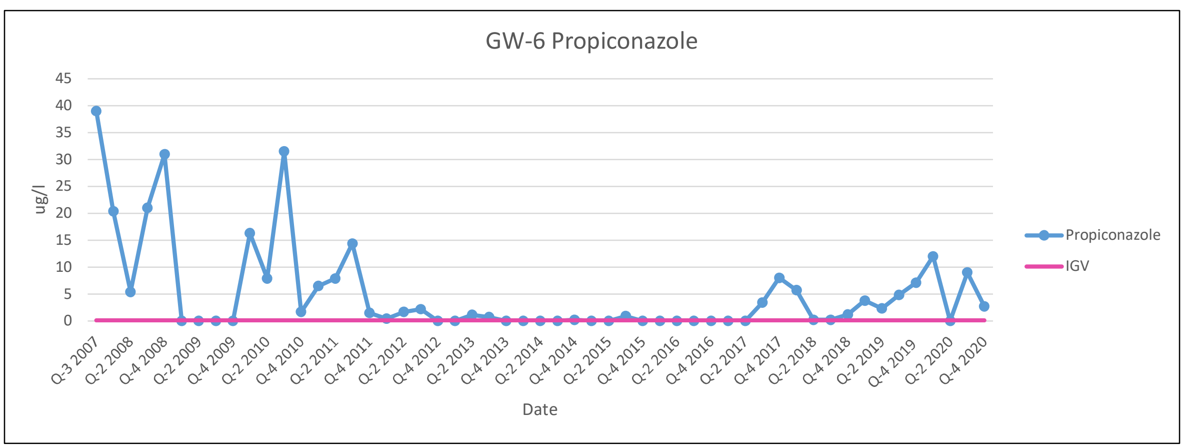

Downstream Propiconazole
ug/l
Date
Propiconazole
IGV


GW-1 Propiconazole
ug/l
Date
Propiconazole
IGV


GW-2 Propiconazole
ug/l
Date
Propiconazole
IGV


GW-4 Propiconazole
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
ug/l
Q-3 2007 Q-2 2008 Q-4 2008 Q-2 2009 Q-4 2009 Q-2 2010 Q-4 2010 Q-2 2011 Q-4 2011 Q-2 2012 Q-4 2012 Q-2 2013 Q-4 2013 Q-2 2014 Q-4 2014 Q-2 2015 Q-4 2015 Q-2 2016 Q-4 2016 Q-2 2017 Q-4 2017 Q-2 2018 Q-4 2018 Q-2 2019 Q-4 2019 Q-2 2020 Q-4 2020
Date
Propiconazole
IGV


GW-5 Propiconazole
450
400
350
300
250
200
150
100
50
0
ug/l
Q-3 2007 Q-2 2008 Q-4 2008 Q-2 2009 Q-4 2009 Q-2 2010 Q-4 2010 Q-2 2011 Q-4 2011 Q-2 2012 Q-4 2012 Q-2 2013 Q-4 2013 Q-2 2014 Q-4 2014 Q-2 2015 Q-4 2015 Q-2 2016 Q-4 2016 Q-2 2017 Q-4 2017 Q-2 2018 Q-4 2018 Q-2 2019 Q-4 2019 Q-2 2020 Q-4 2020
Date
Propiconazole
IGV


GW-6 Propiconazole
45
40
35
30
25
20
15
10
5
0
ug/l
Q-3 2007 Q-2 2008 Q-4 2008 Q-2 2009 Q-4 2009 Q-2 2010 Q-4 2010 Q-2 2011 Q-4 2011 Q-2 2012 Q-4 2012 Q-2 2013 Q-4 2013 Q-2 2014 Q-4 2014 Q-2 2015 Q-4 2015 Q-2 2016 Q-4 2016 Q-2 2017 Q-4 2017 Q-2 2018 Q-4 2018 Q-2 2019 Q-4 2019 Q-2 2020 Q-4 2020
Date
Propiconazole
IGV

Appendix 3 Laboratory Results

CDM Smith

Element Materials Technology
Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

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F: +44 (0) 1244 833781
W: www.element.com

CDM Smith
15 Wentworth
Eblana Villas
Dublin 2
Dublin
D02 WK10

Attention :	Laura Foley
Date :	9th December, 2020
Your reference :	246885
Our reference :	Test Report 20/16487 Batch 1
Location :	Ballon, County Carlow
Date samples received :	25th November, 2020
Status :	Final report
Issue :	2

Five samples were received for analysis on 25th November, 2020 of which five were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Phil Sommerton BSc
Senior Project Manager

Element Materials Technology Environmental UK Limited
Registered in England and Wales
Registered Office: 10 Lower Grosvenor Place, London, SW1W 0EN
Company Registration No: 11371415

Client Name:	CDM Smith	**Report :**	**Liquid**
Reference:	246885		
Location:	Ballon, County Carlow		
Contact:	Laura Foley	**Liquids/products:**	V=40ml vial, G=glass bottle, P=plastic bottle
EMT Job No:	20/16487		$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-2	3-4	5-9	10-11	12-13						LOD/LOR	Units	Method No.
Sample ID	GW-1	GW-2	GW-4	GW-5	GW-6								
Depth													
COC No / misc													
Containers	HN G	HN G	H HN Z P G	HN G	HN G								
Sample Date	24/11/2020 10:00	24/11/2020 10:15	24/11/2020 11:30	24/11/2020 12:00	24/11/2020 12:30								
Sample Type	Water	Water	Water	Water	Water								
Batch Number	1	1	1	1	1								
Date of Receipt	25/11/2020	25/11/2020	25/11/2020	25/11/2020	25/11/2020								
Dissolved Arsenic	<2.5	<2.5	<2.5	<2.5	13.9						<2.5	ug/l	TM30/PM14
Dissolved Boron	24	<12	21	87	89						<12	ug/l	TM30/PM14
Dissolved Cadmium	-	-	<0.5	-	-						<0.5	ug/l	TM30/PM14
Dissolved Calcium	-	-	152.7	-	-						<0.2	mg/l	TM30/PM14
Total Dissolved Chromium	4.9	<1.5	2.4	6.4	10.9						<1.5	ug/l	TM30/PM14
Dissolved Copper	<7	<7	<7	68	35						<7	ug/l	TM30/PM14
Dissolved Lead	-	-	<5	-	-						<5	ug/l	TM30/PM14
Dissolved Manganese	-	-	<2	-	-						<2	ug/l	TM30/PM14
Dissolved Mercury	-	-	<1	-	-						<1	ug/l	TM30/PM14
Dissolved Nickel	-	-	<2	-	-						<2	ug/l	TM30/PM14
Dissolved Phosphorus	-	-	79	-	-						<5	ug/l	TM30/PM14
Dissolved Potassium	-	-	1.8	-	-						<0.1	mg/l	TM30/PM14
Dissolved Sodium	-	-	16.7	-	-						<0.1	mg/l	TM30/PM14
Dissolved Zinc	-	-	<3	-	-						<3	ug/l	TM30/PM14
Permethrin	-	-	<0.1	-							<0.1	ug/l	TM16/PM30
Propiconazole	<0.1	<0.1	<0.1	4.7	2.2						<0.1	ug/l	TM16/PM30
Tebuconazole	<0.1	0.2	<0.1	6.4 AA	3.6						<0.1	ug/l	TM16/PM30
Alcohols/Acetates													
Ethanolamine (TIC)	-	-	<100	-	-						<100	ug/l	TM83/PM10
Sulphate as SO4	-	-	56.3	-	-						<0.5	mg/l	TM38/PM0
Chloride	-	-	32.7	-	-						<0.3	mg/l	TM38/PM0
Nitrite as NO2	-	-	<0.02	-	-						<0.02	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3	-	-	0.11	-	-						<0.01	mg/l	TM38/PM0
Hexavalent Chromium	-	-	<0.006	-	-						<0.006	mg/l	TM38/PM0
Total Alkalinity as CaCO3	-	-	382	-	-						<1	mg/l	TM75/PM0
Sulphide	-	-	<10	-	-						<10	ug/l	TM107/PM0
Anionic Surfactants	-	-	<0.2	-	-						<0.2	mg/l	TM33/PM0

Element Materials Technology

Notification of Deviating Samples

Client Name: CDM Smith
Reference: 246885
Location: Ballon, County Carlow
Contact: Laura Foley

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 20/16487						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

EMT Job No.: 20/16487

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x3 Dilution

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

EMT Job No: 20/16487

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified				
TM33	Determination of Anionic surfactants by reaction with Methylene Blue to form complexes which are analysed spectrophotometrically. (MBAS)	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM0	No preparation is required.				
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.				
TM83	Modified USEPA method 8260B v2:1996. Determination of Alcohols, Acetates, Acetone, Fuel Oxygenates, THF and Cyclohexane by Headspace GC-MS	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.				
TM107	Determination of Sulphide/Thiocyanate by Skalar Continuous Flow Analyser	PM0	No preparation is required.				

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Dublin 2
Dublin
D02 WK10

Attention :	Laura Foley
Date :	4th December, 2020
Your reference :	246885
Our reference :	Test Report 20/16484 Batch 1
Location :	Ballon, County Carlow
Date samples received :	25th November, 2020
Status :	Final report
Issue :	1

Five samples were received for analysis on 25th November, 2020 of which five were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Lucas Halliwell
Project Co-ordinator

Element Materials Technology Environmental UK Limited
Registered in England and Wales
Registered Office: 10 Lower Grosvenor Place, London, SW1W 0EN
Company Registration No: 11371415

Client Name: CDM Smith
Reference: 246885
Location: Ballon, County Carlow
Contact: Laura Foley
EMT Job No: 20/16484

Report : **Liquid**

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H_2SO_4, Z=ZnAc, N=NaOH, HN=$HN0_3$

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-4	5-8	9	10	11						LOD/LOR	Units	Method No.
Sample ID	UPSTREAM	DOWNSTREAM	MP1	MP2	MP3								
Depth													
COC No / misc													
Containers	HN P BOD G	HN P BOD G	G	G	G								
Sample Date	24/11/2020 09:30	24/11/2020 11:15	24/11/2020 10:30	24/11/2020 10:40	24/11/2020 10:50								
Sample Type	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water								
Batch Number	1	1	1	1	1								
Date of Receipt	25/11/2020	25/11/2020	25/11/2020	25/11/2020	25/11/2020								
Dissolved Arsenic #	9.8	3.3	-	-	-						<2.5	ug/l	TM30/PM14
Dissolved Boron	27	26	-	-	-						<12	ug/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	-	-	-						<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	-	-	-						<7	ug/l	TM30/PM14
Propiconazole	<0.1	0.1	<0.1	0.2	0.1						<0.1	ug/l	TM16/PM30
Tebuconazole	<0.1	0.2	<0.1	0.3	0.2						<0.1	ug/l	TM16/PM30
Nitrate as NO3 #	44.8	41.7	-	-	-						<0.2	mg/l	TM38/PM0
Nitrite as NO2 #	0.06	0.06	-	-	-						<0.02	mg/l	TM38/PM0
Ortho Phosphate as P #	0.03	<0.03	-	-	-						<0.03	mg/l	TM38/PM0
BOD (Settled) #	<1	<1	-	-	-						<1	mg/l	TM58/PM0
COD (Settled) #	12	14	-	-	-						<7	mg/l	TM57/PM0
Total Suspended Solids #	<10	<10	-	-	-						<10	mg/l	TM37/PM0

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Element Materials Technology

Notification of Deviating Samples

Client Name: CDM Smith
Reference: 246885
Location: Ballon, County Carlow
Contact: Laura Foley

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 20/16484						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

EMT Job No.: 20/16484

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

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SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

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NOTE

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NFD	No Fibres Detected
BS	AQC Sample
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EMT Job No: 20/16484

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TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			
TM37	Modified methods - TSS: USEPA 160.2 (1983), EN872:2005 and APHA SMEWW 2540D:1999 22nd Edition; VSS: USEPA 1684 (Jan 2001), USEPA 160.4 (1971) and SMEWW 2540E:1999 22nd Edition. Gravimetric determination of Total Suspended Solids (TSS) and Volatile Suspended Solids (VSS). Sample is filtered through a 1.5um pore size glass fibre filter and the resulting residue is dried and weighed at 105°C for TSS and 550°C for VSS	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. (Rev. 2.0 1993) Comparable with ISO 15705:2002. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			
TM58	APHA SMEWW 5210B:1999 22nd Edition. Comparible with ISO 5815:1989. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as am	PM0	No preparation is required.	Yes			

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