AGL Upstream Investments Pty Ltd

Waukivory Pilot Project
Surface Water and Groundwater Monitoring Report to 31 December 2015

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PARSONS BRINCKERHOFF

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Author, Reviewer and Approver details			
Prepared by:	Becky Rollins	Date: 24/02/2016	Signature:
Reviewed by:	Ray Hatley	Date: 24/02/2016	Signature:
Approved by:	Sean Daykin	Date: 24/02/2016	Signature:

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Parsons Brinckerhoff Australia Pty Limited *ABN 80 078 004 798* Level 27 Ernst & Young Centre 680 George Street Sydney NSW 2000 GPO Box 5394 Sydney NSW 2001 Australia Tel: +61 2 9272 5100 Fax: +61 2 9272 5101 www.pbworld.com *Certified to ISO 9001, ISO 14001, OHSAS 18001*

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Glossary

Acid Wash	A technique to enhance formation permeability through the use of acid to dissolve scale and fine sediment that may be blocking fractures and inhibiting permeability.
Alluvium	Unconsolidated sediments (clays, sands, gravels and other materials) deposited by flowing water. Deposits can be made by streams on river beds, floodplains, and alluvial fans.
Alluvial aquifer	Permeable zones that store and produce groundwater from unconsolidated alluvial sediments. Shallow alluvial aquifers are generally unconfined aquifers.
Aquifer	Rock or sediment in a formation, group of formations, or part of a formation that is saturated and sufficiently permeable to transmit economic quantities of water.
Baseline sampling	A period of regular water quality and water level measurements that are carried out over a period long enough to determine the variability in groundwater conditions.
Bore	A structure drilled below the surface to obtain water from an aquifer or series of aquifers.
Coal	A sedimentary rock derived from the compaction and consolidation of vegetation or swamp deposits to form a fossilised carbonaceous rock.
Coal seam	A layer of coal within a sedimentary rock sequence.
Coal seam gas (CSG)	Coal seam gas is a form of natural gas (predominantly methane) that is extracted from coal seams.
Concentration	The amount or mass of a substance present in a given volume or mass of sample, usually expressed as microgram per litre (water sample) or micrograms per kilogram (sediment sample).
Conceptual model	A simplified and idealised representation (usually graphical) of the physical hydrogeologic setting and the hydrogeological understanding of the essential flow processes of the system. This includes the identification and description of the geologic and hydrologic framework, media type, hydraulic properties, sources and sinks, and important aquifer flow and surface water-groundwater interaction processes.
Confining layer	Low permeability strata that may be saturated, however will not allow water to move through it under natural hydraulic gradients.
Datalogger	A digital recording instrument that is inserted in monitoring and pumping bores to record pressure measurements and water level variations.
Detection limit	The concentration below which a particular analytical method cannot determine, with a high degree of certainty, a concentration.
Drawdown	A lowering of the water table in an unconfined aquifer or the pressure surface of a confined aquifer caused by pumping of groundwater from bores and wells.

Electrical conductivity (EC)	A measure of a fluid's ability to conduct an electrical current and is an estimation of the total ions dissolved. It is often used as a measure of water salinity.
Flowback water	The return to surface of fracture stimulation fluids before transition to natural formation water (groundwater), after which water flowing from the well is termed produced water.
Fracture	Breakage in a rock or mineral along a direction or directions that are not cleavage or fissility directions.
Fracture stimulation	Fracture stimulation involves pumping a fluid under pressure through the perforated interval into the coal seam to open cracks or fractures, increasing the connectivity and enabling the flow of water and gas.
Fracture stimulation fluid	The fluid is typically a mixture of sand, water (raw water) and additives.
Fractured rock aquifer	These occur in sedimentary, igneous and metamorphosed rocks which have been subjected to disturbance, deformation, or weathering, and which allow water to move through joints, bedding planes, fractures and faults. Although fractured rock aquifers are found over a wide area, they generally contain much less groundwater than alluvial and porous sedimentary rock aquifers.
Groundwater	The water contained in interconnected pores or fractures located below the water table in the saturated zone.
Groundwater level	The water level measured in a bore; this may be at or close to the water table in unconfined aquifers, or represent the average piezometric level across the screened interval in confined aquifers.
Hydraulic conductivity	The rate at which water of a specified density and kinematic viscosity can move through a permeable medium (notionally equivalent to the permeability of an aquifer to fresh water).
Hydraulic fracturing	See fracture stimulation.
Hydraulic gradient	The change in total hydraulic head with a change in distance in a given direction.
Hydraulic head	A specific measurement of water pressure above a datum. It is usually measured as a water surface elevation, expressed in units of length. In an aquifer, it can be calculated from the depth to water in a monitoring bore. The hydraulic head can be used to determine a hydraulic gradient between two or more points.
Hydrogeology	The study of the interrelationships of geologic materials and processes with water, especially groundwater.
Hydrology	The study of the occurrence, distribution, and chemistry of all surface waters.
Ion	An ion is an atom or molecule where the total number of electrons is not equal to the total number of protons, giving it a net positive or negative electrical charge.
Lithology	The study of rocks and their depositional or formational environment on a large specimen or outcrop scale.

Major ions	Constituents commonly present in concentrations exceeding 10 milligram per litre. Dissolved cations generally are calcium, magnesium, sodium, and potassium; the major anions are sulphate, chloride, fluoride, nitrate, and those contributing to alkalinity, most generally assumed to be bicarbonate and carbonate.
Methane (CH_4)	An odourless, colourless, flammable gas, which is the major constituent of natural gas. It is used as a fuel and is an important source of hydrogen and a wide variety of organic compounds.
Micro Siemens per centimetre (µS/cm)	A measure of water salinity commonly referred to as EC (see also electrical conductivity). Most commonly measured in the field with calibrated field meters.
Monitoring bore	A non-pumping bore, is generally of small diameter that is used to measure the elevation of the water table and/or water quality. Bores generally have a short well screen against a single aquifer through which water can enter.
Oxidation-reduction potential (ORP)	The redox potential is a measure (in volts) of the affinity of a substance for electrons – its electronegativity – compared with hydrogen (which is set at 0). Substances more strongly electronegative than (i.e. capable of oxidising) hydrogen have positive redox potentials. Substances less electronegative than (i.e. capable of reducing) hydrogen have negative redox potentials. Also known as reduction potential.
Percentile	The value below which a given percentage of observations fall. For example, the 5th percentile is the value below which five percent of observations are found.
Perforation	For pilot wells, perforation is holes punctured in the casing of a pilot well to gain access to the gas and water associated with the coal.
Permeable material	Material that permits water to move through it at perceptible rates under the hydraulic gradients normally present.
Permian	The last period of the Palaeozoic era that finished approximately 252 million years before present.
Petroleum Exploration Licence (PEL)	A Petroleum Exploration Lease (PEL) allows a company to exclusively explore a defined area for petroleum, including undertaking desktop studies, collecting samples and drilling.
Petroleum Production Lease (PPL)	A Petroleum Production Lease (PPL) allows a company exclusive rights to extract the resource within the area defined by the PPL. A PPL is only granted after a demonstration to the NSW Government that the resource is of benefit to the State and can be extracted safely and without damage to the environment or heritage areas and infrastructure.
pH	Potential of Hydrogen; the logarithm of the reciprocal of hydrogen-ion concentration in gram atoms per litre; provides a measure on a scale from 0 to 14 of the acidity or alkalinity of a solution (where 7 is neutral, greater than 7 is alkaline and less than 7 is acidic).
Piezometric pressure	See hydraulic head.
Produced water	Natural groundwater generated from coal seams during flow testing and production dewatering.

Pump commissioning	The period over which pumps are installed and tested, following fracture stimulation.
Raw water	Source water used in the fracture stimulation fluid mixture.
Recharge	The process which replenishes groundwater, usually by rainfall infiltrating from the ground surface to the water table and by river water reaching the water table or exposed aquifers. The addition of water to an aquifer.
Recharge area	A geographic area that directly receives infiltrated water from surface and in which there are downward components of hydraulic head in the aquifer. Recharge generally moves downward from the water table into the deeper parts of an aquifer then moves laterally and vertically to recharge other parts of the aquifer or deeper aquifer zones.
Recovery	The difference between the observed water level during the recovery period after cessation of pumping and the water level measured immediately before pumping stopped.
Salinity	The concentration of dissolved salts in water, usually expressed in EC units (µS/cm) or milligrams of total dissolved solids per litre (mg/L TDS).
Salinity classification	Fresh water quality – water with a salinity <800 µS/cm. Marginal water quality – water that is more saline than freshwater and generally waters between 800 and 1,600 µS/cm. Brackish quality – water that is more saline than freshwater and generally waters between 1,600 and 4,800 µS/cm. Slightly saline quality – water that is more saline than brackish water and generally waters with a salinity between 4,800 and 10,000 µS/cm. Moderately saline quality – water that is more saline than slightly saline water and generally waters between 10,000 and 20,000 µS/cm. Saline quality – water that is almost as saline as seawater and generally waters with a salinity greater than 20,000 µS/cm. Seawater quality – water that is generally around 55,000 µS/cm.
Sandstone	Sandstone is a sedimentary rock composed mainly of sand-sized minerals or rock grains (predominantly quartz).
Screen	A type of bore lining or casing of special construction, with apertures designed to permit the flow of water into a bore while preventing the entry of aquifer or filter pack material.
Sedimentary rock aquifer	These occur in consolidated sediments such as porous sandstones and conglomerates, in which water is stored in the intergranular pores, and limestone, in which water is stored in solution cavities and joints. These aquifers are generally located in sedimentary basins that are continuous over large areas and may be tens or hundreds of metres thick. In terms of quantity, they contain the largest volumes of groundwater.
Shut-in	A well is ‘shut-in’ when it is closed to stop gas flow, either by closing valves at the surface or downhole.

Siltstone	A fine-grained rock of sedimentary origin composed mainly of silt-sized particles (0.004 to 0.06 mm).
Stratigraphy	The depositional order of sedimentary rocks in layers.
Surface water-groundwater interaction	This occurs in two ways: (1) streams gain water from groundwater through the streambed when the elevation of the water table adjacent to the streambed is greater than the water level in the stream; and (2) streams lose water to groundwater through streambeds when the elevation of the water table is lower than the water level in the stream.
Total dissolved solids (TDS)	A measure of the salinity of water, usually expressed in milligrams per litre (mg/L).
Trace element	An element found in only minor amounts (concentrations less than 10 milligram per litre) in water or sediment; includes heavy metals arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc.
Water bearing zone	Geological strata that are saturated with groundwater, however not of sufficient permeability to be called an aquifer.
Water quality	Term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose.
Water quality data	Chemical, biological, and physical measurements or observations of the characteristics of surface and ground waters, atmospheric deposition, potable water, treated effluents, and waste water and of the immediate environment in which the water exists.
Water table	The top of an unconfined aquifer. It is at atmospheric pressure and indicates the level below which soil and rock are saturated with water.
Well	Pertaining to a gas exploration well or gas production well.

Abbreviations

AGL	AGL Upstream Investments Pty Ltd
ANZECC	Australian and New Zealand Environment Conservation Council
ALS	Australian Laboratory Services
AST	Above ground storage tank
BTEX	Benzene, toluene, ethyl-benzene and xylenes
BoM	Bureau of Meteorology
BP	Before Present
CDFM	Cumulative deviation from mean
CSG	Coal seam gas
DO	Dissolved oxygen
EC	Electrical conductivity
EPA	Environment Protection Authority
EPL	Environment Protection Licence
EWMA	Exponentially weighted moving average
GDE	Groundwater Dependent Ecosystems
GFDA	Gas Field Development Area
GGP	Gloucester Gas Project
GMWL	Global Meteoric Water Line
GRL	Gloucester Resources Limited
H_2O	Water
H_2S	Hydrogen Sulphide
LMWL	Local Meteoric Water Line
LoR	Limit of reporting
LTA	Long term average
MEA	Monoethanolamine

MGA	Map grid of Australia
NEPM	National Environment Protection Measures
NOW	NSW Office of Water (Department of Primary Industries (DPI) Water from 1 July 2015)
OCSG	Office of Coal Seam Gas
ORP	Oxidation-reduction potential
PEL	Petroleum Exploration Licence
PPL	Petroleum Production Lease
PQL	Practical quantification limit
QA/QC	Quality assurance/quality control
SGMP	Surface water and groundwater management plan
THPS	Tetrakis (hydroxymethyl) phosphonium sulphate
TPH	Total petroleum hydrocarbons
TRH	Total recoverable hydrocarbons
TDS	Total dissolved solids
TOC	Total organic carbon
UHS	Unionised hydrogen sulphide
UV	Ultraviolet

Units

ºC	degrees Celsius
µg/L	micrograms per litre
µS/cm	microSiemens per centimetre
%	percent
kL	kilolitres
km	kilometres
km^2	square kilometres
kPa	kilopascal
L/s	litres per second
m	metres
m/d	metres per day
m^3/s	cubic metres per second
mAHD	metres Australian Height Datum
mbgl	metres below ground level
mg/L	milligram per litre
ML	megalitres
mm	millimetres
mmol/L	millimol per litre
pCM	percent modern carbon
TU	tritium unit
V	volt
yrs BP	years before present

Executive summary

This report presents the groundwater and surface water monitoring results, and their interpretation for the Waukivory Pilot Project (the Project) (exploration) activities within the Stage 1 area of the Gloucester Gas Project (GGP) from 1 October to 31 December 2015 (reporting period). This report is the fifth monitoring report for the Project and provides results of monitoring data from the water monitoring network and flowback water quality and volumes recovered from the four Waukivory (WK) pilot wells: WK11, WK12, WK13 and WK14.

The reporting of this monitoring data is a requirement of Petroleum Exploration Licence (PEL) 285 and Environment Protection Licence (EPL) 20358. The monitoring program and subsequent reporting meets the requirements of the Surface and Groundwater Management Plan (SGMP) (AGL 2015a) and relevant sections of EPL 20358.

The scope of work for this report included:

- Interpretation of water level and water quality trends
- Assessment as to whether these trends are naturally occurring or potentially attributed to Project activities through the use of an analytical methodology that is consistent with the design requirements outlined in ANZECC (2000) and the SGMP (AGL 2015a)
- Assessment of key analytes associated with fracture stimulation additives defined in the SGMP.

The groundwater monitoring network at the Waukivory site consists of seven groundwater monitoring bores, one multizone monitoring well (six zones monitored), and one vibrating wire piezometer location (two zones monitored). There are three surface water monitoring sites at Waukivory located on the Avon River and Waukivory Creek.

Key results and conclusions from this program from 1 October 2015 to 31 December 2015 are as follows:

Pilot well water levels

Water levels in the pilot wells are highly variable and dependent on pump operation, including fluctuating pumping rates and the operational management of the gas wells influencing the build-up/release of gas pressure within the well casing above the water level.

At the start of the reporting period at 1 October 2015, water levels at WK11, WK13 and WK14 continued to show fluctuation in response to pumping. WK12 was undergoing well optimisation workover from 10 September to 14 October 2015 and the same activity took place at WK11 from 22 October until 13 November 2015. The workover activity was designed to increase flow from the well by washing and removing fine sediments from the fractures within the coal seams. Following the workover activities at WK11 and WK12 there was an increase in pumping rate compared to the previous reporting period and the pumped water levels were slightly lower than before the well optimisation workover.

The commencement of the extended pressure build up test from 14 December at WK11, WK13 and WK14 and 16 December at WK12 can be seen in the hydrographs from an initial rapid recovery of water levels followed by a slower recovery until the end of the reporting period.

Pilot well water quality

The chemical characteristics of the water from the pilot wells no longer shows a signature associated with the fracture stimulation fluid and is considered to be representative of produced water from the target formations based on a comparison with produced water from CR06 and WK03.

The EC of the flowback water from all pilot wells is greater than the 5000 µS/cm trigger for the transition from flowback to produced water.

The EC at WK13 and WK14 has been relatively stable during the current reporting period with fluctuations that are considered to be within the natural variability of the target formation water quality. The EC at WK11 and WK12 has been affected by the well optimisation workover activities and is showing elevated concentrations that are not representative of the target formation due to the presence of the fluid used in the workover activities.

MEA concentrations show no overall trend with variability consistent with that observed in the background data from the shallower groundwater and surface water monitoring sites.

A continuation of the general reduction in BTEX concentrations is observed at WK11, WK13 and WK14, while the BTEX concentration at WK12 remains below detection. During the current reporting period the sum of BTEX concentrations at the pilot wells have ranged from <2 to 79 µg/L, which is comparable to the background BTEX concentration range observed in the broader Waukivory shallow groundwater and surface water monitoring data of <2 to 72 µg/L.

All pilot well samples showed unionised hydrogen sulphide (UHS) concentrations to be below detection and as such, concentrations are considered insufficient to compromise well integrity due to corrosion.

Pilot well water volumes

During the current reporting period, WK12 transitioned from the flowback phase to the produced water phase as over 100% of the total volume injected during fracture stimulation and subsequent workover activities has been recovered.

The total water volume recovered from each well as of 31 December 2015 ranges from 291,533 to 1,217,357 L.

The water recovery as a percentage of total volume injected during fracture stimulation for individual wells ranges from 61.2% to 106.7% as of 31 December 2015.

AST2 water quality

There has not been any detections of BTEX compounds or UHS in storage tank AST2 during the current reporting period.

The sum of BTEX concentration is generally an order of magnitude or more lower than that measured at the pilot wells due to the volatilisation of these compounds from the surface of the water in AST2 and dilution by rainfall.

The concentration of BTEX compounds are consistently several orders of magnitude below the adopted threshold values relating to human and environmental health (SGMP Table 6.2 (AGL 2015a)).

Groundwater levels

Groundwater levels in all Waukivory monitoring bores targeting the alluvium, shallow rock and upper interburden including the thrust fault zone have shown no response attributable to fracture stimulation or pumping from the pilot wells during the current reporting period.

The variation in groundwater levels has not exceeded the adopted triggers as defined in the SGMP (AGL 2015a) being 2 m (outside of the normal range) decline in aquifers less than 75 m from the ground surface and 5 m (outside of the normal range) decline for deeper (non-coal) monitoring zones.

Groundwater levels in alluvial monitoring bores GR-P3 and WKMB06A show an overall increase of approximately 0.2 to 0.3 m and groundwater levels in the shallow rock monitoring bores WKMB01, WKMB02 and WKMB06B show an overall increase of up to 0.3 m in response to increased rainfall recharge compared to the previous reporting period.

Groundwater levels at WKMB03 show a distinctive delayed recovery response to sampling events and a subdued and delayed response to seasonal climatic variations rather than a response to individual rainfall events. This is indicative of very low hydraulic conductivity within the interburden/fault zone. During the current reporting period groundwater levels at WKMB03 have shown a negligible increase of 0.05 m.

Both WKMB03 and WKMB06B are screened across the thrust fault zone, and WKMB06A is screened within the alluvium above the thrust fault zone. Hydrographs from these three monitoring bores show no anomalous water level responses and therefore provide no evidence of connectivity between the fracture stimulation zones and the shallow groundwater system via the thrust fault zone.

Groundwater levels at the WKMB06A and WKMB06B show a very slight upward vertical gradient between the shallow rock and the alluvium, which is characteristic of groundwater discharge areas.

It is possible that the slight decrease in piezometric levels at WKMB05 sensors 1, 2 and 3 represent a pressure response to flowback at WK13. Sensor 4 continues to show an increase in piezometric level that commenced around mid-August 2015. It is possible that the piezometric levels in sensor 4 are showing a recovery response to the reduced water production rate at WK13. There is uncertainty as to whether the piezometric levels in WKMB05 sensors 5 and 6 have reached equilibration following installation; this will be reviewed as additional monitoring data becomes available.

The piezometric levels at all sensors in WKMB05 show an upward vertical gradient with the exception of sensors 1 and 2, which is considered to be due to pumping at WK13 depressurising the Cloverdale Seam. The upward vertical gradient is consistent with the conceptual hydrogeological model.

Groundwater quality

Groundwater quality data shows that there were no adverse trends associated with Project activities.

Surface water levels

Water levels at stream gauge sites WKSW01 (Avon River upstream of the Project site), WKSW02 (Waukivory Creek upstream of the Project site) and WKSW03 (Avon River downstream of the Project site) show no change in water levels attributable to fracture stimulation or flowback from the pilot wells during the current reporting period.

Surface water levels showed a slight overall increase in water levels over the reporting period. Water levels at the three stream gauge sites responded to the significant rainfall/runoff events in mid-November 2015 and late-December 2015.

Surface water quality

Surface water quality data shows that there were no adverse trends associated with Project activities.

Water Beneficial Use Conditions

Water beneficial use categories of domestic, stock, industrial and irrigation are based on yield and salinity characteristics. There has been no change in the beneficial use classification for any of the groundwater systems.

Actions to correct identified adverse trends

Analysis of water monitoring results for both water levels and water quality has not identified adverse trends that require corrective action.

1. Introduction

This report presents groundwater and surface water level and quality data collected during the Waukivory Pilot Project (the Project) between 1 October 2015 and 31 December 2015, and includes analysis of flowback water from the pilot wells.

The Project is an exploration activity as distinct from broader activities associated with the development phase of the Gloucester Gas Project (GGP).

1.1 Gloucester Gas Project

On 4 February 2016 AGL Upstream Investments Pty Ltd (AGL) announced that the GGP will not proceed to final investment stage. AGL will relinquish Petroleum Exploration Licence (PEL) 285 (Figure 1.1) to the NSW Government and will commence a comprehensive decommissioning and rehabilitation program for well sites and other infrastructure in the Gloucester region.

A dedicated water monitoring network is in place which has enabled the collection of baseline water level and water quality data for the different groundwater and surface water systems within the Gloucester Basin (Figure 1.2). There are currently more than 50 dedicated water monitoring locations and more than five years of baseline monitoring (water levels and water quality) across the Gloucester Basin.

1.2 Waukivory Pilot Project

AGL received approval for the Project from the NSW Office of Coal Seam Gas (OCSG) on 6 August 2014. The approval was included with the renewal of PEL 285 and permitted AGL to fracture stimulate and flow test four existing pilot wells located within the Stage 1 Gas Field Development Area of the GGP (Figure 1.1) (AGL, 2015a). These four pilot wells were installed between 2 October and 24 November 2012. Fracture stimulation commenced on 27 October 2014, with the final fracture stimulation on 26 November 2014. The flowback phase (process of commissioning pumps and returning fracture stimulation fluids back to the surface) commenced on 16 December 2014. Flowback ceased on 14 December 2015 when all four wells were shut-in to undergo an extended pressure build-up test.

The pilot wells (Waukivory 11 (WK11), Waukivory 12 (WK12), Waukivory 13 (WK13), and Waukivory 14 (WK14)) are located in the northern part of the Stage 1 GFDA on properties leased from Gloucester Resources Limited (GRL) (Figure 1.3). The four wells have been perforated and fracture stimulated within target coal seams ranging from approximately 370 to 960 mbgl.

A surface water and groundwater management plan (SGMP) was prepared by AGL (AGL 2015a) for the Project and approved by the OCSG and NSW Office of Water (NOW) prior to the commencement of the Project. Accompanying the renewal of PEL 285, the NSW Environment Protection Authority (EPA) issued Environment Protection Licence (EPL) 20358 for the Gloucester Coal Seam Gas Project on 6 August 2014, the current version of the EPL is dated 24 December 2015. The SGMP provides a framework which describes how surface water and groundwater in the local Waukivory area will be monitored and assessed during fracture stimulation and flow testing (which includes dewatering) of the deep coal seams. EPL 20358 requires the monitoring of the concentration of analytes and pollutants at prescribed monitoring locations at given frequencies using appropriate sampling methods.

DPI Water (previously NOW) and EPA requirements for groundwater and surface water monitoring of CSG activities, applicable to this report, include:

- Establishment of baseline conditions

- Collection of periodic water level, water quality and volumetric data
- Reporting of data and trends.

This report complies with the reporting requirements outlined in Section 7.2 of the SGMP and addresses the general requirements of EPL 20358, Condition R5.3. There are some differences in the monitoring requirements (locations, frequencies and analytes) identified in the SGMP compared to those stipulated in the EPL. This technical report focuses on the requirements of the SGMP.

1.3 Pilot well testing

Pilot testing is an exploration activity that identifies potential gas resources by testing the composition, flow rate, and volume of gas in target coal seams. Pilot testing also assesses water production volumes (as the wells are depressurised to allow gas flow) and potential connectivity between shallow aquifers and the water bearing zones of the deep coal seams.

The following phases of testing are referred to in this report:

- Baseline sampling was undertaken to characterise the pre-Project groundwater and surface water conditions at the Waukivory site. The baseline sampling comprised four sampling events in March, June, September and October 2014 (prior to the Pilot fracture stimulation program).
- Fracture stimulation involves pumping a fluid under pressure through a zone of perforated steel well casing into the coal seam to open cracks or fractures, increasing the hydraulic conductivity and enabling the flow of water and gas (27 October 2014 to 26 November 2015). The fluid is typically a mixture of sand, water and additives.
- Flowback water is the return to surface (by pumping) of fracture stimulation fluids before transition to natural formation water (groundwater), after which, water flowing from the well is termed produced water. Flowback water includes water and fluids extracted during the short period of pump commissioning (ongoing since 27 November 2014).
- Produced water is formation water which is co-produced with gas, and follows the removal of the fracture stimulation fluid (flowback). Pumping groundwater from a coal seam reduces the pressure and allows the gas and 'produced' groundwater to flow into the well and to the surface. The flow rate of produced water typically decreases over time.

The SGMP (Section 6.1, pages 33 – 34) states that:

- *The flowback water period is deemed to be finished when 100% of the volume of fracture stimulation fluids injected at each well is recovered AND a salinity trigger of 5,000 µS/cm is reached (and maintained) for the return waters; and*
- *Produced water is deemed to be all deep groundwater that is pumped to surface after the flowback water trigger is achieved.*

It should however be noted that the chemical characteristics of the flowback water will start to trend toward and meet the characteristics of produced water prior to the volume criterion being met.

1.4 Objectives

The objectives of the quarterly reporting of water monitoring data for the Project are to meet the commitments stated in the approved SGMP (Section 7.2, pages 60 – 64), as follows:

"The quarterly reports will include:

- *Analysis and interpretation of monitoring results including trends; and*
- *Details of any triggers requiring specific management and actions to be undertaken."*

This report is the fifth monitoring report for the Project, covering the period 1 October and 31 December 2015. Monitoring results include data obtained from groundwater and surface water monitoring points, and pilot well discharge (flowback water).

1.5 Scope of works

This quarterly report includes the following:

- Description of the monitoring program undertaken to 31 December 2015, which includes a description of the monitoring network, frequency of monitoring events, suite of analytes measured, sampling techniques, assessment criteria and quality assurance
- Presentation of groundwater and surface water levels and surface water quality data collected to 31 December 2015
- Presentation of water quality data collected from the flowback water from each pilot well during the reporting period
- Presentation of key analyte concentrations for monitoring fracture stimulation additives and comparison with background concentrations and fracture stimulation fluid
- Identification of trends associated with natural variations or Project activities
- Assessment of any changes to beneficial use of waters during baseline and pilot well activities as a trigger response for the Project
- Identification of exceedance of triggers, including adverse trends from pilot well activities and recommendations for management actions to be taken.

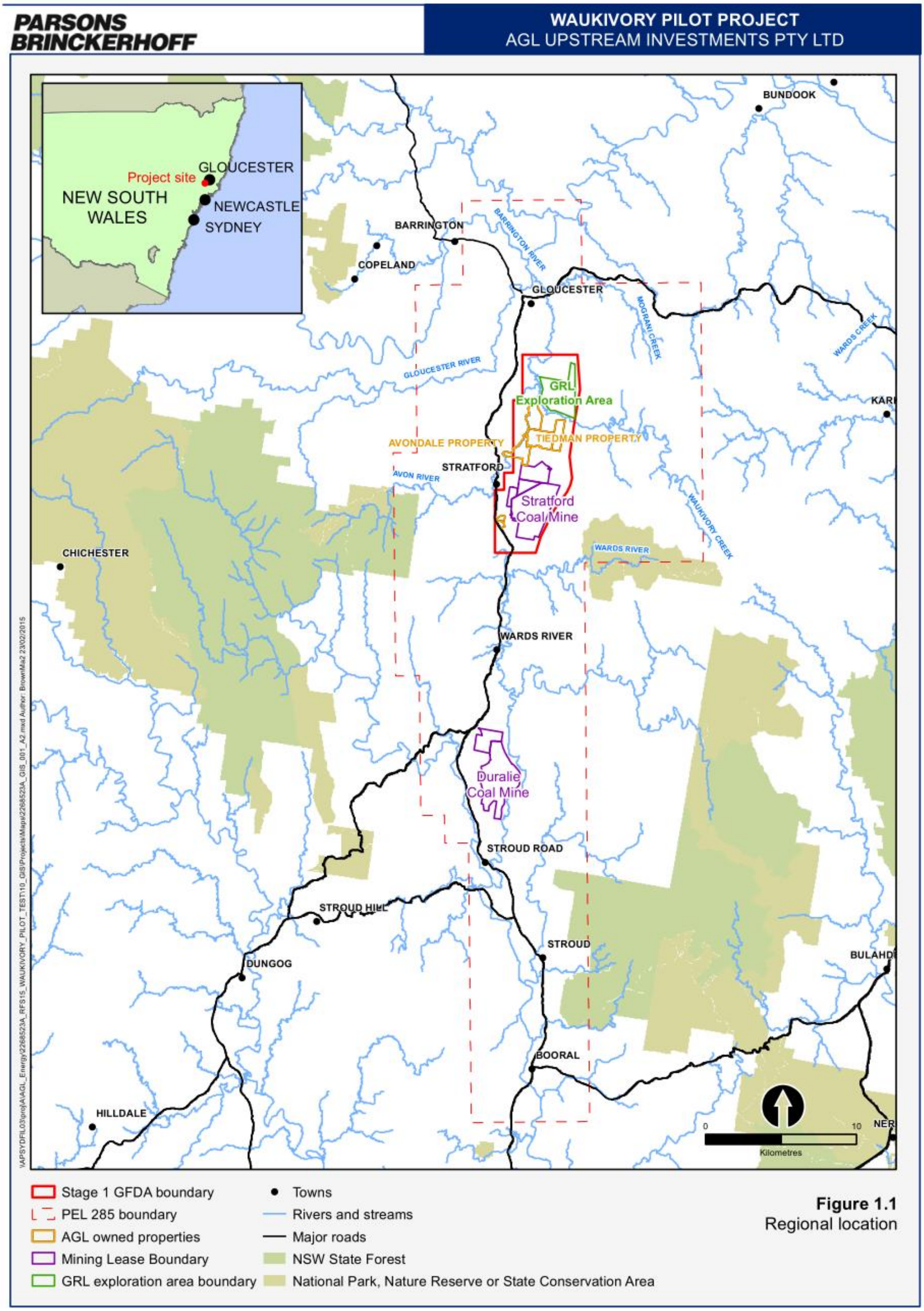


Figure 1.1 Regional location

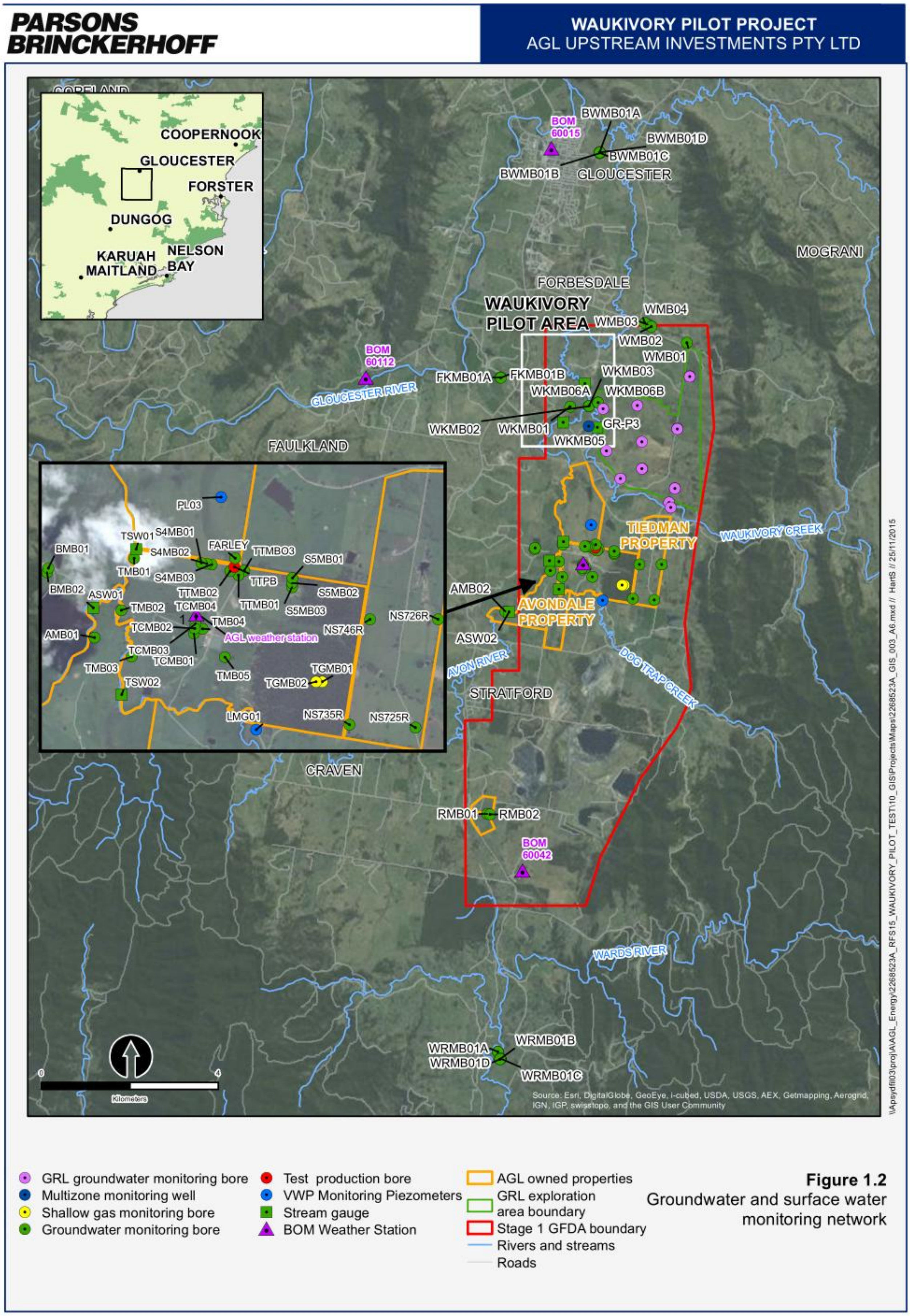


Figure 1.2 Regional groundwater and surface water monitoring network

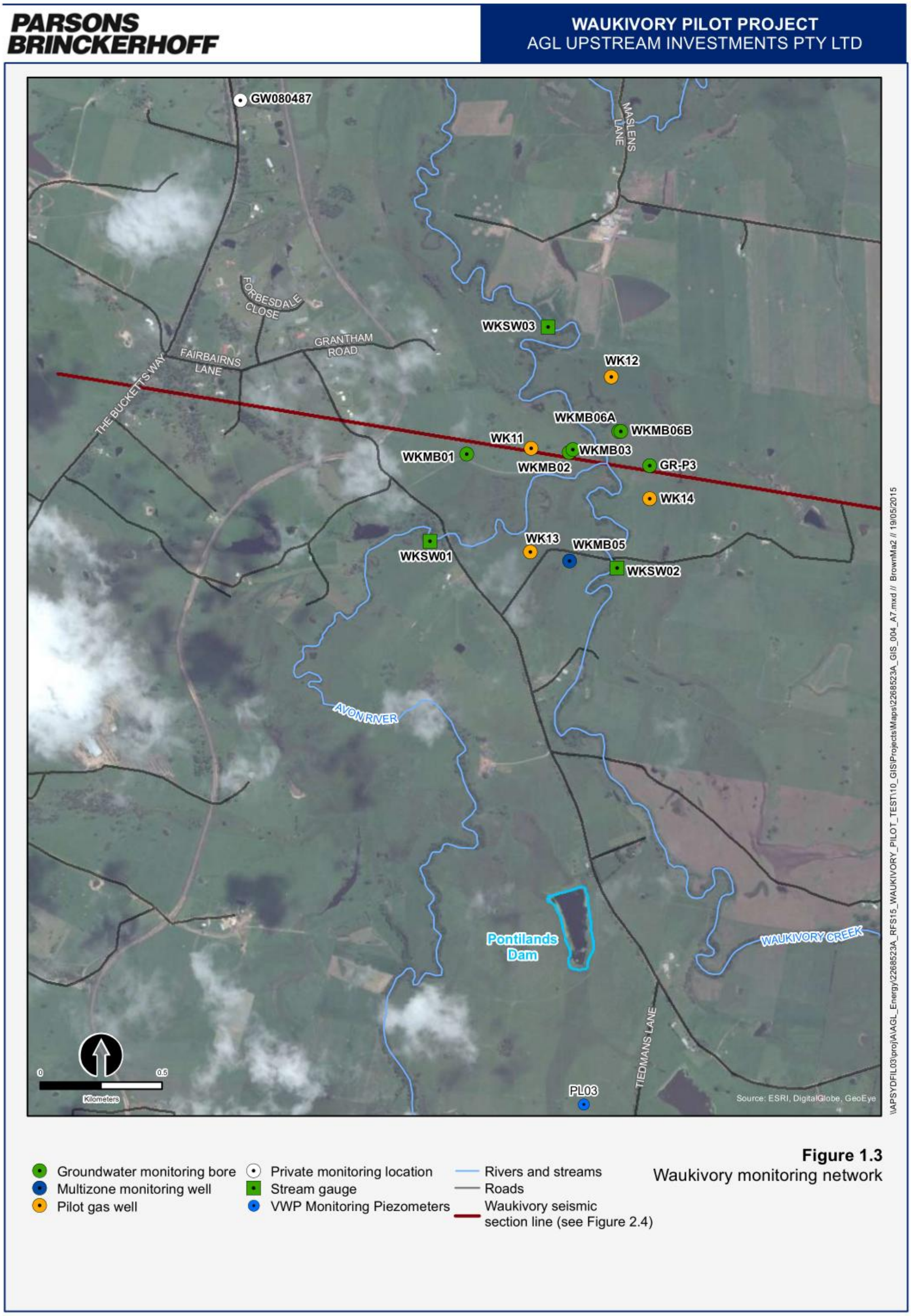


Figure 1.3 **Waukivory groundwater and surface water monitoring network**

2. Site characterisation

2.1 Site location

The Project site is located approximately 6 km south of Gloucester, NSW, at 176 Fairbairns Lane, Forbesdale. The site is adjacent to the flood plain of the Avon River and is characterised by paddocks used for low intensity cattle grazing. The Avon River flows in a northerly direction through the Project site. The confluence of the Avon River and its eastern tributary, Waukivory Creek, is located toward the centre of the site (Figure 1.3).

2.2 Rainfall

AGL has operated a weather station on the Tiedman property just south of the Project site since July 2011. The closest Bureau of Meteorology (BoM) weather station to the Waukivory site, at Gloucester Post Office (60015), has been operational since 1888. The locations of the weather stations are shown in Figure 1.2.

Long-term average annual rainfall (1888 to 2015) at Gloucester Post Office is 980 mm. Rainfall is seasonal, with the highest mean monthly rainfall occurring in the summer months between January and March.

The long-term, annual cumulative deviation from mean (CDFM) rainfall for Gloucester Post Office is plotted in Figure 2.1. The long-term cumulative rainfall residual plots are formulated by subtracting the average annual rainfall for the recorded period from the actual annual rainfall and then accumulating these residuals over the assessment period. Periods of below average rainfall are represented as downward trending slopes while periods of above average rainfall are represented as upward trending slopes.

The cumulative deviation plot for Gloucester Post Office (Figure 2.1) shows that over the last 60 years, short (2 to 3 year) drought periods have occurred about every 10 to 15 years. However there have been no long-term deviations from mean conditions, such as the prolonged drought periods that characterised the first half of last century.

Rainfall data from the AGL weather station for the period July 2011 (installation) to December 2015 are presented in Figure 2.2. During the reporting period, rainfall was below the monthly average in October and December 2015 and above the monthly average in November 2015. Total annual rainfall for 2015 was 1113 mm which is above the long-term average for Gloucester.

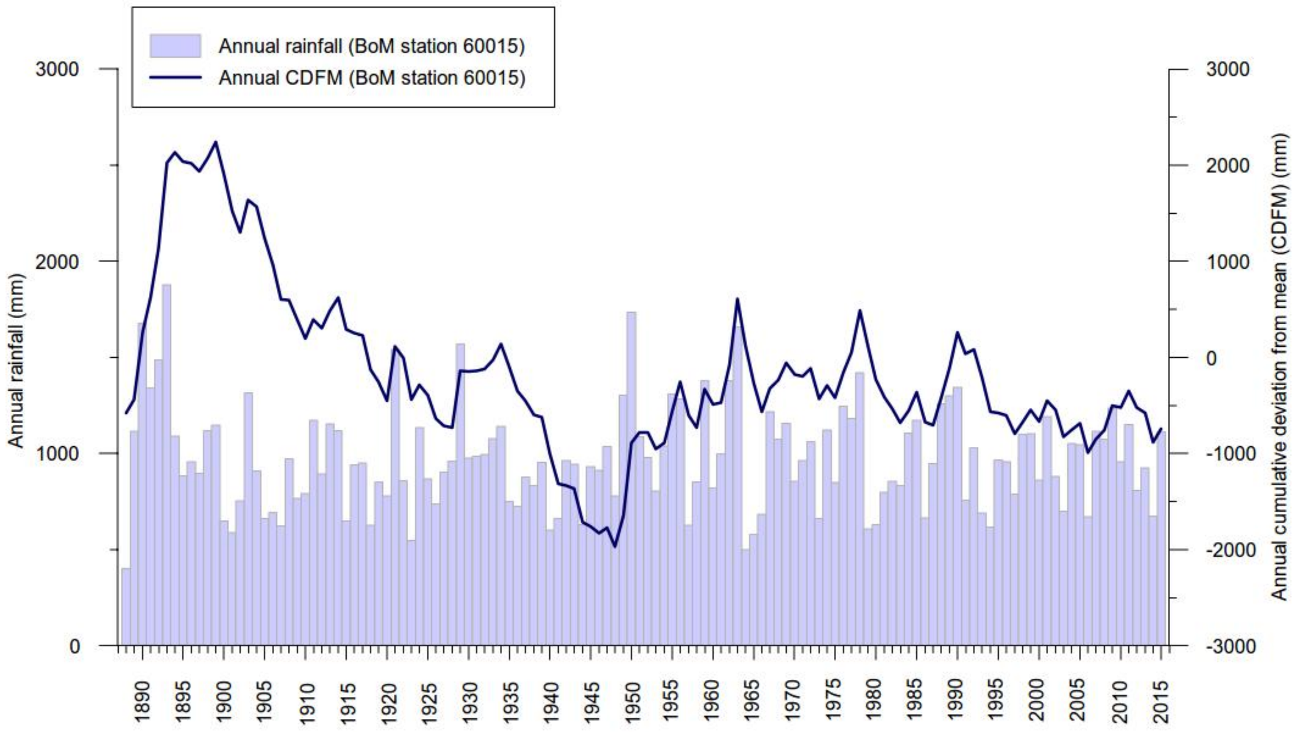


Figure 2.1 **Long-term annual rainfall and cumulative deviation from annual mean (CDFM) rainfall at Gloucester Post Office BoM station 060015 (BoM 2015)**

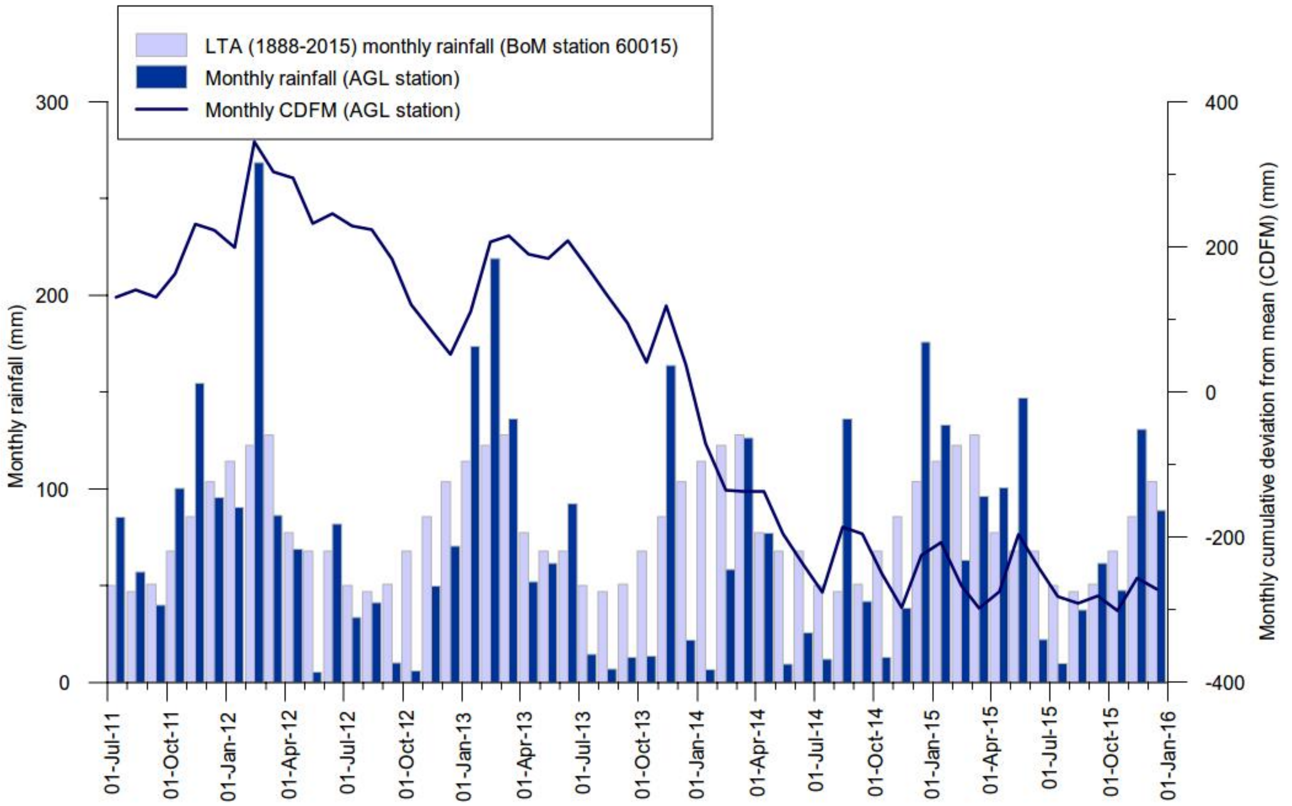


Figure 2.2 **Monthly rainfall and cumulative deviation from the monthly mean (CDFM) rainfall at the AGL Gloucester station since installation in July 2011 (AGL 2015b)**

2.3 Surface hydrology

The Gloucester Basin is a narrow, north-south trending, elongated geological basin approximately 40 km long and 10 km wide, extending from Gloucester in the north to Stroud in the south. The Gloucester Basin is located in the upper Manning River and Karuah River coastal catchments. The area occupied by the Permian Coal Measures (about 217 km^2) is small in comparison to the size of these catchments.

There is a surface water divide between the Wards River catchment (part of the Karuah River catchment) and the Avon River catchment (part of the Manning River catchment). In the northern Avon River catchment, surface water flow is generally to the north. In the southern Wards River catchment, surface water flow is generally to the south.

The Avon River includes the tributaries of Dog Trap Creek and Waukivory Creek within the Stage 1 GFDA (Figure 1.2). The Gloucester River joins the Avon River in the north of the Gloucester Basin. Wards River flows to the south, and is located outside of the Stage 1 GFDA (Figure 1.2).

2.4 Geological setting

The Gloucester Basin comprises a thick succession of Permian sedimentary rocks representing deposition in both terrestrial and marine environments during a complex period of subsidence, uplift and relative sea level change (marine transgression and regression).

The Basin is a synclinal intermontane structure formed in the part of the New England Fold Belt located between a major Permian plate margin and the Sydney-Gunnedah Basin (Lennox 2009). The north–south trending synclinal nature of the Gloucester Basin resulted from the collision between the East Australian and Pacific Plates.

Following a period of extension during the Early Permian, the Gloucester Basin has undergone periods of normal and reverse faulting, with large scale tilting associated with late stage compressional movements towards the end of the Permian (Hughes 1984). Reverse faults dominate present day structure. A comparison with the contemporary horizontal stress field map (Hillis *et al* 1998) indicates the Basin is likely to be under compression in an east-west orientation.

The stratigraphy dips steeply (up to 90°) on the flanks of the Basin, dipping towards the north-south trending synclinal basin axis and flattening toward the centre of the Basin. Early Permian and Carboniferous hard resistive volcanics form the ridgelines of the Basin: the Mograni Range to the east; and the Gloucester and Barrington Tops to the west.

Overlying the Permian stratigraphy is a thin sequence of surficial Quaternary sedimentary deposits and regolith. The Quaternary sediments are non-uniform in thickness, and comprise unconsolidated alluvial sediments (sand, gravel, silt and clay) along the drainage channels and colluvial deposits across the rest of the floodplain sourced from the surrounding outcropping Permian deposits.

The Gloucester Basin is divided into three major Permian stratigraphic units each representing a distinct depositional setting: the Gloucester Coal Measures, the Dewrang Group, and the basal Alum Mountain Volcanics. The generalised stratigraphy of the Basin is summarised in Table 2.1. A geological map is shown in Figure 2.3. The development in the Stage 1 GFDA was targeting the intermediate and deep coal seams in the Gloucester Coal Measures generally below depths of 250 m to around 1,000 m.

The fault zones identified at the Project site are mostly reverse faults where older rock strata are thrust over younger strata. Figure 2.4 shows the trace of the major faults identified on a seismic section through the Waukivory pilot area.

Table 2.1 Stratigraphy of the Gloucester Basin

Period	Group	Sub-group	Formation	Approx. thickness (m)	Coal seam	Depositional environment	Tectonic events
Upper Permian	Gloucester Coal Measures	Craven	Crowthers Road Conglomerate	350		Marine regression, pro-gradation of alluvial fans	Uplift to west of Gloucester Basin
			Leloma	585	Linden		
					JD		
					Bindaboo		
					Deards		
			Jilleon	175	Cloverdale		
					Roseville		
					Tereel/Fairbairns		
			Wards River Conglomerate	Variable			
			Wenham	23.9	Bowens Road		
					Bowens Road Lower		
		Speldon Formation				Marine transgression but also some progradation of alluvial fans in the west related to uplift	Extension (normal fault development) and regional subsidence. Uplift to west of Basin
		Avon	Dog Trap Creek	126	Glenview		
			Waukivory Creek	326	Avon		
					Triple		
					Rombo		
					Glen Road		
					Valley View		
					Parkers Road		
	Dewrang	Mammy Johnsons		300	Mammy Johnsons	Marine transgression, regression and further marine transgression	Extension (normal fault development) and regional subsidence
		Weismantel		20	Weismantel		
		Duralie Road		250			
Lower Permian	Alum Mountain Volcanics				Clareval	Arc-related rift	Rift?
					Basal		

Modified from AECOM (2009) and SRK (2005).

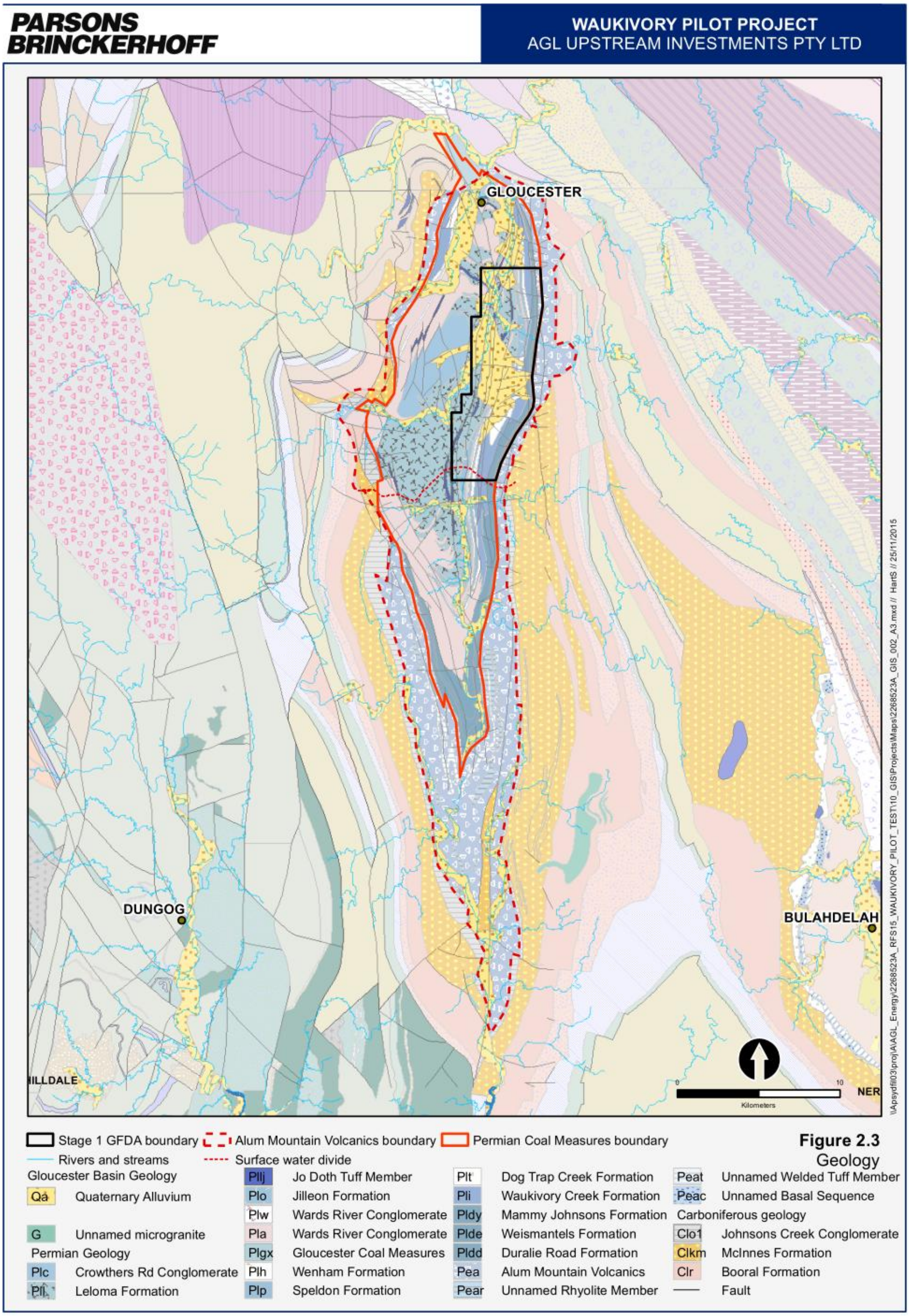


Figure 2.3 Geological map of the Gloucester Basin

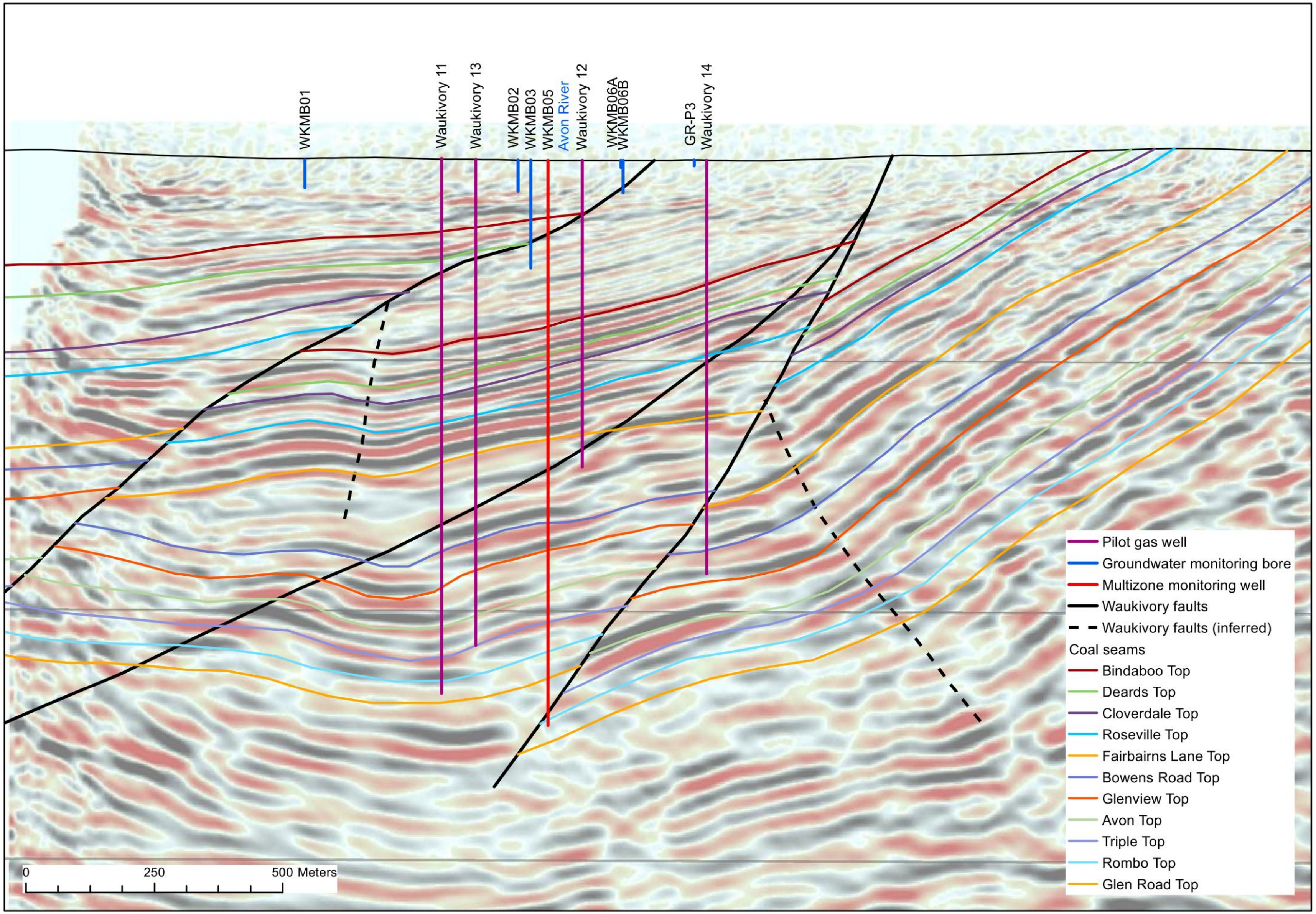


Figure 2.4 **Waukivory interpreted seismic section (from Parsons Brinckerhoff 2015f) (line of section is shown on Figure 1.3)**

2.5 Hydrogeological setting

Four broad hydrogeological units have been identified within the Gloucester Basin (Table 2.2). The permeability and groundwater flow characteristics of rocks within the Gloucester Basin are controlled by several factors including lithology, depth, and the degree of fracturing and faulting. In this sense hydrogeological units and flow systems do not always correspond with defined geological boundaries.

Table 2.2 Four hydrogeological units – Gloucester Basin

Unit	Aquifer type	Formation name	General lithology	Hydraulic characteristics
Alluvial deposits	Semi-confined, clay capped, porous, granular	Quaternary alluvium	Clay/mixed gravels	Heterogeneous, highly variable permeability associated with varying lithology
Shallow Rock (<150 m)	Semi-confined, fractured rock	Upper Permian Coal Measures, Alum Mountain Volcanics	Interbedded sandstone/siltstone with bedding plane fractures	Heterogeneous, high and low permeability domains associated with fault zones and fracturing
Interburden of deep coal measures	Confined, fractured rock, aquitard	Upper Permian Coal Measures	Interbedded indurated sandstone/siltstone and claystone	Low permeability associated with sparse fractures, permeability decreases with depth
Deep coal Seams	Confined, fractured rock, water bearing zones	Upper Permian Coal Measures	Coal/shale	Low permeability associated with cleating and fractures in coal seams, permeability decreases with depth

The four hydrogeological units are summarised as follows:

1. **Alluvial deposits** adjacent to major creeks and rivers comprising unconsolidated sand, gravel, and clay. The deposits are typically 12 to 15 m thick. These systems are heterogeneous but generally permeable with rapid recharge, through-flow, and discharge associated with interactions with streams, and to a lesser extent with the underlying less permeable shallow rock. Hydraulic conductivity measurements range from 0.3 to 300 metres per day (m/d), averaging around 10 m/d.
2. **Shallow rock** comprising variably weathered and fractured Permian rocks extending to approximately 150 m below the surface, across all sub-cropping Permian units. The shallow rock zone is heterogeneous with relatively impermeable domains separated by more permeable domains, but on the whole it is more permeable than the deeper coal measures. The domains of higher permeability are due to a higher density of fracturing associated with an irregular weathering profile and the near-surface expression of faulting. Aquifer zones observed during drilling occur within 75 m of the surface. Groundwater flow within this zone is more strongly controlled by weathering and fracturing than the attitude of geological strata. Hydraulic conductivity of the shallow rock ranges from 10 m/d to $1x10^{-6}$ m/d at a depth of 150 m, but is typically in the order of 10^{-3} to 10^{-4} m/d.
3. **Deep coal measures interburden**. Sandstone and siltstone units that form the interburden to coal seams are indurated and typically of very low permeability, forming aquitards and confining layers. The permeability of the interburden decreases with depth such that, at the maximum depth of CSG production, it is likely to be in the order of 10^{-5} to 10^{-7} m/d, or less.
4. **Deep coal seams**. Coal seams tend to be slightly more permeable than interburden and commonly form weak water bearing zones at depth. Permeability and storage are provided by small fractures and cleats in the coal. As with interburden, drill-stem tests clearly show that the permeability of coal seams generally decreases with depth. At the maximum depth of CSG production, the permeability of coal seams is very low (10^{-4} to 10^{-6} m/d), but may be an order of magnitude higher than the interburden.

The Alum Mountain Volcanics underlie the Permian Coal Measures, and form the impermeable base of the Gloucester Basin. The Alum Mountain Volcanics outcrop in the eastern and western boundaries of the Basin, forming the elevated topography of the Gloucester and Barrington Tops to the west, and the Mograni Range to the east.

3. Waukivory pilot project

3.1 Introduction

The following section provides an overview of pilot well activities and the monitoring program to date relating to the Waukivory Pilot Project. The monitoring program covers the following phases:

- Baseline sampling: Baseline sampling was undertaken to characterise the pre-Project groundwater and surface water conditions at the Waukivory site. The baseline sampling comprised four sampling events in March, June, September, and October 2014 (Parsons Brinckerhoff 2015a).
- Fracture stimulation: The fracture stimulation took place from 27 October 2014 to 26 November 2014 and the associated monitoring commitments were undertaken during November and December 2014 (Parsons Brinckerhoff 2015a).
- Flowback water: Flowback pumping commenced at WK12 and WK13 in December 2014 and flowback pumping commenced from WK11 and WK14 in January 2015 (Parsons Brinckerhoff 2015b).
- Produced water: The produced water phase had commenced at WK12 but had not commenced at WK11, WK13 and WK14 by 31 December 2015 according to the criteria outlined in the SGMP, which states the transition from flowback to produced water will be marked by a salinity (measured as electrical conductivity (EC)) of 5,000 µS/cm or above and a total return to surface of flowback water equal to the volume of fluids injected during fracture stimulation. It is possible that water chemistry can show that flowback water is chemically indiscernible from produced water prior to the volume and EC criteria being met.

3.2 Waukivory pilot schedule and water volumes

Pumps were installed in each pilot well at the completion of fracture stimulation to enable flowback to surface of fracture stimulation fluids and later, produced water. Flowback water was transported from the well head in water gathering lines to an above ground storage tank (AST2) for storage and testing prior to disposal (Figure 3.1).

Flowback pumping commenced at WK12 and WK13 in December 2014 and flowback pumping commenced from WK11 and WK14 in January 2015. The periods of operation of the pumps in each pilot well to 31 December 2015 are shown in Figure 3.2. Pumps were periodically switched off for well workover interventions, maintenance and suspension of operations.

The details of the pumping schedule prior to 1 October 2015 are discussed in the preceding surface water and groundwater monitoring reports (Parsons Brinckerhoff 2015a, 2015b, 2015c & 2015d).

AGL engaged a third party contractor to transport flowback water stored in AST2 for disposal to a licenced facility.

At the start of the reporting period at 1 October 2015, WK11, WK13 and WK14 were operational. WK12 was suspended from 10 September to 14 October 2015 to conduct a well optimisation workover program designed to increase gas flow from the well. The same activity was conducted at WK11 from 22 October to 13 November 2015.

An extended pressure build up test commenced at WK11, WK13 and WK14 on 14 December and at WK12 on 16 December, which involved halting the removal of water and gas from the pilot wells and measuring the water levels and gas pressure within the wells.

The volumes pumped from each pilot well to 31 December 2015 are shown in Figure 3.3. The total volume and percentage of flowback water recovered up to 31 December 2015 for each pilot well is provided in Table 3.1. The percentage recovered is relative to the total volume of fracture stimulation fluids injected at each well. WK12 commenced the produced water phase during the current reporting period as over 100% of the total volume injected during the fracture stimulation and subsequent well workovers has been removed from the well (Table 3.1).

All flowback water was removed from AST2 by 16 December 2015 with AST2 empty at 31 December 2015. The total volume of flowback water lawfully disposed offsite is equal to the total volume extracted (2,784,411 L).

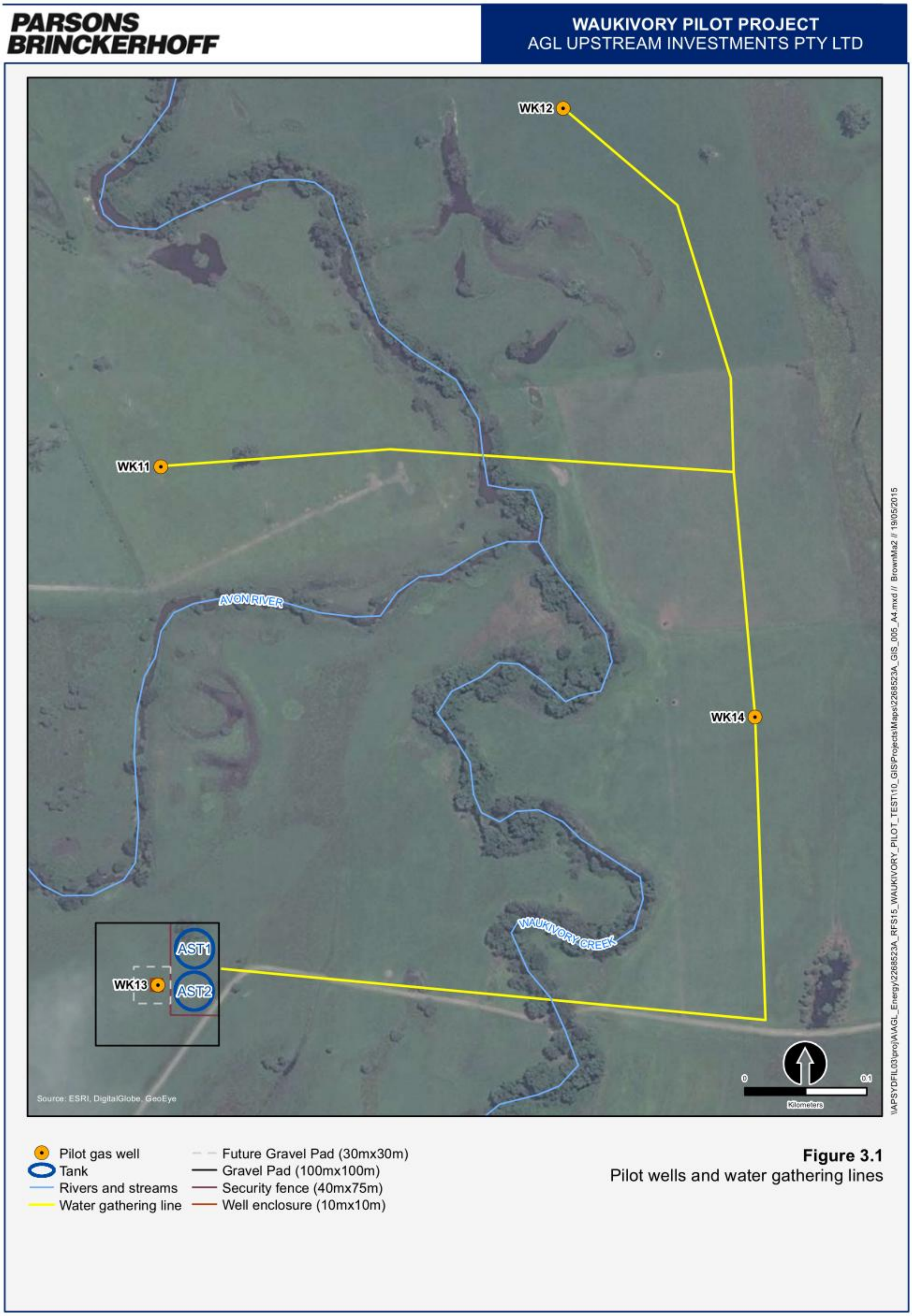


Figure 3.1 Schematic of pilot wells, water gathering lines and storage tanks

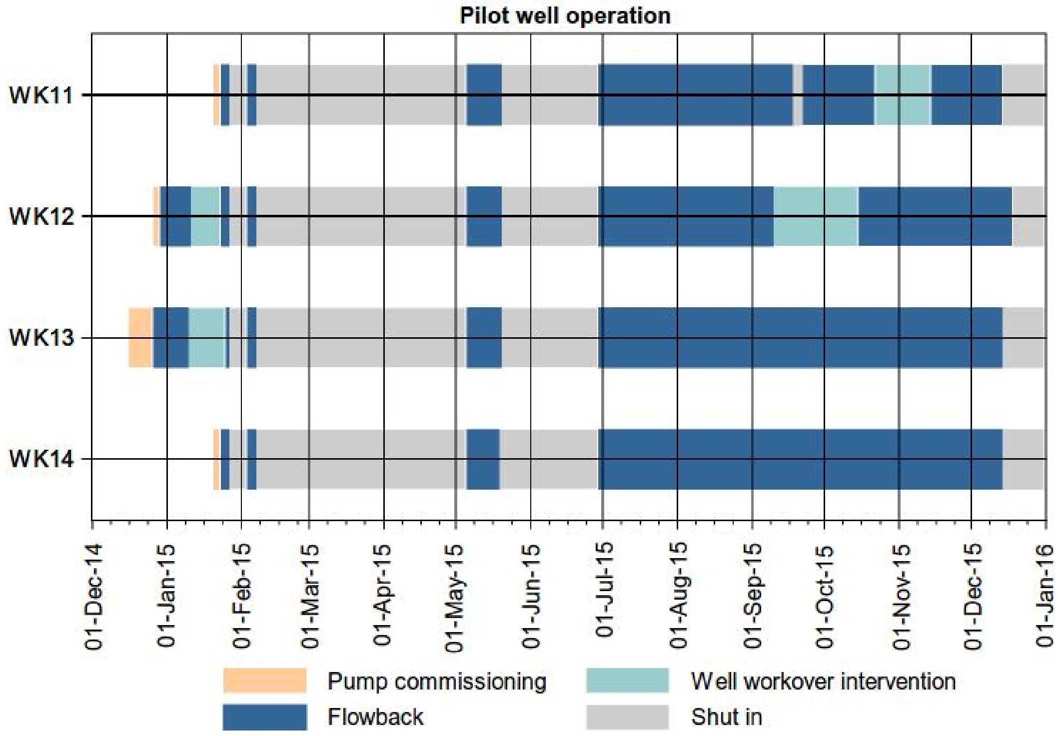


Figure 3.2 **Dates of operation of the pilot wells**

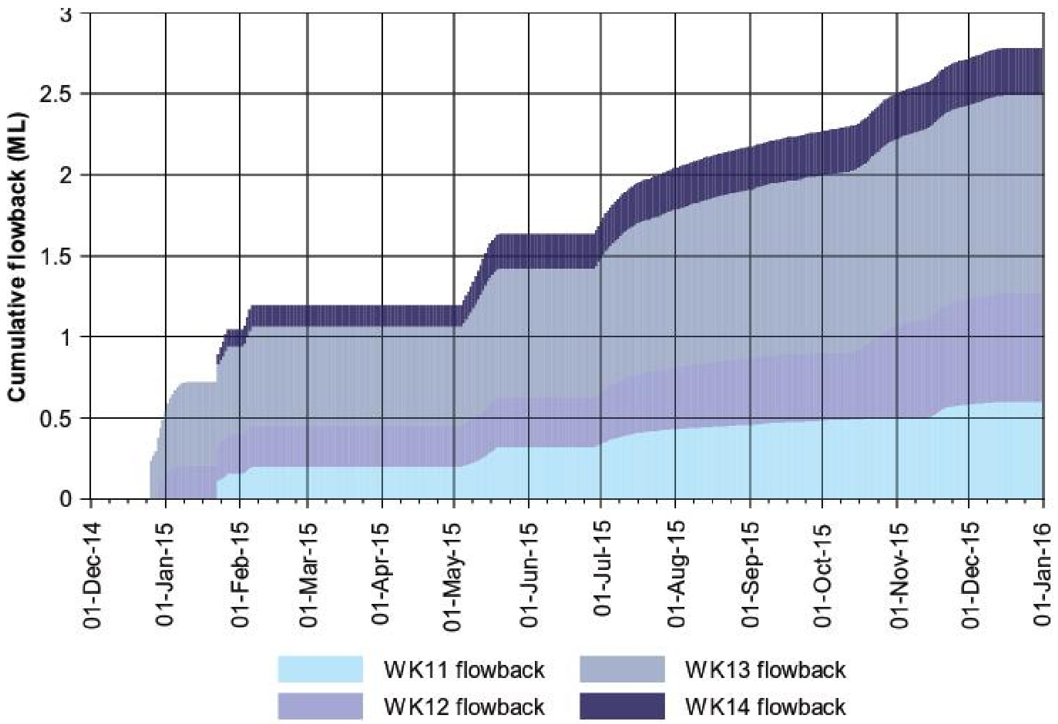


Figure 3.3 **Cumulative flowback volumes from the pilot wells**

Table 3.1 **Flowback volumes recovered up to 31 December 2015**

	WK11		WK12		WK13		WK14	
	litres	%	litres	%	litres	%	litres	%
Volume recovered at 31 December 15	596,720	66.8	678,802	106.7	1,217,357	81.0	291,533	61.2

3.3 Monitoring network

AGL's groundwater and surface water monitoring network consists of more than 50 dedicated water monitoring locations across the Gloucester Basin, as shown in Figure 1.2. There are more than four years of baseline monitoring data (water levels and water quality), as reported in the 2015 Groundwater and Surface Water Monitoring Status report (Parsons Brinckerhoff 2015g). Samples are also collected from the pilot wells and storage tank AST2 as part of the Project; locations are shown in Figure 1.3.

3.3.1 Pilot wells

The flowback sampling locations at the Project site (Figure 3.1) are:

- Pilot well WK11
- Pilot well WK12
- Pilot well WK13
- Pilot well WK14
- Storage tank AST2

Details of the perforation and fracture stimulation intervals in each of the pilot wells are provided in Table 3.2 and indicate which coal seams the flowback water (and subsequent produced water) is sourced from. Pilot well WK12 targets mostly shallow coal seams from 371 to 597 mbgl while the other three pilot wells target mostly deeper coal seams from 404 to 964 mbgl.

3.3.2 Groundwater

The current groundwater monitoring network at the Project site (Figure 1.3) consists of:

- Five AGL groundwater monitoring bores (WKMB01, WKMB02, WKMB03, WKMB06A and WKMB06B)
- One AGL multizone monitoring well (WKMB05: six zones monitored)
- One AGL vibrating wire piezometer (PL03: two zones monitored)
- One GRL groundwater monitoring bore (GR-P3)
- One private groundwater monitoring bore (GW080487)

Details of the groundwater monitoring network are provided in Table 3.3. Construction logs for the AGL monitoring bores are provided in Parsons Brinckerhoff (2014b) and Parsons Brinckerhoff (2015a).

Groundwater monitoring bore WKMB04 was plugged and abandoned in late 2013 prior to the commencement of the Project. There are therefore no water level or water quality data from WKMB04 included in this report.

WKMB05 is a multizone groundwater monitoring well located 164 m east of WK13. The borehole was drilled to a depth of 1,100 m and initially installed with a geophone array to collect data during the fracture stimulation of WK13 to provide an understanding of fracture propagation.

Following the fracture stimulation of WK13, the geophone array was removed from WKMB05, six intervals were perforated, and an array of packers installed to isolate six horizons within the monitoring bore (Parsons Brinckerhoff 2015a). At each horizon a pressure transducer was installed to measure the piezometric level. The monitored horizons are provided in Table 3.3.

Table 3.2 Perforation and fracture stimulation intervals

Zone	Coal seam	Perforation interval (mbgl)	Net coal thickness (m)
WK11			
1	Avon	928.7 – 964.25	9.36
2	Glenview	860.5 – 879.2	2.18
3	Bowens Road and Fairbairns Lane	806.6 – 838.0	2.46
4	Fairbairns Lane	709.1 – 741.9	2.06
WK12			
1	Fairbairns Lane	590.4 – 597.0	1.33
2	Roseville (lower)	485.7 – 504.2	3.24
3	Roseville (upper)	406.0 – 424.1	2.93
4	Cloverdale	371.3 – 385.0	2.42
WK13			
1	Triple	934.2 – 946.3	0.91
2	Avon	878.7 – 911.4	10.05
3	Glenview	812.5 – 826.5	2.35
4	Glenview	Not perforated or fracture stimulated	
5	Fairbairns Lane (lower)	694.1 – 738.3	2.75
6	Fairbairns Lane (upper)	612.2 – 628.8	5.93
7	Roseville (lower)	540.2 – 575.1	2.05
8	Roseville (upper)	514.5 – 523.3	2.79
9	Cloverdale	451.4 – 474.0	2.23
10	Bindaboo	404.5 – 408.4	0.75
WK14			
1	Avon	774.5 – 805.8	7.5[(a)]
2	Fairbairns Lane (lower)	532.5 – 542.0	4.23
3[(b)]	Fairbairns Lane (upper)	473.8 – 490.8	3.81
4[(b)]	Roseville	453.3 – 459.7	2.05

(a) Estimated.
(b) WK14 zones 3 and 4 are acid wash intervals. The acid wash of zones 3 and 4 were conducted simultaneously.

Table 3.3 Current groundwater monitoring network

Monitoring location	Monitoring type	EPA ID	Total depth (mbgl)	Monitored interval (mbgl)	Lithology	Formation	Hydro-geological unit	Date installed	Sampling method[e]
WKMB01	Water levels and quality	10	54.0	47.0 – 53.0	Sandstone	Leloma Formation (upthrust)	Shallow rock	February 2012	Micro-purge™
WKMB02	Water levels and quality	11	61.0	51.0 – 60.0	Sandstone/ siltstone	Leloma Formation (upthrust)	Shallow rock	June 2012	Micro-purge™
WKMB03	Water levels and quality	12	210.0	200.0 – 209.0	Sandstone	Leloma Formation	Interburden (fault zone)	June 2012	Micro-purge™
PL03[a]	Piezometric levels	14	966.3	Sensor 2: 496	Coal	Wenham Formation – Bowens Road Coal Seam	Coal	September 2013	n/a
				Sensor 3: 463	Pebble conglomerate	Wards River conglomerate	Interburden		
WKMB05[b]	Piezometric levels	85	1,100.0	Sensor 1: 340.0 – 343.0	Siltstone/ sandstone	Leloma Formation	Interburden (aquitard)	November 2014	n/a
				Sensor 2: 426.0 – 429.0	Coal	Jilleon Formation – Cloverdale Coal Seam	Coal seam		
				Sensor 3: 584.0 - 587.0	Siltstone/ sandstone	Jilleon Formation	Interburden (aquitard)		
				Sensor 4: 595.4 – 598.4	Coal	Jilleon Formation – Fairbairns Coal Seam	Coal seam		
				Sensor 5: 698.5 – 701.5	Siltstone/ sandstone	Jilleon Formation	Interburden (aquitard)		
				Sensor 6: 711.0 – 714.0	Siltstone/ sandstone	Jilleon Formation	Interburden (fault zone)		
WKMB06A	Water levels and quality	n/a	13.4	6.4 – 12.4	Mixed gravels	Alluvium	Alluvium	November 2014	Submersible pump
WKMB06B	Water levels and quality	n/a	63.0	52.0 – 61.0	Siltstone/ sandstone	Leloma Formation	Shallow rock (fault zone)	November 2014	Micro-purge™

Monitoring location	Monitoring type	EPA ID	Total depth (mbgl)	Monitored interval (mbgl)	Lithology	Formation	Hydro-geological unit	Date installed	Sampling method[e]
GR-P3	Water levels and quality	90	11.0	5.0 – 9.0	Mixed gravels	Alluvium	Alluvium	March 2011	Submersible pump
GW080487	Water levels and quality	91	60.0	48.0 – 60.0	Shale	Leloma	Shallow rock	n/a	Submersible pump

(a) PL03 is a vibrating wire piezometer. Piezometric level is measured at each sensor.

(b) WKMB05 is a multizone monitoring well. Each horizon is installed with a pressure transducer to measure the piezometric level.

3.3.3 Surface water

The surface water monitoring network at the Project site consists of three AGL stream gauge locations (refer to Figure 1.3). Details of these stream gauge locations are provided in Table 3.4.

Table 3.4 Surface water monitoring network

Stream gauge	EPA ID	Easting (MGA, m)	Northing (MGA, m)	Location	Stream
WKSW01	9	402002	6452208	Waukivory	Avon River (upstream)
WKSW02	8	402772	6452099	Waukivory	Waukivory Creek (upstream)
WKSW03	7	402488	6453088	Waukivory	Avon River (downstream)

MGA – Map Grid of Australia.

3.4 Water monitoring

3.4.1 Pilot wells

At the pilot wells, flow meters are installed to measure flow rates of the flowback water (and subsequently produced water) and datalogger instrumentation is installed to monitor water levels and salinity.

3.4.2 Groundwater and surface water

Pressure transducers equipped with a datalogger are installed at all groundwater and surface water monitoring locations. Groundwater levels are recorded every six hours and surface water levels are recorded every 15 minutes. Data from a barometric datalogger are used to correct for the effects of changing barometric pressure on groundwater levels. To calibrate the level recorded by the dataloggers, manual level measurements are recorded prior to logger downloads, which occur every three months.

Dataloggers at the surface water monitoring locations and at WKMB06A and WKMB06B also measure electrical conductivity (EC), which provide an indication of salinity, every 15 minutes. The logged EC measurements are checked for deviation in calibration every three months using a hand-held calibrated water quality meter.

Piezometric pressure is recorded every six hours at each of the six sensors in the multizone monitoring well WKMB05, and at the two vibrating wire piezometers in PL03.

Manual groundwater level measurements are recorded for private bore GW080487.

3.4.3 Water quality sampling frequency

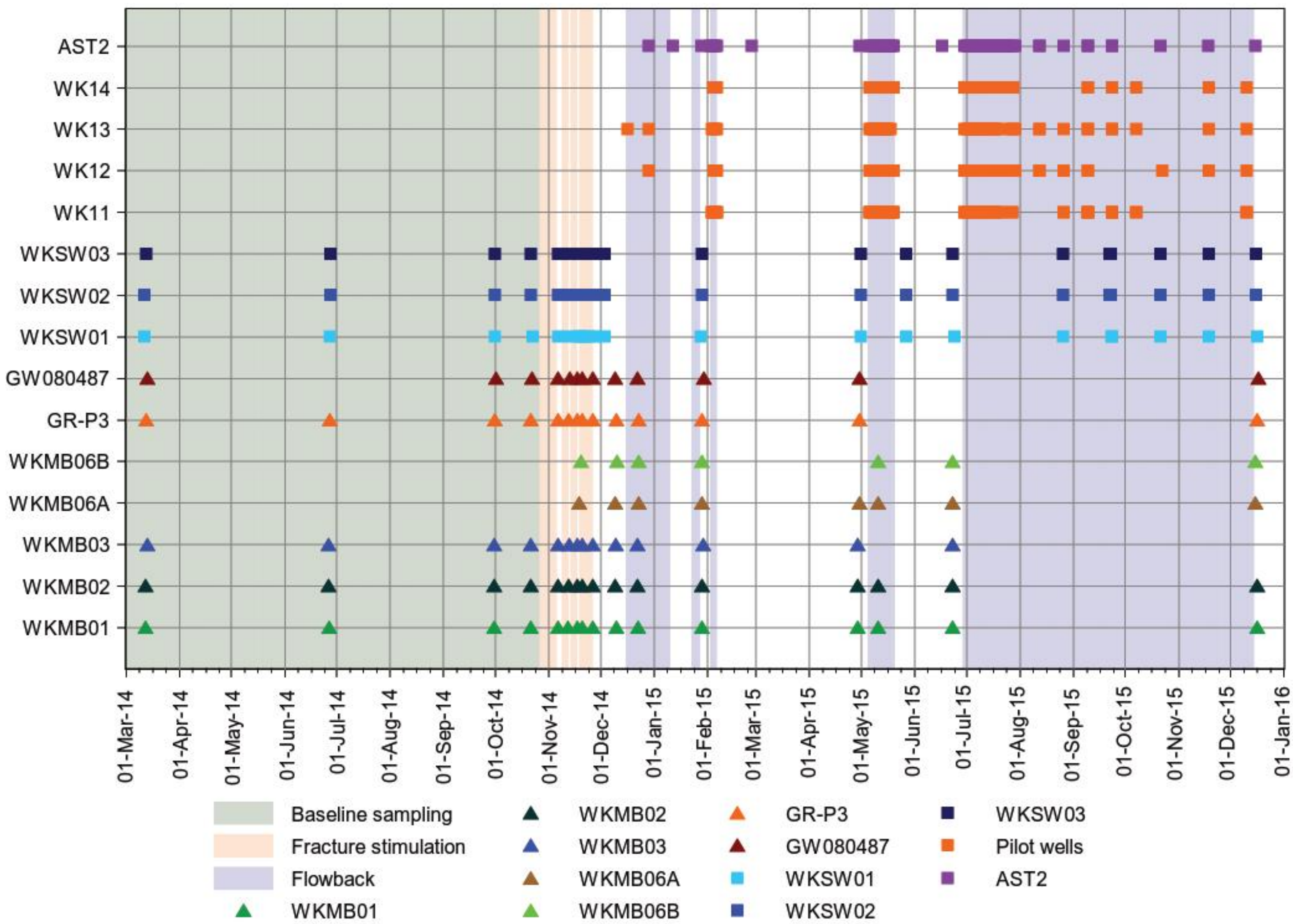
The water quality monitoring conditions as stipulated in EPL 20358 are provided in Table 3.5. AGL has adopted a broader analytical suite for most sites (including BTEX); details are provided in the SGMP (AGL 2015a). The frequency of groundwater, surface water and flowback water quality sampling undertaken since Project inception in 2014 is presented in Figure 3.4. The dates and rationale for the sampling at the surface water and groundwater monitoring locations is provided in Appendix A, Table A1.1. The dates and rationale for sampling at the pilot wells and AST2 is provided in Appendix A, Table A1.2.

Sampling associated with the flowback phase of the Project was undertaken during the period 1 October to 31 December 2015. For the purpose of trend analysis, all data from the baseline sampling, fracture stimulation and flowback phases are also presented.

Table 3.5 Monitoring schedule

Timeframe	Raw (source) water	Fracture stimulation fluid (raw water plus additives)	Surface water	Shallow ground-water	Flowback water	Produced water
During fracture stimulation (each pilot well)[a]	✓	✓				
Within 24 hours of the completion of the fracture stimulation of each pilot well[a]			✓	✓		
1 week after the fracture stimulation of each pilot well[a]			✓			
2 weeks after completion of the fracture stimulation program[a]				✓		
4 weeks after completion of the fracture stimulation program[a]				✓		
6 months after the cessation of fracture stimulation[a], then monthly for the next 12 months[b]			✓			
6 monthly[c]				✓		
Fortnightly from commencement of flowback for the first 8 weeks, then every 2 months[a]					✓	
Every 2 months from the transition to produced water to the cessation of the flow testing[a]						✓

a) Stipulated in EPL dated 6 August 2014
b) Stipulated in EPL dated 1 July 2015
c) Stipulated in EPL dated 17 September 2015. Groundwater sampling from WKMB03 was removed during this revision of the EPL.



The requirement to sample WKMB03 was removed from EPL 20358 in September 2015 as the groundwater recovery time was affecting the groundwater level data.

Figure 3.4 **Waukivory water quality sampling frequency**

3.4.4 Pilot well and AST2 sampling techniques

The techniques, equipment and procedures for water quality sampling from the pilot wells and AST2 are described in detail in the Parsons Brinckerhoff sampling procedure, and the AGL pilot well and AST2 sampling procedure shown in Appendix B.

All work undertaken within the hazardous zone at the well surface facilities is conducted under the supervision and instruction of AGL personnel.

3.4.5 Groundwater and surface water sampling techniques

A range of methods is used to obtain groundwater quality samples from the monitoring bores. The most appropriate method for each bore has been selected based on the depth of the bore, the depth to groundwater, and the permeability of the screened formation. Higher yielding monitoring bores are purged and sampled using a submersible pump. Lower yielding bores are sampled using a low flow pump. Details of the sampling technique used at each monitoring location are provided in Table 3.3.

A telescopic sampler is used to collect grab samples from the surface water sites.

The following physico-chemical parameters of each water sample are measured in the field using calibrated hand-held measuring devices:

- Electrical conductivity – µS/cm
- Temperature – °C
- Dissolved oxygen (DO) – % saturation and mg/L
- Oxidation-reduction potential (ORP) – mV
- pH – pH units
- Total dissolved solids (TDS) – mg/L (calculated from EC)
- Free and total residual chlorine were recorded using a Hach Pocket Colorimeter

All sampling from the groundwater and surface water monitoring sites is carried out in accordance with the Parsons Brinckerhoff sampling procedure shown in Appendix B.

3.4.6 Chemical analysis of water

Samples are analysed for the comprehensive suite of analytes listed in Table 3.6. The comprehensive suite includes all analytes prescribed for the relevant monitoring points in EPL 20358, and the expanded list in the approved SGMP (AGL 2015a).

Table 3.6 Comprehensive suite of analytes

Category	Suite of analytes	
Physico-chemical parameters (Field)	Electrical Conductivity (EC) Total Dissolved Solids (TDS) Temperature Free and total residual chlorine	pH Redox potential (ORP) Dissolved oxygen
Physico-chemical parameters (lab)	EC TDS (measured)	pH Total suspended solids
Major ions	Calcium Magnesium Sodium Potassium Fluoride	Chloride Carbonate Bicarbonate Sulphate
Dissolved metals and minor/ trace elements	Aluminium Antimony Arsenic Barium Beryllium Boron Bromine Cadmium Chromium Cobalt Copper Iron	Lead Manganese Mercury Molybdenum Nickel Selenium Strontium Tin Uranium Vanadium Zinc
Other analytes	Total organic carbon (TOC) Silica Free and total residual chlorine	Monoethanolamine (MEA) Tetrakis (hydroxymethyl) phosphonium sulphate (THPS)[a]
Nutrients	Nitrate Nitrite Total nitrogen	Ammonia Total Kjeldahl Nitrogen Reactive and total phosphorus
Dissolved gases	Methane	Un-ionised hydrogen sulphide
Hydrocarbons	Phenolic compounds Polycyclic aromatic hydrocarbons (PAH) Total petroleum hydrocarbons (TPH)	Benzene, toluene, ethyl-benzene and xylenes (BTEX) Volatile organic compounds (VOC's)

a) Removed from the EPL as of July 2015

Samples were sent to the following laboratories under chain-of-custody protocols:

- Australian Laboratory Service (ALS) Environmental Pty Ltd, Smithfield, Sydney (NATA accredited laboratory for the analytes concerned) – chemistry analysis
- Envirolab Services, Sydney NSW (NATA accredited laboratory for the analytes concerned) – THPS analysis.

3.4.7 Quality assurance and quality control

Data collection and data handling QA/QC

The quality assurance (QA) procedures during sampling and the quality control (QC) procedures during data handling are detailed in the Parsons Brinckerhoff sampling procedures and the AGL pilot well and AST2 sampling procedure shown in Appendix B. All sampling was undertaken in accordance with the Australia//New Zealand standards for water quality sampling (AS/NZS 5667).

Laboratory QA/QC

The laboratories conduct their own internal QA/QC program to assess the accuracy and precision of the analysis and reporting procedures. These programs include analysis of laboratory sample duplicates, spike samples, certified reference standards, surrogate standards/spikes and laboratory blanks. Laboratory QC reports are provided in Appendix C.

3.5 Key analytes: fracture stimulation additives

EPL 20358 currently specifies two compounds that may be present in fracture stimulation additives that are to be included in the analytical suite for all sites:

- Monoethanolamine (MEA) borate
- Sodium hypochlorite.

Sodium hypochlorite was not used as a fracture stimulation additive by AGL, however as discussed below, the constituents of sodium hypochlorite (free and total residual chlorine) were included in the analytical suite.

Choline chloride (clay stabiliser) was originally included in the list of fracture stimulation additives, however the EPA removed the compound from the EPL in November 2014 as choline chloride was not used as an additive in the fracture stimulation fluid for the Project.

THPS (bactericide, Tolcide) was also originally included in the list of fracture stimulation additives. This compound was removed from the EPL in July 2015 so there has not been any THPS data collection during the current reporting period.

A detailed discussion of the analytical method approval process for the key analytes is provided in the surface water and groundwater monitoring report to 31 March 2015 (Parsons Brinckerhoff 2015b). The analytical techniques and approval dates are summarised in Table 3.7.

Table 3.7 Fracture stimulation additives and breakdown constituents

Analyte	Method approved by EPA	Laboratory Limit of Reporting	Rationale	Limitations as Indicator
Monoethanolamine (MEA)	1 December 2014	1 µg/L	Indicator of monoethanol-amine borate	Used in several other applications in industry, for example surfactant, detergents and textiles. Ethanolamine is also used in herbicides and is present in urine secreted by mammals, thus native animals and grazing livestock may be a source of detectable background concentrations in surface water and groundwater.
Free chlorine	Project commencement	0.2 mg/L	Indicator of sodium hypochlorite	Free and total residual chlorine concentrations within fracture stimulation mix may typically be below detection limits. Free chlorine and total residual chlorine are products associated with the chlorination of water supplies and may influence concentrations within surface stream monitoring points where this product has been introduced.
Total residual chlorine	Project commencement	0.2 mg/L	Indicator of sodium hypochlorite	
THPS[a]	19 December 2014	50 µg/L (±50 µg/L[b])	Compound – fracture stimulation additive	THPS degrades rapidly (within 7 days) through hydrolysis, oxidation, and photo-degradation. Degradation time in flowback water and produced water (deep groundwater) is expected to be longer. Oxidation and photolysis will effectively degrade THPS in surface waters. New methodology for analysis of THPS with high level of uncertainty at the PQL level (±50 µg/L[b])

a) Removed from the EPL as of July 2015
b) Envirolab (2015)

Groundwater and surface water monitoring data collected during 2014 showed that MEA, THPS and, free and total residual chlorine were naturally present in the surrounding environment (Parsons Brinckerhoff 2015a). The EPA subsequently conducted independent investigations (EPA 2015a, 2015b and 2015d) into the occurrence of these analytes; the key conclusions of which are as follows:

- *"There is insufficient scientific information on monoethanolamine to determine whether the monoethanolamine concentrations recorded were due to natural or other causes. However the EPA did conclude that it was unlikely that the monoethanolamine detections were the result of hydraulic fracturing operations introducing the chemical to the groundwater"*
- *"It was unlikely that the sporadic THPS detections recorded were a result of contamination of aquifers and surface waters as a result of hydraulic fracturing operations"*
- *"it was concluded that although levels of THPS (as formaldehyde) were detected, this could not be attributed to actions by AGL"*
- *"There are many natural sources of formaldehyde (the immediate breakdown product of Tolcide* [THPS] *and detected by the method) due to breakdown of organic compounds in nature. The validation report indicates the water samples used for method validation already had a background of formaldehyde, at ~ 30, 12 and 20 µg/L in drinking, creek and groundwater, respectively"*
- *"The apparent detections of sodium hypochlorite (as free residual chlorine and total chlorine) were recorded both upstream and downstream of AGLs activities and before during and after hydraulic fracturing."*

- *"The investigation confirmed the licensee did not use sodium hypochlorite (chlorine) in the hydraulic fracturing. The licensee had decided to use Tolcide* [THPS] *for this purpose."*

Following these investigations, the EPL was revised to remove THPS and to remove the limits for MEA and sodium hypochlorite such that a detection does not constitute a license breach as MEA, chlorine and THPS are naturally occurring in the environment.

3.6 Assessment criteria and trigger response

The criteria used for the assessment of monitoring data follows the protocols provided in the SGMP. Specific analyte trigger values at this stage in the Project are not considered appropriate due to the natural variability in groundwater and surface water quality at different locations across the site and at different depths in the geological strata. There are also insufficient sampling events to build up enough confidence/statistical sample pool to enable setting trigger threshold values as described in ANZECC (2000). Instead, general trigger criteria are used to assess monitoring sites as follows:

- Water quality trends associated with fracture stimulation additives or relevant breakdown/elemental constituents as key analytes within surface water and groundwater are monitored as part of the flowback and produced water monitoring program. The fracture stimulation additives readily dissolve and dissociate into intermediate products or elemental constituents.
- The water quality triggers are defined as a distinct deviation from typical observed trends in groundwater and surface water quality that can be related back to pilot well activities, the analytical technique developed to identify such deviations is described in Section 5.5.
- Water level response, i.e. drawdown, is attributed to depressurisation activities and provides a measure of potential connectivity between deep coal seams and the overlying shallow rock and alluvial water resources. The assessment of monitoring data against response triggers is provided in Section 4.2.1. The SGMP (AGL 2015a) details the water level response triggers as follows:

  '*The adopted trigger is a water level decline of more than 2 m (outside of the normal range) in a monitoring bore in an aquifer less than 75 m from surface, or more than 5 m (outside of the normal range) for deeper (non-coal) monitoring zones. It is expected that at least three months of reliable water level data would be required to have confidence in any unusual water level trend.'*
- Trigger levels for BTEX compounds and hydrogen sulphide at AST2 are based on the protection of human health and the environment, and are derived from an assessment of the latest water quality data, exposure pathways and chronic exposure levels. The trigger levels are shown in Table 3.8 and detailed in Table 6.2 of the SGMP (AGL 2015a).
- Change in beneficial use of an aquifer by applying the beneficial use matrix designed within the SGMP (AGL 2015a). The aquifer type refers to the alluvial and shallow fractured rock systems. The change in beneficial use is determined from a review of yield and EC (as an indicator of salinity) over the time period as detailed in Section 7.

Table 3.8 Adopted thresholds for BTEX and hydrogen sulphide at AST2

Analyte	Threshold for investigation (µg/L)	Threshold for action (µg/L)
Benzene	1,900	19,000
Toluene	360,000	3,600,000
Ethyl benzene	160,000	1,600,000
Xylenes	150,000	1,500,000
Hydrogen sulphide	2,000	20,000

Source: Surface and groundwater management plan for the Waukivory Pilot Program Table 6.2 (AGL 2015a)

The SGMP (AGL 2015a) provides trigger management response protocols to be adopted for confirmed or possible changes in water resources or associated water level/water quality impacts arising from pilot well activities.

4. Water levels

4.1 Pilot well water levels

Water levels in the pilot wells are highly variable and dependent on pump operation, including fluctuating pumping rates and the build-up/release of gas pressure within the well casing above the water level. When pumping is taking place, water level declines (drawdown) are observed in the pilot wells and when pumping ceases the water levels re-equilibrate (recover) towards that of the target formations.

The pump commissioning and flowback phases comprise periods where the pumps have been in operation and periods where pumping has ceased (due to workover intervention or 'shut-in' during suspension). These periods and the corresponding water level response in the pilot wells are shown in Figure 4.1.

When the wells are shut-in the build-up of gas pressure within the casing above the water level can attenuate recovery or suppress water levels. The water level responses to the ongoing casing pressure management conducted by AGL are evident in the hydrographs presented in Figure 4.1 and discussed below.

At the start of the reporting period at 1 October 2015, water levels at WK11, WK13 and WK14 continued to show fluctuation in response to pumping. WK12 was undergoing the well optimisation workover until 14 October 2015, discussed in Section 3.2, and the same activity took place at WK11 from 22 October until 13 November 2015. Water level data recorded during the workover activities is not being considered as part of this monitoring report as this data is not representative of the formation pressures or pumping activities.

Following the workover activities at WK11 and WK12 the pumps were lowered by 55 m and 75 m respectively. The well monitoring data show that there was an increase in pumping rate compared to the previous reporting period and the pumped water levels were slightly lower than before the well optimisation workover.

During the current reporting period; WK13 and WK14 continued to be pumped at rates typical of those wells and the corresponding water level fluctuation remained consistent with recent reporting periods (Figure 4.1).

The commencement of the extended pressure build up test from 14 December 2015 at WK11, WK13 and WK14 and 16 December 2015 at WK12 can be seen in the hydrographs from an initial rapid recovery of water levels followed by a slower recovery until the end of the reporting period.

Details of the pumping schedule and corresponding water levels prior to 1 October 2015 are discussed in the preceding surface water and groundwater monitoring reports (Parsons Brinckerhoff 2015a, 2015b, 2015c & 2015d).

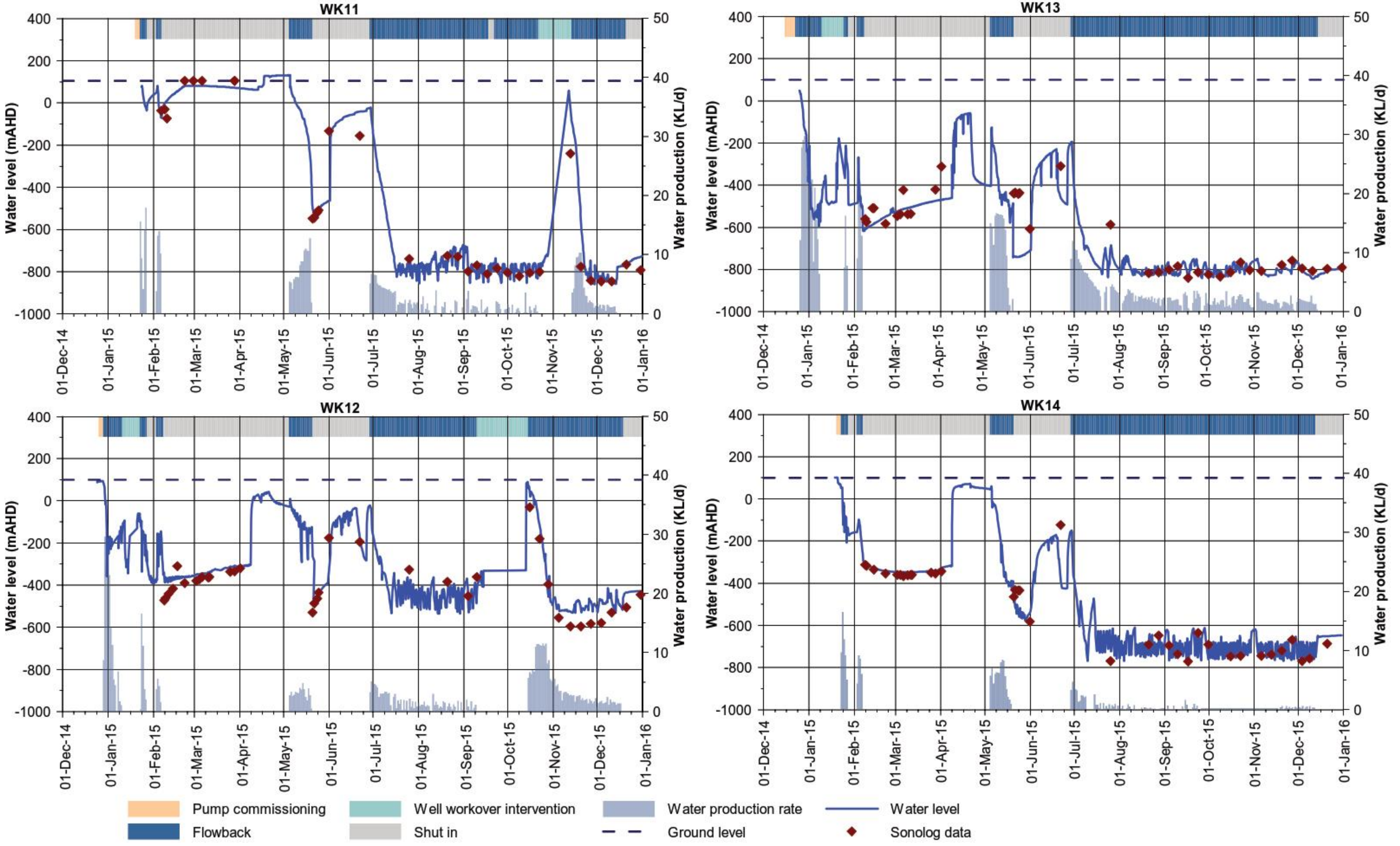


Figure 4.1 **Water levels and flowback volumes at the Waukivory pilot wells**

4.2 Groundwater levels

The figures that correspond to the discussion on groundwater levels for the Waukivory monitoring locations are as follows:

- WKMB01, WKMB02, WKMB03, WKMB06A, WKMB06B, GR-P3 and GW080487 for the period March 2014 to December 2015, including baseline monitoring, fracture stimulation and flowback (Figure 4.2a).
- WKMB01, WKMB02, WKMB03, WKMB06A and WKMB06B, GR-P3 and GW080487 for the period December 2014 to December 2015 covering the flowback phase in detail (Figure 4.2b).
- Alluvial (GR-P3 and WKMB06A) and interburden (WKMB03) water level response triggers compared to groundwater levels for the period December 2014 to December 2015 (Figure 4.3).
- Shallow rock (WKMB01, WKMB02 and WKMB06B) water level response triggers compared to groundwater levels for the period December 2014 to December 2015 (Figure 4.4).
- WKMB05 monitoring intervals and WK13 perforated intervals (Figure 4.5).
- Piezometric levels at all sensors (sensors 1 to 6) in multizone monitoring well WKMB05 compared to water production rates at WK13 for the period November 2014 (installation) to December 2015 (Figure 4.6a).
- Piezometric levels at sensors 1 to 4 (in detail) in multizone monitoring wellWKMB05 compared to water production rates at WK14 for the period November 2014 (installation) to December 2015 (Figure 4.6b).
- WKMB05 water level response triggers compared to piezometric levels for the period November 2014 (installation) to December 2015 (Figure 4.7).
- Piezometric levels in vibrating wire piezometer PL03 for the period March 2014 to December 2015, including baseline monitoring, fracture stimulation and flowback (Figure 4.8).

Spikes depicting rapid groundwater level decline followed by recovery on the hydrographs are associated with water sampling events that have taken place from March 2014. This water level response has been the subject of an investigation by the EPA, which confirmed that the fluctuations are the result of groundwater sampling (EPA, 2015d).

Water level response triggers are described in Section 4.2.1. A description of the variation in groundwater levels in the different hydrogeological units during the flowback phase is provided below.

4.2.1 Water level response triggers

The SGMP (Section 6.4.1, pages 41 – 43) (AGL 2015a) states that:

'The adopted trigger is a water level decline of more than 2 m (outside of the normal range) in a monitoring bore in an aquifer that is less than 75 m from surface, or more than 5 m (outside the normal range) for deeper (non-coal) monitoring zones. It is expected that at least three months of reliable water level data would be required to have confidence in any unusual water level trend'.

Water level response triggers have been calculated as shown in Table 4.1. The normal range of water levels has been calculated based on the 5th and 95th percentile of historical data. Using these percentiles removes anomalous data that is outside of the normal range, for example, sampling events resulting in a decline in water levels are below the 5th percentile, and large rainfall events resulting in a significant increase in water levels are above the 95th percentile. The percentiles (and therefore water level response triggers) have been calculated for different historical date ranges for each monitoring bore based on the following rationale:

- WKMB01, WKMB02, WKMB03 and GR-P3 percentiles have been calculated from water level data for the period from monitoring bore installation through to the start of fracture stimulation (27 October 2014).
- WKMB06A and WKMB06B percentiles have been calculated for the period from water level data from monitoring bore installation (18 November 2014) through to the end of the previous reporting period (30 September 2015).
- WKMB05 sensors 1 and 3 percentiles have been calculated from piezometric level data since equilibration following well installation (1 December 2014) through to the end of the previous reporting period (30 September 2015).
- WKMB05 sensors 2 and 4 are monitoring piezometric levels in coal zones, and therefore water level response triggers are not applicable according to the SGMP.
- There is uncertainty as to whether the piezometric levels in WKMB05 sensors 5 and 6 have reached equilibration following installation. Therefore water level response triggers are not currently considered applicable for the existing monitoring dataset, and will be reviewed as additional monitoring data becomes available.

In order to determine if a water level response trigger has been reached at any of the monitoring locations during the last reporting period, the 5^{th} percentile has been calculated from water level data between 1 October 2015 and 31 December 2015 (Table 4.1). Using the 5^{th} percentile removes misrepresentative water levels that are the result of sampling events.

Groundwater levels compared to the water level response triggers are plotted in Figures 4.3, 4.4 and 4.7, and discussed in Sections 4.2.2 to 4.2.6.

Table 4.1 Water level response triggers

Monitoring location	Hydro-geological unit	Normal range			Trigger level (mAHD)	1 Oct to 31 Dec 2015	Comments
		Date range	95th percent-ile (mAHD)	5th percent-ile (mAHD)		5th percent-ile (mAHD)	
WKMB01	Shallow rock <75m	9 Feb 12 – 27 Oct 14	96.0	95.3	93.3	95.5	Trigger not reached, increasing trend
WKMB02	Shallow rock <75m	4 Jun 12 – 27 Oct 14	96.7	96.0	94.0	96.2	Trigger not reached, increasing trend
WKMB03	Interburden (fault zone) >75m	4 Oct 13 – 27 Oct 14	98.9	97.9	92.9	98.6	Trigger not reached, increasing trend
WKMB06A	Alluvium <75m	18 Nov 14 – 30 Sept 15	97.5	96.2	94.2	96.7	Trigger not reached, increasing trend
WKMB06B	Shallow rock (fault zone) <75m	18 Nov 14 – 30 Sept 15	97.3	96.4	94.4	97.0	Trigger not reached, increasing trend
GR-P3	Alluvium <75m	10 Mar 11 – 27 Oct 14	98.1	96.7	94.7	97.1	Trigger not reached, increasing trend
WKMB05 sensor 1	Interburden >75m	1 Dec 14 – 30 Sept 15	108.5	104.1	99.1	103.5	Trigger not reached, decreasing trend
WKMB05 sensor 2	Cloverdale Coal Seam >75m	1 Dec 14 – 30 Sept 15	107.9	101.9	n/a	100.9	Coal monitoring zone, therefore trigger not appropriate
WKMB05 sensor 3	Interburden >75m	1 Dec 14 – 30 Sept 15	113.0	111.9	106.9	111.6	Trigger not reached, decreasing trend
WKMB05 sensor 4	Fairbairns Coal Seam >75m	1 Dec 14 – 30 Sept 15	117.0	116.7	n/a	117.2	Coal monitoring zone, therefore trigger not appropriate
WKMB05 sensor 5	Interburden >75m	1 Feb 15 – 30 Sept 15	145.1	141.9	tbd	141.3	Initial equilibration uncertain, <3 months reliable water level data available
WKMB05 sensor 6	Interburden >75m	1 Feb 15 – 30 Sept 15	171.5	168.6	tbd	168.1	Initial equilibration uncertain, <3 months reliable water level data available

tbd – to be determined

4.2.2 Alluvium

During the current reporting period (1 October 2015 to 31 December 2015) groundwater levels in alluvial monitoring bores GR-P3 and WKMB06A show an upward trend with an overall increase of approximately 0.2 to 0.3 m in response to increased rainfall recharge compared to the previous reporting period. Alluvial groundwater levels at these sites respond quickly to rainfall with responses apparent in the hydrographs to individual rainfall events over approximately 20 mm/day.

Groundwater levels in alluvial monitoring bores GR-P3 and WKMB06A show no response attributable to flowback pumping. Groundwater levels in the alluvium do not exceed the water level response trigger (Table 4.1 and Figure 4.3).

4.2.3 Shallow rock

During the current reporting period (1 October 2015 to 31 December 2015) groundwater levels in the shallow rock monitoring bores WKMB01, WKMB02 and WKMB06B show an overall increase of up to 0.3 m in response to increased rainfall recharge compared to the previous reporting period (Figure 4.2b). Responses to individual rainfall events are most pronounced in WKMB02 and WKMB06B.

Due to a data logger malfunction at WKMB01, groundwater level data from 09 December to the end of the reporting period is not available (31 December 2015).

Groundwater levels in monitoring bores WKMB01, WKMB02 and WKMB06B show no response attributable to flowback pumping. Groundwater levels in the shallow rock do not exceed the water level response trigger (Table 4.1 and Figure 4.4).

Manual groundwater measurements at private monitoring bore GW080487 screened in the shallow rock do not show a significant change in groundwater levels over the reporting period. Groundwater levels in GW080487 show no response attributable to flowback pumping (Figure 4.2b).

4.2.4 Interburden of deeper coal measures

Groundwater levels in monitoring bore WKMB03, screened in the interburden (and thrust fault zone) remain steady throughout the current reporting period (1 October 2015 to 31 December 2015) with a negligible increase of 0.05 m.

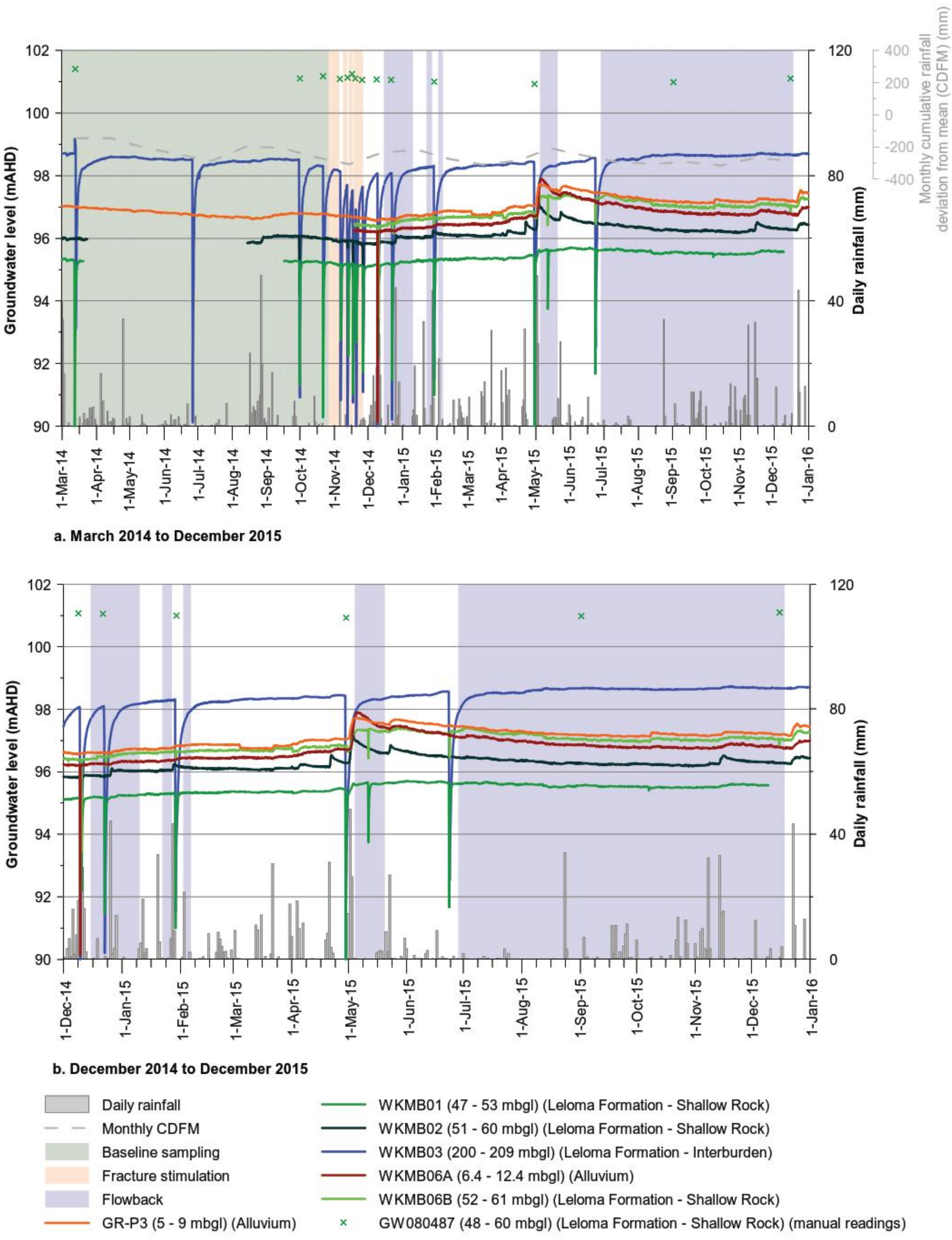
Groundwater levels at WKMB03 show a distinctive delayed recovery response to sampling events and a subdued and delayed response to seasonal climatic variations rather than a response to individual rainfall events. This is indicative of very low hydraulic conductivity within the interburden/fault zone.

Increasing groundwater levels at WKMB03 from January 2015 to September 2015 are due to a delayed recovery response after frequent groundwater sampling events carried out during the fracture stimulation period in late 2014 and subsequent sampling up to June 2015 (Figure 4.2a). Groundwater sampling from this bore has since been suspended to prevent interference with water level data.

Groundwater levels in monitoring bore WKMB03 show no response attributable to flowback pumping. Groundwater levels in the interburden do not exceed the water level response trigger (Table 4.1 and Figure 4.3).

4.2.5 Thrust fault zone

Both WKMB03 and WKMB06B are screened across the thrust fault zone, and WKMB06A is screened within the alluvium above the thrust fault zone. Hydrographs from these three monitoring bores show no anomalous water level responses and provide no evidence of connectivity between the fracture simulation zones and the shallow groundwater system arising from the thrust fault zone.



NB. Spikes depicting rapid groundwater level decline followed by recovery on the hydrographs are associated with water sampling events that have taken place from March 2014. This water level response has been the subject of an investigation by the EPA, which concluded that the fluctuations are the result of groundwater sampling (EPA 2015d).

Figure 4.2 Groundwater levels and rainfall at the Waukivory monitoring bores

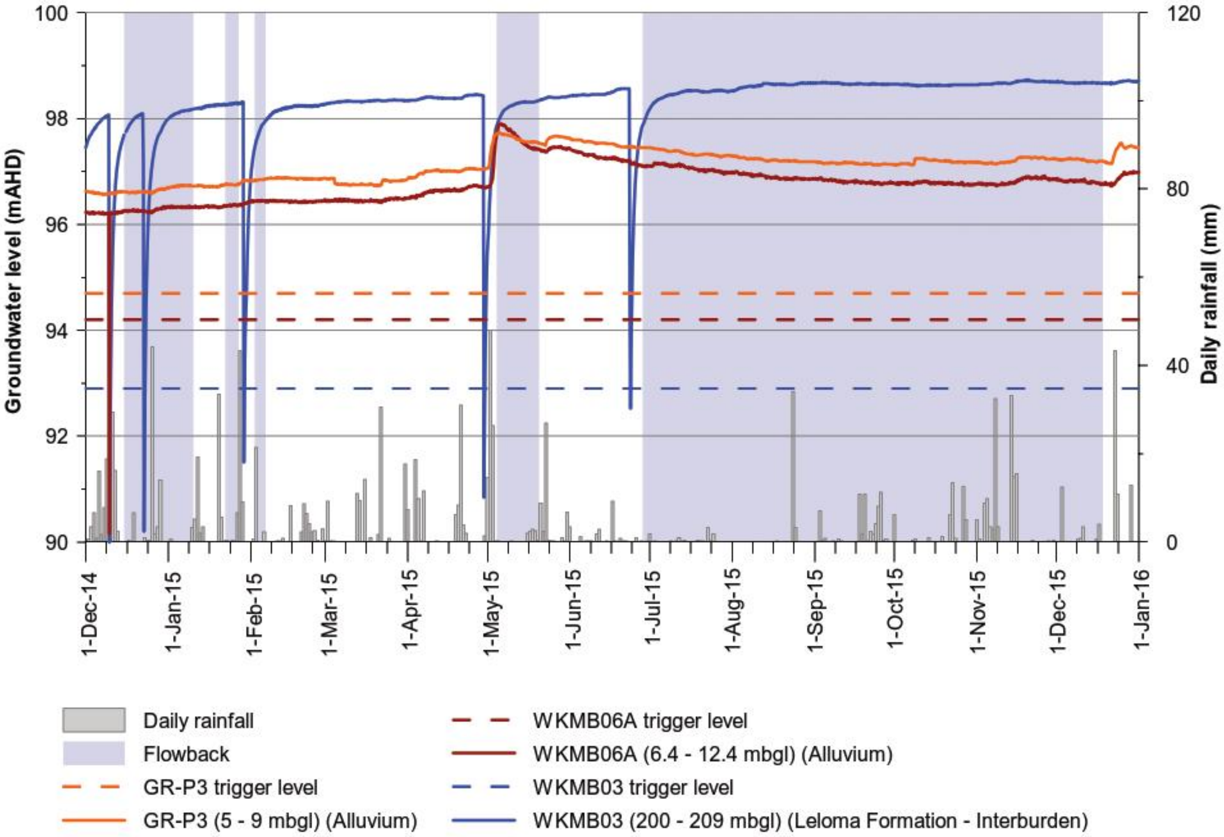


Figure 4.3 Groundwater and trigger levels at the Waukivory alluvial and interburden monitoring bores

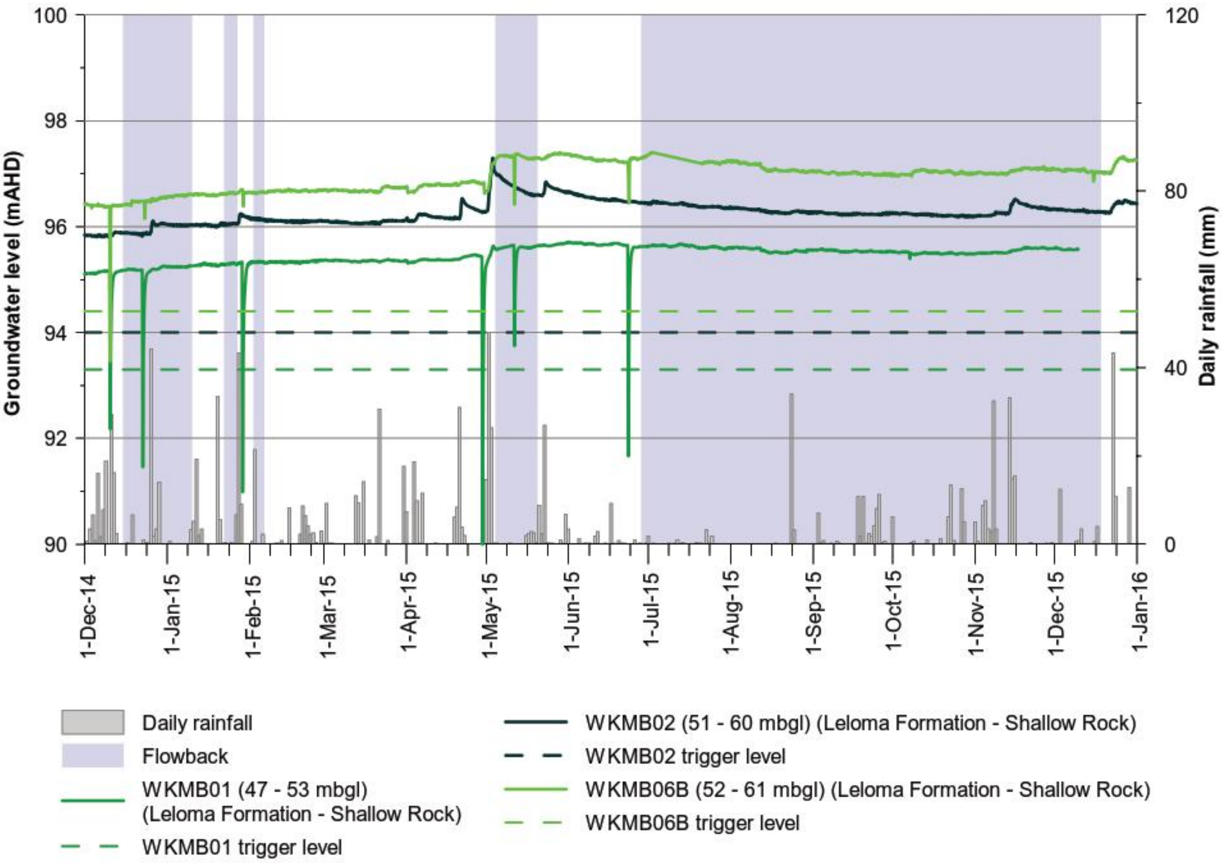


Figure 4.4 Groundwater and trigger levels at the Waukivory shallow rock monitoring bores

4.2.6 Deep groundwater systems

Deep groundwater (>300 mbgl) is monitored by WKMB05 (multizone monitoring well) and PL03 (vibrating wire piezometer). The monitored intervals are both deep coal seam water bearing zones and overlying aquitards.

WKMB05

A comparison of the WKMB05 monitored intervals to WK13 perforated intervals is shown in Figure 4.5. The westerly dip of geological strata is such that coal seams intersected by WKMB05 are intersected at a greater depth in WK13 which is located 164 m to the west.

Piezometric levels in WKMB05 for the period November 2014 (installation) to 31 December 2015 are shown in Figure 4.6. The rapid changes in the piezometric levels measured at all sensors on 25 November 2014 occurred during the commissioning of the packer system. There are divergent pressure trends at WKMB05 with different sensors showing downward and upward trends during the reporting period (1 October 2015 to 31 December 2015):

- Piezometric levels at sensor 1 decrease by about 0.3 m
- Piezometric levels at sensor 2 decrease by about 0.8 m
- Piezometric levels at sensor 3 decrease by about 0.1 m
- Piezometric levels at sensor 4 increase by about 1.7 m
- Piezometric levels at sensor 5 decrease by about 0.5 m
- Piezometric levels at sensor 6 decrease by about 0.4 m.

It is possible that the slight decrease in piezometric levels at WKMB05 sensors 1, 2 and 3 represent a pressure response to flowback at WK13. Sensor 4 continues to show an increase in piezometric level that commenced around mid-August 2015 (Figure 4.6b). The water production rate at WK13 also decreased to less than 5 KL/d from mid-August onwards, and it is possible that the piezometric levels in sensor 4 are showing a recovery response to the reduced water production rate.

There is uncertainty as to whether the piezometric levels in WKMB05 sensors 5 and 6 have reached equilibration following installation (Figure 4.6a). A long recovery period following installation is widely observed in deep VWP installations in low permeability formations (Parsons Brinckerhoff, 2014c). The piezometric response will continue to be reviewed as additional monitoring data becomes available.

Piezometric levels in the deep groundwater systems do not exceed the water level response triggers shown in Table 4.1 and Figure 4.7.

Comparing each of the hydrographs at WKMB05 there is an apparent and pronounced upward gradient between the deepest zones (with the highest artesian pressures) and the shallowest zones (with the lowest artesian pressures). This data conforms to the conceptual model with upward flow in the centre of the Basin and aquitards confining the piezometric pressures of the underlying strata.

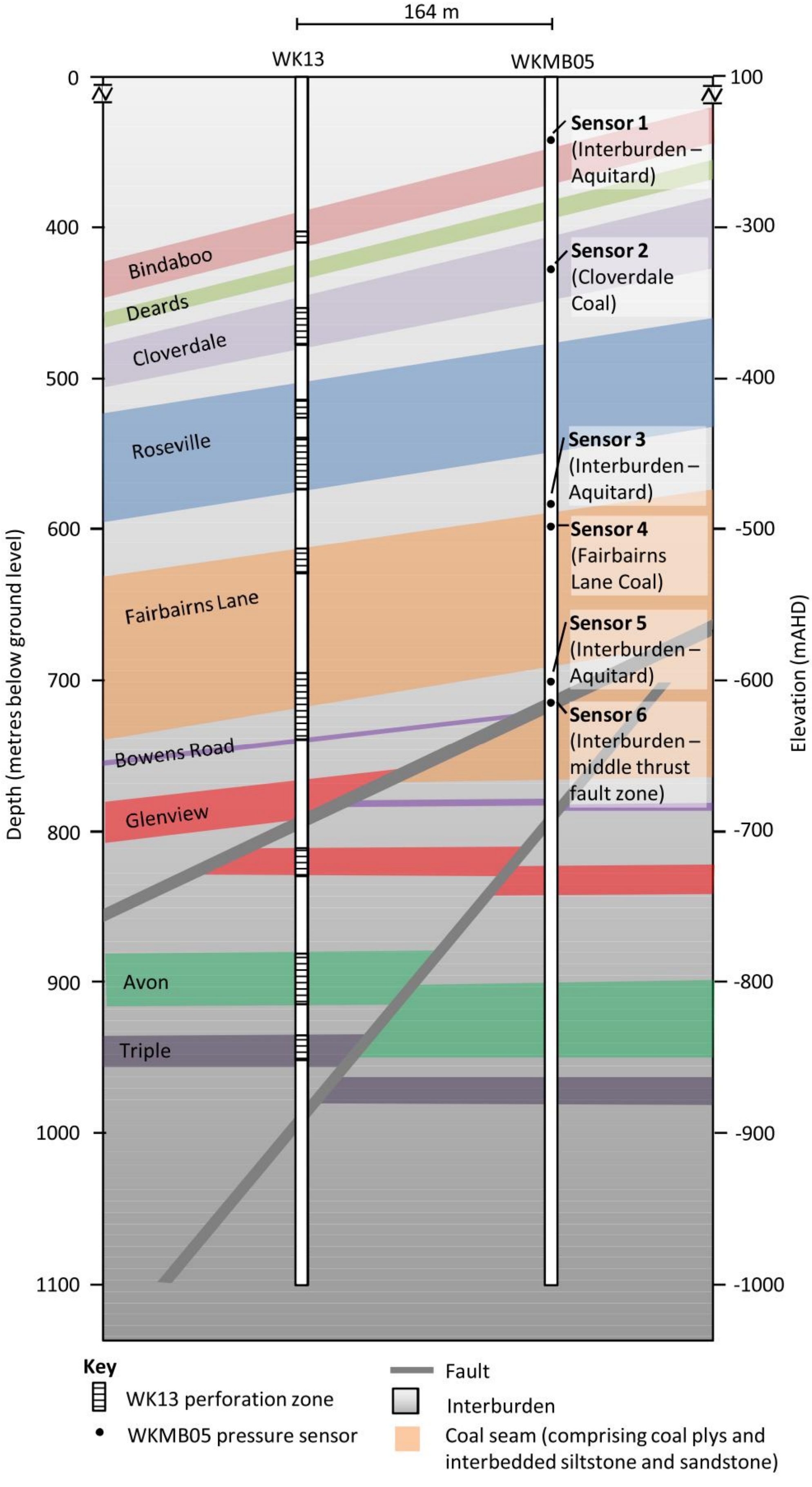


Figure 4.5 **Schematic comparison of WK13 perforated intervals and WKMB05 monitored intervals**

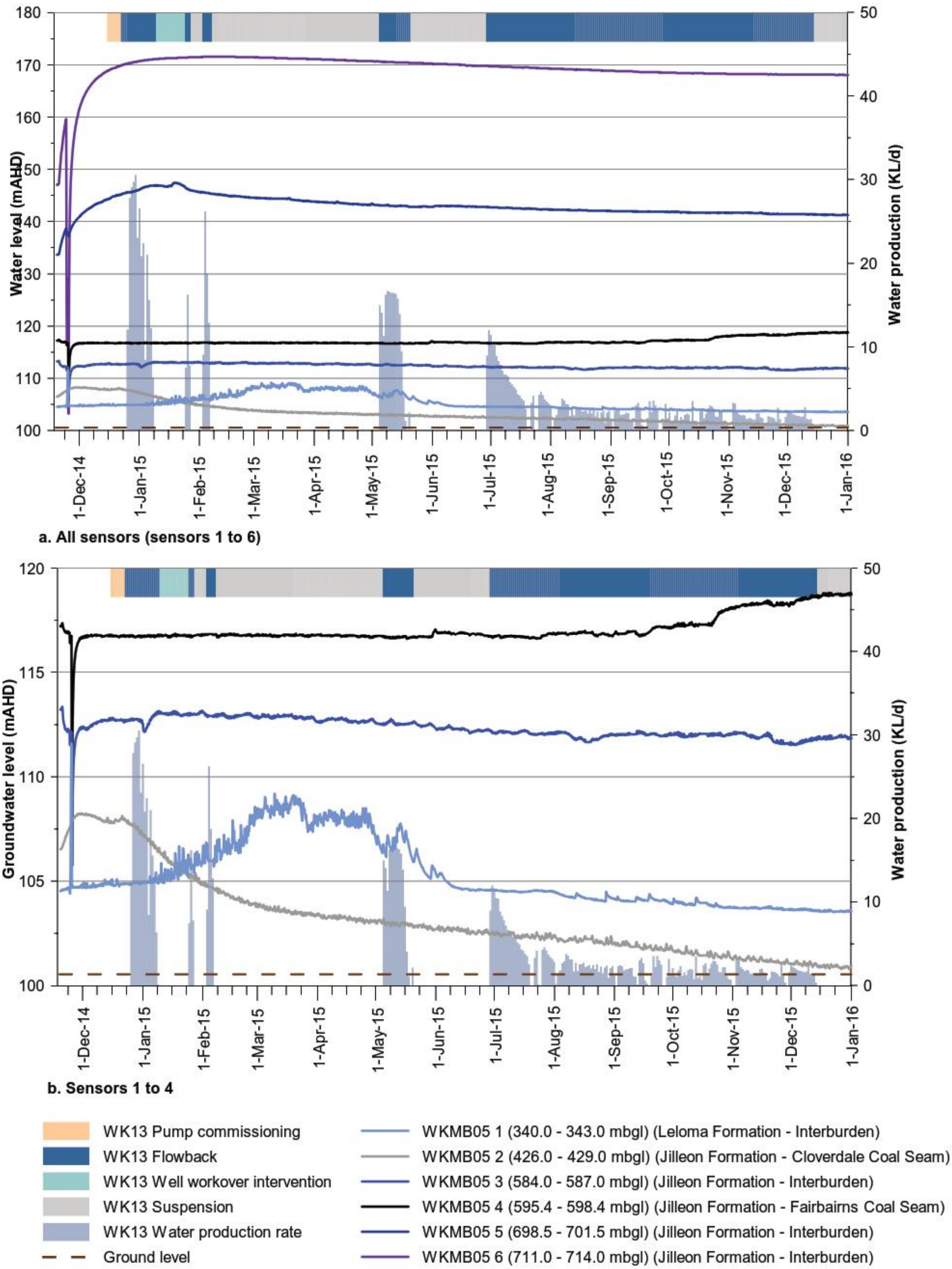


Figure 4.6 **Groundwater levels and rainfall at multizone monitoring well WKMB05 compared to water levels at WK13**

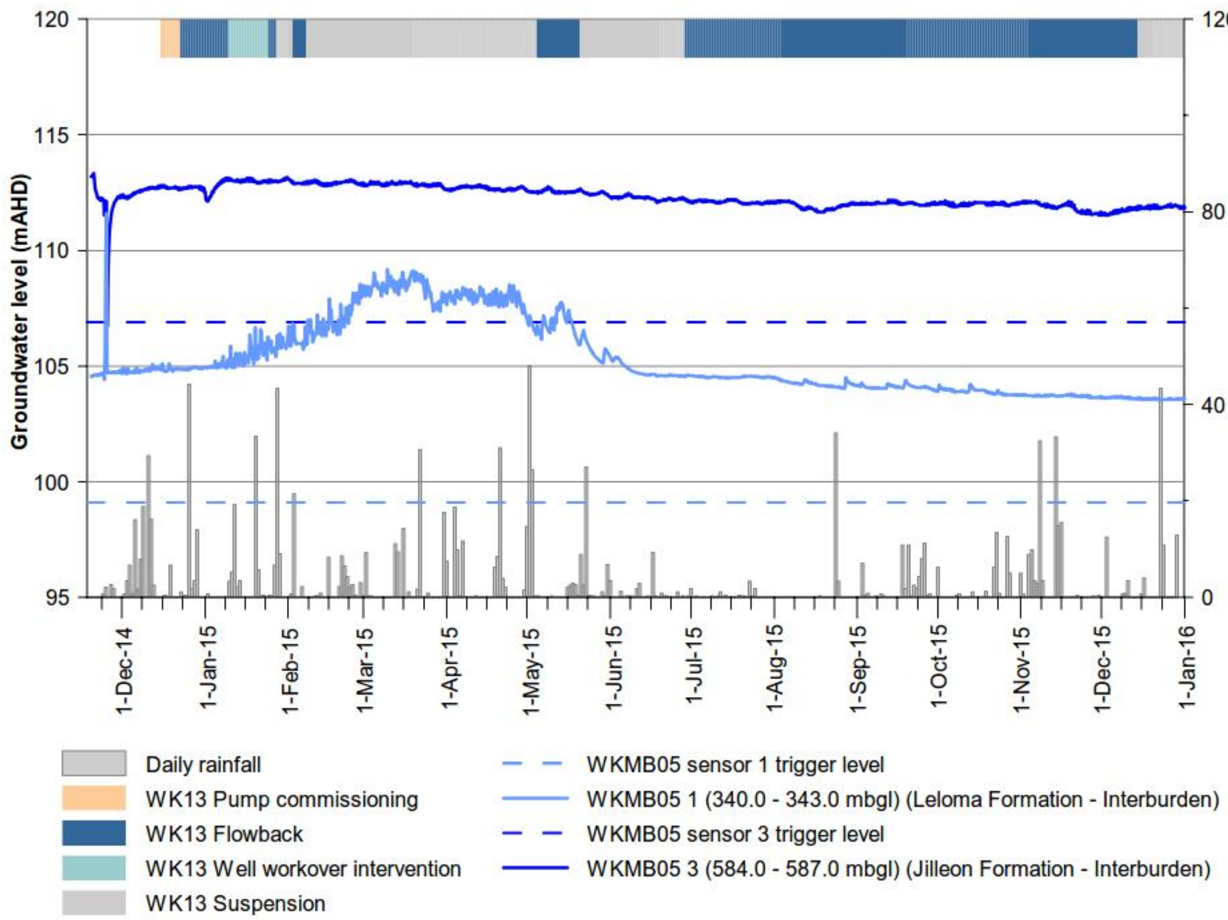


Figure 4.7 Groundwater and trigger levels at multizone monitoring well WKMB05

PL03

Vibrating wire piezometer PL03 was installed in September 2013. Sensor 2 (496 mbgl) located in the Bowens Road coal seam shows a decrease in piezometric pressure of approximately 20 m since installation up to the beginning of the current reporting period. The piezometric pressure measured at sensor 2 has remained steady at approximately 77 mAHD throughout the majority of the current reporting period. Sensor 3 (463 mbgl) located in interburden shows a decrease in piezometric pressure of approximately 60 m since installation. The declines in piezometric level may reflect the long term readjustment of pore pressure in the surrounding rock since installation and are not considered to represent natural trends. However, since February 2015 the piezometric level in sensor 3 has remained relatively constant at approximately 44 mAHD with a slight rising trend evident during the current reporting period.

A long equilibration period has been observed at VWPs installed at the AGL Hunter Gas Project. At that location, groundwater levels took over one year to equilibrate following installation (Parsons Brinckerhoff, 2014c) and was considered to reflect pore pressures in low permeability formations adjusting and recovering towards hydrostatic pressures following the local disturbance associated with installation.

During the reporting period (1 October 2015 to 31 December 2015) piezometric levels at PL03 sensor 2 have decreased by approximately 0.5 m and at PL03 sensor 3 have increased by about 0.4 m (Figure 4.8).

Despite the apparent equilibration, there is still uncertainty that the data from PL03 is representative of the target formations and consequently this monitoring site has not been included in the water level response trigger assessment at this stage.

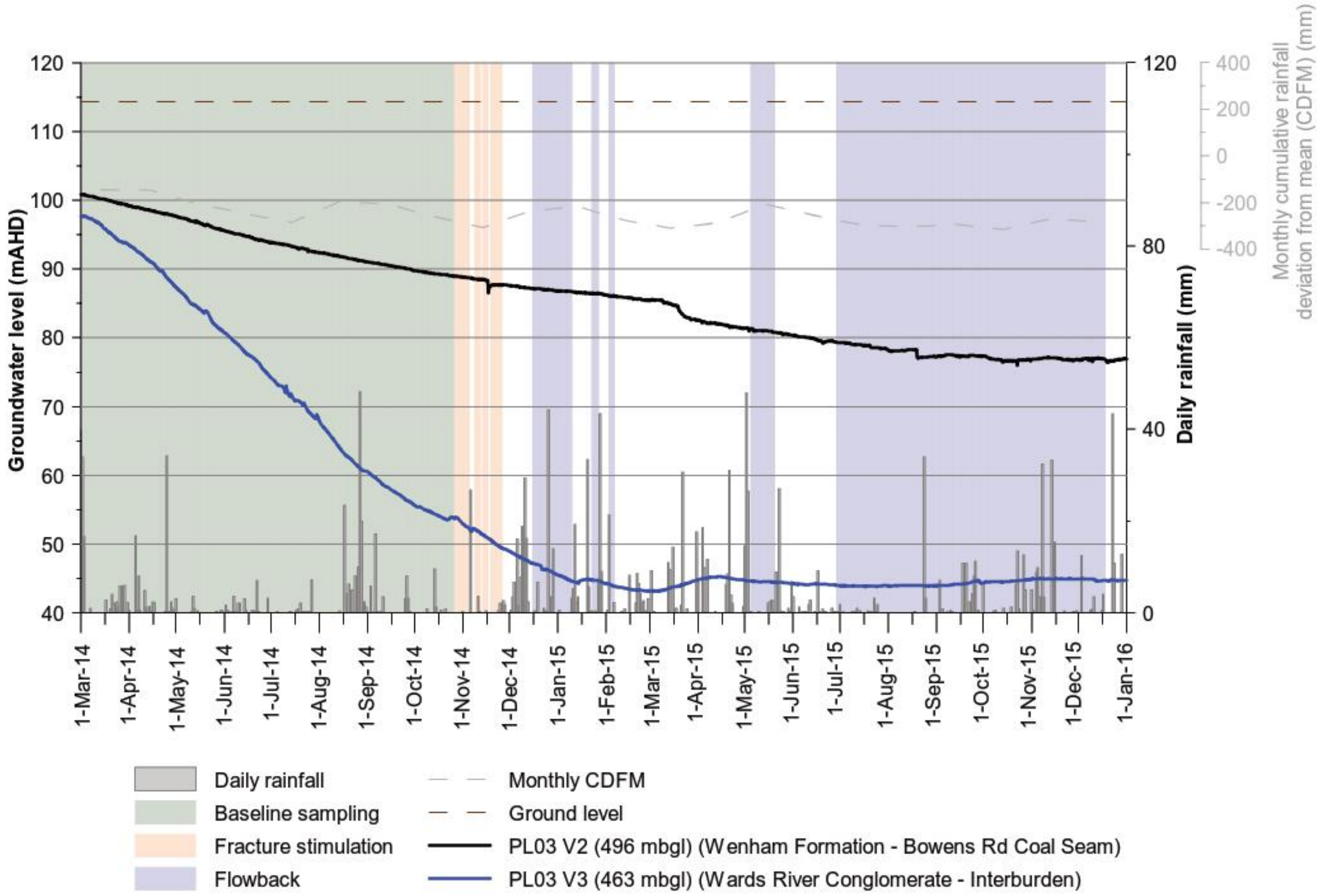


Figure 4.8 **Groundwater levels and rainfall at vibrating wire piezometer PL03**

4.2.7 Vertical hydraulic gradients

Groundwater levels at the WKMB06A and WKMB06B nested monitoring site show a very slight upward vertical gradient between the shallow rock and the alluvium. An upward vertical component of hydraulic gradient is characteristic of groundwater discharge areas. This is consistent with the conceptual hydrogeological model whereby deeper groundwater migrates through the shallow fractured rock and into the base of the alluvium before mixed shallow and deep groundwater discharges as baseflow to surface waters.

Groundwater levels at WKMB03 within the interburden of the deeper coal measures are higher than in the shallow rock monitoring bores WKMB01, WKMB02 and WKMB06B (Figure 4.2) and indicate an upward vertical gradient and probable confining conditions attributed to the low permeability rock. Vertical seepage is likely to be limited and slow due to the low permeability of the interburden units. Furthermore, this data provides no indication that the upper thrust zone is a conduit for deep groundwater or that it is in hydraulic connection with shallow aquifers.

Piezometric levels at WKMB05 sensors 1 to 6 show an upward vertical gradient prior to any substantial flowback pumping in January 2015 (Figure 4.6). An apparent reversal of the gradient between WKMB05 sensor 1 and sensor 2 from January 2015 may be related to flowback from WK13 leading to depressurisation of the Cloverdale coal seam (sensor 2). Possible evidence of hydraulic connectivity between sensors 1 and 2 and WK13 may also be shown in the initial period following installation. The peak pressure at Sensor 2 during December 2014 followed by a later peak at Sensor 1 during March 2015 may represent a delayed response to the fracture stimulation at WK13 as the pressure wave propagated along the Cloverdale and Bindaboo Seams and into the adjacent aquitards. A corresponding pressure response is not observed at

WMKB03 (Figure 4.2) so in this scenario the hydraulic connectivity will be limited to the coal seams and, to a lesser extent, the adjacent aquitards.

WKMB05 sensors 5 and 6 show piezometric levels of approximately 45 m and 70 m respectively above ground level (Figure 4.6). Piezometric pressures at these depths and in the centre of the basin are expected to be artesian (above ground elevation); although initial numerical modelling suggests that the piezometric pressures at the deepest sensors should be approximately 10 to 20 m above ground level. There is uncertainty as to whether the piezometric levels in WKMB05 sensors 5 and 6 have reached equilibration following installation; this will be reviewed as additional monitoring data becomes available.

4.3 Surface water levels

Surface water levels for the period September 2014 (installation) to 31 December 2015 are shown in Figure 4.9.

Water levels at stream gauge sites WKSW01 (Avon River upstream of the Project site), WKSW02 (Waukivory Creek upstream of the Project site) and WKSW03 (Avon River downstream of the Project site) show a slight increase in water levels over the reporting period (1 October 2015 to 31 December 2015).

Water levels at the three stream gauge sites responded to the significant rainfall/runoff events in mid-November 2015 and late-December 2015. The largest water level increase of about 2.5 m is observed at WKSW01 in response to the mid-November rainfall event. Water levels at WKSW03 increase by about 2 m in mid-November, and water levels at WKSW02 increase by about 1 m in response to the late-December rainfall event.

Water levels at the Waukivory stream gauge sites show no response attributable to flowback pumping from the pilot wells (Figure 4.9).

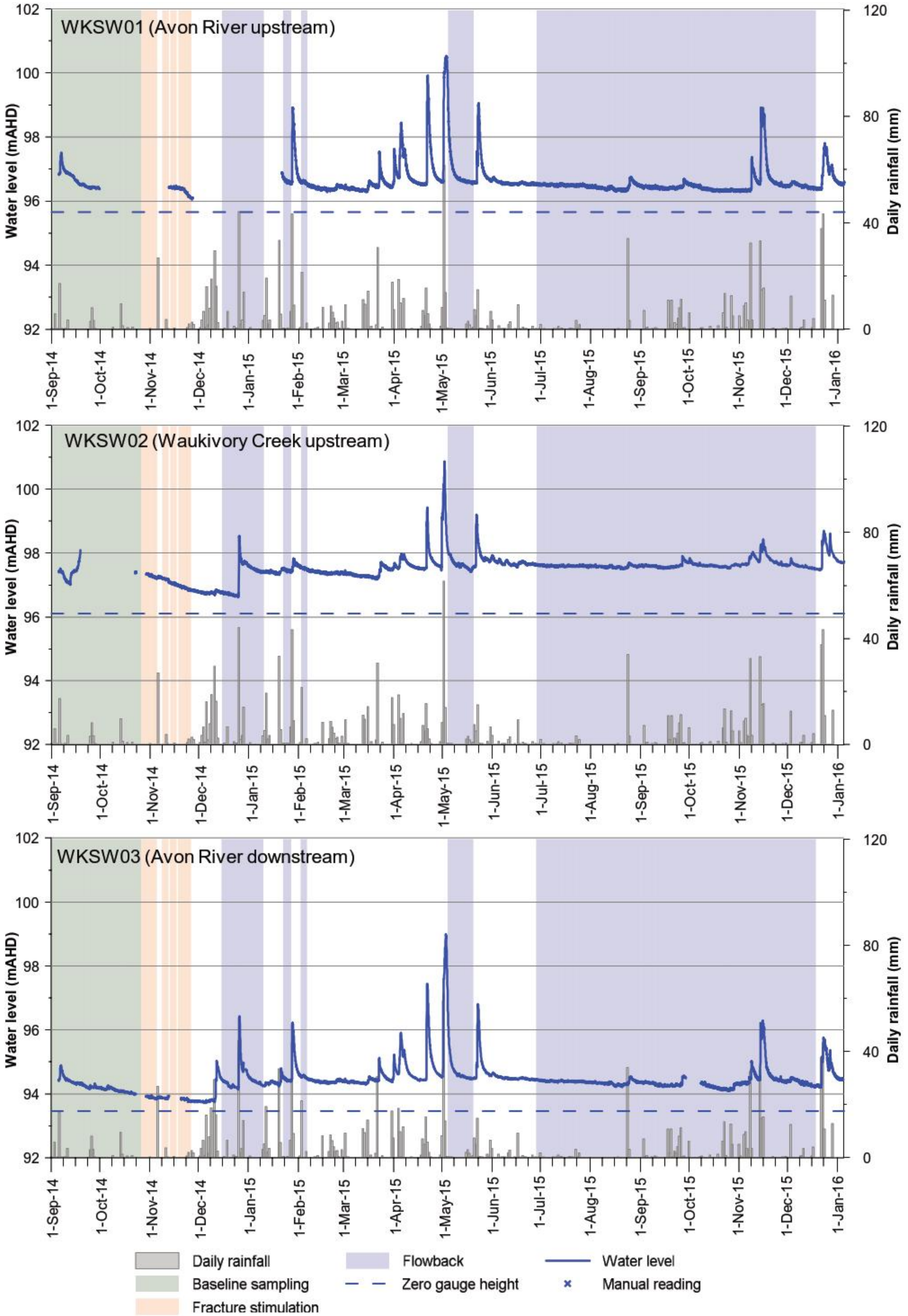


Figure 4.9 **Surface water levels and rainfall at the Waukivory stream gauges**

5. Water quality

5.1 Introduction

This section presents water quality monitoring data for the period 1 October 2015 to 31 December 2015. For the purpose of identifying trends, data collected since baseline sampling commenced in March 2014 is also included in the time-series charts in this report. The water quality assessment is described for the following components within this chapter:

- Fracture stimulation fluid composition (for comparison to flowback water quality)
- Pilot well water quality monitoring results
- AST2 water quality monitoring results
- Surface water quality monitoring results

There has been no groundwater quality sampling during the current reporting period in accordance with the sampling schedule stipulated in EPL 20358 and the SGMP (AGL 2015a).

A comprehensive suite of elements and compounds were analysed in each sample (Section 3). Water quality results and analysis for all sampling sites are provided in the Appendices.

5.2 Fracture stimulation fluid

Chemical analysis of the fracture stimulation fluid is presented in Table 5.1, and further details are provided in the Waukivory Pilot Project Surface Water and Groundwater Monitoring Report to 31 December 2014 (Parsons Brinckerhoff 2015a). For context, summary findings of chemical analysis of waters during the fracture stimulation period in November 2014 were as follows:

- The injected fracture stimulation fluid contained lower concentrations of total dissolved solids, major ions, and trace metals than the Waukivory groundwater and surface water monitoring sites.
- BTEX and some phenolic compounds were detected in baseline groundwater data, but were not present in the fracture stimulation fluids. Total petroleum hydrocarbons (TPH) were detected in both groundwater and fracture stimulation fluid at low concentrations.
- Monoethanolamine (MEA) was present in concentrations that are 2 to 3 orders of magnitude higher in the fracture stimulation fluid than in surface water and groundwater; however the presence of MEA in groundwater (detected in baseline monitoring) prior to any fracture stimulation activities and raw water during fracture stimulation indicates an alternative source other than the fracture stimulation fluid.
- THPS was also present in the fracture stimulation fluid at concentrations 2 to 3 orders of magnitude higher than the surface water and groundwater. However, there are no confirmed detections of this analyte at the water monitoring sites which could be attributed to fracture stimulation activities.
- Free and total residual chlorine (constituents of sodium hypochlorite) detections occurred at selected surface water and groundwater sites. Sodium hypochlorite was not used as a fracture stimulation additive for the Project.

Groundwater and surface water monitoring data collected during 2014 showed that MEA, THPS and free and total residual chlorine were naturally present in the surrounding environment (Parsons Brinckerhoff 2015a). The EPA subsequently conducted independent investigations (EPA 2015a, 2015b and 2015c) into the occurrence of these analytes; the key conclusions are detailed in Section 3.5.

Table 5.1 Summary of fracture stimulation fluid concentrations

Parameter	Fracture stimulation fluid
Monoethanolamine (MEA)	Values ranged from 4,200 µg/L to 5,690 µg/L.
THPS	Values ranged from 7,800 µg/L to 13,000 µg/L.
Free and total residual chlorine	Below LoR (0.2 mg/L).
BTEX compounds	Below LoR (2 µg/L).
Boron	Values ranged from 82.5 mg/L to 115.0 mg/L.
Sulphate	Values ranged from <10 mg/L to 63 mg/L.
Total phosphorus	Values ranged from 7.1 mg/L to 16.0 mg/L.
Total nitrogen (as N)	Values ranged from 48.0 mg/L to 75.8 mg/L.
Salinity (EC)	470 to 653 µS/cm
pH	Alkaline pH (8.16 to 9.09)
Major ions	Na -HCO_3-Cl
Dissolved metals	Below LoR: Sb, Be, Cd, Cr, Co, Hg, Se, U, V. Detected dissolved metal concentrations were typically higher than in the raw water (with the exception of Fe).
Nutrients	Ammonia, nitrate and nitrite concentrations (as N) ranged between the LoR (0.1 mg/L) and 0.34 mg/L. Total organic carbon concentrations ranged from 815 to 873 mg/L.
Dissolved methane	Below LoR (10 µg/L).
Petroleum hydrocarbons	Phenols and PAHs were below LORs. TPH C_{10}-C_{36} (sum) ranged from below LoR (50 µg/L) to 1,860 µg/L.

5.3 Pilot well water quality

During the flowback phase, pilot well water quality is influenced by the residual chemical signature of the fracture stimulation fluid and the water quality of the target formations exposed in the pilot well. During flowback pumping the water quality will transition towards that of the formation water with the concentration of fracture stimulation additives decreasing to background levels as the produced water phase commences.

A summary of fracture stimulation fluid chemistry is provided in Table 5.1, with further details provided in the Waukivory Pilot Project Surface Water and Groundwater Monitoring Report to 31 December 2014 (Parsons Brinckerhoff 2015a).

Water quality data from other deep coal seams (‘formation water’) within the Gloucester Basin is available from flow testing of the Craven 06 and Waukivory 03 gas wells in 2013 (Parsons Brinckerhoff 2014d), and flow testing of the Craven 06 gas well in 2014 (Parsons Brinckerhoff 2015e). However the targeted coal seams depths at these two sites are mostly shallower than the coal seams targeted in the Waukivory gas wells, and hence the EC of the produced water is generally less than at Waukivory. As a comparison, some produced water quality data for Craven 06 and Waukivory 03 is included in Figures 5.1 and 5.2.

In the Waukivory surface water and groundwater monitoring reports up to June 2015 (Parsons Brinckerhoff 2015a, 2015b and 2015c) four analytes were selected as indicators of the transition of flowback water quality towards ‘typical’ Gloucester Basin coal seam formation water (‘produced water’). However, as discussed in Section 3.5, one of these indicator analytes, THPS, was removed from the EPL in July 2015 and, as such, was removed from the discussion of pilot well water quality in Parsons Brinckerhoff 2015d. On this basis, the following assessment of the transition from flowback to produced water quality conditions focusses on the following three indicator analytes:

- *Sodium and EC* - used as general indicators of salinity to illustrate the transition from flowback water (lower EC and sodium due to dilution by fracture stimulation fluid) to produced water (naturally higher EC and sodium).
- *MEA borate* as indicated by boron – although MEA was present in high concentrations in the fracture stimulation fluid compared to the baseline groundwater and surface water data; there is no baseline MEA data for the produced water from CR06 and WK03 prior to the Project. Consequently, boron is used as an indicator of fracture stimulation fluid in flowback water as boron was present in high concentrations in the fracture stimulation fluid compared to produced water monitoring undertaken prior to the Project (i.e. from CR06 and WK03).
- *BTEX* – naturally occurring hydrocarbons in variable concentrations in deep coal seam formation water and not present in the fracture stimulation fluid.

The degree to which the flowback water quality has transitioned towards that of 'typical' Gloucester Basin coal seam formation water ('produced water') is shown by the scatter plots presented in Figure 5.1.

The three indicator analytes described above are presented in scatter plots relative to TDS concentration. This is considered appropriate since TDS shows considerable variation between the fracture stimulation fluid, flowback water and produced water, allowing the different water 'types' to be discerned. The TDS data for WK11 and WK12 during the current reporting period shows a general increase due to the recent well optimisation workover activities, discussed in Section 3.2.

Figure 5.1 shows that the flowback water quality is more similar to the CR06 and WK03 produced water than the fracture stimulation fluid.

Sodium

Sodium concentrations are considered to represent natural background variability for the target formations as the concentrations are significantly higher in flowback water compared to the fracture stimulation fluid. The sodium data shows greater concentrations at the Waukivory pilot wells compared to CR06 and WK03 which indicates that the fracture stimulation fluid has been removed and is no longer influencing the flowback water quality.

MEA borate

Boron concentrations are typically high in the fracture stimulation fluid due to the presence of MEA borate. Boron concentrations in the flowback water during the current reporting period have continued to show a low degree of variability ranging from 1.11 to 3.43 mg/L. The reduced variability in boron concentration over the last two reporting periods is therefore consistent with a transition from flowback to produced water, and demonstrates removal of the fracture stimulation fluid and the natural breakdown of MEA borate.

BTEX Compounds

There has been intensive sampling for BTEX analysis at the pilot wells during 2015 and therefore there is more BTEX data presented in Figure 5.1 compared to the other indicator analytes. The large variability in BTEX concentrations, as shown in Figure 5.1, is representative of the natural variation of these compounds within the deep coal seams. The lowest BTEX concentrations at WK11, WK12 and WK14 have been measured during the current reporting period; WK12 continues to show negligible or no BTEX detections, inferred to be due to shallower coal seams being targeted by that well. The depth of the target formations is a key influence on BTEX concentrations and as such explains the difference between the BTEX data collected at deeper wells WK11, WK13 and WK14 compared to shallower wells WK12, CR06 and WK03.

Figure 5.1 shows the water quality of the Waukivory pilot wells to be distinctly diferent form the fracture stimulation fluid with a clear transition to a chemical signature that represents produced water, as depicted by the CR06 and WK03 data. The reduction in the variablity of indictaor analytes suggests that the latest concentraitons are representtive of background levels for the target formations.

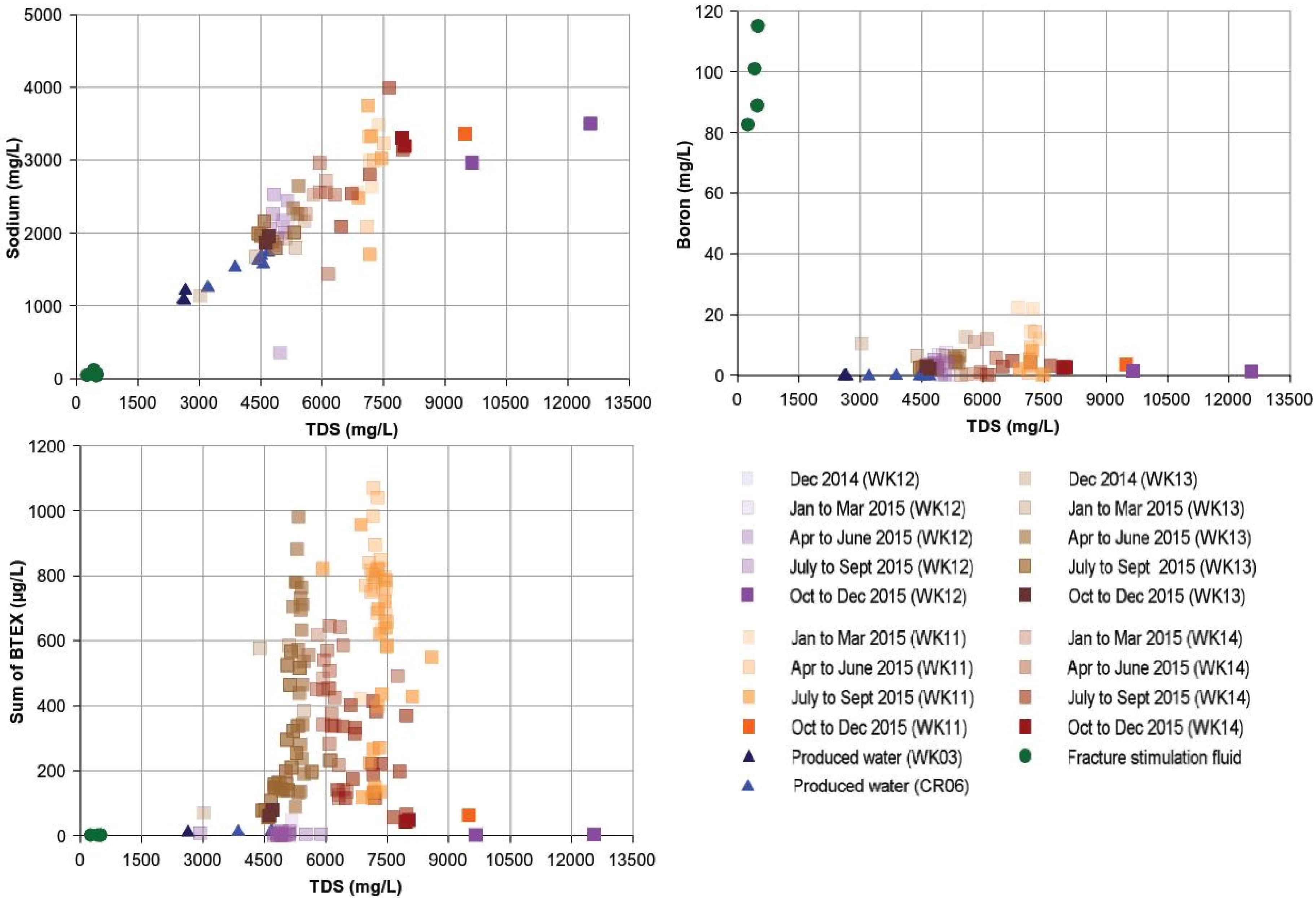


Figure 5.1 **Sodium, boron and BTEX vs TDS for formation water, fracture stimulation fluid and flowback water**

5.3.1 Results

Time series plots for EC, MEA and BTEX concentrations for each of the four pilot wells are shown in Figures 5.2 to 5.4. The data has been plotted against daily water production from each pilot well. A discussion of the interpretation of the water quality trends is provided below:

EC

Figure 5.2 shows that one of the indicators of the transition from flowback to produced water quality; an EC value above 5,000 µS/cm, has been met at all pilot wells. The EC at WK13 and WK14 has been relatively stable during the current reporting period with fluctuations that are considered to be within the natural variability of the target formation water quality. The EC at WK11 and WK12 has been affected by the well optimisation workover, discussed in Section 3.2, and is showing elevated concentrations that are not representative of the target formation due to the presence of the fluid circulated to control the well during the workover activities.

The latest sampling event (10 December 2015) shows the EC ranged from 7,240 to 15,400 µS/cm across the four pilot wells. At all pilot wells the EC is higher than the average EC from produced water (5907 µS/cm) at WK03 and CR06 (Figure 5.2). This is due to the Waukivory pilot wells targeting deeper coal seams than WK03 and CR06.

MEA

Figure 5.3 shows the variation of MEA concentrations during the current reporting period. The data continues to show variability that is consistent with natural groundwater and surface water background concentrations observed at Waukivory (Parsons Brinckerhoff 2015a). The latest sampling event from the pilot wells (10 December 2015) shows the MEA concentrations ranging from 6 to 31 µg/L.

The background MEA concentration range for Waukivory shallow groundwater and surface water monitoring is <1 to 61 µg/L. As such, the current concentrations observed at the pilot wells are consistent with the background data, which indicates that a transition from flowback to produced water is well advanced or has already occurred.

BTEX

Figure 5.4 shows the variation in the sum of BTEX compound concentration throughout the current reporting period. A continuation of the general reduction in BTEX concentrations is observed at WK11, WK13 and WK14, while the BTEX concentration at WK12 remains low or below the LoR. The BTEX and water production data presented in Figure 5.4 demonstrates that through continued pumping, the BTEX concentrations reduce to background levels for the target formations (produced water quality). During the current reporting period the sum of BTEX concentrations at the pilot wells have ranged from <2 to 79 µg/L, which is comparable to the background BTEX concentration range observed in the broader Waukivory shallow groundwater monitoring data of <2 to 72 µg/L.

The sum of BTEX concentrations in WK12 are low (<5 µg/L during the current reporting period) compared to the other pilot wells. WK12 is perforated against shallower intervals (maximum depth of 597 mbgl at WK12, compared to 964 mbgl at WK11, 946 mbgl at WK13 and 805 mbgl at WK14). This data supports the findings of the investigation into the occurrence of BTEX compounds in flowback water carried out by AGL, the EPA and the DRE (DRE, 2015 and EPA, 2015d). The investigations concluded that the source of BTEX in the flowback water is naturally occurring in groundwater within the deep coal seams at depths in excess of 600 m below the surface.

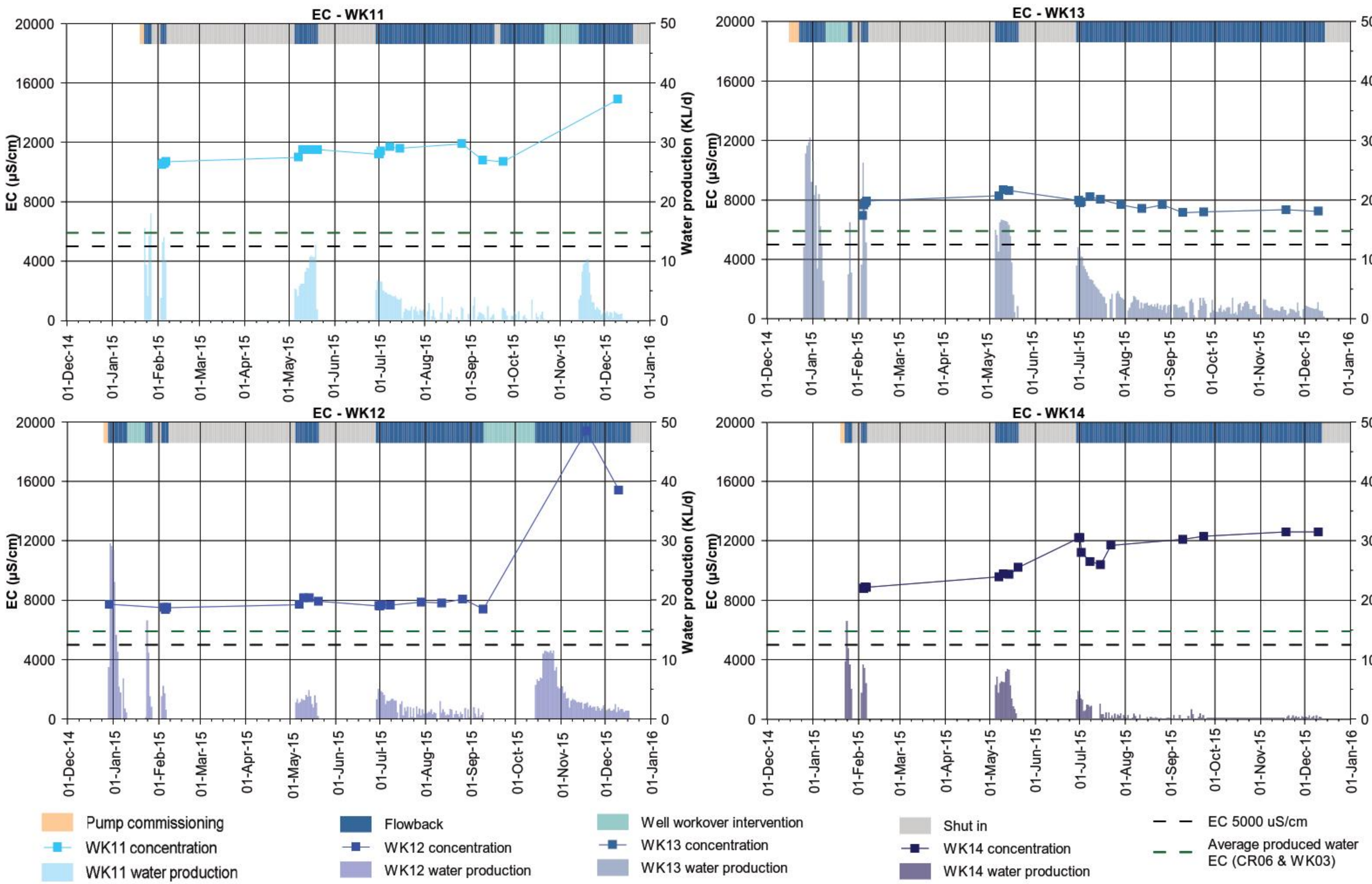


Figure 5.2 **Laboratory electrical conductivity (EC) measurements and flowback volumes at the Waukivory pilot wells**

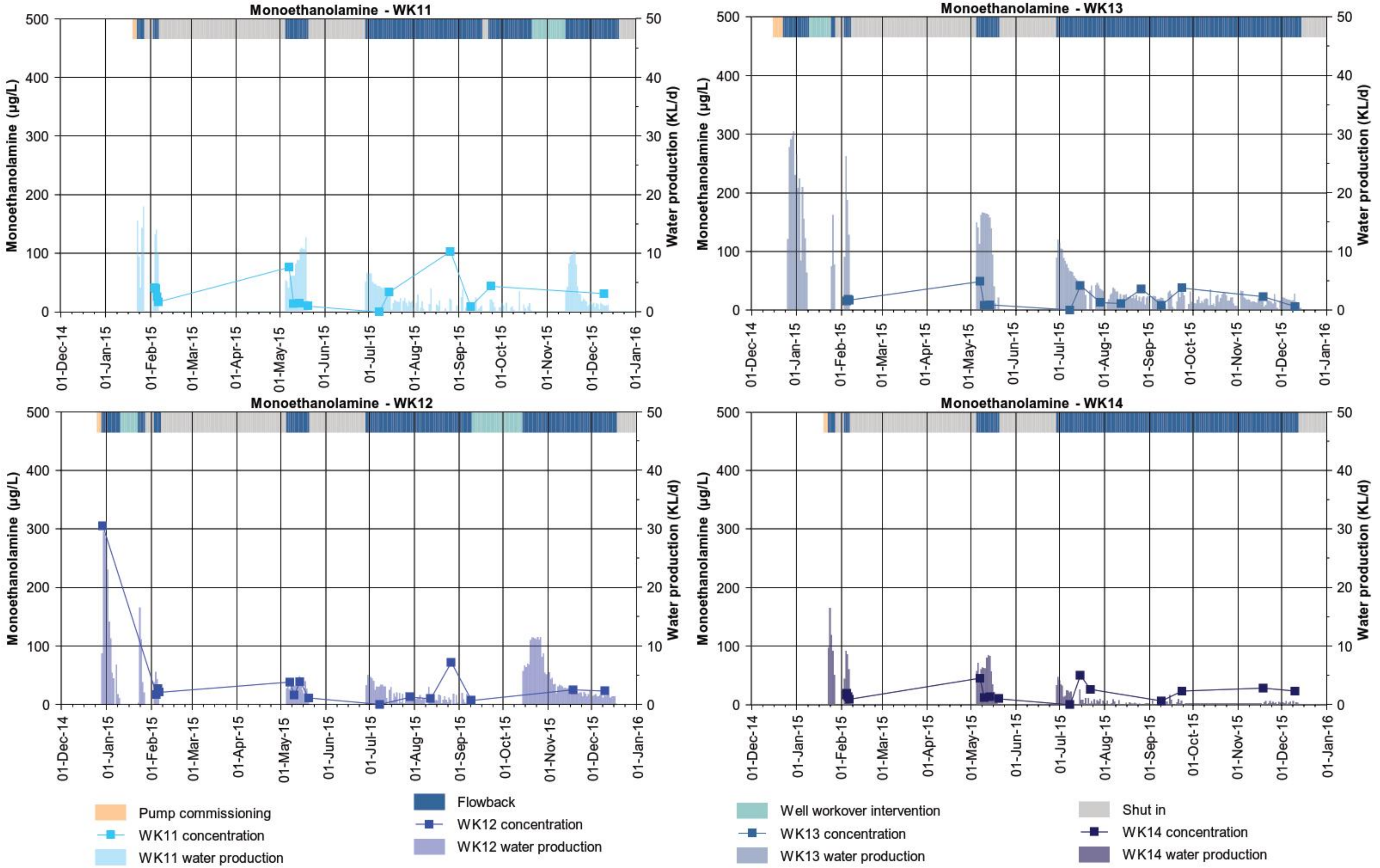


Figure 5.3 **Monoethanolamine concentrations and flowback volumes at the Waukivory pilot wells**

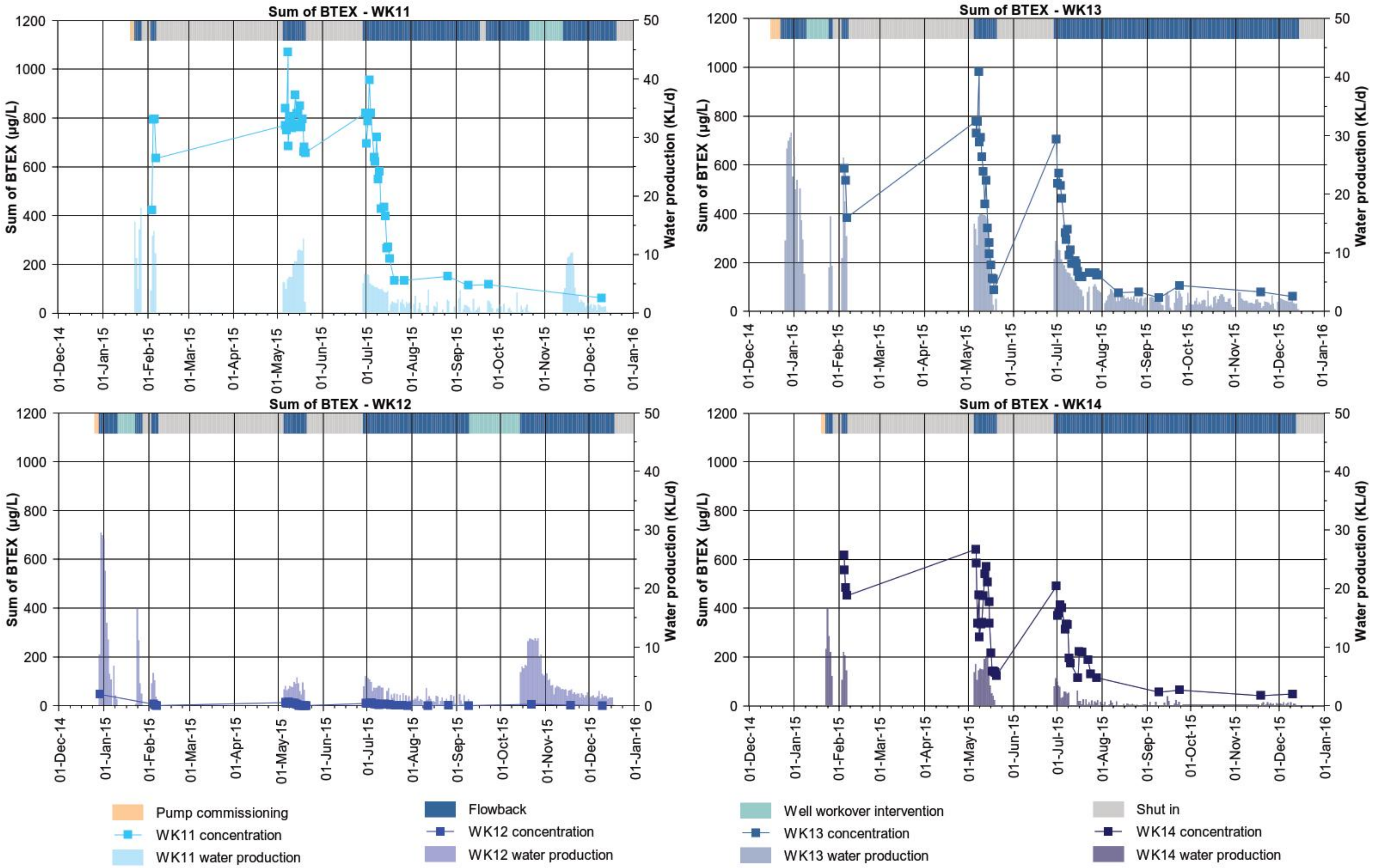


Figure 5.4 Sum of BTEX concentrations and flowback volumes at the Waukivory pilot wells

5.3.2 Unionised hydrogen sulphide

Hydrogen sulphide (H_2S), as indicated by the concentration of unionised hydrogen sulphide (UHS), is a metabolic by-product of sulphate reducing bacteria (SRB), which obtain energy by oxidizing organic compounds or molecular hydrogen while reducing sulphate to H_2S. UHS concentrations provide an indicator of the potential for corrosive processes of steel infrastructure.

SRB generally thrive in the absence of oxygen and highly reduced environments; however they can circulate in aerated waters and have been detected in surface water samples from WKSW01, WKSW02 and WKSW03 and shallow rock monitoring bore WKMB06B during previous reporting periods (Parsons Brinckerhoff 2015c).

SRB are capable of causing corrosion because they produce enzymes which accelerate the reduction of sulphate compounds to produce corrosive H_2S. As such, SRB act as a catalyst in the reduction reaction however the presence of SRB alone is not an indicator of corrosion risk. The microbiological, organic and inorganic chemistry must be reviewed to provide a complete understanding as in the absence of sulphate and under alkaline pH conditions; SRB cannot produce the corrosive H_2S.

All pilot well samples showed UHS concentrations below the LoR of 0.1 mg/L.

The pH of the flowback water varies between 7 and 10 and the sulphate concentration of the flowback water is typically low (<5 mg/L). Despite the presence of SRB (Parsons Brinckerhoff 2015c), the water chemistry results have shown the concentrations of UHS as being undetectable (<LoR) and hence insufficient to compromise well integrity by corrosion.

5.4 AST2 water quality

AST2 is an open topped, 1.5 ML above ground storage tank situated adjacent to WK13 (Figure 3.1) receiving flowback water from the four pilot wells. Flowback water is stored in AST2 prior to disposal to a licenced facility. Monitoring at AST2 allows identification of changes in the flowback water chemistry over time and provides a water quality assessment for disposal purposes.

The water quality at AST2 will be influenced by the following factors:

- Quantity and quality of the flowback water
- Relative contributions from each gas well
- Meteorological conditions such as rainfall and evaporation
- Microbial activity
- Length of time the water has been standing.

Comprehensive water quality data and time series plots for AST2 are presented in Appendices D and F respectively. This section focuses on the results of BTEX analysis only in AST2 with respect to the trigger levels discussed in section 3.6.

5.4.1 BTEX

Figure 5.5 shows the variation in the sum of BTEX concentration at AST2. There have not been any detection of BTEX compounds during the current reporting period. The sum of BTEX concentration at AST2 are generally lower than that measured at the pilot wells due to the volatilisation of these compounds from the surface of the water in AST2 and dilution by rainfall.

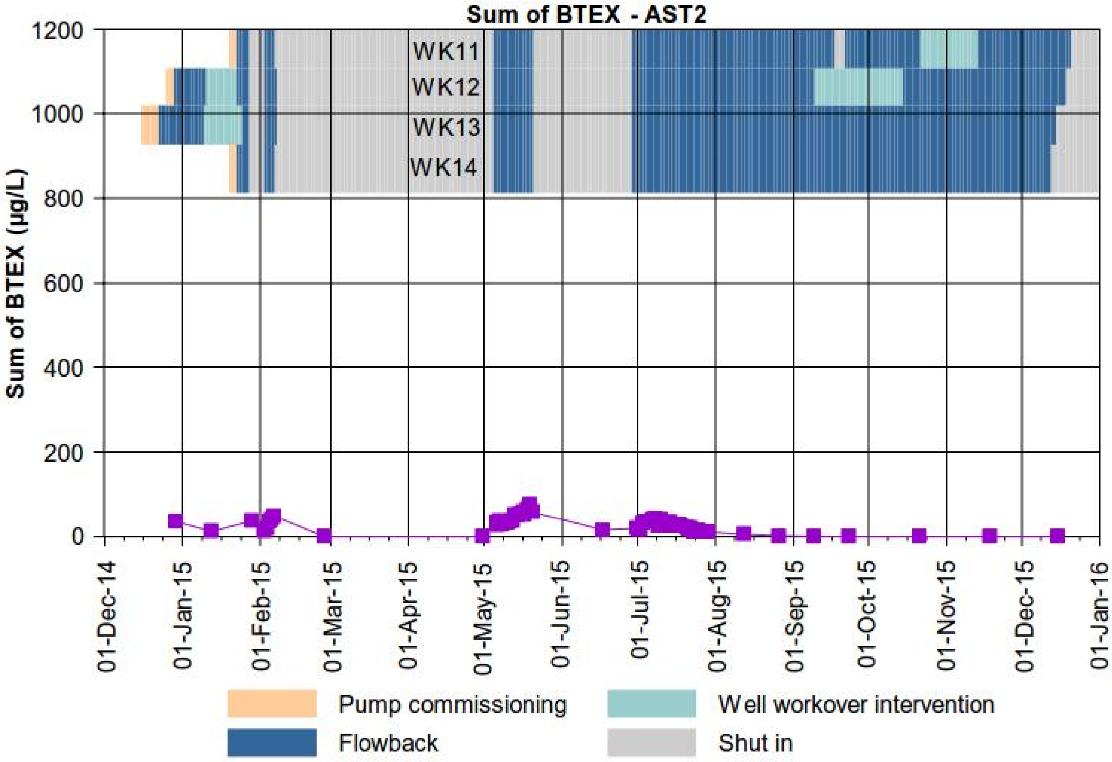


Figure 5.5 Sum of BTEX concentrations at AST2

Figure 5.6 shows the variation of the individual BTEX compounds during the current reporting period in relation to the adopted threshold values based on the protection of human health and the environment (Table 3.8). The concentration of BTEX compounds at AST2 is consistently several orders of magnitude below the adopted threshold values and has been below the LoR since August 2015.

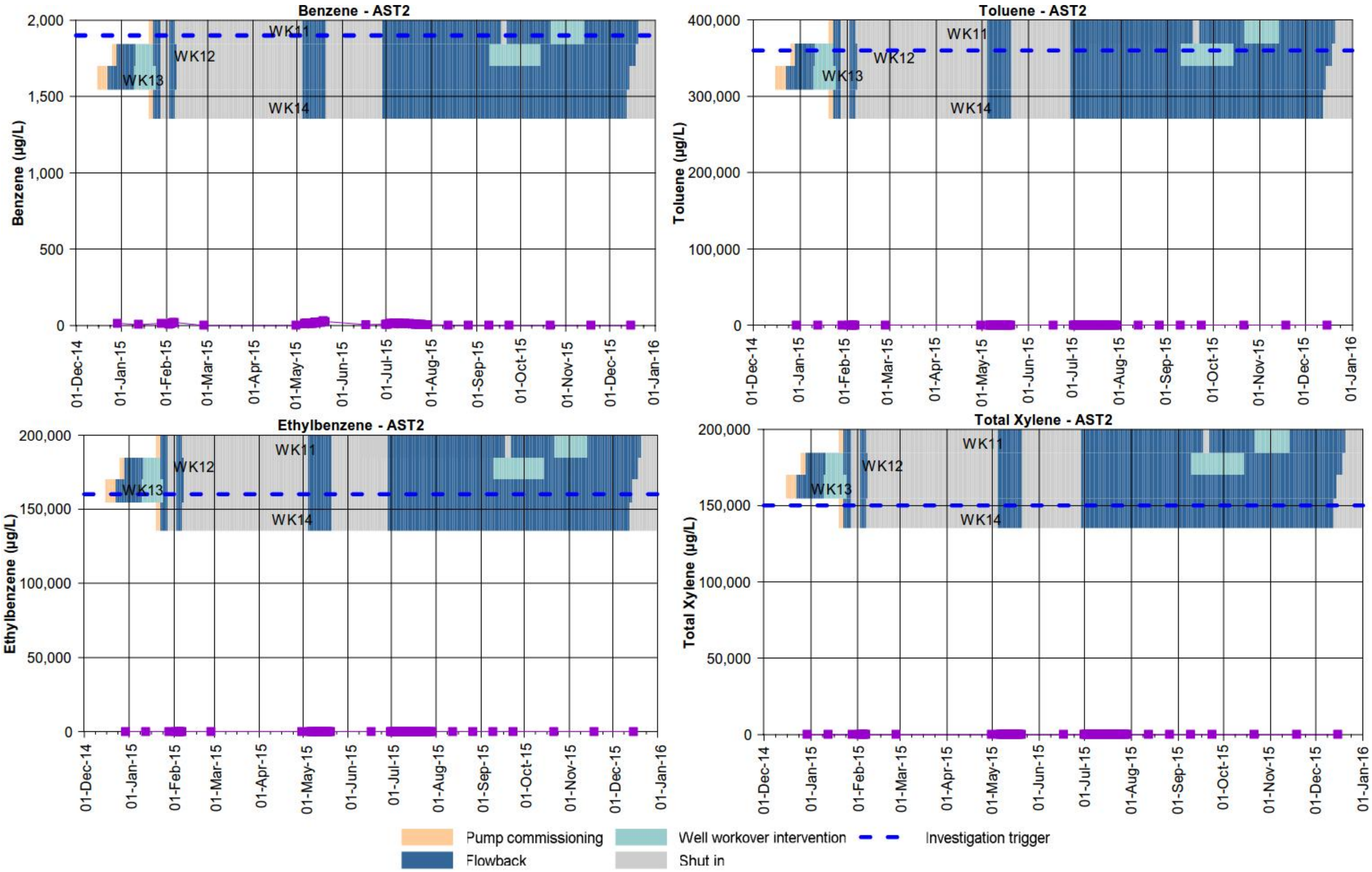


Figure 5.6 **Benzene, Toluene, Ethylbenzene and Total Xylene concentrations at AST2**

5.4.2 Unionised hydrogen sulphide

During the current reporting period there were no detections of UHS at AST2.

5.5 Groundwater and surface water quality

The following section presents the water quality data from the Waukivory surface water monitoring sites. The sampling events undertaken throughout the Project are shown in Figure 3.4.

5.5.1 Analysis methodology

The analytical methods selected for the groundwater and surface water quality data and the rationale for their use in this investigation are discussed in the monitoring report covering the period January to March 2015 (Parsons Brinckerhoff 2015b).

The methodology is consistent with the requirements of the environmental guidelines for fresh and marine water quality (ANZECC 2000) and the Surface and Groundwater Management Plan (SGMP) (AGL 2015a).

The analysis methodology is summarised as follows:

1. ***Filter***: All analytes (187) were filtered to identify those for which there were no detections in any sample. Those analytes were not considered further. After removing a number of non-critical and duplicated analytes, a residual list of 63 analytes remained.
2. ***Plot***: Time series plots of concentration for each detected analyte at each monitoring site were generated (Appendix I). A 5th and 95th percentile concentration was calculated for each time series, for all data *prior* to the current reporting period. These levels reflect the variation in the sample analyses and serve as '***indicator thresholds***' above (or below) which further assessment of the data may be required.
3. ***Threshold test***: The exponentially weighted moving average (EWMA) was calculated for each time series. The EWMA is a moving average that is weighted in favour of the most recent sample; the weighting decreases exponentially for progressively older samples. The parameter alpha (α) controls the distribution of weighting (a value of 0.2 was used in the analysis). An *indicator threshold* (above) is triggered if one or more EWMA values for the reporting period (quarter) exceed the 95th percentile value. The trigger simply indicates a potential trend requiring further comment; it is not a regulatory exceedance.
4. ***Trend test***: The Mann-Kendall rank correlation test (Kendall, 1938) was applied to each time series to identify if a statistically significant trend (or dependence) exists in the concentration of each analyte with respect to time. The test was applied to samples collected between the start of the fracture stimulation to the most recent sample. The level of significance was set at 95% (p-value ≤ 0.05). As above, a significant trend indicates that further review and comment is warranted.
5. ***Action trigger***: On its own, a significant data trend (as determined by the Mann-Kendall test) or an exceedance of a 95th percentile indicator threshold does not necessarily indicate impact from a disturbance activity. Rather, it acts as a trigger for further data review and assessment to determine the cause of the trend. This is a data review action trigger and is different to the primary trigger levels and the thresholds for action that AGL has adopted in the SGMP should there be a perceived risk to human health or the environment.
6. ***Response***: Trends that trigger an indicator threshold will be further assessed to determine if:
    a) there is sufficient data to adequately define the natural variation in concentrations
    b) the trends are clearly related to Project activities

c) there are other factors that may indicate enhanced connectivity between the gas well and the monitoring site.

If the further data assessment suggests that the trend is related to Project activities then the trend will be tracked more closely before the investigation and action levels in the SGMP are triggered and other management responses are required.

If it is concluded that the data suggests an adverse trend related to Project activities then an investigation and management response will be initiated as described in the SGMP.

5.5.2 Results

Time series plots of each analyte (for which at least one sample is > LoR) and for each monitoring site are shown in Appendix I. The plots show blue shading representing the 5th to 95th percentile range of concentration prior to the last quarter and the EMWA trend in red. The fracture stimulation periods are shown in pink shading. The Mann Kendall Statistic is also shown ('nan' is shown if there is insufficient data above LOR). An example of a time series plot used for trend assessment is shown in Figure 5.7.

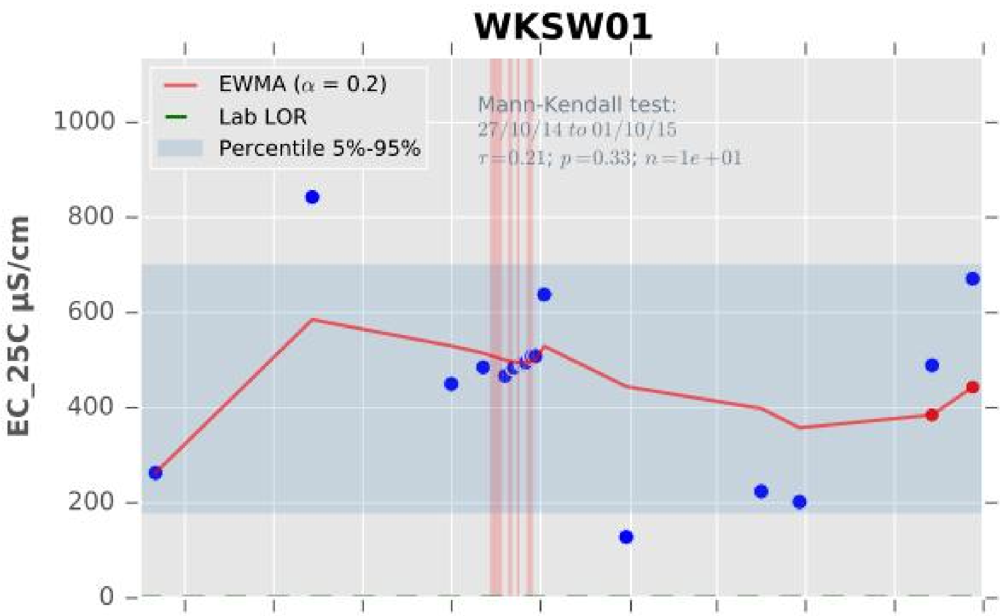
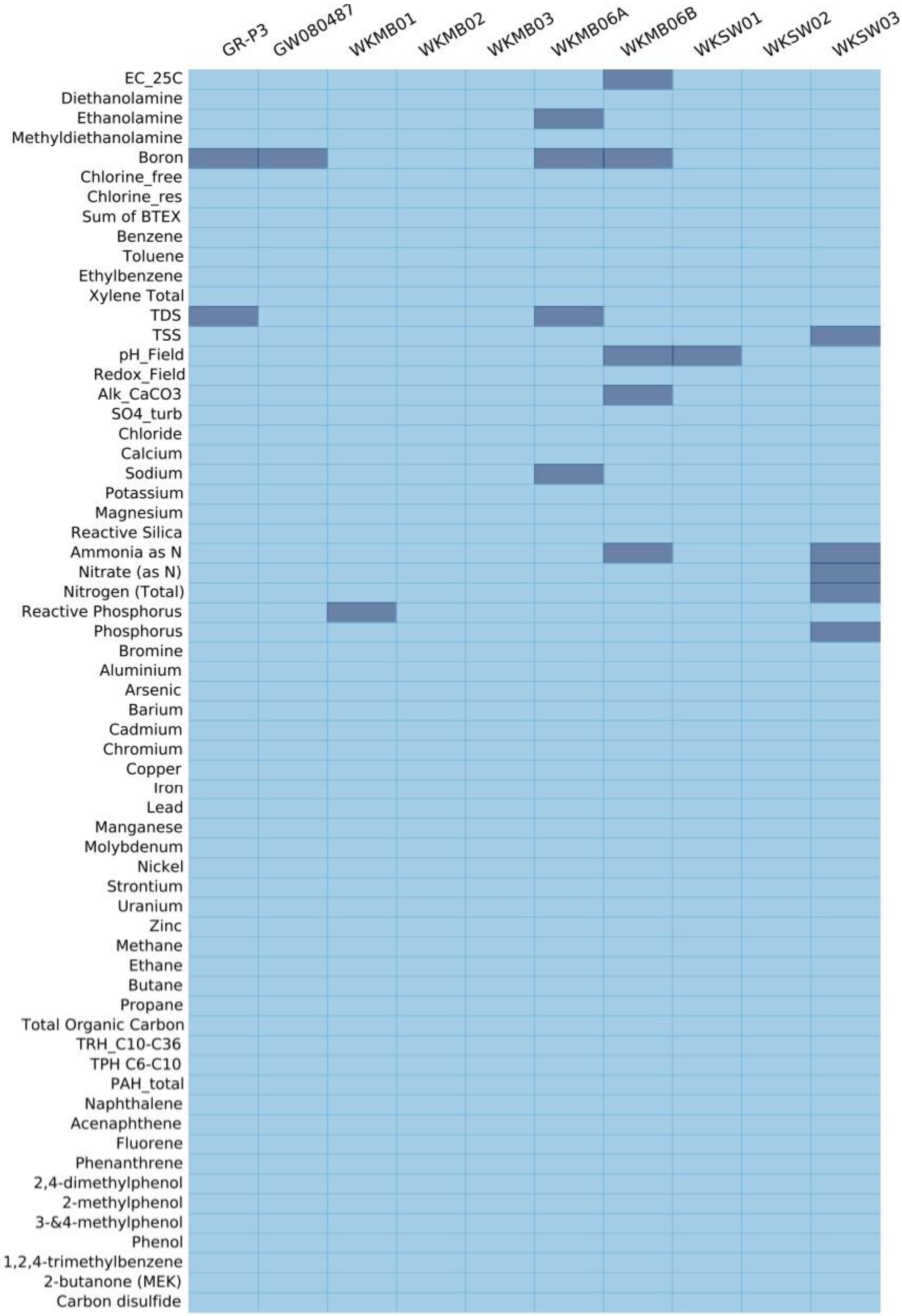


Figure 5.7 Example of time series plot used for trend analysis

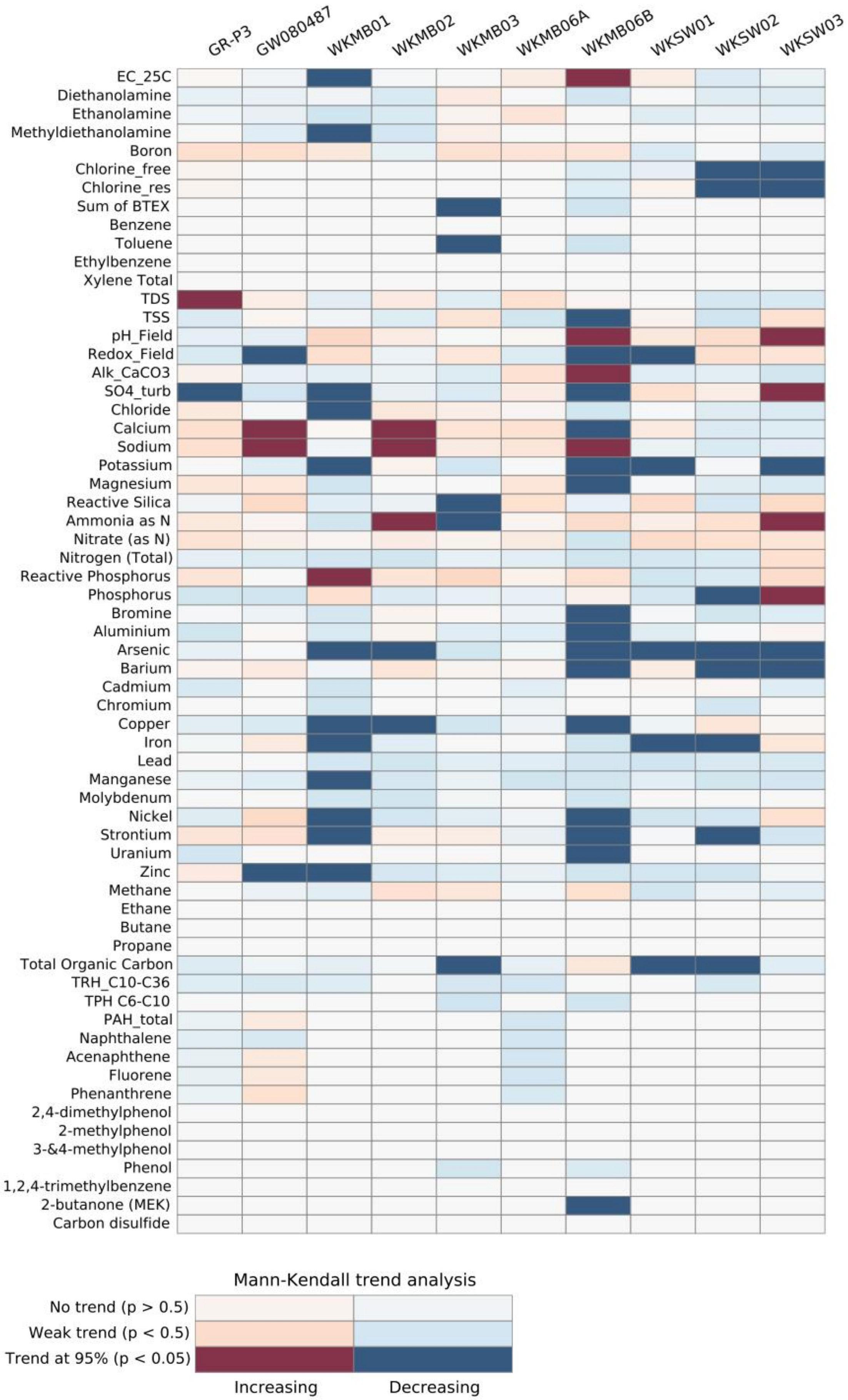
Table 5.2 summarises sites and analytes for which at least one EMWA value in the last quarter has exceeded the 95th percentile (dark blue shading). Table 5.3 summarises locations and analytes for which the time series data define a significant trend. The table is colour-coded to signify the direction of the trend (reds = increasing, blues = decreasing) and the significance of the trend. The strongest coloured rectangles represent trends that are significant at the 95% level. Locations and analytes for which an indicator threshold has been triggered are further considered in Table 5.4 to assess whether additional investigation and management is required as listed in the SGMP (AGL 2015a).

Table 5.2 Comparison of the EWMA to the 5th and 95th percentile for the current reporting period



Note: Dark blue indicates sites and analytes for which at least one EMWA value in the last quarter has exceeded the 95th percentile (the P95 is calculated for data prior to the current reporting period).

Table 5.3 Summary of trends in water quality data up to 31 December 2015



5.5.3 Groundwater quality

Groundwater monitoring sites and analyses for which time series data have triggered an indicator threshold are listed in Table 5.4. Each trigger event is assessed in line with the criteria in Section 5.5.1 to determine if further investigation of the data is justified.

Table 5.4 Groundwater monitoring sites and analytes that trigger further review

Site	Analyte	Indicator type[a]	Comment	Action
WKMB01	Reactive Phosphorus	T	Rising trend over latest sampling events, most recent data is below 95th percentile	No
WKMB02	Ammonia as N	T	Rising trend over latest sampling events, most recent data is below 95th percentile	No
WKMB06B	EC	E&T	Rising trend in EC over recent sampling events, data considered to be representative of the formation. Limited data set for this site so percentile range may not yet represent long term seasonal variation	No
	Boron	E	One detection of boron (0.12 mg/L) marginally above the LoR (0.05 mg/L). Detection is low compared to natural background variability. Limited data set for this site so percentile range may not yet represent long term seasonal variation	No
	Sodium	T	Slight rising trend over recent sampling events, EWMA within 95th percentile. These analytes are not associated with Project activities	No
	Alkalinity (CaCO3)	T		No
GR-P3	TDS	T	Slight rising trend over recent samples, EWMA still within 95th percentile	No
GW080487	Calcium	T	Slight rising trend over recent samples, EWMA still within 95th percentile. These analytes are not associated with Project activities	No
	Sodium	T		No

a) Indicator threshold type: E = EWMA outside the 5 – 95%; T = significant positive trend (Mann-Kendall $p \leq 0.05$)

5.5.3.1 Key analytes in groundwater

There has been one detection of MEA in groundwater during the current reporting period. 2 µg/L was measured at GW080487 on 17 December 2015. This value is within baseline concentrations of this analyte (Parsons Brinckerhoff, 2015a).

There have not been any detections of free or total residual chlorine at the groundwater monitoring sites during the current reporting period.

5.5.3.2 Other analytes in groundwater

Table 5.4 shows rising trends in some nutrient related analytes including phosphorous, ammonia, alkalinity and calcium, in some of the shallow rock monitoring bores. These analytes are not associated with Project activities and their background variability may be attributable to local land use practices.

5.5.4 Surface water quality

Surface water monitoring sites and analyses for which time series data have triggered an indicator threshold are listed in Table 5.5. Each trigger event is assessed in line with the criteria in Section 5.5.1 to determine if further investigation of the data response is justified.

Table 5.5 Surface water monitoring sites and analytes that trigger further review

Site	Analyte	Indicator type[a]	Comment	Action
WKSW03	Ammonia as N	T	Slight rising trend over recent samples, EWMA still within 95th percentile. These analytes are not associated with Project activities and may be associated with local land use practices and other upstream agricultural activities	No
	Field pH	T		No
	Sulphate (turb)	T		No

a) Indicator threshold type: E = EWMA outside the 5 – 95%; T = significant positive trend (Mann-Kendall $p \leq 0.05$)

5.5.4.1 Key analytes in surface water

There has been two detections of MEA in surface water during the current reporting period. 2 µg/L was measured at WKSW02 and 3 µg/L was measured at WKSW03 on 21 October 2015. These values are within baseline concentrations of this analyte (Parsons Brinckerhoff, 2015a).

There has been one detection of total residual chlorine in surface waters during the current reporting period. 0.3 mg/L was measured at WKSW01 on 16 December 2015. This value is within baseline concentrations of this analyte (Parsons Brinckerhoff, 2015a).

5.5.4.2 Other analytes in surface water

The EWMA for nitrogen (total), phosphorous and ammonia (as N) at WKSW03 has exceeded the 95th percentile of the historic data and some analytes, mostly nutrients, are showing an upward trend according to the Mann Kendal trend analysis (Table 5.3) at WKSW03. This is not considered to be related to Project activities as an increase in nutrient concentrations within the Avon River is considered indicative of local land use practices such as the use of fertilisers and other upstream agricultural activities.

6. Flowback and produced water

The total volume of fluid injected during fracture stimulation, and flowback volumes and percentage recovered up to 31 December 2015 are provided in Table 6.1. Flowback volumes are provided for all four pilot wells since commissioning in December 2014 (WK12 and WK13) and January 2015 (WK11 and WK12).

A comparison of cumulative flowback volumes recovered and laboratory electrical conductivity (EC) measurements in each of the four pilot wells is shown in Figure 6.1. At 31 December 2015 the salinity trigger of 5000 µS/cm has been reached and maintained for the flowback waters at all wells.

As discussed in Section 5.3, the chemical characteristics of the water from the pilot wells no longer shows a signature associated with the fracture stimulation fluid and is considered to be representative of produced water from the target formations.

Table 6.1 Flowback volumes recovered up to 31 December 2015

	WK11		WK12		WK13		WK14	
	litres	%	litres	%	litres	%	litres	%
Total volume injected	893,720	-	636,134	-	1,503,030	-	476,388	-
Total volume recovered relative to volume injected at 31 December 2015	596,720	66.8	678,802	106.7	1,217,357	81.0	291,533	61.2
Produced water volume at 31 December 2015	0	-	42,668	-	0	-	0	-

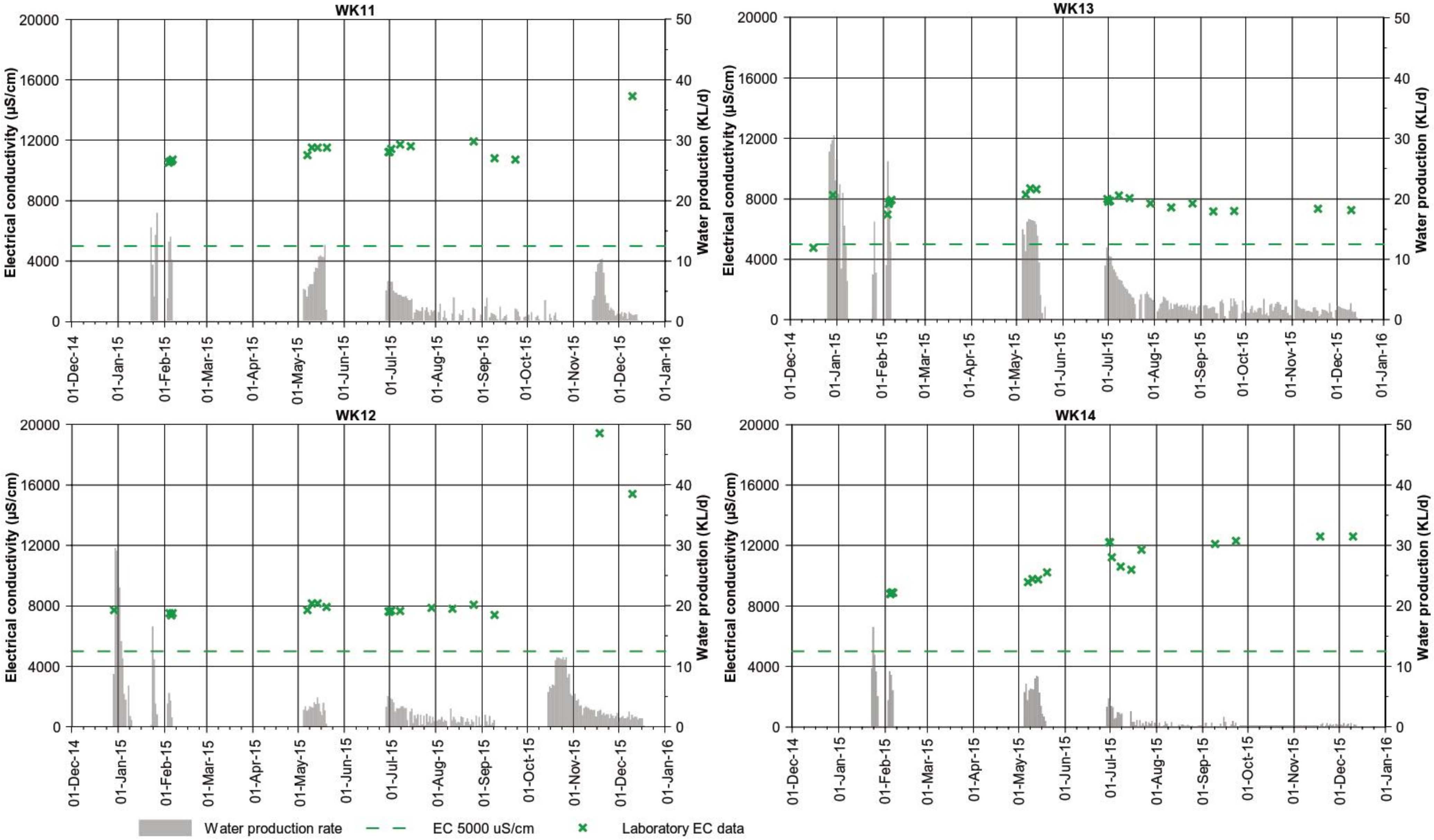


Figure 6.1 **Laboratory electrical conductivity measurements and flowback volumes at the Waukivory pilot wells**

7. Beneficial use

Water beneficial use categories of domestic, stock, industrial and irrigation are based on yield and salinity characteristics. A generalised beneficial use matrix is described in the SGMP (AGL 2015a). Each aquifer can be assigned one or more beneficial use categories (based on the matrix in Table 7.1). Beneficial use categories can vary spatially for each groundwater system.

The aquifers in the Waukivory area rarely yield water at a rate greater than 1 L/s and contain poor water quality with salinities greater than 1,600 µS/cm (AGL 2015a). The beneficial use categories that apply across the Gloucester Basin are shown in Table 7.1.

Table 7.1 Generalised beneficial use matrix, based on salinity and yield

		Yield (L/s)			
		<5	0.5-5	<0.5	
Salinity (µS/cm)	0-800	D+I+S	D+I+S	D+S	**A**
	801-1600	D+I+S	D+I+S	D+S+In	**B**
	1601-4800	I+S+In	I+S+In	S+In	**C**
	4801-10000	S+In	S+In	In	**D**
	10001-20000	In	In	In	**E**
	>20000				**F**
		1	**2**	**3**	

Key: D – domestic; I – irrigation; S – stock; In – industry

- Alluvial baseline
- Alluvial fracture stimulation
- Alluvial flowback
- Shallow rock baseline
- Shallow rock fracture stimulation
- Shallow rock flowback

The salinity (EC) data on which the beneficial use classification for the Waukivory pilot area is based is summarised in Table 7.2. All data that is within the 10th percentile and the 90th percentile has been used in the beneficial use classification. A percentile is the value below which a given percentage of observations fall. For example, the 10th percentile is the value below which 10% of observations are found. The 10th and 90th percentiles presented in Table 7.2 are used as a method of discounting outlying values.

The yield data is assumed to remain unchanged from the assessment documented in the SGMP (AGL 2015a).

Table 7.2 Summary statistics for electrical conductivity during baseline, fracture stimulation and flowback/produced water quality monitoring

		Electrical conductivity (µS/cm)			
		Alluvial		**Shallow Rock**	
		Field	**Lab**	**Field**	**Lab**
Baseline	10th percentile	3966	4105	880	912
	Median	4013	4215	3865	3970
	90th percentile	4248	4297	5644	5960
Fracture stimulation	10th percentile	2737	2754	884	862
	Median	3821	4090	3739	3870
	90th percentile	4013	4105	4920	5048
Flowback and produced water	10th percentile	2355	2346	908	919
	Median	3298	3160	1507	1450
	90th percentile	4151	4180	4480	4452

The following beneficial use categories can be assigned to each of the groundwater systems in the Waukivory area during the baseline reporting period, as shown in Table 7.1:

- Alluvial aquifers – C2, C3
- Shallow rock aquifers – B2, B3, C2, C3, D2, D3.

The following beneficial use categories can be assigned to each of the groundwater systems in the Waukivory area during the fracture stimulation period, as shown in Table 7.1:

- Alluvial aquifers – C2, C3
- Shallow rock aquifers – B2, B3, C2, C3, D2, D3.

The following beneficial use categories can be assigned to each of the groundwater systems in the Waukivory area during the flowback period, as shown in Table 7.1:

- Alluvial aquifers – C2, C3
- Shallow rock aquifers – B2, B3, C2, C3.

Salinity (EC) data from the current reporting period show an apparent improvement compared to the baseline and fracture stimulation reporting periods. This is likely due to natural variation (such as rainfall recharge during the period) combined with the relatively limited data available during the flowback reporting period. No management response is required.

Water beneficial use categories of domestic, stock, industrial and irrigation are based on yield and salinity characteristics. There has been no change in the beneficial use classification of the different waters across the different phases of the Project.

8. Conclusions

The following conclusions are drawn from a review of the flowback water, groundwater and surface water monitoring data for the Waukivory site, during the period 1 October to 31 December 2015. The review included:

- Interpretation of water level and water quality trends
- Assessment as to whether trends are naturally occurring or potentially attributed to Project activities
- Assessment of key analytes associated with fracture stimulation additives defined in AGL's SGMP.

Pilot well water levels

Water levels in the pilot wells are highly variable and dependent on pump operation, including fluctuating pumping rates and the operational management of the gas wells influencing the build-up/release of gas pressure within the well casing above the water level.

At the start of the reporting period at 1 October 2015, water levels at WK11, WK13 and WK14 continued to show fluctuation in response to pumping. WK12 was undergoing well optimisation workover from 10 September to 14 October 2015 and the same activity took place at WK11 from 22 October until 13 November 2015. The workover activity was designed to increase flow from the well. Following the workover activities at WK11 and WK12 there was an increase in pumping rate compared to the previous reporting period and the pumped water levels were slightly lower than before the well optimisation workover.

The commencement of the extended pressure build up test from 14 December at WK11, WK13 and WK14 and 16 December at WK12 can be seen in the hydrographs from an initial rapid recovery of water levels followed by a slower recovery until the end of the reporting period.

Pilot well water quality

The chemical characteristics of the water from the pilot wells no longer shows a signature associated with the fracture stimulation fluid and is considered to be representative of produced water from the target formations based on a comparison with produced water from CR06 and WK03.

The EC of the flowback water from all pilot wells is greater than the 5000 µS/cm trigger for the transition from flowback to produced water.

The EC at WK13 and WK14 has been relatively stable during the current reporting period with fluctuations that are considered to be within the natural variability of the target formation water quality. The EC at WK11 and WK12 has been affected by the well optimisation workover activities and is showing elevated concentrations that are not representative of the target formation due to the presence of the fluid used in the workover activities.

MEA concentrations show no overall trend with variability consistent with that observed in the background data from the shallower groundwater and surface water monitoring sites.

A continuation of the general reduction in BTEX concentrations is observed at WK11, WK13 and WK14, while the BTEX concentration at WK12 remains below detection. During the current reporting period the sum of BTEX concentrations at the pilot wells have ranged from <2 to 79 µg/L, which is comparable to the background BTEX concentration range observed in the broader Waukivory shallow groundwater monitoring data of <2 to 72 µg/L.

All pilot well samples showed unionised hydrogen sulphide (UHS) concentrations to be below detection and as such, concentrations are considered insufficient to compromise well integrity due to corrosion.

Pilot well water volumes

During the current reporting period, WK12 transitioned from the flowback phase to the produced water phase as over 100% of the total volume injected during fracture stimulation and subsequent workover activities has been recovered.

The total water volume recovered from each well as of 31 December 2015 ranges from 291,533 to 1,217,357 L.

The water recovery as a percentage of total volume injected during fracture stimulation for individual wells ranges from 61.2% to 106.7% as of 31 December 2015.

AST2 water quality

There has not been any detections of BTEX compounds or UHS in storage tank AST2 during the current reporting period.

The sum of BTEX concentration is generally an order of magnitude or more lower than that measured at the pilot wells due to the volatilisation of these compounds from the surface of the water in AST2 and dilution by rainfall.

The concentration of BTEX compounds are consistently several orders of magnitude below the adopted threshold values relating to human and environmental health (SGMP Table 6.2 (AGL 2015a)).

Groundwater levels

Groundwater levels in all Waukivory monitoring bores targeting the alluvium, shallow rock and upper interburden including the thrust fault zone have shown no response attributable to fracture stimulation or pumping from the pilot wells during the current reporting period.

The variation in groundwater levels has not exceeded the adopted triggers as defined in the SGMP (AGL 2015a) being 2 m (outside of the normal range) decline in aquifers less than 75 m from the ground surface and 5 m (outside of the normal range) decline for deeper (non-coal) monitoring zones.

Groundwater levels in alluvial monitoring bores GR-P3 and WKMB06A show an overall increase of approximately 0.2 to 0.3 m and groundwater levels in the shallow rock monitoring bores WKMB01, WKMB02 and WKMB06B show an overall increase of up to 0.3 m in response to increased rainfall recharge compared to the previous reporting period.

Groundwater levels at WKMB03 show a distinctive delayed recovery response to sampling events and a subdued and delayed response to seasonal climatic variations rather than a response to individual rainfall events. This is indicative of very low hydraulic conductivity within the interburden/fault zone. During the current reporting period groundwater levels at WKMB03 have shown a negligible increase of 0.05 m.

Both WKMB03 and WKMB06B are screened across the thrust fault zone, and WKMB06A is screened within the alluvium above the thrust fault zone. Hydrographs from these three monitoring bores show no anomalous water level responses and therefore provide no evidence of connectivity between the fracture stimulation zones and the shallow groundwater system via the thrust fault zone.

Groundwater levels at the WKMB06A and WKMB06B show a very slight upward vertical gradient between the shallow rock and the alluvium, which is characteristic of groundwater discharge areas.

It is possible that the slight decrease in piezometric levels at WKMB05 sensors 1, 2 and 3 represent a pressure response to flowback at WK13. Sensor 4 continues to show an increase in piezometric level that commenced around mid-August 2015. It is possible that the piezometric levels in sensor 4 are showing a recovery response to the reduced water production rate at WK13. There is uncertainty as to whether the piezometric levels in WKMB05 sensors 5 and 6 have reached equilibration following installation; this will be reviewed as additional monitoring data becomes available.

The piezometric levels at all sensors in WKMB05 show an upward vertical gradient with the exception of sensors 1 and 2, which is considered to be due to pumping at WK13 depressurising the Cloverdale Seam. The upward vertical gradient is consistent with the conceptual hydrogeological model.

Groundwater quality

Groundwater quality data shows that there were no adverse trends associated with Project activities.

Surface water levels

Water levels at stream gauge sites WKSW01 (Avon River upstream of the Project site), WKSW02 (Waukivory Creek upstream of the Project site) and WKSW03 (Avon River downstream of the Project site) show no change in water levels attributable to fracture stimulation or pumping from the pilot wells during the current reporting period.

Surface water levels showed a slight overall increase in water levels over the reporting period. Water levels at the three stream gauge sites responded to the significant rainfall/runoff events in mid-November 2015 and late-December 2015.

Surface water quality

Surface water quality data shows that there were no adverse trends associated with Project activities.

Water Beneficial Use Conditions

Water beneficial use categories of domestic, stock, industrial and irrigation are based on yield and salinity characteristics. There has been no change in the beneficial use classification for any of the groundwater systems.

Actions to correct identified adverse trends

Analysis of water monitoring results for both water levels and water quality has not identified adverse trends that require corrective action.

9. Statement of limitations

Scope of services

This second operational quarterly report (the report) has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the client and Parsons Brinckerhoff (scope of services). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

Reliance on data

In preparing the report, Parsons Brinckerhoff has relied upon data, surveys, analyses, designs, plans and other information provided by the client and other individuals and organisations, most of which are referred to in the report (the data). Except as otherwise stated in the report, Parsons Brinckerhoff has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report (conclusions) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. Parsons Brinckerhoff will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to Parsons Brinckerhoff.

Environmental conclusions

In accordance with the scope of services, Parsons Brinckerhoff has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

On all sites, varying degrees of non-uniformity of the vertical and horizontal soil or groundwater conditions are encountered. Hence no monitoring, common testing or sampling technique can eliminate the possibility that monitoring or testing results/samples are not totally representative of soil and/or water conditions encountered. The conclusions are based upon the data and the environmental field monitoring and/or testing and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions.

Also, it should be recognised that site conditions, including the extent and concentration of contaminants, can change with time.

Within the limitations imposed by the scope of services, the monitoring, testing, sampling and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

Report for benefit of client

The report has been prepared for the benefit of the client (and no other party). Parsons Brinckerhoff assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of Parsons Brinckerhoff or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Parties other than the client should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

Other limitations

Parsons Brinckerhoff will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

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Appendix A

Sampling dates, locations and rationale

Table A1.1 Monitoring dates and rationale for groundwater and surface water sampling

		Monitoring point										
	EPA ID	10	11	12	na	na	90	91	9	8	7	Sampling rationale
	AGL Location	WKMB01	WKMB02	WKMB03	WKMB06A	WKMB06B	GR-P3	GW080487	WKSW01	WKSW02	WKSW03	
Sampling date	11 Mar 14 12 Mar 14 13 Mar 14	x	x	x			x	x	x	x	x	2014 baseline #1 (pre-Waukivory Pilot)
	26 Jun 14 27 Jun 14	x	x	x			x		x	x	x	2014 baseline #2 (pre-Waukivory Pilot)
	30 Sep 14 1 Oct 14	x	x	x			x	x	x	x	x	2014 baseline #3 (pre-Waukivory Pilot)
	21 Oct 14 22 Oct 14	x	x	x			x	x	x	x	x	2014 baseline #4 (pre-Waukivory Pilot)
	6 Nov 14	x	x	x			x	x	x	x	x	within 24 hours of the completion of the fracture stimulation of WK13
	12 Nov 14 13 Nov 14	x	x	x			x	x	x	x	x	within 24 hours of the completion of the fracture stimulation of zone 2 WK12, one week after fracture stimulation of WK13 for surface water samples
	17 Nov 14 18 Nov 14	x	x	x			x	x	x	x	x	within 24 hours of the completion of the fracture stimulation of WK14
	18 Nov 14 19 Nov 14				x	x			x	x	x	first sampling events following installation of the new bores, one week after fracture stimulation of zone 2 WK12 for surface water samples

	Monitoring point										
EPA ID	10	11	12	na	na	90	91	9	8	7	Sampling rationale
AGL Location	WKMB01	WKMB02	WKMB03	WKMB06A	WKMB06B	GR-P3	GW080487	WKSW01	WKSW02	WKSW03	
20 Nov 14	x	x	x			x	x	x	x	x	within 24 hours of the completion of the fracture stimulation of WK12
24 Nov 14								x	x	x	one week after fracture stimulation of WK14 for surface water samples
26 Nov 14 27 Nov 14	x	x	x			x	x	x	x	x	within 24 hours of the completion of the fracture stimulation of WK11, one week after fracture stimulation of WK12 for surface water samples
3 Dec 14								x	x	x	one week after fracture stimulation of WK13 for surface water samples
9 Dec 14 10 Dec 14	x	x	x	x	x	x	x				two weeks after the completion of the fracture stimulation of WK11
22 Dec 14 23 Dec 14	x	x	x	x	x	x	x				four weeks after the completion of the fracture stimulation of WK11
29 Jan 15 30 Jan 15	x	x	x	x	x	x	x	x	x	x	two weeks from commencement of flowback
29 Apr 15 30 Apr 15 1 May 15	x	x	x	x		x	x	x	x	x	sampling prior to recommencement of flowback on 5 May. WKMB06B was not sampled on 30 April due to waterlogging, sample taken on 11 May 2015

	Monitoring point										
EPA ID	10	11	12	na	na	90	91	9	8	7	Sampling rationale
AGL Location	WKMB01	WKMB02	WKMB03	WKMB06A	WKMB06B	GR-P3	GW080487	WKSW01	WKSW02	WKSW03	
11 May 15	x	x		x	x						sampling on 11 May 2015 from WKMB01, WKMB02 and WKMB06A at DRE request WKMB06B sampled due to waterlogging on 29 Apr to 1 May
27 May 15								x	x	x	six months from cessation of fracture stimulation (surface water only)
23 Jun 15	x	x	x	x	x				x	x	sampling on 23 June 2015 as part of the periodic sampling of AGL's wider Gloucester Basin monitoring network
24 Jun 15								x			
26 Aug 15								x	x	x	monthly sampling (surface water only)
22 Sept 15									x	x	monthly sampling (surface water only)
23 Sept 15								x			
21 Oct 15								x	x	x	monthly sampling (surface water only)
18 Nov 15								x	x	x	monthly sampling (surface water only)
15 Dec 15				x	x				x	x	Six-monthly sampling (groundwater), monthly sampling (surface water)
16 Dec 15	x	x				x		x			
17 Dec 15							x				

Table A1.2 Monitoring dates and rationale for flowback sampling

		Monitoring point					
	EPA ID	92	86	87	88	89	Sampling rationale
	AGL Location	AST2	WK11	WK12	WK13	WK14	
Sampling date	16 Dec 14				X		Commencement of flowback
	29 Dec 14	X		X	X		Fortnightly sampling from the commencement of flowback
	12 Jan 15	X					Fortnightly sampling from the commencement of flowback
	28 Jan 15	X					Fortnightly sampling from the commencement of flowback
	2 Feb 15	X					BTEX investigation
	3 Feb 15	X	X		X		BTEX investigation
	4 Feb 15	X	X	X	X	XX	BTEX investigation
	5 Feb 15	X	X	X	X	X	BTEX investigation
	6 Feb 15	X	X	X	X	X	BTEX investigation
	26 Feb 15	X					AST2 water quality monitoring
	30 Apr 15	X					AST2 water quality monitoring
	6 May 15	XX	XX	XX	XX	XX	BTEX and UHS investigation DRE additional sampling
	7 May 15	X	X	X	X	X	Fortnightly sampling from the commencement of flowback, BTEX and UHS investigation
	8 May 15	X	XX	XX	XX	XX	BTEX and UHS investigation DRE additional sampling
	9 May 15	X	X	X	X	X	BTEX and UHS investigation
	10 May 15	X	X	X	X	X	Water quality monitoring, BTEX and UHS investigation
	11 May 15	X	X	X	X	X	BTEX and UHS investigation
	12 May 15	X	X	X	X	X	BTEX and UHS investigation
	13 May 15	X	X	X	X	X	BTEX and UHS investigation

	Monitoring point					
EPA ID	92	86	87	88	89	Sampling rationale
AGL Location	AST2	WK11	WK12	WK13	WK14	
14 May 15	X	X	X	X	X	Water quality monitoring, BTEX and UHS investigation
15 May 15	X	XX	XX	XX	XX	BTEX and UHS investigation DRE additional sampling
16 May 15	X	X	X	X	X	BTEX and UHS investigation
17 May 15	X	X	X	X	X	BTEX and UHS investigation
18 May 15	X	X	X	XX	X	BTEX and UHS investigation. Second WK13 sample collected 18/05/15 in the afternoon
19 May 15	X	XX	XX		XX	BTEX and UHS investigation
20 May 15	X	X	X		X	Water quality monitoring, BTEX and UHS investigation
17 Jun 15	X					AST2 water quality monitoring
30 Jun 15	X	X	X	X	X	BTEX and UHS investigation
1 Jul 15	X	X	X	X	X	BTEX and UHS investigation
2 Jul 15	X	X	X	X	X	BTEX and UHS investigation
3 Jul 15	X	X	X	X	X	BTEX and UHS investigation
4 Jul 15	X	X	X	X	X	BTEX and UHS investigation
6 Jul 15	X	X	X	X	X	BTEX and UHS investigation
7 Jul 15	X	X	X	X	X	Water quality monitoring, BTEX and UHS investigation
8 Jul 15	X	X	X	X	X	BTEX and UHS investigation
9 Jul 15	X	X	X	X	X	BTEX and UHS investigation
10 Jul 15	X	X	X	X	X	BTEX and UHS investigation
11 Jul 15	X	X	X	X		BTEX and UHS investigation
13 Jul 15	X	X	X	X		BTEX and UHS investigation
14 Jul 15	X	X		X		BTEX and UHS investigation
15 Jul 15	X	X		X	X	Water quality monitoring, BTEX and UHS investigation

	Monitoring point					
EPA ID	92	86	87	88	89	Sampling rationale
AGL Location	AST2	WK11	WK12	WK13	WK14	
16 Jul 15	X	X	X	X	X	BTEX and UHS investigation
17 Jul 15	X	X	X	X		BTEX and UHS investigation
18 Jul 15	X			X	X	BTEX and UHS investigation
20 Jul 15	X	X	X			BTEX and UHS investigation
21 Jul 15	X		X			BTEX and UHS investigation
22 Jul 15	X				X	Water quality monitoring, BTEX and UHS investigation
23 Jul 15	X		X	X		BTEX and UHS investigation
24 Jul 15	X				X	BTEX and UHS investigation
25 Jul 15	X		X			BTEX and UHS investigation
27 Jul 15	X	X		X		BTEX and UHS investigation
28 Jul 15	X			X	X	BTEX and UHS investigation
29 Jul 15	X		X	X		Fortnightly sampling
12 Aug 15	X		X	X		Fortnightly sampling
26 Aug 15	X	X	X	X		Fortnightly sampling
9 Sept 15	X	X	X	X	X	Fortnightly sampling
23 Sept 15	X	X		X	X	Monthly BTEX AST2, water quality monitoring
21 Oct 15 22 Oct 15	X 		 X			Monthly BTEX AST2 Water quality monitoring
18 Nov 15	X		X	X	X	Monthly BTEX AST2, water quality monitoring
10 Dec 15		X	X	X	X	Water quality monitoring
15 Dec 15	X					Monthly BTEX AST2, water quality monitoring

Appendix B

Parsons Brinckerhoff sampling procedure and AGL pilot well and AST2 sampling procedure

PARSONS BRINCKERHOFF

Groundwater Team

Standard Operating Procedure Groundwater and Surface Water Sampling and logger download

Controlled Document – Change Register

Revision	Section Changed	Change Description	Initial	Date
A	All	New document	AM	01/02/15
B	3, 8, 9	Enhance QA/QC procedures	SD	28/09/15
C	All	General review and update	CR	30/9/2015
D	10, 11	Sample handling and data QC procedure	SD	16/10/2015
E	1, 3, 11	Project scope and CoC check	SD	30/11/15

1. Introduction

This procedure outlines general protocols and work practices to be applied when collecting groundwater and surface water samples and downloading data loggers.

It is noted that other methods of groundwater and surface water sampling are possible and that deviation from this standard operating procedure (SOP) may be appropriate in some circumstances. The rationale for any deviations from this SOP should be discussed and agreed to with the Project Manager (PM) prior to undertaking the works and documented during the works.

1.1 Objectives

The objective of this procedure is to provide a framework to describe how WSP|Parsons Brinckerhoff will perform surface water and groundwater sampling and monitoring activities. The procedure includes:

- Sampling and monitoring equipment.
- Sampling techniques.
- Sample collection and preservation.
- Logger download
- Quality Assurance / Quality Control (QA/QC) procedures.
- Chain of custody documentation.

1.2 Responsibilities

WSP Parsons Brinckerhoff project managers are responsible for:

- Implementation and distribution of the procedure for field activities.
- Review of this procedure and client consultation to identify specific client requirements.
- Review of this procedure where any deviation to the procedure may exist and seek client confirmation of any adopted changes or recommendations.
- Ensuring that all staff undertaking the work have been fully briefed on the scope of all field activities by way of written instruction that sets out the comprehensive and detailed list of activities

- Ensuring that all staff undertaking the work have been trained appropriately and are familiar with sampling procedures and equipment operating procedures.
- Ensuring all staff are inducted for site activities and are familiar with the project safety requirements.

All WSP Parsons Brinckerhoff staff are responsible for:

- Undertaking all groundwater and surface water activities in accordance with this procedure.
- Review of this procedure to reflect any recommendations or changes to procedure.
- The maintenance of equipment and ensuring that all equipment has been tested and tagged appropriately before use.

2. References

The following standards and guidelines have been considered and apply to this procedure:

- AS/NZS 5667.1:1998: Water quality - Sampling - Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples.
- AS/NZS 5667.11:1998: Water quality - Sampling - Guidance on sampling of groundwaters.
- AS/NZS 5667.6:1998: Water quality - Sampling - Guidance on sampling of rivers and streams.
- Australian and New Zealand Environmental Conservation Council, and Agricultural and Resource Management Council of Australia and New Zealand 2000 *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* October 2000.
- Geoscience Australia 2009, *Groundwater Sampling and Analysis – a field guide*, Geoscience Australia, Record 2009/27 95 pp.

The following documents have been developed by WSP Parsons Brinckerhoff and should be referred to when undertaking all field activities for water quality sampling:

- Standard operating procedure – Groundwater and Surface Water Sampling (this document).
- Parsons Brinckerhoff safe work method statements (SWMS's) for the use of the micropurge control box, generator, air compressor, Grundfos and 12-volt pump.
- Parsons Brinckerhoff groundwater field parameters – field data recording form.
- Sample bottle checklist from template (WAN-CHK-001Rev.1).

3. Input documentation

- Site specific Health, Environment and Safety Plan (HESP), SWMS's and other related OHSE documents.
- Site specific access permits (if required).
- Authority to work (if required).
- Detailed task list for all fieldwork activities.
- Sample bottle checklist (WAN-CHK-001Rev.1).

4. Selection of groundwater sampling methods

A range of methods can be used to obtain groundwater quality samples from monitoring bores. The most appropriate method for each bore should be selected based on the depth of the bore, the diameter of the bore, the depth to groundwater, and the permeability of the screened formation. Higher yielding monitoring bores are typically purged and sampled using a submersible (high-flow) pump. Lower yielding bores are typically sampled using a low-flow pump.

Submersible (high-flow) pump

High flow pumps (usually submersible pumps such as 12 volt pumps, Grundfos or Bennett pumps) are deployed in high yielding bores. Typically, three bore volumes are extracted before a water quality sample is collected, however abstracting this volume is not always required or possible so appropriate sampling protocols must be agreed at project inception.

Where high flow pumps can be deployed to the screened interval of the monitoring bore, three well volumes may not always be necessary (Refer to section 6.2.2).

4.1 Non-purge groundwater sampling

Low flow (MicroPurge®) groundwater sampling

Low flow sampling techniques (such as the MicroPurge® pump) allows groundwater to be drawn into the pump intake directly from the screened interval of the monitoring bore, eliminating the need to purge large volumes of groundwater from these bores.

Bailing

Bailed samples collect a discrete sample at depth. Double check bailers (with stop valves at the top and bottom of the bailer) can be lowered to the screened interval to collect a grab sample at a specified depth within the water column. Disposable bailers with a single stop valve are generally not suitable to collect samples from deep within the water column, as mixing of the collected water sample is likely when the bailer is retrieved.

Despite the double checks on the discrete depth bailer, it is possible for mixing to occur if a proper seal is not established or if the bailer is not raised from the well steadily enough. Reusable bailers should be rinsed between samples and decontaminated between sites.

Care must be taken to ensure sediment in the sump of the monitoring bore is not disturbed using this sampling method.

Other non-purge methods

No-purge samplers include diffusion samplers and grab samplers (e.g. HydraSleeve® and Snap Sampler™). Deploy and retrieve the no-purge sampler in the well in accordance with the manufacturer's instructions. No purging is required for this method of groundwater sampling. Ensure that a sufficient volume of groundwater can be recovered to enable the required analysis, and measurement of groundwater quality parameters, can be conducted.

5. Equipment

5.1 General water quality sampling equipment

The following equipment is used for the majority of sampling tasks and is applicable to groundwater and surface water sampling:

- Personal protective equipment and other safety equipment as identified in the HESP.
- Field data recording forms, chain-of-custody forms (COC), tablet and/or laptop.
- Water level meters (dipper), (electronic water level meters are not to be used where there is a requirement for equipment to be intrinsically safe, other manual methods (such as a “plopper” should be used instead).
- Multi-parameter water quality instruments and calibration solution.
- Appropriate sample containers as specified by the laboratory.
- Storage containers for the samples (such as an esky, ice (or ice bricks), or fridge).
- Decontamination equipment including clean buckets, phosphate free detergent e.g. Decon 90, potable water and deionised water (if required).
- Appropriately labelled storage containers to collect waste water discharge or transport.
- Nitrile gloves, syringes and water filters for filtered samples (e.g. dissolved metals, dissolved organic carbon, iron).
- Camera and mobile phone.

5.2 Groundwater sampling equipment

Groundwater sampling equipment is specific to the sampling methodology to be used for sample collection. Before staff use any groundwater sampling equipment they should be fully trained and competent in the use of the equipment, familiar with the operation and safe work method statements for the task to be performed. All equipment should be regularly maintained, tested and tagged appropriately before use.

The following list is provided as a guide for necessary equipment for the range of sampling methodologies and not intended as an exhaustive checklist.

Submersible pump (12 volt pumps)

- 12 volt submersible pump and reel.
- Power cable (12 volt) and connectors (ensure appropriate connectors are selected based on vehicle / power source connection).
- 12 volt power source (auxiliary battery).
- Extension hose for purged water discharge.
- Water discharge controllers where applicable.

Submersible pump (Grundfos)

- Grundfos pump and reel.

- Generator and residual control device (RCD).
- Water discharge control (variable speed control).
- Extension hose for purged water discharge.

Low flow techniques (Micro-purge®)

- Generator and residual control device (RCD).
- Air compressor.
- Micro-purge® control box
- Air hoses and fittings
- Extension hose for purged water discharge.
- Flow cells for water quality monitoring

5.3 Surface water sampling equipment

Surface water samples should be collected using the following:

- Nalgene sample collection container.
- Telescopic sampling pole.

Surface water samples can be collected directly into sample containers that do not contain preservatives, provided that a representative sample can be collected. The Nalgene sample container should be replaced between each sample.

5.4 Groundwater level monitoring equipment

Generally, Solinst Leveloggers have been deployed to continuously monitoring groundwater levels. Data loggers should be installed as follows:

- Data loggers should be suspended from the surface using stainless steel wire rope and stainless steel swages.
- Data loggers should be suspended below the standing water level. Potential groundwater level variations in the bore and individual logger specifications (different loggers have different pressure thresholds) should be considered before the depth at which the logger is to be installed is determined, as the logger must remain below the groundwater level.
- Program the data logger and then lower the data logger into a bore. Data logging intervals should be determined to satisfy client requirements and the resolution of data sought. Generally, 6 hourly intervals (00:00, 6:00, 12:00 and 18:00)

6. Sampling and monitoring

6.1 Water quality samples

- Prepare sample bottle checklist from template (WAN-CHK-001Rev.1). PM to familiarise field personnel with the sampling suite, holding times, sample security procedures and other project or site specific requirements regarding the sampling.
- Prepare suite of sampling containers as per the sample bottle checklist. Complete all fields on the checklist following the packing and filling of the containers.
- Complete all fields on the label of the container using a xylene free marker.
- Ensure sampling personnel are wearing a clean pair of disposable sampling gloves for each sample.
- Ensure that all bottles are filled and capped as quickly as practicable to reduce exposure of the sample to the atmosphere. Care should be taken when handling sample container lids to avoid contact with any surfaces that may compromise the integrity of the sample.
- Ensure that while collecting the sample, that no foreign object (such as the sampling hose) is inserted into the bottle, nor should anything touch the rim of the bottle.
- When collecting samples for volatile analysis, make sure all bottles are filled as far as practicable to minimise the headspace within the container and avoid potential loss of volatiles.
- Immediately place all samples into an esky pre-packed with ice or ice bricks, or a cooled field fridge. To reduce the potential for breakage, samples can be placed on the firm base of the esky with ice placed in a secure bag (to prevent leakage) on top. Samples should be arranged to minimise lateral movement during transport, and free space can be reduced by adding inert packing material (bubble wrap etc.) if required.
- Complete a quality control check of the labels of all samples submitted to the laboratory against the sample IDs on the COC.
- Transport all samples on ice (temperature below 4°C) to the laboratory as soon as practical with the completed and relinquished COC. The COC should include the following information: sample ID, date and time of sampling, project number, number of sample bottles, analysis requested, laboratory quote number, specific comments and remarks, name and signature of collector, date and time samples are relinquished and contact details.
- Any split replicate (triplicate) samples should be sent directly to the secondary laboratory in a separate esky from that containing the primary samples, with all other samples sent to the primary laboratory.
- Typically samples should not be frozen. Exceptions include samples for total phosphorus (AS/NZS 5667.1:1998) however advice must be sought from the laboratory.
- Where filtering of samples is required (e.g. dissolved metals and dissolved organic carbon) disposable disc filters (0.45µm) should be used with disposable syringes. Filtering equipment should not be reused between sampling locations.

6.2 Groundwater sampling and monitoring

6.2.1 Groundwater levels

Groundwater levels (or pressures, where appropriate) are collected either manually (by electronic water level meters) or by data loggers installed at each monitoring location (or a combination of both).

Prior to removing the data logger, manual water levels are recorded using the following procedure:

- Test the water level meter at the surface to ensure it is operational. Slowly lower the probe down the well and measure and record the depth to groundwater from the marked point at the top of the casing and record.
- If no marking is present, measure from the highest point of the casing, note this on the field data recording form and mark the casing for future monitoring.

The data logger can then be retrieved from the monitoring bore for data download by pulling the wire rope attached to the data logger. Data loggers are then downloaded using appropriate software for storage and data processing. The following diagnostics should be performed regularly to ensure data loggers are functioning properly:

- Visually inspect and clean the data logger if necessary.
- Inspect swages and connections to ensure the data logger is secured at the surface.
- Test run the data logger in air and submerged in a known depth of water and record real time data.
- Check real time data to ensure water levels recorded by the data logger are accurate before redeploying.
- Check data logger battery levels and record.

6.2.2 Deployment of groundwater sampling equipment and purging

- Calibrate the water quality meter daily and record details on the calibration sheet.
- Unstable parameters should be measured in the field, such as temperature, dissolved oxygen (DO), oxidation-reduction potential (redox), electrical conductivity (EC) and pH as purging progresses. Total dissolved solids and carbon dioxide can also be measured in the field if required.
- Continue purging until at least three consecutive sets of field parameters are obtained and monitor the changes in pH, temperature and EC. Do not sample until field parameters show no significant variations (< +/- 10%).
- Typically three bore volumes are removed from a bore prior to sampling (moderate to high yielding bores). Less than three bore volumes can be removed prior to sampling in the following circumstances:
  - A bore is purged dry and the recovery water is sampled.
  - Field parameters stabilise prior to the removal of three bore volumes, yet after the removal of at least one bore volume.
  - No-purge sampling equipment is used.
  - Low-flow groundwater pumps are used, with the intake at the screened section.
- Bore volumes can be estimated as follows:
  - Bore volume (L) = 2 x water column length (m) for 50 mm wells.
- Qualitatively assess and record the colour of purged water, turbidity, any odours and other observations and note this on the field data recording form.

6.3 Surface water samples

- Ensure that a representative water sample is collected from the water body as close to the thalweg as practicable. Consideration should be given to the choice of sampling location so that the water body is homogenous and any source mixing is complete.
- Take care to avoid disturbing sediment when collecting a sample. If there is a risk that sampling would have a downstream effects, sampling should be collected from a downstream location first, working upstream.
- Note and record the appearance of the surface water body, i.e. colour, turbidity, odour, surface crusts, films or floating material, algae, etc. Also note any other relevant observations such as dead or distressed vegetation, surface rubbish, surface sheen, etc.
- If sampling un-stratified surface waters, lower the surface water sampler carefully into the surface water body at a location well away from the edge. Collect the water sample from approximately 100 mm below the surface of the water body. Following collection, decant the surface water sample into the laboratory supplied sample containers. Use a dedicated sampling bottle for each location. Never submerse laboratory-supplied sample bottles that may contain acid or preservative, into the surface water body.
- If sampling stratified surface waters, lower a weighted sampler such as a bomb sampler or a Van Dorn sampler below the water surface to the depth required, and allow to fill until bubbles stop rising to the surface. When the bottle is full, gently remove it from the water.

7. Quality Assurance (QA) sample collection

The requirement for QA samples should be assessed depending on the project and client requirements. The following provides the types of QA samples that may be required and a suggested frequency:

- Field duplicate: 1 in 10 samples. This is a replicate sample collected for analysis from the same sample site at the same time. This provides information on the sampling error and a measure of sample precision.
- Label QA samples 'QA**_date' with the first QA sample labelled QA01 and the second labelled QA02 etc. in order of collection. This includes field duplicates as well as rinsate, trip and field blanks and trip spikes.
- When a QA sample is taken a note must be made on the field sheet of the parent sample.
- Ensure specified PPE is worn and correct sampling techniques are followed (refer to section 6) to avoid contamination of the sample from the surrounding environment.
- Other blanks and controls can be collected depending on client requirements. The requirements of a sampling program should be defined and documented in a sampling program prior to the sampling program commencing. Other quality control samples could include:
  - Field blanks – to estimate contamination of a sample during the collection procedure.
  - Transport blanks – to estimate contamination introduced during transport and storage of the sample.
  - Container blanks – to estimate contamination from the container and preservation technique during storage of a sample.
  - Field spikes – to determine the loss or cross-contamination of volatile materials.

- Blanks and controls should be collected in consultation with the laboratory engaged for analysis. Ensure that the storage of blanks and controls adheres to laboratory requirements.

8. Purged groundwater disposal

- Store and dispose of purged water appropriately. Purged water should not be disposed of onto the site surface or to sewer/stormwater without testing, unless approved by the client and appropriate procedures are in place to ensure that there is no adverse impact to the environment or human health.
- Purged water can be collected in appropriately labelled storage containers.

9. Output documentation

The following documents shall be placed on the electronic project file as soon as possible upon completion of the fieldwork:

- Field data recording forms.
- Logger data files.
- Completed bottle checklist.
- Completed COC.
- Signed HESP.

Field data recording forms

Field data recording forms include all necessary information that would enable a repetition of sampling to take place under identical conditions. The Parsons Brinckerhoff groundwater and surface water field parameters form should be completed in its entirety for every sampling event.

10. Sample storage, transit and delivery

- Complete all relevant fields on the CoC, if required, send to the lab prior to sampling for review to ensure that all required analyses are shown on the CoC
- Store samples upright, in new zip lock bags in an ice filled esky
- Samples should be stored I the tray of the vehicle whilst in transit, locked in the cab whilst parked if the vehicle is out of view and stored securely overnight in the accommodation or workplace
- Samples should be delivered by the trained water sampling technician to the laboratories where possible
- In the event that a courier is required, field staff will complete and send a Chain-of-Custody form with the sample for sample transport to the laboratory and seal each ice filled esky prior to pick up. Photographs to be taken of the open esky(s) and the closed, sealed esky(s)
- Complete the change of custodian fields on the CoC when samples are handed to courier or the lab

11. Laboratory liaison Data QC and data provision

- At project commencement request a draft CoC from the lab with all required analyses as shown on the analysis quote. Cross reference with project scope as agreed with the client.

- Update draft CoC following any amendments to the analytical suite.
- Prepare and check CoC prior to field activities to ensure all required analyses and other information such as turn-around times and sampler details are correct for the sampling event.
- The standard communications from the laboratory to all email addresses in the reporting field of the CoC are as follows:
  - Scanned copy of the CoC with work order number assigned by the lab
  - Sample receipt notification (SRN). This document cross references the samples received with the data required and identifies any non-compliances regarding container(s), preservation, holding time and sample condition

    The SRN must be reviewed and any non-compliances immediately followed up with the lab and actioned
  - Results are emailed in ESdat format with pdf certificate of analysis (CoA). The CoA must be reviewed to ensure all required data is present and samples and the front page displays the correct sampler names and dates
- Prior to use of the data in further analysis/reporting or provision to the client the data must undergo a Quality Control (QC) process:
  - Undertake the QC as soon as possible after receiving results to maximise the possibility of rectifying any data omissions
  - It is the responsibility of the PM to ensure all required data has been received from the lab
  - Responsibilities regarding identifying anomalous data, trend tracking and comparison against QA samples must be agreed at project inception
  - QC for the presence of data can be done visually by cross referencing the CoA with the scope for smaller data sets. For larger datasets, the use of an excel lookup table (or similar) is recommended
- The QC process should be agreed in writing between the client and the PM at project inception

Appendix C

Laboratory QC reports

Appendix C

Laboratory QC reports summary table

Report number	Date samples received	Lab Name
H1527198	21-October-2015	ALS
ES1534159	21-October-2015	ALS
ES1534161	21-October-2015	ALS
ES1534163	21-October-2015	ALS
ES1534210	21-October-2015	ALS
ES1534389	23-October-2015	ALS
ES1536590	19-November-2015	ALS
ES1536677	19-November-2015	ALS
ES1536678	19-November-2015	ALS
ES1538433	10-December-2015	ALS
ES1538987	16-December-2015	ALS
ES1538988	16-December-2015	ALS
ES1538990	16-December-2015	ALS
ES1539080	17-December-2015	ALS

ALS Water

ABN 84 009 936 029

5/585 Maitland Rd
MAYFIELD WEST NSW 2304
Tele: (02) 4014 2500

REPORT OF ANALYSIS

CUSTOMER:	Parsons Brinckerhoff GPO Box 5394, SYDNEY NSW 2000
CONTACT:	Sean Daykin
SAMPLE DATE:	21 October 2015
DATE RECEIVED:	21 October 2015 at 3:30 pm – Sample temperature 5°C 1 sample/s sampled and submitted by customer, tested as received
TESTING COMMENCED:	21 October 2015 at 4:00 pm
REPORT NO.:	HWA-15/08107

Sample No:	Sample Identification	Iron Related Bacteria (IRB) (Approximate IRB Population cfu/mL)	Sulphate Reducing Bacteria (SRB) (Approximate SRB Population cfu/mL)
H1527198	AST2	Present (570,000)	Present (500,000)

Test Methods:- HWC017 – (SRB-BART™ - for water and wastewater)
HWC020 – (IRB-BART™ - for water and wastewater)

RWoodward

R Woodward
Principal Microbiologist
30 October 2015

QUALITY CONTROL REPORT

Work Order	: **ES1534159**	Page	: 1 of 18
Amendment	: **3**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523B	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 21-Oct-2015
C-O-C number	: ----	Date Analysis Commenced	: 21-Oct-2015
Sampler	: DAVID WATSON	Issue Date	: 04-Nov-2015
Site	: ----	No. of samples received	: 4
Quote number	: ----	No. of samples analysed	: 4

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key :
- Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
- CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
- LOR = Limit of reporting
- RPD = Relative Percentage Difference
- # = Indicates failed QC

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Merrin Avery	Supervisor - Inorganic	Newcastle - Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Phalak Inthakesone	Laboratory Manager - Organics	Sydney Organics
Shobhna Chandra	Metals Coordinator	Sydney Inorganics

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005: pH (QC Lot: 251860)									
EN1513562-001	Anonymous	EA005: pH Value	----	0.01	pH Unit	8.21	8.22	0.122	0% - 20%
ES1534172-006	Anonymous	EA005: pH Value	----	0.01	pH Unit	6.49	6.50	0.154	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 252163)									
ES1534159-001	WKSW01	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	681	676	0.598	0% - 20%
ES1534172-006	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1080	1080	0.00	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 251837)									
ES1534124-019	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	559	579	3.51	0% - 20%
ES1534172-003	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	764	735	3.93	0% - 20%
EA025: Suspended Solids (QC Lot: 251836)									
ES1534124-019	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	9	6	37.3	No Limit
ES1534172-003	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	14	6	82.9	No Limit
ED009: Anions (QC Lot: 251349)									
EP1514973-001	Anonymous	ED009-X: Chloride	16887-00-6	0.1	mg/L	113	113	0.00	0% - 20%
ES1534152-001	Anonymous	ED009-X: Chloride	16887-00-6	0.1	mg/L	384	384	0.00	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 252161)									
ES1534159-001	WKSW01	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	75	72	3.72	0% - 20%
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	75	72	3.72	0% - 20%
ES1534172-006	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	37	37	0.00	0% - 20%
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	37	37	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 252156)									
ES1534172-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10	<10	0.00	No Limit
ES1534159-001	WKSW01	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	24	24	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 252155)									
ES1534172-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	296	292	1.52	0% - 20%
ES1534159-001	WKSW01	ED045G: Chloride	16887-00-6	1	mg/L	138	141	2.48	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 252061)									
ES1534090-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	52	51	2.43	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	39	38	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	29	28	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	315	292	7.46	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
ED093F: Dissolved Major Cations (QC Lot: 252061) - continued									
ES1534135-006	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	124	122	1.90	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	125	124	1.000	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	25	25	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	293	292	0.465	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 252060)									
ES1534090-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.003	0.002	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.124	0.119	4.38	0% - 20%
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.008	0.008	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	1.02	0.961	6.02	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.017	0.017	0.00	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.015	0.015	0.00	0% - 50%
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.010	0.010	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.04	0.04	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Bromine	7726-95-6	0.1	mg/L	0.2	0.2	0.00	No Limit
ES1534135-006	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.003	63.2	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.069	0.066	4.19	0% - 20%
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.010	0.010	0.00	0% - 50%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.173	0.172	0.661	0% - 20%
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 252060) - continued									
ES1534135-006	Anonymous	EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.81	0.83	2.48	0% - 50%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	5.47	5.48	0.235	0% - 20%
		EG020A-F: Bromine	7726-95-6	0.1	mg/L	2.0	2.0	0.00	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 252063)									
ES1534159-001	WKSW01	EG020B-F: Strontium	7440-24-6	0.001	mg/L	0.317	0.309	2.52	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
ES1534135-006	Anonymous	EG020B-F: Strontium	7440-24-6	0.001	mg/L	1.62	1.62	0.275	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	0.017	0.017	0.00	0% - 50%
EG035F: Dissolved Mercury by FIMS (QC Lot: 252062)									
ES1534090-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1534135-005	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG052G: Silica by Discrete Analyser (QC Lot: 252157)									
ES1534159-001	WKSW01	EG052G: Reactive Silica	----	0.05	mg/L	0.24	0.27	10.9	No Limit
EK010/011: Chlorine (QC Lot: 251183)									
ES1534159-001	WKSW01	EK010: Chlorine - Free	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
		EK010: Chlorine - Total Residual	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 252162)									
ES1534159-001	WKSW01	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.2	0.1	0.00	No Limit
ES1534172-006	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 251535)									
ES1533935-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	2.27	2.26	0.00	0% - 20%
ES1534159-003	WKSW03	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.01	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 252153)									
ES1534172-006	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1534159-001	WKSW01	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 251536)									
ES1533985-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	2.08	2.07	0.00	0% - 20%
ES1534118-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.09	0.12	35.3	0% - 50%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 251485)									
ES1534118-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.2	0.5	86.4	No Limit
ES1533985-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	67.2	65.4	2.70	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 251486)									
ES1534118-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.19	0.19	0.00	No Limit
ES1533985-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	10.3	10.5	1.68	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 252154)									
ES1534172-006	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 252154) - continued									
ES1534159-001	WKSW01	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.02	0.02	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 251396)									
ES1534047-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	16	13	26.1	0% - 50%
ES1534141-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	<1	<1	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 251397)									
ES1534159-002	WKSW02	EP005: Total Organic Carbon	----	1	mg/L	5	5	0.00	No Limit
ES1534205-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	20	20	0.00	0% - 20%
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 252252)									
EP1514362-001	Anonymous	EP033: Butane	106-97-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.00	No Limit
		EP033: Methane	74-82-8	10	µg/L	207	202	2.42	0% - 20%
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.00	No Limit
ES1534159-003	WKSW03	EP033: Butane	106-97-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.00	No Limit
		EP033: Methane	74-82-8	10	µg/L	568	578	1.72	0% - 20%
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.00	No Limit
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 251844)									
ES1534067-001	Anonymous	EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.00	No Limit
ES1534159-001	WKSW01	EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 251844) - continued									
ES1534159-001	WKSW01	EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.00	No Limit
EP074B: Oxygenated Compounds (QC Lot: 251844)									
ES1534067-001	Anonymous	EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.00	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.00	No Limit
ES1534159-001	WKSW01	EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.00	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.00	No Limit
EP074C: Sulfonated Compounds (QC Lot: 251844)									
ES1534067-001	Anonymous	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.00	No Limit
ES1534159-001	WKSW01	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.00	No Limit
EP074D: Fumigants (QC Lot: 251844)									
ES1534067-001	Anonymous	EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
ES1534159-001	WKSW01	EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
EP074E: Halogenated Aliphatic Compounds (QC Lot: 251844)									
ES1534067-001	Anonymous	EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP074E: Halogenated Aliphatic Compounds (QC Lot: 251844) - continued									
ES1534067-001	Anonymous	EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit
		EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
ES1534159-001	WKSW01	EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP074E: Halogenated Aliphatic Compounds (QC Lot: 251844) - continued									
ES1534159-001	WKSW01	EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit
		EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
EP074F: Halogenated Aromatic Compounds (QC Lot: 251844)									
ES1534067-001	Anonymous	EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit
ES1534159-001	WKSW01	EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit
EP074G: Trihalomethanes (QC Lot: 251844)									
ES1534067-001	Anonymous	EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
ES1534159-001	WKSW01	EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 251843)									
ES1534067-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1534159-001	WKSW01	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 251843)									
ES1534067-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1534159-001	WKSW01	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 251843)									
ES1534067-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP080: BTEXN (QC Lot: 251843) - continued									
ES1534067-001	Anonymous	EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1534159-001	WKSW01	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP262: Ethanolamines (QC Lot: 251256)									
ES1534159-001	WKSW01	EP262: Diethanolamine	111-42-2	1	µg/L	<1	<1	0.00	No Limit
		EP262: Ethanolamine	141-43-5	1	µg/L	<1	<1	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 252163)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	105	95	113
EA015: Total Dissolved Solids (QCLot: 251837)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	89.1	87	109
				<10	293 mg/L	106	66	126
EA025: Suspended Solids (QCLot: 251836)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	89.3	83	129
				<5	1000 mg/L	91.6	84	110
ED009: Anions (QCLot: 251349)								
ED009-X: Chloride	16887-00-6	0.1	mg/L	<0.100	2 mg/L	103	89	107
ED037P: Alkalinity by PC Titrator (QCLot: 252161)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	82.5	81	111
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 252156)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	86	122
ED045G: Chloride by Discrete Analyser (QCLot: 252155)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	111	75	123
				<1	1000 mg/L	92.6	77	119
ED093F: Dissolved Major Cations (QCLot: 252061)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.4	90	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	90	110
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	98.5	87	117
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	94.8	82	118
EG020F: Dissolved Metals by ICP-MS (QCLot: 252060)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	95.2	85	115
EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	0.01 mg/L	88.4	85	115
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	87.4	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	93.8	85	115
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	93.3	85	115
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	96.0	85	115
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	----	----	----	----
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.8	85	115
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	93.1	85	115
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	96.0	85	115
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.0	85	115

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EG020F: Dissolved Metals by ICP-MS (QCLot: 252060) - continued								
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	95.5	85	115
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.1	85	115
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.8	85	115
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	94.4	85	115
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.7	85	115
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	93.5	85	115
EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	95.7	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	95.7	85	115
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.6	85	115
EG020F: Dissolved Metals by ICP-MS (QCLot: 252063)								
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	91.6	80	112
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG035F: Dissolved Mercury by FIMS (QCLot: 252062)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	94.1	78	114
EG052G: Silica by Discrete Analyser (QCLot: 252157)								
EG052G: Reactive Silica	----	0.05	mg/L	<0.05	5 mg/L	108	94	114
EK010/011: Chlorine (QCLot: 251183)								
EK010: Chlorine - Free	----	0.2	mg/L	<0.2	----	----	----	----
EK010: Chlorine - Total Residual	----	0.2	mg/L	<0.2	----	----	----	----
EK040P: Fluoride by PC Titrator (QCLot: 252162)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	93.2	75	119
EK055G: Ammonia as N by Discrete Analyser (QCLot: 251535)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	103	90	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 252153)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	97.0	82	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 251536)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	106	91	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 251485)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	98.7	69	101
				<0.1	1 mg/L	98.3	70	118
				<0.1	5 mg/L	112	74	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 251486)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	99.8	71	101
				<0.01	0.442 mg/L	101	72	108
				<0.01	1 mg/L	112	78	118
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 252154)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	102	85	117

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP005: Total Organic Carbon (TOC) (QCLot: 251396)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	101	76	120
EP005: Total Organic Carbon (TOC) (QCLot: 251397)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	104	76	120
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 252252)								
EP033: Butane	106-97-8	10	µg/L	<10	102.18 µg/L	97.9	85	115
EP033: Butene	25167-67-3	10	µg/L	<10	99.61 µg/L	97.8	83	115
EP033: Ethane	74-84-0	10	µg/L	<10	54.43 µg/L	93.8	87	111
EP033: Ethene	74-85-1	10	µg/L	<10	50.29 µg/L	94.0	87	111
EP033: Methane	74-82-8	10	µg/L	<10	28.48 µg/L	94.0	86	114
EP033: Propane	74-98-6	10	µg/L	<10	78.28 µg/L	92.4	84	112
EP033: Propene	115-07-1	10	µg/L	<10	73.97 µg/L	94.0	85	113
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 251844)								
EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	10 µg/L	96.3	71	121
EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	10 µg/L	97.2	70	122
EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	10 µg/L	99.5	75	121
EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	10 µg/L	97.8	62	126
EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	10 µg/L	96.9	67	123
EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	10 µg/L	95.0	67	123
EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	10 µg/L	98.4	69	123
EP074: Styrene	100-42-5	5	µg/L	<5	10 µg/L	95.4	74	118
EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	10 µg/L	95.7	70	122
EP074B: Oxygenated Compounds (QCLot: 251844)								
EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	100 µg/L	106	74	130
EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	100 µg/L	98.2	65	137
EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	100 µg/L	65.5	61	139
EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	100 µg/L	85.1	61	134
EP074C: Sulfonated Compounds (QCLot: 251844)								
EP074: Carbon disulfide	75-15-0	5	µg/L	<5	10 µg/L	89.3	73	127
EP074D: Fumigants (QCLot: 251844)								
EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	10 µg/L	83.7	69	117
EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	10 µg/L	93.7	76	120
EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	10 µg/L	68.3	61	119
EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	10 µg/L	71.6	62	120
EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	10 µg/L	79.0	61	119
EP074E: Halogenated Aliphatic Compounds (QCLot: 251844)								
EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	10 µg/L	93.2	66	114
EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	10 µg/L	68.3	61	119
EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	10 µg/L	88.3	70	124

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP074E: Halogenated Aliphatic Compounds (QCLot: 251844) - continued								
EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	10 µg/L	97.3	75	123
EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	10 µg/L	94.8	75	119
EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	10 µg/L	95.9	69	123
EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	10 µg/L	94.2	73	119
EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	10 µg/L	95.6	74	128
EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	10 µg/L	74.3	66	136
EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	10 µg/L	96.2	78	122
EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	10 µg/L	101	79	121
EP074: Bromomethane	74-83-9	50	µg/L	<50	100 µg/L	101	56	140
EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	10 µg/L	77.5	63	121
EP074: Chloroethane	75-00-3	50	µg/L	<50	100 µg/L	101	63	135
EP074: Chloromethane	74-87-3	50	µg/L	<50	100 µg/L	82.2	67	130
EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	10 µg/L	101	77	117
EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	10 µg/L	85.2	71	128
EP074: Dibromomethane	74-95-3	5	µg/L	<5	10 µg/L	88.8	74	118
EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	100 µg/L	86.1	61	138
EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	10 µg/L	90.7	58	132
EP074: Iodomethane	74-88-4	5	µg/L	<5	10 µg/L	89.1	70	128
EP074: Pentachloroethane	76-01-7	5	µg/L	<5	10 µg/L	85.5	72	126
EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	10 µg/L	101	72	124
EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	10 µg/L	94.2	71	119
EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	10 µg/L	86.0	60	120
EP074: Trichloroethene	79-01-6	5	µg/L	<5	10 µg/L	93.9	74	120
EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	100 µg/L	109	65	131
EP074: Vinyl chloride	75-01-4	50	µg/L	<50	100 µg/L	101	69	129
EP074F: Halogenated Aromatic Compounds (QCLot: 251844)								
EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	10 µg/L	90.5	67	125
EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	10 µg/L	90.4	60	126
EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	10 µg/L	97.3	77	117
EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	10 µg/L	96.7	74	120
EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	10 µg/L	95.5	72	120
EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	10 µg/L	98.2	71	121
EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	10 µg/L	97.2	71	121
EP074: Bromobenzene	108-86-1	5	µg/L	<5	10 µg/L	93.4	76	116
EP074: Chlorobenzene	108-90-7	5	µg/L	<5	10 µg/L	99.5	80	118
EP074G: Trihalomethanes (QCLot: 251844)								
EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	10 µg/L	78.1	64	118
EP074: Bromoform	75-25-2	5	µg/L	<5	10 µg/L	80.7	74	126
EP074: Chloroform	67-66-3	5	µg/L	<5	10 µg/L	87.0	76	118

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074G: Trihalomethanes (QCLot: 251844) - continued								
EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	10 µg/L	79.6	65	115
EP075(SIM)A: Phenolic Compounds (QCLot: 251503)								
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	5 µg/L	71.8	50	108
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	5 µg/L	70.8	59	118
EP075(SIM): 2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	5 µg/L	65.9	59	122
EP075(SIM): 2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	5 µg/L	76.8	60	112
EP075(SIM): 2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	5 µg/L	66.3	64	118
EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	5 µg/L	66.2	64	110
EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	5 µg/L	75.7	56	112
EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	5 µg/L	75.7	63	117
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	10 µg/L	65.9	43	114
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	5 µg/L	70.4	63	119
EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	10 µg/L	48.9	10	95
EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	5 µg/L	33.2	25	62
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 251503)								
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	65.5	62	113
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	66.5	64	114
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	78.7	64	116
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	81.9	64	117
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	86.1	63	117
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	81.4	62	119
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	88.8	59	118
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	99.0	62	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	92.4	63	116
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	87.4	61	117
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	82.6	64	118
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	67.7	64	115
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	87.2	60	118
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	68.4	59	119
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	78.2	63	116
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	85.6	63	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 251504)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	102	59	129
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	103	71	131
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	100	62	120
EP080/071: Total Petroleum Hydrocarbons (QCLot: 251843)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	98.3	75	127

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 251504)								
EP071: >C10 - C16 Fraction	>C10_C16	100	µg/L	<100	2500 µg/L	102	59	131
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	101	74	138
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	99.5	67	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 251843)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	100	75	127
EP080: BTEXN (QCLot: 251843)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	102	70	124
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	97.4	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	97.7	69	121
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	95.0	70	124
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	98.1	72	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	97.6	65	129
EP262: Ethanolamines (QCLot: 251256)								
EP262: Diethanolamine	111-42-2	1	µg/L	<1	10 µg/L	94.1	50	130
EP262: Ethanolamine	141-43-5	1	µg/L	<1	10 µg/L	97.8	50	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED009: Anions (QCLot: 251349)							
EP1514973-001	Anonymous	ED009-X: Chloride	16887-00-6	4 mg/L	# Not Determined	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 252156)							
ES1534159-001	WKSW01	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	97.1	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 252155)							
ES1534159-001	WKSW01	ED045G: Chloride	16887-00-6	250 mg/L	95.9	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 252060)							
ES1534090-002	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	93.4	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	# Not Determined	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	92.2	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	95.2	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG020F: Dissolved Metals by ICP-MS (QCLot: 252060) - continued							
ES1534090-002	Anonymous	EG020A-F: Chromium	7440-47-3	0.2 mg/L	94.5	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	93.2	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	95.6	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	88.6	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	87.6	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	91.9	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	99.3	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	93.6	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 252062)							
ES1534090-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	104	70	130
EG052G: Silica by Discrete Analyser (QCLot: 252157)							
ES1534159-001	WKSW01	EG052G: Reactive Silica	----	5 mg/L	106	70	130
EK040P: Fluoride by PC Titrator (QCLot: 252162)							
ES1534159-001	WKSW01	EK040P: Fluoride	16984-48-8	5 mg/L	103	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 251535)							
ES1533935-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	105	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 252153)							
ES1534159-001	WKSW01	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	97.0	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 251536)							
ES1533985-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 251485)							
ES1534000-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	106	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 251486)							
ES1534000-001	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	# Not Determined	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 252154)							
ES1534159-001	WKSW01	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	103	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 251396)							
ES1534047-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	119	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 251397)							
ES1534159-003	WKSW03	EP005: Total Organic Carbon	----	100 mg/L	120	70	130
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 252252)							
EP1514362-002	Anonymous	EP033: Butane	106-97-8	102.18 µg/L	101	70	130
		EP033: Butene	25167-67-3	99.61 µg/L	102	70	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 252252) - continued							
EP1514362-002	Anonymous	EP033: Ethane	74-84-0	54.43 µg/L	101	70	130
		EP033: Ethene	74-85-1	50.29 µg/L	99.8	70	130
		EP033: Methane	74-82-8	28.48 µg/L	# Not Determined	70	130
		EP033: Propane	74-98-6	78.28 µg/L	97.8	70	130
		EP033: Propene	115-07-1	73.97 µg/L	99.6	70	130
EP074E: Halogenated Aliphatic Compounds (QCLot: 251844)							
ES1534067-001	Anonymous	EP074: 1.1-Dichloroethene	75-35-4	25 µg/L	90.6	70	130
		EP074: Trichloroethene	79-01-6	25 µg/L	89.3	70	130
EP074F: Halogenated Aromatic Compounds (QCLot: 251844)							
ES1534067-001	Anonymous	EP074: Chlorobenzene	108-90-7	25 µg/L	98.1	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 251843)							
ES1534067-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	120	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 251843)							
ES1534067-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	118	70	130
EP080: BTEXN (QCLot: 251843)							
ES1534067-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	91.2	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	104	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	101	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	96.5	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	103	70	130
		EP080: Toluene	108-88-3	25 µg/L	96.4	70	130
EP262: Ethanolamines (QCLot: 251256)							
ES1534159-001	WKSW01	EP262: Diethanolamine	111-42-2	10 µg/L	91.4	50	130
		EP262: Ethanolamine	141-43-5	10 µg/L	119	50	130

ALS Environmental

QA/QC Compliance Assessment for DQO Reporting

Work Order	: **ES1534159**	Page	: 1 of 11
Amendment	: **3**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Telephone	: +61 2 8784 8503
Project	: 2268523B	Date Samples Received	: 21-Oct-2015
Site	: ----	Issue Date	: 04-Nov-2015
Sampler	: DAVID WATSON	No. of samples received	: 4
Order number	: ----	No. of samples analysed	: 4

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED009: Anions	EP1514973--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG020F: Dissolved Metals by ICP-MS	ES1534090--002	Anonymous	**Barium**	7440-39-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	ES1533985--001	Anonymous	**Nitrite + Nitrate as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EK067G: Total Phosphorus as P by Discrete Analyser	ES1534000--001	Anonymous	**Total Phosphorus as P**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP033: C1 - C4 Hydrocarbon Gases	EP1514362--002	Anonymous	**Methane**	74-82-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	19	0.00	10.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	0	18	0.00	10.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	19	0.00	5.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	0	18	0.00	5.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EA005: pH								
Clear Plastic Bottle - Natural (EA005)								
WKSW01, WKSW03,	WKSW02, QA14	**21-Oct-2015**	**----**	----	----	**21-Oct-2015**	21-Oct-2015	✓
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P)								
WKSW01, WKSW03,	WKSW02, QA14	**21-Oct-2015**	**----**	----	----	**22-Oct-2015**	18-Nov-2015	✓
EA015: Total Dissolved Solids								
Clear Plastic Bottle - Natural (EA015H)								
WKSW01, WKSW03,	WKSW02, QA14	**21-Oct-2015**	**----**	----	----	**22-Oct-2015**	28-Oct-2015	✓
EA025: Suspended Solids								
Clear Plastic Bottle - Natural (EA025H)								
WKSW01, WKSW03,	WKSW02, QA14	**21-Oct-2015**	**----**	----	----	**22-Oct-2015**	28-Oct-2015	✓
ED009: Anions								
Clear Plastic Bottle - Natural (ED009-X)								
WKSW01, WKSW03,	WKSW02, QA14	**21-Oct-2015**	**----**	----	----	**22-Oct-2015**	18-Nov-2015	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
WKSW01, WKSW03,	WKSW02, QA14	**21-Oct-2015**	**----**	----	----	**22-Oct-2015**	04-Nov-2015	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
WKSW01, WKSW03,	WKSW02, QA14	**21-Oct-2015**	**----**	----	----	**22-Oct-2015**	18-Nov-2015	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
WKSW01, WKSW03,	WKSW02, QA14	**21-Oct-2015**	**----**	----	----	**22-Oct-2015**	18-Nov-2015	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)								
WKSW01, WKSW03,	WKSW02, QA14	**21-Oct-2015**	**----**	----	----	**22-Oct-2015**	18-Nov-2015	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)								
WKSW01, WKSW03,	WKSW02, QA14	**21-Oct-2015**	**----**	----	----	**22-Oct-2015**	18-Apr-2016	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F)								
WKSW01, WKSW03,	WKSW02, QA14	**21-Oct-2015**	----	----	----	**22-Oct-2015**	18-Apr-2016	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)								
WKSW01, WKSW03,	WKSW02, QA14	**21-Oct-2015**	----	----	----	**27-Oct-2015**	18-Nov-2015	✓
EG052G: Silica by Discrete Analyser								
Clear Plastic Bottle - Natural (EG052G)								
WKSW01, WKSW03,	WKSW02, QA14	**21-Oct-2015**	----	----	----	**22-Oct-2015**	18-Nov-2015	✓
EK010/011: Chlorine								
Clear Plastic Bottle - Natural (EK010)								
WKSW01, WKSW03,	WKSW02, QA14	**21-Oct-2015**	----	----	----	**21-Oct-2015**	21-Oct-2015	✓
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P)								
WKSW01, WKSW03,	WKSW02, QA14	**21-Oct-2015**	----	----	----	**22-Oct-2015**	18-Nov-2015	✓
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G)								
WKSW01, WKSW03,	WKSW02, QA14	**21-Oct-2015**	----	----	----	**22-Oct-2015**	18-Nov-2015	✓
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G)								
WKSW01, WKSW03,	WKSW02, QA14	**21-Oct-2015**	----	----	----	**22-Oct-2015**	23-Oct-2015	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G)								
WKSW01, WKSW03,	WKSW02, QA14	**21-Oct-2015**	----	----	----	**22-Oct-2015**	18-Nov-2015	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G)								
WKSW01, WKSW03,	WKSW02, QA14	**21-Oct-2015**	**22-Oct-2015**	18-Nov-2015	✓	**22-Oct-2015**	18-Nov-2015	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G)								
WKSW01, WKSW03,	WKSW02, QA14	**21-Oct-2015**	**22-Oct-2015**	18-Nov-2015	✓	**22-Oct-2015**	18-Nov-2015	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G)								
WKSW01,	WKSW02,	**21-Oct-2015**	----	----	----	**22-Oct-2015**	23-Oct-2015	✓
WKSW03,	QA14							
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulfuric Acid (EP005)								
WKSW01,	WKSW02,	**21-Oct-2015**	----	----	----	**22-Oct-2015**	18-Nov-2015	✓
WKSW03,	QA14							
EP033: C1 - C4 Hydrocarbon Gases								
Amber VOC Vial - Sulfuric Acid (EP033)								
WKSW01,	WKSW02,	**21-Oct-2015**	----	----	----	**22-Oct-2015**	04-Nov-2015	✓
WKSW03,	QA14							
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071)								
WKSW01,	WKSW02,	**21-Oct-2015**	**22-Oct-2015**	28-Oct-2015	✓	**23-Oct-2015**	01-Dec-2015	✓
WKSW03,	QA14							
EP074A: Monocyclic Aromatic Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP074)								
WKSW01,	WKSW02,	**21-Oct-2015**	**22-Oct-2015**	04-Nov-2015	✓	**22-Oct-2015**	04-Nov-2015	✓
WKSW03,	QA14							
EP075(SIM)T: PAH Surrogates								
Amber Glass Bottle - Unpreserved (EP075(SIM))								
WKSW01,	WKSW02,	**21-Oct-2015**	**22-Oct-2015**	28-Oct-2015	✓	**23-Oct-2015**	01-Dec-2015	✓
WKSW03,	QA14							
EP080S: TPH(V)/BTEX Surrogates								
Amber VOC Vial - Sulfuric Acid (EP080)								
WKSW01,	WKSW02,	**21-Oct-2015**	**22-Oct-2015**	04-Nov-2015	✓	**22-Oct-2015**	04-Nov-2015	✓
WKSW03,	QA14							
EP262: Ethanolamines								
Amber Glass Bottle - Unpreserved (EP262)								
WKSW01,	WKSW02,	**21-Oct-2015**	----	----	----	**22-Oct-2015**	28-Oct-2015	✓
WKSW03,	QA14							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	2	15	**13.33**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	2	13	**15.38**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Chlorine	EK010	1	6	**16.67**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	2	11	**18.18**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	2	12	**16.67**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	12	**16.67**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	10	**20.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Ethanolamines by LCMSMS	EP262	1	5	**20.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	2	11	**18.18**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	2	12	**16.67**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	19	**0.00**	**10.00**	✗	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
pH	EA005	2	13	**15.38**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	11	**18.18**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	4	**25.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Standard Anions -by IC (Extended Method)	ED009-X	2	7	**28.57**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Suspended Solids (High Level)	EA025H	2	17	**11.76**	**9.52**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	17	**11.76**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	0	18	**0.00**	**10.00**	✗	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	2	19	**10.53**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Volatile Organic Compounds	EP074	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	13	**7.69**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	11	**9.09**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	1	12	**8.33**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	12	**8.33**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	10	**10.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Ethanolamines by LCMSMS	EP262	1	5	**20.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	11	**9.09**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	12	**8.33**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	11	**9.09**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	4	**25.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Standard Anions -by IC (Extended Method)	ED009-X	1	7	**14.29**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Suspended Solids (High Level)	EA025H	2	17	**11.76**	**9.52**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	17	**11.76**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	20	**15.00**	**15.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	3	20	**15.00**	**15.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	1	18	**5.56**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Volatile Organic Compounds	EP074	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	13	**7.69**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Chlorine	EK010	1	6	**16.67**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	11	**9.09**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	1	12	**8.33**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	12	**8.33**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	10	**10.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Ethanolamines by LCMSMS	EP262	1	5	**20.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	11	**9.09**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	12	**8.33**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	11	**9.09**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	4	**25.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Standard Anions -by IC (Extended Method)	ED009-X	1	7	**14.29**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Suspended Solids (High Level)	EA025H	1	17	**5.88**	**4.76**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	1	17	**5.88**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	1	18	**5.56**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Volatile Organic Compounds	EP074	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	13	**7.69**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	1	12	**8.33**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	12	**8.33**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Ethanolamines by LCMSMS	EP262	1	5	**20.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	11	**9.09**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	19	**0.00**	**5.00**	✗	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	11	**9.09**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	4	**25.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Standard Anions -by IC (Extended Method)	ED009-X	1	7	**14.29**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	0	18	**0.00**	**5.00**	✗	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Volatile Organic Compounds	EP074	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH	EA005	WATER	In house: Referenced to APHA 4500 H+ B. pH of water samples is determined by ISE either manually or by automated pH meter. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of \`filterable\` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of \`non-filterable\` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Standard Anions -by IC (Extended Method)	ED009-X	WATER	In house: Referenced to APHA 4110. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45 um filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Silica (Reactive) by Discrete Analyser	EG052G	WATER	In house: Referenced to APHA 4500-SiO2 D: Under Acdic conditions reactive silicon combines with ammonium molybdate to form a yellow molybdosilicic acid complex. This is reduced by 1-amino-2-naphthol-4-sulfonic acid to a silicomolybdenum blue complex which is measured by discrete analyser at 670 nm. This method is compliant with NEPM (2013) Schedule B(3)
Chlorine	EK010	WATER	In-house (DPD colourimetry)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ammonium as N	EK055G-NH4	WATER	Ammonium in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH and Temperature. Ammonia is determined by direct colorimetry by Discrete Analyser according to APHA 4500-NH3 G. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (2013) Schedule B(3)
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.
TRH - Semivolatile Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Volatile Organic Compounds	EP074	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Ethanolamines by LCMSMS	EP262	WATER	In-house LC-MSMS: Benzoyl derivatives of target compounds are analysed by LC/MSMS in ESI Positive Mode.

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)

Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1534161**	Page	: 1 of 18
Amendment	: **1**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523B	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 21-Oct-2015
C-O-C number	: ----	Date Analysis Commenced	: 21-Oct-2015
Sampler	: DAVID WATSON	Issue Date	: 30-Oct-2015
Site	: ----	No. of samples received	: 1
Quote number	: ----	No. of samples analysed	: 1

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key :
- Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
- CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
- LOR = Limit of reporting
- RPD = Relative Percentage Difference
- # = Indicates failed QC

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Dian Dao		Sydney Inorganics
Merrin Avery	Supervisor - Inorganic	Newcastle - Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Phalak Inthakesone	Laboratory Manager - Organics	Sydney Organics

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005: pH (QC Lot: 251860)									
EN1513562-001	Anonymous	EA005: pH Value	----	0.01	pH Unit	8.21	8.22	0.122	0% - 20%
ES1534172-006	Anonymous	EA005: pH Value	----	0.01	pH Unit	6.49	6.50	0.154	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 251837)									
ES1534124-019	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	559	579	3.51	0% - 20%
ES1534172-003	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	764	735	3.93	0% - 20%
EA025: Suspended Solids (QC Lot: 251836)									
ES1534124-019	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	9	6	37.3	No Limit
ES1534172-003	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	14	6	82.9	No Limit
ED009: Anions (QC Lot: 253775)									
EP1515047-041	Anonymous	ED009-X: Chloride	16887-00-6	0.1	mg/L	1380	1360	1.26	0% - 20%
ES1534246-001	Anonymous	ED009-X: Chloride	16887-00-6	0.1	mg/L	84.8	85.5	0.909	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 251162)									
ES1534124-004	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	173	172	0.00	0% - 20%
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	41	41	0.00	0% - 20%
		ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	214	214	0.00	0% - 20%
ES1534213-005	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	251	254	0.840	0% - 20%
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	251	254	0.840	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 251171)									
ES1534161-001	AST2	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 251168)									
ES1534124-007	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	267	262	1.90	0% - 20%
ES1534161-001	AST2	ED045G: Chloride	16887-00-6	1	mg/L	852	848	0.474	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 252061)									
ES1534090-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	52	51	2.43	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	39	38	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	29	28	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	315	292	7.46	0% - 20%
ES1534135-006	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	124	122	1.90	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	125	124	1.000	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	25	25	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	293	292	0.465	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 252060)									
ES1534090-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.003	0.002	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.124	0.119	4.38	0% - 20%
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.008	0.008	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	1.02	0.961	6.02	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.017	0.017	0.00	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.015	0.015	0.00	0% - 50%
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.010	0.010	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.04	0.04	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Bromine	7726-95-6	0.1	mg/L	0.2	0.2	0.00	No Limit
ES1534135-006	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.003	63.2	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.069	0.066	4.19	0% - 20%
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.010	0.010	0.00	0% - 50%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.173	0.172	0.661	0% - 20%
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.81	0.83	2.48	0% - 50%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	5.47	5.48	0.235	0% - 20%
		EG020A-F: Bromine	7726-95-6	0.1	mg/L	2.0	2.0	0.00	0% - 50%

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 252063)									
ES1534159-001	Anonymous	EG020B-F: Strontium	7440-24-6	0.001	mg/L	0.317	0.309	2.52	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
ES1534135-006	Anonymous	EG020B-F: Strontium	7440-24-6	0.001	mg/L	1.62	1.62	0.275	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	0.017	0.017	0.00	0% - 50%
EG035F: Dissolved Mercury by FIMS (QC Lot: 252062)									
ES1534090-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1534135-005	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG052G: Silica by Discrete Analyser (QC Lot: 251172)									
ES1534161-001	AST2	EG052G: Reactive Silica	----	0.05	mg/L	1.26	1.27	0.816	0% - 20%
EK010/011: Chlorine (QC Lot: 251183)									
ES1534159-001	Anonymous	EK010: Chlorine - Free	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
		EK010: Chlorine - Total Residual	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 251165)									
ES1534161-001	AST2	EK040P: Fluoride	16984-48-8	0.1	mg/L	2.0	2.1	5.46	0% - 20%
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 251535)									
ES1533935-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	2.27	2.26	0.00	0% - 20%
ES1534159-003	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.01	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 251169)									
ES1534213-005	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1534161-001	AST2	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 251536)									
ES1533985-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	2.08	2.07	0.00	0% - 20%
ES1534118-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.09	0.12	35.3	0% - 50%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 251485)									
ES1534118-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.2	0.5	86.4	No Limit
ES1533985-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	67.2	65.4	2.70	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 251486)									
ES1534118-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.19	0.19	0.00	No Limit
ES1533985-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	10.3	10.5	1.68	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 251170)									
ES1534161-001	AST2	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.02	0.02	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 251397)									
ES1534159-002	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	5	5	0.00	No Limit
ES1534205-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	20	20	0.00	0% - 20%
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 252117)									
EB1531929-001	Anonymous	EP033: Butane	106-97-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 252117) - continued									
EB1531929-001	Anonymous	EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.00	No Limit
		EP033: Methane	74-82-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.00	No Limit
EB1532104-001	Anonymous	EP033: Butane	106-97-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.00	No Limit
		EP033: Methane	74-82-8	10	µg/L	4120	3950	4.12	0% - 20%
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.00	No Limit
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 254208)									
EP1515055-001	Anonymous	EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.00	No Limit
EP1515055-014	Anonymous	EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.00	No Limit
EP074B: Oxygenated Compounds (QC Lot: 254208)									
EP1515055-001	Anonymous	EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.00	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.00	No Limit
EP1515055-014	Anonymous	EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.00	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.00	No Limit
EP074C: Sulfonated Compounds (QC Lot: 254208)									

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP074C: Sulfonated Compounds (QC Lot: 254208) - continued									
EP1515055-001	Anonymous	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.00	No Limit
EP1515055-014	Anonymous	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.00	No Limit
EP074D: Fumigants (QC Lot: 254208)									
EP1515055-001	Anonymous	EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
EP1515055-014	Anonymous	EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
EP074E: Halogenated Aliphatic Compounds (QC Lot: 254208)									
EP1515055-001	Anonymous	EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP074E: Halogenated Aliphatic Compounds (QC Lot: 254208) - continued									
EP1515055-001	Anonymous	EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
EP1515055-014	Anonymous	EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit
		EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
EP074F: Halogenated Aromatic Compounds (QC Lot: 254208)									
EP1515055-001	Anonymous	EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP074F: Halogenated Aromatic Compounds (QC Lot: 254208) - continued									
EP1515055-014	Anonymous	EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit
EP074G: Trihalomethanes (QC Lot: 254208)									
EP1515055-001	Anonymous	EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
EP1515055-014	Anonymous	EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 254209)									
EP1515055-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	680	670	1.65	0% - 20%
EP1515055-014	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 254209)									
EP1515055-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	690	680	2.02	0% - 20%
EP1515055-014	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 254209)									
EP1515055-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1515055-014	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP262: Ethanolamines (QC Lot: 251256)									
ES1534159-001	Anonymous	EP262: Diethanolamine	111-42-2	1	µg/L	<1	<1	0.00	No Limit
		EP262: Ethanolamine	141-43-5	1	µg/L	<1	<1	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA015: Total Dissolved Solids (QCLot: 251837)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	89.1	87	109
				<10	293 mg/L	106	66	126
EA025: Suspended Solids (QCLot: 251836)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	89.3	83	129
				<5	1000 mg/L	91.6	84	110
ED009: Anions (QCLot: 253775)								
ED009-X: Chloride	16887-00-6	0.1	mg/L	<0.100	2 mg/L	104	89	107
ED037P: Alkalinity by PC Titrator (QCLot: 251162)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	94.8	81	111
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 251171)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	105	86	122
ED045G: Chloride by Discrete Analyser (QCLot: 251168)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	99.1	75	123
				<1	1000 mg/L	101	77	119
ED093F: Dissolved Major Cations (QCLot: 252061)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.4	90	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	90	110
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	98.5	87	117
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	94.8	82	118
EG020F: Dissolved Metals by ICP-MS (QCLot: 252060)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	95.2	85	115
EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	0.01 mg/L	88.4	85	115
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	87.4	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	93.8	85	115
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	93.3	85	115
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	96.0	85	115
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	----	----	----	----
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.8	85	115
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	93.1	85	115
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	96.0	85	115
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.0	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	95.5	85	115
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.1	85	115
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.8	85	115

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EG020F: Dissolved Metals by ICP-MS (QCLot: 252060) - continued								
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	94.4	85	115
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.7	85	115
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	93.5	85	115
EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	95.7	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	95.7	85	115
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.6	85	115
EG020F: Dissolved Metals by ICP-MS (QCLot: 252063)								
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	91.6	80	112
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG035F: Dissolved Mercury by FIMS (QCLot: 252062)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	94.1	78	114
EG052G: Silica by Discrete Analyser (QCLot: 251172)								
EG052G: Reactive Silica	----	0.05	mg/L	<0.05	5 mg/L	113	94	114
EK010/011: Chlorine (QCLot: 251183)								
EK010: Chlorine - Free	----	0.2	mg/L	<0.2	----	----	----	----
EK010: Chlorine - Total Residual	----	0.2	mg/L	<0.2	----	----	----	----
EK040P: Fluoride by PC Titrator (QCLot: 251165)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	107	75	119
EK055G: Ammonia as N by Discrete Analyser (QCLot: 251535)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	103	90	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 251169)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	107	82	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 251536)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	106	91	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 251485)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	98.7	69	101
				<0.1	1 mg/L	98.3	70	118
				<0.1	5 mg/L	112	74	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 251486)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	99.8	71	101
				<0.01	0.442 mg/L	101	72	108
				<0.01	1 mg/L	112	78	118
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 251170)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	104	85	117
EP005: Total Organic Carbon (TOC) (QCLot: 251397)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	104	76	120
EP020: Oil and Grease (O&G) (QCLot: 258510)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EP020: Oil and Grease (O&G) (QCLot: 258510) - continued								
EP020: Oil & Grease	----	5	mg/L	<5	5000 mg/L	116	80	120
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 252117)								
EP033: Butane	106-97-8	10	µg/L	<10	102.18 µg/L	106	85	115
EP033: Butene	25167-67-3	10	µg/L	<10	99.61 µg/L	106	83	115
EP033: Ethane	74-84-0	10	µg/L	<10	54.43 µg/L	104	87	111
EP033: Ethene	74-85-1	10	µg/L	<10	50.29 µg/L	102	87	111
EP033: Methane	74-82-8	10	µg/L	<10	28.48 µg/L	102	86	114
EP033: Propane	74-98-6	10	µg/L	<10	78.28 µg/L	105	84	112
EP033: Propene	115-07-1	10	µg/L	<10	73.97 µg/L	104	85	113
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 254208)								
EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	10 µg/L	104	71	121
EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	10 µg/L	103	70	122
EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	10 µg/L	103	75	121
EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	10 µg/L	104	62	126
EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	10 µg/L	104	67	123
EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	10 µg/L	104	67	123
EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	10 µg/L	105	69	123
EP074: Styrene	100-42-5	5	µg/L	<5	10 µg/L	98.1	74	118
EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	10 µg/L	104	70	122
EP074B: Oxygenated Compounds (QCLot: 254208)								
EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	100 µg/L	103	74	130
EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	100 µg/L	99.6	65	137
EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	100 µg/L	101	61	139
EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	100 µg/L	99.7	61	134
EP074C: Sulfonated Compounds (QCLot: 254208)								
EP074: Carbon disulfide	75-15-0	5	µg/L	<5	10 µg/L	90.8	73	127
EP074D: Fumigants (QCLot: 254208)								
EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	10 µg/L	96.1	69	117
EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	10 µg/L	106	76	120
EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	10 µg/L	98.7	61	119
EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	10 µg/L	88.0	62	120
EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	10 µg/L	89.0	61	119
EP074E: Halogenated Aliphatic Compounds (QCLot: 254208)								
EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	10 µg/L	87.0	66	114
EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	10 µg/L	99.4	61	119
EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	10 µg/L	103	70	124
EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	10 µg/L	103	75	123
EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	10 µg/L	108	75	119

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074E: Halogenated Aliphatic Compounds (QCLot: 254208) - continued								
EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	10 µg/L	111	69	123
EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	10 µg/L	99.7	73	119
EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	10 µg/L	104	74	128
EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	10 µg/L	81.1	66	136
EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	10 µg/L	112	78	122
EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	10 µg/L	104	79	121
EP074: Bromomethane	74-83-9	50	µg/L	<50	100 µg/L	# 50.4	56	140
EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	10 µg/L	92.6	63	121
EP074: Chloroethane	75-00-3	50	µg/L	<50	100 µg/L	132	63	135
EP074: Chloromethane	74-87-3	50	µg/L	<50	100 µg/L	105	67	130
EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	10 µg/L	103	77	117
EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	10 µg/L	79.7	71	128
EP074: Dibromomethane	74-95-3	5	µg/L	<5	10 µg/L	97.5	74	118
EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	100 µg/L	99.0	61	138
EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	10 µg/L	104	58	132
EP074: Iodomethane	74-88-4	5	µg/L	<5	10 µg/L	120	70	128
EP074: Pentachloroethane	76-01-7	5	µg/L	<5	10 µg/L	83.9	72	126
EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	10 µg/L	108	72	124
EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	10 µg/L	100.0	71	119
EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	10 µg/L	75.2	60	120
EP074: Trichloroethene	79-01-6	5	µg/L	<5	10 µg/L	106	74	120
EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	100 µg/L	120	65	131
EP074: Vinyl chloride	75-01-4	50	µg/L	<50	100 µg/L	119	69	129
EP074F: Halogenated Aromatic Compounds (QCLot: 254208)								
EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	10 µg/L	104	67	125
EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	10 µg/L	102	60	126
EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	10 µg/L	106	77	117
EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	10 µg/L	106	74	120
EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	10 µg/L	106	72	120
EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	10 µg/L	115	71	121
EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	10 µg/L	105	71	121
EP074: Bromobenzene	108-86-1	5	µg/L	<5	10 µg/L	106	76	116
EP074: Chlorobenzene	108-90-7	5	µg/L	<5	10 µg/L	105	80	118
EP074G: Trihalomethanes (QCLot: 254208)								
EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	10 µg/L	87.4	64	118
EP074: Bromoform	75-25-2	5	µg/L	<5	10 µg/L	88.3	74	126
EP074: Chloroform	67-66-3	5	µg/L	<5	10 µg/L	102	76	118
EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	10 µg/L	80.5	65	115

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	High
EP075(SIM)A: Phenolic Compounds (QCLot: 251503)								
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	5 µg/L	71.8	50	108
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	5 µg/L	70.8	59	118
EP075(SIM): 2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	5 µg/L	65.9	59	122
EP075(SIM): 2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	5 µg/L	76.8	60	112
EP075(SIM): 2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	5 µg/L	66.3	64	118
EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	5 µg/L	66.2	64	110
EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	5 µg/L	75.7	56	112
EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	5 µg/L	75.7	63	117
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	10 µg/L	65.9	43	114
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	5 µg/L	70.4	63	119
EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	10 µg/L	48.9	10	95
EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	5 µg/L	33.2	25	62
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 251503)								
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	65.5	62	113
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	66.5	64	114
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	78.7	64	116
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	81.9	64	117
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	86.1	63	117
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	81.4	62	119
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	88.8	59	118
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	99.0	62	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	92.4	63	116
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	87.4	61	117
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	82.6	64	118
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	67.7	64	115
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	87.2	60	118
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	68.4	59	119
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	78.2	63	116
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	85.6	63	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 251504)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	102	59	129
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	103	71	131
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	100	62	120
EP080/071: Total Petroleum Hydrocarbons (QCLot: 254209)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	121	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 251504)								
EP071: >C10 - C16 Fraction	>C10_C16	100	µg/L	<100	2500 µg/L	102	59	131

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 251504) - continued								
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	101	74	138
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	99.5	67	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 254209)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	123	75	127
EP080: BTEXN (QCLot: 254209)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	122	70	124
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	120	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	118	69	121
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	107	70	124
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	119	72	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	119	65	129
EP262: Ethanolamines (QCLot: 251256)								
EP262: Diethanolamine	111-42-2	1	µg/L	<1	10 µg/L	94.1	50	130
EP262: Ethanolamine	141-43-5	1	µg/L	<1	10 µg/L	97.8	50	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	Recovery Limits (%) High
ED009: Anions (QCLot: 253775)							
EP1515047-041	Anonymous	ED009-X: Chloride	16887-00-6	4 mg/L	# Not Determined	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 251171)							
ES1534161-001	AST2	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	100	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 251168)							
ES1534124-007	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	96.1	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 252060)							
ES1534090-002	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	93.4	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	# Not Determined	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	92.2	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	95.2	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	94.5	70	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 252060) - continued							
ES1534090-002	Anonymous	EG020A-F: Cobalt	7440-48-4	0.2 mg/L	93.2	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	95.6	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	88.6	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	87.6	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	91.9	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	99.3	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	93.6	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 252062)							
ES1534090-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	104	70	130
EG052G: Silica by Discrete Analyser (QCLot: 251172)							
ES1534161-001	AST2	EG052G: Reactive Silica	----	5 mg/L	105	70	130
EK040P: Fluoride by PC Titrator (QCLot: 251165)							
ES1534161-001	AST2	EK040P: Fluoride	16984-48-8	5 mg/L	117	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 251535)							
ES1533935-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	105	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 251169)							
ES1534161-001	AST2	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	98.6	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 251536)							
ES1533985-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 251485)							
ES1534000-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	106	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 251486)							
ES1534000-001	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	# Not Determined	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 251170)							
ES1534161-001	AST2	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	96.8	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 251397)							
ES1534159-003	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	120	70	130
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 252117)							
EB1531959-001	Anonymous	EP033: Butane	106-97-8	102.18 µg/L	98.1	70	130
		EP033: Butene	25167-67-3	99.61 µg/L	97.5	70	130
		EP033: Ethane	74-84-0	54.43 µg/L	96.0	70	130
		EP033: Ethene	74-85-1	50.29 µg/L	96.0	70	130
		EP033: Methane	74-82-8	28.48 µg/L	92.8	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 252117) - continued							
EB1531959-001	Anonymous	EP033: Propane	74-98-6	78.28 µg/L	95.9	70	130
		EP033: Propene	115-07-1	73.97 µg/L	97.1	70	130
EP074E: Halogenated Aliphatic Compounds (QCLot: 254208)							
EP1515055-001	Anonymous	EP074: 1.1-Dichloroethene	75-35-4	25 µg/L	102	70	130
		EP074: Trichloroethene	79-01-6	25 µg/L	102	70	130
EP074F: Halogenated Aromatic Compounds (QCLot: 254208)							
EP1515055-001	Anonymous	EP074: Chlorobenzene	108-90-7	25 µg/L	103	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 254209)							
EP1515055-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	102	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 254209)							
EP1515055-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	98.5	70	130
EP080: BTEXN (QCLot: 254209)							
EP1515055-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	93.4	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	102	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	98.0	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	90.0	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	100	70	130
		EP080: Toluene	108-88-3	25 µg/L	96.9	70	130
EP262: Ethanolamines (QCLot: 251256)							
ES1534159-001	Anonymous	EP262: Diethanolamine	111-42-2	10 µg/L	91.4	50	130
		EP262: Ethanolamine	141-43-5	10 µg/L	119	50	130

ALS Environmental

QA/QC Compliance Assessment for DQO Reporting

Work Order	: **ES1534161**	Page	: 1 of 11
Amendment	: **1**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Telephone	: +61 2 8784 8503
Project	: 2268523B	Date Samples Received	: 21-Oct-2015
Site	: ----	Issue Date	: 30-Oct-2015
Sampler	: DAVID WATSON	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **Laboratory Control outliers exist - please see following pages for full details.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EP074E: Halogenated Aliphatic Compounds	QC-254208-002	----	**Bromomethane**	74-83-9	50.4 %	56-140%	**Recovery less than lower control limit**
Matrix Spike (MS) Recoveries							
ED009: Anions	EP1515047--041	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG020F: Dissolved Metals by ICP-MS	ES1534090--002	Anonymous	**Barium**	7440-39-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	ES1533985--001	Anonymous	**Nitrite + Nitrate as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EK067G: Total Phosphorus as P by Discrete Analyser	ES1534000--001	Anonymous	**Total Phosphorus as P**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	19	0.00	10.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	0	18	0.00	10.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	19	0.00	5.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	0	18	0.00	5.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*	*Sample Date*	*Extraction / Preparation* *Date extracted*	*Due for extraction*	*Evaluation*	*Analysis* *Date analysed*	*Due for analysis*	*Evaluation*

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EA005: pH							
Clear Plastic Bottle - Natural (EA005)							
AST2	21-Oct-2015	----	----	----	21-Oct-2015	21-Oct-2015	✓
EA015: Total Dissolved Solids							
Clear Plastic Bottle - Natural (EA015H)							
AST2	21-Oct-2015	----	----	----	22-Oct-2015	28-Oct-2015	✓
EA025: Suspended Solids							
Clear Plastic Bottle - Natural (EA025H)							
AST2	21-Oct-2015	----	----	----	22-Oct-2015	28-Oct-2015	✓
ED009: Anions							
Clear Plastic Bottle - Natural (ED009-X)							
AST2	21-Oct-2015	----	----	----	23-Oct-2015	18-Nov-2015	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
AST2	21-Oct-2015	----	----	----	21-Oct-2015	04-Nov-2015	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
AST2	21-Oct-2015	----	----	----	21-Oct-2015	18-Nov-2015	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
AST2	21-Oct-2015	----	----	----	21-Oct-2015	18-Nov-2015	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
AST2	21-Oct-2015	----	----	----	22-Oct-2015	18-Nov-2015	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
AST2	21-Oct-2015	----	----	----	22-Oct-2015	18-Apr-2016	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F)							
AST2	21-Oct-2015	----	----	----	22-Oct-2015	18-Apr-2016	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
AST2	21-Oct-2015	----	----	----	27-Oct-2015	18-Nov-2015	✓
EG052G: Silica by Discrete Analyser							
Clear Plastic Bottle - Natural (EG052G)							
AST2	21-Oct-2015	----	----	----	21-Oct-2015	18-Nov-2015	✓
EK010/011: Chlorine							
Clear Plastic Bottle - Natural (EK010)							
AST2	21-Oct-2015	----	----	----	21-Oct-2015	21-Oct-2015	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P)							
AST2	**21-Oct-2015**	**----**	----	----	**21-Oct-2015**	18-Nov-2015	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
AST2	**21-Oct-2015**	**----**	----	----	**22-Oct-2015**	18-Nov-2015	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
AST2	**21-Oct-2015**	**----**	----	----	**21-Oct-2015**	23-Oct-2015	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
AST2	**21-Oct-2015**	**----**	----	----	**22-Oct-2015**	18-Nov-2015	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
AST2	**21-Oct-2015**	**22-Oct-2015**	18-Nov-2015	✓	**22-Oct-2015**	18-Nov-2015	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
AST2	**21-Oct-2015**	**22-Oct-2015**	18-Nov-2015	✓	**22-Oct-2015**	18-Nov-2015	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
AST2	**21-Oct-2015**	**----**	----	----	**21-Oct-2015**	23-Oct-2015	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
AST2	**21-Oct-2015**	**----**	----	----	**22-Oct-2015**	18-Nov-2015	✓
EP020: Oil and Grease (O&G)							
Amber Jar - Sulfuric Acid or Sodium Bisulfate (EP020)							
AST2	**21-Oct-2015**	**----**	----	----	**28-Oct-2015**	18-Nov-2015	✓
EP033: C1 - C4 Hydrocarbon Gases							
Amber VOC Vial - Sulfuric Acid (EP033)							
AST2	**21-Oct-2015**	**----**	----	----	**22-Oct-2015**	04-Nov-2015	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
AST2	**21-Oct-2015**	**22-Oct-2015**	28-Oct-2015	✓	**23-Oct-2015**	01-Dec-2015	✓
EP074A: Monocyclic Aromatic Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP074)							
AST2	**21-Oct-2015**	**23-Oct-2015**	04-Nov-2015	✓	**23-Oct-2015**	04-Nov-2015	✓
EP075(SIM)T: PAH Surrogates							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
AST2	**21-Oct-2015**	**22-Oct-2015**	28-Oct-2015	✓	**23-Oct-2015**	01-Dec-2015	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080S: TPH(V)/BTEX Surrogates							
Amber VOC Vial - Sulfuric Acid (EP080)							
AST2	**21-Oct-2015**	**23-Oct-2015**	04-Nov-2015	✓	**23-Oct-2015**	04-Nov-2015	✓
EP262: Ethanolamines							
Amber Glass Bottle - Unpreserved (EP262)							
AST2	**21-Oct-2015**	**----**	----	----	**22-Oct-2015**	28-Oct-2015	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	11	**18.18**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	2	15	**13.33**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	10	**20.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Chlorine	EK010	1	6	**16.67**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	18	**11.11**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Ethanolamines by LCMSMS	EP262	1	5	**20.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	9	**11.11**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	18	**11.11**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	19	**0.00**	**10.00**	✗	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
pH	EA005	2	13	**15.38**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	2	**50.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	1	**100.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Standard Anions -by IC (Extended Method)	ED009-X	2	1	**200.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	8	**12.50**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Suspended Solids (High Level)	EA025H	2	17	**11.76**	**9.52**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	17	**11.76**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	17	**11.76**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	0	18	**0.00**	**10.00**	✗	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	2	18	**11.11**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Volatile Organic Compounds	EP074	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	11	**9.09**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	10	**20.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Ethanolamines by LCMSMS	EP262	1	5	**20.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Fluoride by PC Titrator	EK040P	1	9	**11.11**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	18	**5.56**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Oil and Grease	EP020	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	2	**50.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Standard Anions -by IC (Extended Method)	ED009-X	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	8	**12.50**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Suspended Solids (High Level)	EA025H	2	17	**11.76**	**9.52**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	17	**11.76**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	20	**15.00**	**15.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	17	**5.88**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	3	20	**15.00**	**15.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	1	18	**5.56**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	18	**5.56**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Volatile Organic Compounds	EP074	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	10	**10.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Chlorine	EK010	1	6	**16.67**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Ethanolamines by LCMSMS	EP262	1	5	**20.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	9	**11.11**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	18	**5.56**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Oil and Grease	EP020	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	2	**50.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Standard Anions -by IC (Extended Method)	ED009-X	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	8	**12.50**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Suspended Solids (High Level)	EA025H	1	17	**5.88**	**4.76**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	1	17	**5.88**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Organic Carbon	EP005	1	17	**5.88**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	1	18	**5.56**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	18	**5.56**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Volatile Organic Compounds	EP074	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	10	**10.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Ethanolamines by LCMSMS	EP262	1	5	**20.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	9	**11.11**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	18	**5.56**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	19	**0.00**	**5.00**	✗	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	2	**50.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Standard Anions -by IC (Extended Method)	ED009-X	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	8	**12.50**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	17	**5.88**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	0	18	**0.00**	**5.00**	✗	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	18	**5.56**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Volatile Organic Compounds	EP074	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH	EA005	WATER	In house: Referenced to APHA 4500 H+ B. pH of water samples is determined by ISE either manually or by automated pH meter. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Standard Anions -by IC (Extended Method)	ED009-X	WATER	In house: Referenced to APHA 4110. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45 um filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Silica (Reactive) by Discrete Analyser	EG052G	WATER	In house: Referenced to APHA 4500-SiO2 D: Under Acdic conditions reactive silicon combines with ammonium molybdate to form a yellow molybdosilicic acid complex. This is reduced by 1-amino-2-naphthol-4-sulfonic acid to a silicomolybdenum blue complex which is measured by discrete analyser at 670 nm. This method is compliant with NEPM (2013) Schedule B(3)
Chlorine	EK010	WATER	In-house (DPD colourimetry)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ammonium as N	EK055G-NH4	WATER	Ammonium in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH and Temperature. Ammonia is determined by direct colorimetry by Discrete Analyser according to APHA 4500-NH3 G. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (2013) Schedule B(3)
Oil and Grease	EP020	WATER	In house: Referenced to APHA 5520 B. Oil & grease is a gravimetric procedure to determine the amount of oil & grease residue in an aqueous sample. The sample is serially extracted three times n-hexane. The resultant extracts are combined, dehydrated and concentrated prior to gravimetric determination. This method is compliant with NEPM (2013) Schedule B(3)
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.
TRH - Semivolatile Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Volatile Organic Compounds	EP074	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Ethanolamines by LCMSMS	EP262	WATER	In-house LC-MSMS: Benzoyl derivatives of target compounds are analysed by LC/MSMS in ESI Positive Mode.

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1534163**	Page	: 1 of 4
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523B	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 21-Oct-2015
C-O-C number	: ----	Date Analysis Commenced	: 22-Oct-2015
Sampler	: ----	Issue Date	: 27-Oct-2015
Site	: ----	No. of samples received	: 1
Quote number	: ----	No. of samples analysed	: 1

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA

WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ashesh Patel	Inorganic Chemist	Sydney Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG051G: Ferrous Iron by Discrete Analyser (QC Lot: 252409)									
ES1534150-001	Anonymous	EG051G: Ferrous Iron	----	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EK085M: Sulfide as S2- (QC Lot: 256857)									
ES1534132-001	Anonymous	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	2.2	2.2	0.00	0% - 20%
EP006D: Dissolved Inorganic Carbon (DIC) (QC Lot: 251555)									
ES1534163-001	AST2	EP006: Dissolved Inorganic Carbon	----	1	mg/L	844	867	2.69	0% - 20%
EP030: Biochemical Oxygen Demand (BOD) (QC Lot: 252176)									
ES1534124-004	Anonymous	EP030: Biochemical Oxygen Demand	----	2	mg/L	4	8	66.7	No Limit
ES1534296-001	Anonymous	EP030: Biochemical Oxygen Demand	----	2	mg/L	4	5	22.2	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 252409)								
EG051G: Ferrous Iron	----	0.05	mg/L	<0.05	2 mg/L	98.4	89	113
EK085M: Sulfide as S2- (QCLot: 256857)								
EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	0.5 mg/L	102	73	127
EP006D: Dissolved Inorganic Carbon (DIC) (QCLot: 251555)								
EP006: Dissolved Inorganic Carbon	----	1	mg/L	<1	10 mg/L	92.6	76	117
EP030: Biochemical Oxygen Demand (BOD) (QCLot: 252176)								
EP030: Biochemical Oxygen Demand	----	2	mg/L	<2	200 mg/L	89.5	74	110

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 252409)							
ES1534150-001	Anonymous	EG051G: Ferrous Iron	----	1 mg/L	101	70	130
EK085M: Sulfide as S2- (QCLot: 256857)							
ES1534147-001	Anonymous	EK085: Sulfide as S2-	18496-25-8	0.33 mg/L	94.8	70	130

ALS Environmental

QA/QC Compliance Assessment for DQO Reporting

Work Order	: **ES1534163**	Page	: 1 of 4
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Telephone	: +61 2 8784 8503
Project	: 2268523B	Date Samples Received	: 21-Oct-2015
Site	: ----	Issue Date	: 27-Oct-2015
Sampler	: ----	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EG051G: Ferrous Iron by Discrete Analyser							
Clear Plastic Bottle - HCl - Filtered (EG051G)							
AST2	**21-Oct-2015**	----	----	----	**22-Oct-2015**	28-Oct-2015	✓
EK085M: Sulfide as S2-							
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085)							
AST2	**21-Oct-2015**	----	----	----	**27-Oct-2015**	28-Oct-2015	✓
EP006D: Dissolved Inorganic Carbon (DIC)							
Clear Plastic Bottle - Natural (EP006 D)							
AST2	**21-Oct-2015**	----	----	----	**22-Oct-2015**	22-Oct-2015	✓
EP030: Biochemical Oxygen Demand (BOD)							
Clear Plastic Bottle - Natural (EP030)							
AST2	**21-Oct-2015**	----	----	----	**22-Oct-2015**	23-Oct-2015	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Biochemical Oxygen Demand (BOD)	EP030	2	14	**14.29**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Inorganic Carbon	EP006 D	1	1	**100.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Ferrous Iron by Discrete Analyser	EG051G	1	7	**14.29**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfide as S2-	EK085	1	9	**11.11**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Biochemical Oxygen Demand (BOD)	EP030	1	14	**7.14**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Inorganic Carbon	EP006 D	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Ferrous Iron by Discrete Analyser	EG051G	1	7	**14.29**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfide as S2-	EK085	1	9	**11.11**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Biochemical Oxygen Demand (BOD)	EP030	1	14	**7.14**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Inorganic Carbon	EP006 D	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Ferrous Iron by Discrete Analyser	EG051G	1	7	**14.29**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfide as S2-	EK085	1	9	**11.11**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ferrous Iron by Discrete Analyser	EG051G	1	7	**14.29**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfide as S2-	EK085	1	9	**11.11**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Ferrous Iron by Discrete Analyser	EG051G	WATER	In house: Referenced to APHA 3500 Fe-B. A colorimetric determination based on the reaction between phenanthroline and ferrous iron at pH 3.2-3.3 to form an orange-red complex that is measured against a five-point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Sulfide as S2-	EK085	WATER	In house: Referenced to APHA 4500-S2- D. Sulfide species present in water samples are immediately precipitated when collected in pretreated caustic/zinc acetate preserved sample containers. After the supernatant is discarded, the resultant precipitate is then coloured using methylene blue indicator and measured using UV-VIS detection at 664nm. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Inorganic Carbon	EP006 D	WATER	In house: Referenced to APHA 5310 B The automated carbon analyzer removes Inorganic carbon from a filtered sample as CO2, which is swept into an IR detector. This method is compliant with NEPM (2013) Schedule B(3)
Biochemical Oxygen Demand (BOD)	EP030	WATER	In house: Referenced to APHA 5210 B. The 5-Day BOD test provides an empirical measure of the oxygen consumption capacity of a given water. A portion of the sample is diluted into oxygenated, nutrient rich water, and a seed added to begin biological decay. The initial dissolved oxygen content is measured, then the bottle is sealed and incubated for five days. The remaining dissolved oxygen is measured, and from the difference, the demand for oxygen, by biological decay, is determined. This method is compliant with NEPM (2013) Schedule B(3)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1534210**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523A	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 21-Oct-2015
C-O-C number	: ----	Date Analysis Commenced	: 21-Oct-2015
Sampler	: DAVID WATSON	Issue Date	: 23-Oct-2015
Site	: ----	No. of samples received	: 1
Quote number	: ----	No. of samples analysed	: 1

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA

WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key :
Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA010P: Conductivity by PC Titrator (QC Lot: 251176)									
EN1513562-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	4150	4150	0.00	0% - 20%
EK084: Un-ionized Hydrogen Sulfide (QC Lot: 253961)									
ES1534210-001	AST2	EK084: Unionized Hydrogen Sulfide	----	0.1	mg/L	<0.1	<0.1	0.00	0% - 20%
EP080: BTEXN (QC Lot: 251802)									
ES1533878-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	136	137	0.764	0% - 20%
		EP080: Ethylbenzene	100-41-4	2	µg/L	195	198	1.78	0% - 20%
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	122	125	1.94	0% - 20%
		EP080: ortho-Xylene	95-47-6	2	µg/L	39	39	0.00	0% - 50%
		EP080: Toluene	108-88-3	2	µg/L	66	67	0.00	0% - 20%
		EP080: Naphthalene	91-20-3	5	µg/L	19	18	0.00	No Limit
ES1533880-007	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 251176)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	108	95	113
EK084: Un-ionized Hydrogen Sulfide (QCLot: 253961)								
EK084: Unionized Hydrogen Sulfide	----	0.1	mg/L	<0.1	0.05 mg/L	100	72	126
EP080: BTEXN (QCLot: 251802)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	93.5	70	124
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	84.5	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	84.7	69	121
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	86.3	70	124
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	84.2	72	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	92.0	65	129

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080: BTEXN (QCLot: 251802)							
ES1533878-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	# Not Determined	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	# Not Determined	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	# Not Determined	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	86.1	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	87.2	70	130
		EP080: Toluene	108-88-3	25 µg/L	77.0	70	130

ALS Environmental

QA/QC Compliance Assessment for DQO Reporting

Work Order	: **ES1534210**	Page	: 1 of 4
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Telephone	: +61 2 8784 8503
Project	: 2268523A	Date Samples Received	: 21-Oct-2015
Site	: ----	Issue Date	: 23-Oct-2015
Sampler	: DAVID WATSON	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP080: BTEXN	ES1533878--001	Anonymous	**Benzene**	71-43-2	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP080: BTEXN	ES1533878--001	Anonymous	**Ethylbenzene**	100-41-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP080: BTEXN	ES1533878--001	Anonymous	**meta- & para-Xylene**	108-38-3 106-42-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Un-ionized Hydrogen Sulfide	0	1	0.00	10.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)					
Un-ionized Hydrogen Sulfide	0	1	0.00	5.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)					
Un-ionized Hydrogen Sulfide	0	1	0.00	5.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) AST2	**21-Oct-2015**	**----**	----	----	**21-Oct-2015**	18-Nov-2015	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) AST2	**21-Oct-2015**	**22-Oct-2015**	04-Nov-2015	✓	**22-Oct-2015**	04-Nov-2015	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✘ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Conductivity by PC Titrator	EA010-P	1	5	**20.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Un-ionized Hydrogen Sulfide	EK084	0	1	**0.00**	**10.00**	✘	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Conductivity by PC Titrator	EA010-P	1	5	**20.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Un-ionized Hydrogen Sulfide	EK084	0	1	**0.00**	**5.00**	✘	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Conductivity by PC Titrator	EA010-P	1	5	**20.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Un-ionized Hydrogen Sulfide	EK084	0	1	**0.00**	**5.00**	✘	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Un-ionized Hydrogen Sulfide	EK084	WATER	In house: Referenced to APHA 4500-S2- H. Sulfide in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

QUALITY CONTROL REPORT

Work Order	: **ES1534389**	Page	: 1 of 4
Amendment	: **2**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523A	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: ----	Date Samples Received	: 23-Oct-2015
C-O-C number	: ----	Date Analysis Commenced	: 23-Oct-2015
Sampler	: B EASTWOOD	Issue Date	: 05-Jan-2016
Site	: ----	No. of samples received	: 4
Quote number	: ----	No. of samples analysed	: 1

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

WORLD RECOGNISED ACCREDITATION

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Phalak Inthakesone	Laboratory Manager - Organics	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080: BTEXN (QC Lot: 254327)									
ES1534389-001	WK12 FRAC TANK 1	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	41	47	13.2	0% - 20%
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	148	169	13.0	0% - 20%
		EP080: ortho-Xylene	95-47-6	2	µg/L	103	118	13.2	0% - 20%
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP080: BTEXN (QCLot: 254327)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	109	70	124
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	109	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	108	69	121
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	106	70	124
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	107	72	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	114	65	129

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080: BTEXN (QCLot: 254327)							
ES1534389-002	WK12 FRAC TANK 2	EP080: Benzene	71-43-2	25 µg/L	71.5	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	80.1	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	81.5	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	72.6	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	82.0	70	130
		EP080: Toluene	108-88-3	25 µg/L	74.5	70	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1534389**	Page	: 1 of 4
Amendment	: **2**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Telephone	: +61 2 8784 8503
Project	: 2268523A	Date Samples Received	: 23-Oct-2015
Site	: ----	Issue Date	: 05-Jan-2016
Sampler	: B EASTWOOD	No. of samples received	: 4
Order number	: ----	No. of samples analysed	: 1

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Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
WK12	**22-Oct-2015**	**23-Oct-2015**	05-Nov-2015	✓	**23-Oct-2015**	05-Nov-2015	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
TRH Volatiles/BTEX	EP080	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
TRH Volatiles/BTEX	EP080	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
TRH Volatiles/BTEX	EP080	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
TRH Volatiles/BTEX	EP080	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
TRH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1536590**	Page	: 1 of 19
Amendment	: **3**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523A	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: ----	Date Samples Received	: 19-Nov-2015
C-O-C number	: ----	Date Analysis Commenced	: 20-Nov-2015
Sampler	: DAVID WATSON	Issue Date	: 05-Jan-2016
Site	: ----	No. of samples received	: 6
Quote number	: ----	No. of samples analysed	: 5

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.
This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out ir compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW
Pabi Subba	Senior Organic Chemist	Sydney Organics, Smithfield, NSW
Phalak Inthakesone	Laboratory Manager - Organics	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005P: pH by PC Titrator (QC Lot: 285059)									
ES1536590-001	AST2	EA005-P: pH Value	----	0.01	pH Unit	9.28	9.28	0.00	0% - 20%
ES1536809-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.67	7.56	1.44	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 285060)									
ES1536590-001	AST2	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	10500	10500	0.00	0% - 20%
ES1536809-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	951	951	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 285717)									
ES1536544-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	328	314	4.51	0% - 20%
ES1536544-011	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	342	330	3.49	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 285718)									
ES1536544-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	6	10	47.6	No Limit
ES1536544-011	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	33	45	31.0	No Limit
ED009: Anions (QC Lot: 284433)									
ES1536521-001	Anonymous	ED009-X: Chloride	16887-00-6	0.1	mg/L	2330	2370	1.70	0% - 20%
ES1536522-002	Anonymous	ED009-X: Chloride	16887-00-6	0.1	mg/L	268	266	0.812	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 285057)									
ES1536590-001	AST2	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1560	1590	2.18	0% - 20%
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	869	870	0.00	0% - 20%
		ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	2420	2460	1.42	0% - 20%
ES1536809-001	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	359	362	0.857	0% - 20%
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	359	362	0.857	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 285063)									
ES1536682-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5	4	0.00	No Limit
ES1536590-001	AST2	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1	<1	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 285062)									
ES1536722-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	125	122	1.75	0% - 20%
ES1536590-001	AST2	ED045G: Chloride	16887-00-6	1	mg/L	1900	1880	1.12	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 284896)									
ES1536590-001	AST2	ED093F: Calcium	7440-70-2	1	mg/L	14	14	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	12	12	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	284	273	3.89	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2370	2290	3.42	0% - 20%

Sub-Matrix: **WATER**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093F: Dissolved Major Cations (QC Lot: 284896) - continued									
ES1536682-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	191	192	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	53	52	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	240	234	2.32	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 284895)									
ES1536590-001	AST2	EG020B-F: Strontium	7440-24-6	0.001	mg/L	2.82	2.76	2.07	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
ES1536682-002	Anonymous	EG020B-F: Strontium	7440-24-6	0.001	mg/L	2.88	2.82	2.18	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 284897)									
ES1536590-001	AST2	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	2.20	2.12	3.57	0% - 20%
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.005	0.004	28.3	No Limit
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.010	0.012	12.4	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.07	0.07	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	3.93	4.13	4.85	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.06	0.06	0.00	No Limit
		EG020A-F: Bromine	7726-95-6	0.1	mg/L	2.9	2.9	0.00	0% - 20%
ES1536682-002	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.706	0.698	1.25	0% - 20%
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.098	0.094	3.68	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EG020F: Dissolved Metals by ICP-MS (QC Lot: 284897) - continued									
ES1536682-002	Anonymous	EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.011	0.009	22.9	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	2.11	2.08	1.37	0% - 20%
		EG020A-F: Bromine	7726-95-6	0.1	mg/L	0.5	0.5	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 284894)									
ES1536590-003	WK13	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1536613-006	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG052G: Silica by Discrete Analyser (QC Lot: 285064)									
ES1536682-001	Anonymous	EG052G: Reactive Silica	----	0.05	mg/L	18.8	19.1	1.42	0% - 20%
ES1536590-001	AST2	EG052G: Reactive Silica	----	0.05	mg/L	3.23	3.22	0.369	0% - 20%
EK010/011: Chlorine (QC Lot: 285587)									
ES1536440-001	Anonymous	EK010: Chlorine - Free	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
		EK010: Chlorine - Total Residual	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
ES1536622-003	Anonymous	EK010: Chlorine - Free	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
		EK010: Chlorine - Total Residual	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 285058)									
ES1536590-001	AST2	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.6	1.6	0.00	0% - 50%
ES1536809-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.0	1.0	0.00	0% - 50%
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 286160)									
ES1536590-001	AST2	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	1.03	1.03	0.00	0% - 20%
ES1536645-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.01	0.02	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 285065)									
ES1536682-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1536590-001	AST2	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 286159)									
ES1536590-001	AST2	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.04	0.04	0.00	No Limit
ES1536645-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.07	0.07	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 286141)									
EN1513975-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	21.2	20.0	5.93	0% - 20%
ES1536645-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	0.2	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 286142)									
EN1513975-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	1.42	1.40	1.44	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 286142) - continued									
ES1536645-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 285061)									
ES1536682-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.02	0.02	0.00	No Limit
ES1536590-001	AST2	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 284241)									
ES1536590-001	AST2	EP005: Total Organic Carbon	----	1	mg/L	33	31	6.28	0% - 20%
ES1536682-002	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	5	5	0.00	No Limit
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 284470)									
EP1516089-001	Anonymous	EP033: Butane	106-97-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.00	No Limit
		EP033: Methane	74-82-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.00	No Limit
EP1516089-011	Anonymous	EP033: Butane	106-97-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.00	No Limit
		EP033: Methane	74-82-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.00	No Limit
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 286112)									
ES1536696-001	Anonymous	EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.00	No Limit
ES1536590-002	WK12	EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	**Client sample ID**	**Method: Compound**	**CAS Number**	**LOR**	**Unit**	**Original Result**	**Duplicate Result**	**RPD (%)**	**Recovery Limits (%)**
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 286112) - continued									
ES1536590-002	WK12	EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.00	No Limit
EP074B: Oxygenated Compounds (QC Lot: 286112)									
ES1536696-001	Anonymous	EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.00	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.00	No Limit
ES1536590-002	WK12	EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.00	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.00	No Limit
EP074C: Sulfonated Compounds (QC Lot: 286112)									
ES1536696-001	Anonymous	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.00	No Limit
ES1536590-002	WK12	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.00	No Limit
EP074D: Fumigants (QC Lot: 286112)									
ES1536696-001	Anonymous	EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
ES1536590-002	WK12	EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
EP074E: Halogenated Aliphatic Compounds (QC Lot: 286112)									
ES1536696-001	Anonymous	EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP074E: Halogenated Aliphatic Compounds (QC Lot: 286112) - continued									
ES1536696-001	Anonymous	EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit
		EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
ES1536590-002	WK12	EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP074E: Halogenated Aliphatic Compounds (QC Lot: 286112) - continued									
ES1536590-002	WK12	EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit
		EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
EP074F: Halogenated Aromatic Compounds (QC Lot: 286112)									
ES1536696-001	Anonymous	EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit
ES1536590-002	WK12	EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit
EP074G: Trihalomethanes (QC Lot: 286112)									
ES1536696-001	Anonymous	EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
ES1536590-002	WK12	EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 284481)									
ES1536590-001	AST2	EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	<1.0	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075(SIM)A: Phenolic Compounds (QC Lot: 284481) - continued									
ES1536590-001	AST2	EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	<2.0	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	<2.0	0.00	No Limit
ES1536590-005	QA18	EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	<2.0	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	<2.0	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 284481)									
ES1536590-001	AST2	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	<1.0	0.00	No Limit
ES1536590-005	QA18	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 284481) - continued									
ES1536590-005	QA18	EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	<1.0	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 284482)									
ES1536590-001	AST2	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
ES1536590-005	QA18	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 286111)									
ES1536696-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1536590-002	WK12	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 284482)									
ES1536590-001	AST2	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
ES1536590-005	QA18	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 286111)									
ES1536696-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1536590-002	WK12	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP262: Ethanolamines (QC Lot: 283946)									
EB1534690-003	Anonymous	EP262: Diethanolamine	111-42-2	1	µg/L	0.021	25	15.8	0% - 20%
		EP262: Ethanolamine	141-43-5	1	µg/L	<0.001	<1	0.00	No Limit
ES1536677-002	Anonymous	EP262: Diethanolamine	111-42-2	1	µg/L	<1	<1	0.00	No Limit
		EP262: Ethanolamine	141-43-5	1	µg/L	<1	<1	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 285060)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	106	95	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 285717)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	99.0	87	109
				<10	293 mg/L	118	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 285718)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	96.7	83	129
				<5	1000 mg/L	94.7	82	110
ED009: Anions (QCLot: 284433)								
ED009-X: Chloride	16887-00-6	0.1	mg/L	<0.100	2 mg/L	101	91	111
ED037P: Alkalinity by PC Titrator (QCLot: 285057)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	88.0	81	111
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 285063)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 285062)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.5	75	123
				<1	1000 mg/L	97.6	78	128
ED093F: Dissolved Major Cations (QCLot: 284896)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	113	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	107	90	116
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	103	85	113
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	101	82	120
EG020F: Dissolved Metals by ICP-MS (QCLot: 284895)								
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	92.5	81	113
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 284897)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	96.6	80	116
EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	0.01 mg/L	98.7	85	115
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.2	85	114
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	93.3	82	110
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	92.2	85	115
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	88.4	85	115
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	----	----	----	----
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.8	84	110

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 284897) - continued								
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.7	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	98.5	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	93.7	81	111
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	95.2	82	112
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.9	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	94.8	82	110
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	100	79	113
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.6	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	102	85	115
EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	97.4	77	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	92.8	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	93.1	81	117
EG035F: Dissolved Mercury by FIMS (QCLot: 284894)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	92.7	83	105
EG052G: Silica by Discrete Analyser (QCLot: 285064)								
EG052G: Reactive Silica	----	0.05	mg/L	<0.05	5 mg/L	104	92	118
EK010/011: Chlorine (QCLot: 285587)								
EK010: Chlorine - Free	----	0.2	mg/L	<0.2	----	----	----	----
EK010: Chlorine - Total Residual	----	0.2	mg/L	<0.2	----	----	----	----
EK040P: Fluoride by PC Titrator (QCLot: 285058)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	99.6	82	116
EK055G: Ammonia as N by Discrete Analyser (QCLot: 286160)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	102	90	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 285065)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	90.5	82	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 286159)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	108	91	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 286141)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	98.7	69	101
				<0.1	1 mg/L	103	70	118
				<0.1	5 mg/L	109	74	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 286142)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	88.0	71	101
				<0.01	0.442 mg/L	92.2	72	108
				<0.01	1 mg/L	106	78	118
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 285061)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	94.9	85	117

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	High
EP005: Total Organic Carbon (TOC) (QCLot: 284241)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	92.4	72	120
EP020: Oil and Grease (O&G) (QCLot: 288292)								
EP020: Oil & Grease	----	5	mg/L	<5	5000 mg/L	91.3	81	121
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 284470)								
EP033: Butane	106-97-8	10	µg/L	<10	102.18 µg/L	92.1	85	115
EP033: Butene	25167-67-3	10	µg/L	<10	99.61 µg/L	93.3	83	115
EP033: Ethane	74-84-0	10	µg/L	<10	54.43 µg/L	92.2	87	111
EP033: Ethene	74-85-1	10	µg/L	<10	50.29 µg/L	93.1	87	111
EP033: Methane	74-82-8	10	µg/L	<10	28.48 µg/L	92.4	86	114
EP033: Propane	74-98-6	10	µg/L	<10	78.28 µg/L	92.2	84	112
EP033: Propene	115-07-1	10	µg/L	<10	73.97 µg/L	93.4	85	113
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 286112)								
EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	10 µg/L	101	74	116
EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	10 µg/L	103	74	116
EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	10 µg/L	101	76	118
EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	10 µg/L	92.2	65	123
EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	10 µg/L	100.0	69	119
EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	10 µg/L	102	71	119
EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	10 µg/L	102	73	119
EP074: Styrene	100-42-5	5	µg/L	<5	10 µg/L	99.3	73	119
EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	10 µg/L	103	72	116
EP074B: Oxygenated Compounds (QCLot: 286112)								
EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	100 µg/L	86.5	74	130
EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	100 µg/L	94.5	65	137
EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	100 µg/L	95.2	66	132
EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	100 µg/L	90.9	61	134
EP074C: Sulfonated Compounds (QCLot: 286112)								
EP074: Carbon disulfide	75-15-0	5	µg/L	<5	10 µg/L	74.9	73	127
EP074D: Fumigants (QCLot: 286112)								
EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	10 µg/L	96.4	69	117
EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	10 µg/L	91.7	76	118
EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	10 µg/L	90.0	68	122
EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	10 µg/L	78.1	62	120
EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	10 µg/L	75.4	60	114
EP074E: Halogenated Aliphatic Compounds (QCLot: 286112)								
EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	10 µg/L	84.0	66	114
EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	10 µg/L	92.8	67	119
EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	10 µg/L	95.1	70	124

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074E: Halogenated Aliphatic Compounds (QCLot: 286112) - continued								
EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	10 µg/L	100	72	126
EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	10 µg/L	93.5	74	120
EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	10 µg/L	92.5	70	124
EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	10 µg/L	89.5	73	119
EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	10 µg/L	91.2	74	126
EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	10 µg/L	82.8	66	136
EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	10 µg/L	92.4	73	123
EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	10 µg/L	99.1	71	129
EP074: Bromomethane	74-83-9	50	µg/L	<50	100 µg/L	78.3	56	140
EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	10 µg/L	80.4	62	120
EP074: Chloroethane	75-00-3	50	µg/L	<50	100 µg/L	95.0	61	139
EP074: Chloromethane	74-87-3	50	µg/L	<50	100 µg/L	77.6	67	130
EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	10 µg/L	92.5	77	119
EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	10 µg/L	80.4	71	128
EP074: Dibromomethane	74-95-3	5	µg/L	<5	10 µg/L	88.1	73	119
EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	100 µg/L	61.4	61	138
EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	10 µg/L	96.3	58	130
EP074: Iodomethane	74-88-4	5	µg/L	<5	10 µg/L	79.5	70	128
EP074: Pentachloroethane	76-01-7	5	µg/L	<5	10 µg/L	83.3	72	126
EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	10 µg/L	103	72	124
EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	10 µg/L	91.9	74	118
EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	10 µg/L	67.6	60	120
EP074: Trichloroethene	79-01-6	5	µg/L	<5	10 µg/L	91.5	76	118
EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	100 µg/L	99.1	69	131
EP074: Vinyl chloride	75-01-4	50	µg/L	<50	100 µg/L	78.1	69	129
EP074F: Halogenated Aromatic Compounds (QCLot: 286112)								
EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	10 µg/L	89.7	67	123
EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	10 µg/L	84.7	61	125
EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	10 µg/L	94.6	75	117
EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	10 µg/L	97.7	75	117
EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	10 µg/L	96.3	74	118
EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	10 µg/L	95.3	73	119
EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	10 µg/L	101	73	119
EP074: Bromobenzene	108-86-1	5	µg/L	<5	10 µg/L	100	76	116
EP074: Chlorobenzene	108-90-7	5	µg/L	<5	10 µg/L	97.5	79	117
EP074G: Trihalomethanes (QCLot: 286112)								
EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	10 µg/L	79.3	64	118
EP074: Bromoform	75-25-2	5	µg/L	<5	10 µg/L	89.3	74	126
EP074: Chloroform	67-66-3	5	µg/L	<5	10 µg/L	94.2	72	120

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP074G: Trihalomethanes (QCLot: 286112) - continued								
EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	10 µg/L	86.2	65	115
EP075(SIM)A: Phenolic Compounds (QCLot: 284481)								
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	5 µg/L	85.4	51	105
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	5 µg/L	81.2	50	106
EP075(SIM): 2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	5 µg/L	77.4	53	105
EP075(SIM): 2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	5 µg/L	63.9	49	99
EP075(SIM): 2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	5 µg/L	75.0	57	105
EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	5 µg/L	70.7	52	90
EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	5 µg/L	65.0	51	91
EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	5 µg/L	74.8	48	100
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	10 µg/L	69.7	44	88
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	5 µg/L	77.1	53	99
EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	10 µg/L	79.4	10	95
EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	5 µg/L	42.0	25	62
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 284481)								
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	76.4	62	113
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	83.8	64	114
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	82.0	64	116
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	92.5	64	117
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	92.4	63	117
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	91.9	62	119
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	98.4	59	118
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	93.2	63	115
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	88.3	63	116
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	91.2	61	117
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	97.3	64	118
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	85.6	64	115
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	92.0	60	118
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	68.8	50	94
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	83.3	63	116
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	94.8	63	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 284482)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	84.5	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	97.0	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	102	75	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 286111)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	106	75	127

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 284482)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	92.0	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	91.9	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	95.2	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 286111)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	105	75	127
EP262: Ethanolamines (QCLot: 283946)								
EP262: Diethanolamine	111-42-2	1	µg/L	<1	10 µg/L	120	50	130
EP262: Ethanolamine	141-43-5	1	µg/L	<1	10 µg/L	87.1	50	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED009: Anions (QCLot: 284433)							
ES1536521-001	Anonymous	ED009-X: Chloride	16887-00-6	4 mg/L	# Not Determined	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 285063)							
ES1536590-001	AST2	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	119	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 285062)							
ES1536590-001	AST2	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 284897)							
ES1536590-002	WK12	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	115	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	# Not Determined	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	95.6	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	93.5	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	85.5	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	112	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	102	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	95.3	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	83.0	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	105	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	89.6	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	101	70	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EG035F: Dissolved Mercury by FIMS (QCLot: 284894)							
ES1536590-001	AST2	EG035F: Mercury	7439-97-6	0.01 mg/L	96.0	70	130
EG052G: Silica by Discrete Analyser (QCLot: 285064)							
ES1536590-001	AST2	EG052G: Reactive Silica	----	5 mg/L	91.5	70	130
EK040P: Fluoride by PC Titrator (QCLot: 285058)							
ES1536590-001	AST2	EK040P: Fluoride	16984-48-8	5 mg/L	93.2	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 286160)							
ES1536590-001	AST2	EK055G: Ammonia as N	7664-41-7	1 mg/L	71.0	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 285065)							
ES1536590-001	AST2	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	104	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 286159)							
ES1536590-001	AST2	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	119	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 286141)							
ES1536590-001	AST2	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	104	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 286142)							
ES1536590-001	AST2	EK067G: Total Phosphorus as P	----	1 mg/L	93.5	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 285061)							
ES1536590-001	AST2	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	106	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 284241)							
ES1536590-002	WK12	EP005: Total Organic Carbon	----	100 mg/L	88.6	70	130
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 284470)							
EP1516089-002	Anonymous	EP033: Butane	106-97-8	102.18 µg/L	91.4	70	130
		EP033: Butene	25167-67-3	99.61 µg/L	91.1	70	130
		EP033: Ethane	74-84-0	54.43 µg/L	92.5	70	130
		EP033: Ethene	74-85-1	50.29 µg/L	92.4	70	130
		EP033: Methane	74-82-8	28.48 µg/L	89.0	70	130
		EP033: Propane	74-98-6	78.28 µg/L	91.6	70	130
		EP033: Propene	115-07-1	73.97 µg/L	91.8	70	130
EP074E: Halogenated Aliphatic Compounds (QCLot: 286112)							
ES1536696-001	Anonymous	EP074: 1.1-Dichloroethene	75-35-4	25 µg/L	87.6	70	130
		EP074: Trichloroethene	79-01-6	25 µg/L	79.4	70	130
EP074F: Halogenated Aromatic Compounds (QCLot: 286112)							
ES1536696-001	Anonymous	EP074: Chlorobenzene	108-90-7	25 µg/L	91.8	70	130
EP075(SIM)A: Phenolic Compounds (QCLot: 284481)							
ES1536590-002	WK12	EP075(SIM): 2-Chlorophenol	95-57-8	2 µg/L	71.4	60	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP075(SIM)A: Phenolic Compounds (QCLot: 284481) - continued							
ES1536590-002	WK12	EP075(SIM): 2-Nitrophenol	88-75-5	2 µg/L	97.1	60	130
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	2 µg/L	80.7	70	130
		EP075(SIM): Pentachlorophenol	87-86-5	2 µg/L	60.1	20	130
		EP075(SIM): Phenol	108-95-2	2 µg/L	45.0	20	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 284481)							
ES1536590-002	WK12	EP075(SIM): Acenaphthene	83-32-9	2 µg/L	74.8	70	130
		EP075(SIM): Pyrene	129-00-0	2 µg/L	85.5	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 284482)							
ES1536590-002	WK12	EP071: C10 - C14 Fraction	----	2000 µg/L	119	74	150
		EP071: C15 - C28 Fraction	----	2500 µg/L	89.9	77	153
		EP071: C29 - C36 Fraction	----	2000 µg/L	85.9	67	153
EP080/071: Total Petroleum Hydrocarbons (QCLot: 286111)							
ES1536696-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	124	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 284482)							
ES1536590-002	WK12	EP071: >C10 - C16 Fraction	----	2500 µg/L	106	74	150
		EP071: >C16 - C34 Fraction	----	3500 µg/L	86.0	77	153
		EP071: >C34 - C40 Fraction	----	1500 µg/L	80.7	67	153
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 286111)							
ES1536696-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	120	70	130
EP262: Ethanolamines (QCLot: 283946)							
EB1534690-003	Anonymous	EP262: Diethanolamine	111-42-2	10 µg/L	122	50	130
		EP262: Ethanolamine	141-43-5	10 µg/L	76.0	50	130

Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1536590**	Page	: 1 of 12
Amendment	: **3**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Telephone	: +61 2 8784 8503
Project	: 2268523A	Date Samples Received	: 19-Nov-2015
Site	: ----	Issue Date	: 05-Jan-2016
Sampler	: DAVID WATSON	No. of samples received	: 6
Order number	: ----	No. of samples analysed	: 5

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED009: Anions	ES1536521--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	ES1536590--001	AST2	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG020F: Dissolved Metals by ICP-MS	ES1536590--002	WK12	**Barium**	7440-39-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural AST2, WK12, WK13, WK14, QA18	----	----	----	20-Nov-2015	18-Nov-2015	**2**
EK010/011: Chlorine						
Clear Plastic Bottle - Natural AST2, WK12, WK13, WK14, QA18	----	----	----	21-Nov-2015	18-Nov-2015	**2**

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*		*Sample Date*	*Extraction / Preparation*			*Analysis*		
			Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
AST2,	WK12,	**18-Nov-2015**	----	----	----	**20-Nov-2015**	18-Nov-2015	×
WK13,	WK14,							
QA18								
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P)								
WK12,	WK13,	**18-Nov-2015**	----	----	----	**20-Nov-2015**	16-Dec-2015	✓
WK14								
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
AST2,	WK12,	**18-Nov-2015**	----	----	----	**22-Nov-2015**	25-Nov-2015	✓
WK13,	WK14,							
QA18								
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)								
AST2,	WK12,	**18-Nov-2015**	----	----	----	**22-Nov-2015**	25-Nov-2015	✓
WK13,	WK14,							
QA18								
ED009: Anions								
Clear Plastic Bottle - Natural (ED009-X)								
AST2,	WK12,	**18-Nov-2015**	----	----	----	**20-Nov-2015**	16-Dec-2015	✓
WK13,	WK14,							
QA18								
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
AST2,	WK12,	**18-Nov-2015**	----	----	----	**20-Nov-2015**	02-Dec-2015	✓
WK13,	WK14,							
QA18								
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
AST2,	WK12,	**18-Nov-2015**	----	----	----	**20-Nov-2015**	16-Dec-2015	✓
WK13,	WK14,							
QA18								
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
AST2,	WK12,	**18-Nov-2015**	----	----	----	**20-Nov-2015**	16-Dec-2015	✓
WK13,	WK14,							
QA18								

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)								
AST2, WK13, QA18	WK12, WK14,	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	16-Dec-2015	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)								
AST2, WK13, QA18	WK12, WK14,	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	16-May-2016	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F)								
AST2, WK13, QA18	WK12, WK14,	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	16-May-2016	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)								
AST2, WK13, QA18	WK12, WK14,	**18-Nov-2015**	**----**	----	----	**23-Nov-2015**	16-Dec-2015	✓
EG052G: Silica by Discrete Analyser								
Clear Plastic Bottle - Natural (EG052G)								
AST2, WK13, QA18	WK12, WK14,	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	16-Dec-2015	✓
EK010/011: Chlorine								
Clear Plastic Bottle - Natural (EK010)								
AST2, WK13, QA18	WK12, WK14,	**18-Nov-2015**	**----**	----	----	**21-Nov-2015**	18-Nov-2015	×
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P)								
AST2, WK13, QA18	WK12, WK14,	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	16-Dec-2015	✓
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G)								
AST2, WK13, QA18	WK12, WK14,	**18-Nov-2015**	**----**	----	----	**23-Nov-2015**	16-Dec-2015	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
AST2, WK12, WK13, WK14, QA18	**18-Nov-2015**	----	----	----	**20-Nov-2015**	20-Nov-2015	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
AST2, WK12, WK13, WK14, QA18	**18-Nov-2015**	----	----	----	**23-Nov-2015**	16-Dec-2015	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
AST2, WK12, WK13, WK14, QA18	**18-Nov-2015**	**23-Nov-2015**	16-Dec-2015	✓	**23-Nov-2015**	16-Dec-2015	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
AST2, WK12, WK13, WK14, QA18	**18-Nov-2015**	**23-Nov-2015**	16-Dec-2015	✓	**23-Nov-2015**	16-Dec-2015	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
AST2, WK12, WK13, WK14, QA18	**18-Nov-2015**	----	----	----	**20-Nov-2015**	20-Nov-2015	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
AST2, WK12, WK13, WK14, QA18	**18-Nov-2015**	----	----	----	**20-Nov-2015**	16-Dec-2015	✓
EP020: Oil and Grease (O&G)							
Amber Jar - Sulfuric Acid or Sodium Bisulfate (EP020)							
AST2, WK12, WK13, WK14, QA18	**18-Nov-2015**	----	----	----	**24-Nov-2015**	16-Dec-2015	✓
EP033: C1 - C4 Hydrocarbon Gases							
Amber VOC Vial - Sulfuric Acid (EP033)							
AST2, WK12, WK13, WK14, QA18	**18-Nov-2015**	----	----	----	**20-Nov-2015**	02-Dec-2015	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071)								
AST2,	WK12,	**18-Nov-2015**	**23-Nov-2015**	25-Nov-2015	✓	**24-Nov-2015**	02-Jan-2016	✓
WK13,	WK14,							
QA18								
EP074A: Monocyclic Aromatic Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP074)								
AST2,	WK12,	**18-Nov-2015**	**23-Nov-2015**	02-Dec-2015	✓	**23-Nov-2015**	02-Dec-2015	✓
WK13,	WK14,							
QA18								
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM))								
AST2,	WK12,	**18-Nov-2015**	**23-Nov-2015**	25-Nov-2015	✓	**24-Nov-2015**	02-Jan-2016	✓
WK13,	WK14,							
QA18								
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080)								
AST2,	WK12,	**18-Nov-2015**	**23-Nov-2015**	02-Dec-2015	✓	**23-Nov-2015**	02-Dec-2015	✓
WK13,	WK14,							
QA18								
EP262: Ethanolamines								
Amber Glass Bottle - Unpreserved (EP262)								
AST2,	WK12,	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	25-Nov-2015	✓
WK13,	WK14,							
QA18								

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
C1 - C4 Gases	EP033	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorine	EK010	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	9	**22.22**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Silica (Reactive) by Discrete Analyser	EG052G	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Standard Anions -by IC (Extended Method)	ED009-X	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**9.52**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
C1 - C4 Gases	EP033	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type / *Analytical Methods*	*Method*	*Count QC*	*Count Regular*	*Rate (%) Actual*	*Rate (%) Expected*	*Evaluation*	*Quality Control Specification*
Laboratory Control Samples (LCS) - Continued							
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Silica (Reactive) by Discrete Analyser	EG052G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Standard Anions -by IC (Extended Method)	ED009-X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**9.52**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	18	**16.67**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	19	**15.79**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
C1 - C4 Gases	EP033	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorine	EK010	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Silica (Reactive) by Discrete Analyser	EG052G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Standard Anions -by IC (Extended Method)	ED009-X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Suspended Solids (High Level)	EA025H	1	19	**5.26**	**4.76**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
C1 - C4 Gases	EP033	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Silica (Reactive) by Discrete Analyser	EG052G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Standard Anions -by IC (Extended Method)	ED009-X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Standard Anions -by IC (Extended Method)	ED009-X	WATER	In house: Referenced to APHA 4110. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45 um filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Silica (Reactive) by Discrete Analyser	EG052G	WATER	In house: Referenced to APHA 4500-SiO2 D: Under Acdic conditions reactive silicon combines with ammonium molybdate to form a yellow molybdosilicic acid complex. This is reduced by 1-amino-2-naphthol-4-sulfonic acid to a silicomolybdenum blue complex which is measured by discrete analyser at 670 nm. This method is compliant with NEPM (2013) Schedule B(3)
Chlorine	EK010	WATER	In-house (DPD colourimetry)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ammonium as N	EK055G-NH4	WATER	Ammonium in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH and Temperature. Ammonia is determined by direct colorimetry by Discrete Analyser according to APHA 4500-NH3 G. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (2013) Schedule B(3)
Oil and Grease	EP020	WATER	In house: Referenced to APHA 5520 B. Oil & grease is a gravimetric procedure to determine the amount of oil & grease residue in an aqueous sample. The sample is serially extracted three times n-hexane. The resultant extracts are combined, dehydrated and concentrated prior to gravimetric determination. This method is compliant with NEPM (2013) Schedule B(3)
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.
TRH - Semivolatile Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Volatile Organic Compounds	EP074	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Ethanolamines by LCMSMS	EP262	WATER	In-house LC-MSMS: Benzoyl derivatives of target compounds are analysed by LC/MSMS in ESI Positive Mode.

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)

QUALITY CONTROL REPORT

Work Order	: **ES1536677**	Page	: 1 of 21
Amendment	: **1**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523B	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: ----	Date Samples Received	: 19-Nov-2015
C-O-C number	: ----	Date Analysis Commenced	: 20-Nov-2015
Sampler	: DAVID WATSON	Issue Date	: 10-Dec-2015
Site	: ----	No. of samples received	: 6
Quote number	: ----	No. of samples analysed	: 6

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

WORLD RECOGNISED ACCREDITATION

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Phalak Inthakesone	Laboratory Manager - Organics	Sydney Organics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005P: pH by PC Titrator (QC Lot: 285059)									
ES1536590-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	9.28	9.28	0.00	0% - 20%
ES1536809-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.67	7.56	1.44	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 285060)									
ES1536590-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	10500	10500	0.00	0% - 20%
ES1536809-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	951	951	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 286368)									
ES1536677-001	WKSW01	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	218	195	11.0	0% - 20%
EW1512659-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	781	737	5.80	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 286369)									
ES1536677-001	WKSW01	EA025H: Suspended Solids (SS)	----	5	mg/L	12	10	18.2	No Limit
EW1512659-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	23	26	13.1	No Limit
ED009: Anions (QC Lot: 284433)									
ES1536521-001	Anonymous	ED009-X: Chloride	16887-00-6	0.1	mg/L	2330	2370	1.70	0% - 20%
ES1536522-002	Anonymous	ED009-X: Chloride	16887-00-6	0.1	mg/L	268	266	0.812	0% - 20%
ED009: Anions (QC Lot: 284435)									
ES1536677-003	WKSW03	ED009-X: Chloride	16887-00-6	0.1	mg/L	33.9	34.1	0.699	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 285057)									
ES1536590-001	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1560	1590	2.18	0% - 20%
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	869	870	0.00	0% - 20%
		ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	2420	2460	1.42	0% - 20%
ES1536809-001	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	359	362	0.857	0% - 20%
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	359	362	0.857	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 285063)									
ES1536682-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5	4	0.00	No Limit
ES1536590-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1	<1	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 285062)									
ES1536722-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	125	122	1.75	0% - 20%
ES1536590-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1900	1880	1.12	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 284896)									
ES1536590-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	14	14	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	12	12	0.00	0% - 50%

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
ED093F: Dissolved Major Cations (QC Lot: 284896) - continued									
ES1536590-001	Anonymous	ED093F: Potassium	7440-09-7	1	mg/L	284	273	3.89	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2370	2290	3.42	0% - 20%
ES1536682-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	191	192	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	53	52	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	240	234	2.32	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 284895)									
ES1536590-001	Anonymous	EG020B-F: Strontium	7440-24-6	0.001	mg/L	2.82	2.76	2.07	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
ES1536682-002	Anonymous	EG020B-F: Strontium	7440-24-6	0.001	mg/L	2.88	2.82	2.18	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 284897)									
ES1536590-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	2.20	2.12	3.57	0% - 20%
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.005	0.004	28.3	No Limit
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.010	0.012	12.4	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.07	0.07	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	3.93	4.13	4.85	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.06	0.06	0.00	No Limit
		EG020A-F: Bromine	7726-95-6	0.1	mg/L	2.9	2.9	0.00	0% - 20%
ES1536682-002	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.706	0.698	1.25	0% - 20%
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 284897) - continued									
ES1536682-002	Anonymous	EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.098	0.094	3.68	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.011	0.009	22.9	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	2.11	2.08	1.37	0% - 20%
		EG020A-F: Bromine	7726-95-6	0.1	mg/L	0.5	0.5	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 284894)									
ES1536590-003	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1536613-006	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG052G: Silica by Discrete Analyser (QC Lot: 285064)									
ES1536682-001	Anonymous	EG052G: Reactive Silica	----	0.05	mg/L	18.8	19.1	1.42	0% - 20%
ES1536590-001	Anonymous	EG052G: Reactive Silica	----	0.05	mg/L	3.23	3.22	0.369	0% - 20%
EK010/011: Chlorine (QC Lot: 285587)									
ES1536440-001	Anonymous	EK010: Chlorine - Free	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
		EK010: Chlorine - Total Residual	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
ES1536622-003	Anonymous	EK010: Chlorine - Free	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
		EK010: Chlorine - Total Residual	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 285058)									
ES1536590-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.6	1.6	0.00	0% - 50%
ES1536809-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.0	1.0	0.00	0% - 50%
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 286162)									
ES1536672-004	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.03	0.00	No Limit
ES1536682-003	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	1.57	1.54	2.50	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 285065)									
ES1536682-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1536590-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 286161)									
ES1536672-004	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.01	0.00	No Limit
ES1536682-003	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.03	0.05	35.9	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 286144)									
ES1536672-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.3	1.3	0.00	0% - 50%
ES1536682-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.2	2.1	0.00	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 286143)									
ES1536672-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.24	0.24	0.00	0% - 20%
ES1536682-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.06	0.06	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 285061)									
ES1536682-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.02	0.02	0.00	No Limit
ES1536590-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 284241)									
ES1536590-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	33	31	6.28	0% - 20%
ES1536682-002	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	5	5	0.00	No Limit
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 284467)									
EB1534626-001	Anonymous	EP033: Butane	106-97-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.00	No Limit
		EP033: Methane	74-82-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.00	No Limit
EP1516049-003	Anonymous	EP033: Butane	106-97-8	10	µg/L	122	138	12.9	0% - 50%
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.00	No Limit
		EP033: Methane	74-82-8	10	µg/L	74	77	4.09	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.00	No Limit
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 286112)									
ES1536696-001	Anonymous	EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.00	No Limit
ES1536590-002	Anonymous	EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 286112) - continued									
ES1536590-002	Anonymous	EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.00	No Limit
EP074B: Oxygenated Compounds (QC Lot: 286112)									
ES1536696-001	Anonymous	EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.00	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.00	No Limit
ES1536590-002	Anonymous	EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.00	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.00	No Limit
EP074C: Sulfonated Compounds (QC Lot: 286112)									
ES1536696-001	Anonymous	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.00	No Limit
ES1536590-002	Anonymous	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.00	No Limit
EP074D: Fumigants (QC Lot: 286112)									
ES1536696-001	Anonymous	EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
ES1536590-002	Anonymous	EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
EP074E: Halogenated Aliphatic Compounds (QC Lot: 286112)									
ES1536696-001	Anonymous	EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP074E: Halogenated Aliphatic Compounds (QC Lot: 286112) - continued									
ES1536696-001	Anonymous	EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit
		EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
ES1536590-002	Anonymous	EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP074E: Halogenated Aliphatic Compounds (QC Lot: 286112) - continued									
ES1536590-002	Anonymous	EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit
		EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
EP074F: Halogenated Aromatic Compounds (QC Lot: 286112)									
ES1536696-001	Anonymous	EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit
ES1536590-002	Anonymous	EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit
EP074G: Trihalomethanes (QC Lot: 286112)									
ES1536696-001	Anonymous	EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
ES1536590-002	Anonymous	EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 284481)									
ES1536590-001	Anonymous	EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	<1.0	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP075(SIM)A: Phenolic Compounds (QC Lot: 284481) - continued									
ES1536590-001	Anonymous	EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	<2.0	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	<2.0	0.00	No Limit
ES1536590-005	Anonymous	EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	<2.0	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	<2.0	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 284481)									
ES1536590-001	Anonymous	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	<1.0	0.00	No Limit
ES1536590-005	Anonymous	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 284481) - continued									
ES1536590-005	Anonymous	EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	<1.0	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 284482)									
ES1536590-001	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
ES1536590-005	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 286111)									
ES1536696-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1536590-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 284482)									
ES1536590-001	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
ES1536590-005	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 286111)									
ES1536696-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1536590-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 286111)									
ES1536696-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080: BTEXN (QC Lot: 286111) - continued									
ES1536696-001	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1536590-002	Anonymous	EP080: Benzene	71-43-2	1	µg/L	1	1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP262: Ethanolamines (QC Lot: 283946)									
EB1534690-003	Anonymous	EP262: Diethanolamine	111-42-2	1	µg/L	0.021	25	15.8	0% - 20%
		EP262: Ethanolamine	141-43-5	1	µg/L	<0.001	<1	0.00	No Limit
ES1536677-002	WKSW02	EP262: Diethanolamine	111-42-2	1	µg/L	<1	<1	0.00	No Limit
		EP262: Ethanolamine	141-43-5	1	µg/L	<1	<1	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EA010P: Conductivity by PC Titrator (QCLot: 285060)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	106	95	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 286368)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	97.2	87	109
				<10	293 mg/L	116	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 286369)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	98.3	83	129
				<5	1000 mg/L	97.0	82	110
ED009: Anions (QCLot: 284433)								
ED009-X: Chloride	16887-00-6	0.1	mg/L	<0.100	2 mg/L	101	91	111
ED009: Anions (QCLot: 284435)								
ED009-X: Chloride	16887-00-6	0.1	mg/L	<0.100	2 mg/L	109	91	111
ED037P: Alkalinity by PC Titrator (QCLot: 285057)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	88.0	81	111
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 285063)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 285062)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.5	75	123
				<1	1000 mg/L	97.6	78	128
ED093F: Dissolved Major Cations (QCLot: 284896)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	113	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	107	90	116
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	103	85	113
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	101	82	120
EG020F: Dissolved Metals by ICP-MS (QCLot: 284895)								
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	92.5	81	113
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 284897)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	96.6	80	116
EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	0.01 mg/L	98.7	85	115
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.2	85	114
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	93.3	82	110
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	92.2	85	115
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	88.4	85	115

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 284897) - continued								
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	----	----	----	----
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.8	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.7	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	98.5	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	93.7	81	111
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	95.2	82	112
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.9	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	94.8	82	110
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	100	79	113
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.6	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	102	85	115
EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	97.4	77	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	92.8	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	93.1	81	117
EG035F: Dissolved Mercury by FIMS (QCLot: 284894)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	92.7	83	105
EG052G: Silica by Discrete Analyser (QCLot: 285064)								
EG052G: Reactive Silica	----	0.05	mg/L	<0.05	5 mg/L	104	92	118
EK010/011: Chlorine (QCLot: 285587)								
EK010: Chlorine - Free	----	0.2	mg/L	<0.2	----	----	----	----
EK010: Chlorine - Total Residual	----	0.2	mg/L	<0.2	----	----	----	----
EK040P: Fluoride by PC Titrator (QCLot: 285058)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	99.6	82	116
EK055G: Ammonia as N by Discrete Analyser (QCLot: 286162)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	103	90	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 285065)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	90.5	82	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 286161)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	106	91	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 286144)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	101	69	101
				<0.1	1 mg/L	107	70	118
				<0.1	5 mg/L	115	74	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 286143)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	91.4	71	101
				<0.01	0.442 mg/L	90.5	72	108
				<0.01	1 mg/L	102	78	118

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 285061)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	94.9	85	117
EP005: Total Organic Carbon (TOC) (QCLot: 284241)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	92.4	72	120
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 284467)								
EP033: Butane	106-97-8	10	µg/L	<10	102.18 µg/L	92.3	85	115
EP033: Butene	25167-67-3	10	µg/L	<10	99.61 µg/L	93.4	83	115
EP033: Ethane	74-84-0	10	µg/L	<10	54.43 µg/L	93.1	87	111
EP033: Ethene	74-85-1	10	µg/L	<10	50.29 µg/L	94.1	87	111
EP033: Methane	74-82-8	10	µg/L	<10	28.48 µg/L	92.8	86	114
EP033: Propane	74-98-6	10	µg/L	<10	78.28 µg/L	91.6	84	112
EP033: Propene	115-07-1	10	µg/L	<10	73.97 µg/L	93.9	85	113
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 286112)								
EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	10 µg/L	101	74	116
EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	10 µg/L	103	74	116
EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	10 µg/L	101	76	118
EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	10 µg/L	92.2	65	123
EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	10 µg/L	100.0	69	119
EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	10 µg/L	102	71	119
EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	10 µg/L	102	73	119
EP074: Styrene	100-42-5	5	µg/L	<5	10 µg/L	99.3	73	119
EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	10 µg/L	103	72	116
EP074B: Oxygenated Compounds (QCLot: 286112)								
EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	100 µg/L	86.5	74	130
EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	100 µg/L	94.5	65	137
EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	100 µg/L	95.2	66	132
EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	100 µg/L	90.9	61	134
EP074C: Sulfonated Compounds (QCLot: 286112)								
EP074: Carbon disulfide	75-15-0	5	µg/L	<5	10 µg/L	74.9	73	127
EP074D: Fumigants (QCLot: 286112)								
EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	10 µg/L	96.4	69	117
EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	10 µg/L	91.7	76	118
EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	10 µg/L	90.0	68	122
EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	10 µg/L	78.1	62	120
EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	10 µg/L	75.4	60	114
EP074E: Halogenated Aliphatic Compounds (QCLot: 286112)								
EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	10 µg/L	84.0	66	114
EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	10 µg/L	92.8	67	119
EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	10 µg/L	95.1	70	124

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074E: Halogenated Aliphatic Compounds (QCLot: 286112) - continued								
EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	10 µg/L	100	72	126
EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	10 µg/L	93.5	74	120
EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	10 µg/L	92.5	70	124
EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	10 µg/L	89.5	73	119
EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	10 µg/L	91.2	74	126
EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	10 µg/L	82.8	66	136
EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	10 µg/L	92.4	73	123
EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	10 µg/L	99.1	71	129
EP074: Bromomethane	74-83-9	50	µg/L	<50	100 µg/L	78.3	56	140
EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	10 µg/L	80.4	62	120
EP074: Chloroethane	75-00-3	50	µg/L	<50	100 µg/L	95.0	61	139
EP074: Chloromethane	74-87-3	50	µg/L	<50	100 µg/L	77.6	67	130
EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	10 µg/L	92.5	77	119
EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	10 µg/L	80.4	71	128
EP074: Dibromomethane	74-95-3	5	µg/L	<5	10 µg/L	88.1	73	119
EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	100 µg/L	61.4	61	138
EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	10 µg/L	96.3	58	130
EP074: Iodomethane	74-88-4	5	µg/L	<5	10 µg/L	79.5	70	128
EP074: Pentachloroethane	76-01-7	5	µg/L	<5	10 µg/L	83.3	72	126
EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	10 µg/L	103	72	124
EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	10 µg/L	91.9	74	118
EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	10 µg/L	67.6	60	120
EP074: Trichloroethene	79-01-6	5	µg/L	<5	10 µg/L	91.5	76	118
EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	100 µg/L	99.1	69	131
EP074: Vinyl chloride	75-01-4	50	µg/L	<50	100 µg/L	78.1	69	129
EP074F: Halogenated Aromatic Compounds (QCLot: 286112)								
EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	10 µg/L	89.7	67	123
EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	10 µg/L	84.7	61	125
EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	10 µg/L	94.6	75	117
EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	10 µg/L	97.7	75	117
EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	10 µg/L	96.3	74	118
EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	10 µg/L	95.3	73	119
EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	10 µg/L	101	73	119
EP074: Bromobenzene	108-86-1	5	µg/L	<5	10 µg/L	100	76	116
EP074: Chlorobenzene	108-90-7	5	µg/L	<5	10 µg/L	97.5	79	117
EP074G: Trihalomethanes (QCLot: 286112)								
EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	10 µg/L	79.3	64	118
EP074: Bromoform	75-25-2	5	µg/L	<5	10 µg/L	89.3	74	126
EP074: Chloroform	67-66-3	5	µg/L	<5	10 µg/L	94.2	72	120

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP074G: Trihalomethanes (QCLot: 286112) - continued								
EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	10 µg/L	86.2	65	115
EP075(SIM)A: Phenolic Compounds (QCLot: 284481)								
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	5 µg/L	85.4	51	105
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	5 µg/L	81.2	50	106
EP075(SIM): 2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	5 µg/L	77.4	53	105
EP075(SIM): 2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	5 µg/L	63.9	49	99
EP075(SIM): 2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	5 µg/L	75.0	57	105
EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	5 µg/L	70.7	52	90
EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	5 µg/L	65.0	51	91
EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	5 µg/L	74.8	48	100
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	10 µg/L	69.7	44	88
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	5 µg/L	77.1	53	99
EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	10 µg/L	79.4	10	95
EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	5 µg/L	42.0	25	62
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 284481)								
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	76.4	62	113
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	83.8	64	114
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	82.0	64	116
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	92.5	64	117
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	92.4	63	117
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	91.9	62	119
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	98.4	59	118
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	93.2	63	115
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	88.3	63	116
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	91.2	61	117
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	97.3	64	118
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	85.6	64	115
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	92.0	60	118
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	68.8	50	94
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	83.3	63	116
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	94.8	63	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 284482)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	84.5	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	97.0	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	102	75	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 286111)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	106	75	127

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 284482)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	92.0	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	91.9	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	95.2	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 286111)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	105	75	127
EP080: BTEXN (QCLot: 286111)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	118	70	122
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	108	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	108	69	121
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	99.4	70	120
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	114	72	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	113	69	123
EP262: Ethanolamines (QCLot: 283946)								
EP262: Diethanolamine	111-42-2	1	µg/L	<1	10 µg/L	120	50	130
EP262: Ethanolamine	141-43-5	1	µg/L	<1	10 µg/L	87.1	50	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	Recovery Limits (%) High
ED009: Anions (QCLot: 284433)							
ES1536521-001	Anonymous	ED009-X: Chloride	16887-00-6	4 mg/L	# Not Determined	70	130
ED009: Anions (QCLot: 284435)							
ES1536677-003	WKSW03	ED009-X: Chloride	16887-00-6	4 mg/L	# Not Determined	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 285063)							
ES1536590-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	119	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 285062)							
ES1536590-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 284897)							
ES1536590-002	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	115	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 284897) - continued							
ES1536590-002	Anonymous	EG020A-F: Barium	7440-39-3	0.2 mg/L	# Not Determined	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	95.6	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	93.5	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	85.5	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	112	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	102	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	95.3	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	83.0	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	105	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	89.6	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	101	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 284894)							
ES1536590-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	96.0	70	130
EG052G: Silica by Discrete Analyser (QCLot: 285064)							
ES1536590-001	Anonymous	EG052G: Reactive Silica	----	5 mg/L	91.5	70	130
EK040P: Fluoride by PC Titrator (QCLot: 285058)							
ES1536590-001	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	93.2	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 286162)							
ES1536672-004	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	77.2	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 285065)							
ES1536590-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	104	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 286161)							
ES1536672-004	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	98.0	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 286144)							
ES1536672-004	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	107	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 286143)							
ES1536672-004	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	105	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 285061)							
ES1536590-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	106	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 284241)							
ES1536590-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	88.6	70	130
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 284467)							
EP1516016-001	Anonymous	EP033: Butane	106-97-8	102.18 µg/L	92.2	70	130
		EP033: Butene	25167-67-3	99.61 µg/L	92.5	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	Concentration	MS	Low	High
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 284467) - continued							
EP1516016-001	Anonymous	EP033: Ethane	74-84-0	54.43 µg/L	91.4	70	130
		EP033: Ethene	74-85-1	50.29 µg/L	92.3	70	130
		EP033: Methane	74-82-8	28.48 µg/L	88.8	70	130
		EP033: Propane	74-98-6	78.28 µg/L	90.6	70	130
		EP033: Propene	115-07-1	73.97 µg/L	92.0	70	130
EP074E: Halogenated Aliphatic Compounds (QCLot: 286112)							
ES1536696-001	Anonymous	EP074: 1.1-Dichloroethene	75-35-4	25 µg/L	87.6	70	130
		EP074: Trichloroethene	79-01-6	25 µg/L	79.4	70	130
EP074F: Halogenated Aromatic Compounds (QCLot: 286112)							
ES1536696-001	Anonymous	EP074: Chlorobenzene	108-90-7	25 µg/L	91.8	70	130
EP075(SIM)A: Phenolic Compounds (QCLot: 284481)							
ES1536590-002	Anonymous	EP075(SIM): 2-Chlorophenol	95-57-8	2 µg/L	71.4	60	130
		EP075(SIM): 2-Nitrophenol	88-75-5	2 µg/L	97.1	60	130
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	2 µg/L	80.7	70	130
		EP075(SIM): Pentachlorophenol	87-86-5	2 µg/L	60.1	20	130
		EP075(SIM): Phenol	108-95-2	2 µg/L	45.0	20	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 284481)							
ES1536590-002	Anonymous	EP075(SIM): Acenaphthene	83-32-9	2 µg/L	74.8	70	130
		EP075(SIM): Pyrene	129-00-0	2 µg/L	85.5	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 284482)							
ES1536590-002	Anonymous	EP071: C10 - C14 Fraction	----	2000 µg/L	119	74	150
		EP071: C15 - C28 Fraction	----	2500 µg/L	89.9	77	153
		EP071: C29 - C36 Fraction	----	2000 µg/L	85.9	67	153
EP080/071: Total Petroleum Hydrocarbons (QCLot: 286111)							
ES1536696-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	124	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 284482)							
ES1536590-002	Anonymous	EP071: >C10 - C16 Fraction	----	2500 µg/L	106	74	150
		EP071: >C16 - C34 Fraction	----	3500 µg/L	86.0	77	153
		EP071: >C34 - C40 Fraction	----	1500 µg/L	80.7	67	153
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 286111)							
ES1536696-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	120	70	130
EP080: BTEXN (QCLot: 286111)							
ES1536696-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	107	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	102	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	101	70	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EP080: BTEXN (QCLot: 286111) - continued							
ES1536696-001	Anonymous	EP080: Naphthalene	91-20-3	25 µg/L	93.6	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	101	70	130
		EP080: Toluene	108-88-3	25 µg/L	103	70	130
EP262: Ethanolamines (QCLot: 283946)							
EB1534690-003	Anonymous	EP262: Diethanolamine	111-42-2	10 µg/L	122	50	130
		EP262: Ethanolamine	141-43-5	10 µg/L	76.0	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1536677**	Page	: 1 of 11
Amendment	: **1**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Telephone	: +61 2 8784 8503
Project	: 2268523B	Date Samples Received	: 19-Nov-2015
Site	: ----	Issue Date	: 10-Dec-2015
Sampler	: DAVID WATSON	No. of samples received	: 6
Order number	: ----	No. of samples analysed	: 6

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED009: Anions	ES1536521--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED009: Anions	ES1536677--003	WKSW03	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	ES1536590--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG020F: Dissolved Metals by ICP-MS	ES1536590--002	Anonymous	**Barium**	7440-39-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)	*Date extracted*	*Due for extraction*	***Days overdue***	*Date analysed*	*Due for analysis*	***Days overdue***
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural WKSW01, WKSW02, WKSW03	----	----	----	20-Nov-2015	18-Nov-2015	**2**
EK010/011: Chlorine						
Clear Plastic Bottle - Natural WKSW01, WKSW02, WKSW03	----	----	----	21-Nov-2015	18-Nov-2015	**2**

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
WKSW01, WKSW03	WKSW02,	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	18-Nov-2015	×
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P)								
WKSW01, WKSW03	WKSW02,	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	16-Dec-2015	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
WKSW01, WKSW03	WKSW02,	**18-Nov-2015**	**----**	----	----	**23-Nov-2015**	25-Nov-2015	✓
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)								
WKSW01, WKSW03	WKSW02,	**18-Nov-2015**	**----**	----	----	**23-Nov-2015**	25-Nov-2015	✓
ED009: Anions								
Clear Plastic Bottle - Natural (ED009-X)								
WKSW01, WKSW03	WKSW02,	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	16-Dec-2015	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
WKSW01, WKSW03	WKSW02,	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	02-Dec-2015	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
WKSW01, WKSW03	WKSW02,	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	16-Dec-2015	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
WKSW01, WKSW03	WKSW02,	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	16-Dec-2015	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)								
WKSW01, WKSW03	WKSW02,	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	16-Dec-2015	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)								
WKSW01, WKSW03, QA16,	WKSW02, QA15, QA17	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	16-May-2016	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F)								
WKSW01,	WKSW02,	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	16-May-2016	✓
WKSW03,	QA15,							
QA16,	QA17							
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)								
WKSW01,	WKSW02,	**18-Nov-2015**	**----**	----	----	**23-Nov-2015**	16-Dec-2015	✓
WKSW03,	QA15,							
QA16,	QA17							
EG052G: Silica by Discrete Analyser								
Clear Plastic Bottle - Natural (EG052G)								
WKSW01,	WKSW02,	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	16-Dec-2015	✓
WKSW03								
EK010/011: Chlorine								
Clear Plastic Bottle - Natural (EK010)								
WKSW01,	WKSW02,	**18-Nov-2015**	**----**	----	----	**21-Nov-2015**	18-Nov-2015	×
WKSW03								
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P)								
WKSW01,	WKSW02,	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	16-Dec-2015	✓
WKSW03								
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G)								
WKSW01,	WKSW02,	**18-Nov-2015**	**----**	----	----	**23-Nov-2015**	16-Dec-2015	✓
WKSW03								
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G)								
WKSW01,	WKSW02,	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	20-Nov-2015	✓
WKSW03								
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G)								
WKSW01,	WKSW02,	**18-Nov-2015**	**----**	----	----	**23-Nov-2015**	16-Dec-2015	✓
WKSW03								
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G)								
WKSW01,	WKSW02,	**18-Nov-2015**	**23-Nov-2015**	16-Dec-2015	✓	**23-Nov-2015**	16-Dec-2015	✓
WKSW03								
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G)								
WKSW01,	WKSW02,	**18-Nov-2015**	**23-Nov-2015**	16-Dec-2015	✓	**23-Nov-2015**	16-Dec-2015	✓
WKSW03								

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) WKSW01, WKSW03	WKSW02,	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	20-Nov-2015	✓
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulfuric Acid (EP005) WKSW01, WKSW03	WKSW02,	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	16-Dec-2015	✓
EP033: C1 - C4 Hydrocarbon Gases								
Amber VOC Vial - Sulfuric Acid (EP033) WKSW01, WKSW03	WKSW02,	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	02-Dec-2015	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071) WKSW01, WKSW03	WKSW02,	**18-Nov-2015**	**23-Nov-2015**	25-Nov-2015	✓	**24-Nov-2015**	02-Jan-2016	✓
EP074A: Monocyclic Aromatic Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP074) WKSW01, WKSW03	WKSW02,	**18-Nov-2015**	**23-Nov-2015**	02-Dec-2015	✓	**23-Nov-2015**	02-Dec-2015	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM)) WKSW01, WKSW03	WKSW02,	**18-Nov-2015**	**23-Nov-2015**	25-Nov-2015	✓	**24-Nov-2015**	02-Jan-2016	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080) WKSW01, WKSW03	WKSW02,	**18-Nov-2015**	**23-Nov-2015**	02-Dec-2015	✓	**23-Nov-2015**	02-Dec-2015	✓
EP262: Ethanolamines								
Amber Glass Bottle - Unpreserved (EP262) WKSW01, WKSW03	WKSW02,	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	25-Nov-2015	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
C1 - C4 Gases	EP033	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorine	EK010	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	10	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Silica (Reactive) by Discrete Analyser	EG052G	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Standard Anions -by IC (Extended Method)	ED009-X	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	11	**18.18**	**9.52**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
C1 - C4 Gases	EP033	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type / Analytical Methods	Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Evaluation	Quality Control Specification
Laboratory Control Samples (LCS) - Continued							
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Silica (Reactive) by Discrete Analyser	EG052G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Standard Anions -by IC (Extended Method)	ED009-X	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	11	18.18	9.52	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	16	18.75	15.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	17	17.65	15.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
C1 - C4 Gases	EP033	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chlorine	EK010	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Silica (Reactive) by Discrete Analyser	EG052G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Standard Anions -by IC (Extended Method)	ED009-X	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	11	9.09	4.76	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
C1 - C4 Gases	EP033	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Silica (Reactive) by Discrete Analyser	EG052G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Standard Anions -by IC (Extended Method)	ED009-X	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Standard Anions -by IC (Extended Method)	ED009-X	WATER	In house: Referenced to APHA 4110. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45 um filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Silica (Reactive) by Discrete Analyser	EG052G	WATER	In house: Referenced to APHA 4500-SiO2 D: Under Acdic conditions reactive silicon combines with ammonium molybdate to form a yellow molybdosilicic acid complex. This is reduced by 1-amino-2-naphthol-4-sulfonic acid to a silicomolybdenum blue complex which is measured by discrete analyser at 670 nm. This method is compliant with NEPM (2013) Schedule B(3)
Chlorine	EK010	WATER	In-house (DPD colourimetry)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ammonium as N	EK055G-NH4	WATER	Ammonium in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH and Temperature. Ammonia is determined by direct colorimetry by Discrete Analyser according to APHA 4500-NH3 G. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (2013) Schedule B(3)
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.
TRH - Semivolatile Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Volatile Organic Compounds	EP074	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Ethanolamines by LCMSMS	EP262	WATER	In-house LC-MSMS: Benzoyl derivatives of target compounds are analysed by LC/MSMS in ESI Positive Mode.

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1536678**	Page	: 1 of 4
Amendment	: **2**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523A	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: ----	Date Samples Received	: 19-Nov-2015
C-O-C number	: ----	Date Analysis Commenced	: 20-Nov-2015
Sampler	: ANDREW FARINA, DAVID WATSON	Issue Date	: 06-Jan-2016
Site	: ----	No. of samples received	: 6
Quote number	: ----	No. of samples analysed	: 5

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA010P: Conductivity by PC Titrator (QC Lot: 284438)									
ES1536678-001	AST2	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	10300	10300	0.00	0% - 20%
EK084: Un-ionized Hydrogen Sulfide (QC Lot: 285996)									
ES1536440-001	Anonymous	EK084: Unionized Hydrogen Sulfide	----	0.1	mg/L	<0.1	<0.1	0.00	0% - 20%
ES1536678-006	WK11 FRAC TANK 1	EK084: Unionized Hydrogen Sulfide	----	0.1	mg/L	<0.1	<0.1	0.00	0% - 20%
EP080: BTEXN (QC Lot: 284409)									
ES1536678-001	AST2	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 284438)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	104	95	113
EK084: Un-ionized Hydrogen Sulfide (QCLot: 285996)								
EK084: Unionized Hydrogen Sulfide	----	0.1	mg/L	<0.1	0.05 mg/L	100	72	126
EP080: BTEXN (QCLot: 284409)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	106	70	122
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	106	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	107	69	121
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	109	70	120
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	109	72	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	112	69	123

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080: BTEXN (QCLot: 284409)							
ES1536678-001	AST2	EP080: Benzene	71-43-2	25 µg/L	70.1	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	78.4	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	81.0	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	76.5	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	82.3	70	130
		EP080: Toluene	108-88-3	25 µg/L	75.6	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1536678**	Page	: 1 of 4
Amendment	: **2**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Telephone	: +61 2 8784 8503
Project	: 2268523A	Date Samples Received	: 19-Nov-2015
Site	: ----	Issue Date	: 06-Jan-2016
Sampler	: ANDREW FARINA, DAVID WATSON	No. of samples received	: 6
Order number	: ----	No. of samples analysed	: 5

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Un-ionized Hydrogen Sulfide	0	19	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)					
Un-ionized Hydrogen Sulfide	0	19	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)					
Un-ionized Hydrogen Sulfide	0	19	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P)								
AST2,	QA18	**18-Nov-2015**	**----**	----	----	**20-Nov-2015**	16-Dec-2015	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)								
AST2, WK13, QA18	WK12, WK14,	**18-Nov-2015**	**20-Nov-2015**	02-Dec-2015	✓	**20-Nov-2015**	02-Dec-2015	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Conductivity by PC Titrator	EA010-P	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Un-ionized Hydrogen Sulfide	EK084	0	19	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Conductivity by PC Titrator	EA010-P	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Un-ionized Hydrogen Sulfide	EK084	0	19	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Conductivity by PC Titrator	EA010-P	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Un-ionized Hydrogen Sulfide	EK084	0	19	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
TRH Volatiles/BTEX	EP080	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Un-ionized Hydrogen Sulfide	EK084	WATER	In house: Referenced to APHA 4500-S2- H. Sulfide in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1538433**	Page	: 1 of 17
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523A	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: ----	Date Samples Received	: 10-Dec-2015
C-O-C number	: ----	Date Analysis Commenced	: 10-Dec-2015
Sampler	: DAVID WATSON	Issue Date	: 16-Dec-2015
Site	: ----	No. of samples received	: 4
Quote number	: ----	No. of samples analysed	: 4

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Barbara Coupland	Quality Officer	Newcastle - Inorganics, Mayfield West, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Pabi Subba	Senior Organic Chemist	Sydney Organics, Smithfield, NSW
Phalak Inthakesone	Laboratory Manager - Organics	Sydney Organics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW
Shobhna Chandra	Metals Coordinator	Sydney Inorganics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005: pH (QC Lot: 306613)									
EN1514248-001	Anonymous	EA005: pH Value	----	0.01	pH Unit	7.38	7.38	0.00	0% - 20%
ES1538433-004	WK14	EA005: pH Value	----	0.01	pH Unit	7.98	7.99	0.125	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 306123)									
ES1538467-003	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	439	438	0.237	0% - 20%
ES1538433-001	WK11	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	14900	14800	0.342	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 307046)									
ES1538344-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	1630	1600	1.76	0% - 20%
ES1538433-002	WK12	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	9810	9940	1.32	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 307045)									
ES1538344-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	457	458	0.219	0% - 20%
ES1538433-002	WK12	EA025H: Suspended Solids (SS)	----	5	mg/L	78	81	4.61	0% - 50%
ED009: Anions (QC Lot: 306594)									
ES1538404-001	Anonymous	ED009-X: Chloride	16887-00-6	0.1	mg/L	22.2	22.0	0.643	0% - 20%
ES1538437-005	Anonymous	ED009-X: Chloride	16887-00-6	0.1	mg/L	224	224	0.00	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 306124)									
ES1538468-003	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	332	316	4.80	0% - 20%
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	332	316	4.80	0% - 20%
ES1538433-001	WK11	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1890	1990	5.15	0% - 20%
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	93	101	8.61	0% - 20%
		ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	1980	2090	5.32	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 306059)									
ES1538487-010	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10	<10	0.00	No Limit
ES1538433-001	WK11	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10	<10	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 306062)									
ES1538407-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	379	380	0.455	0% - 20%
ES1538487-010	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	3750	3740	0.292	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 306326)									
ES1538433-003	WK13	ED093F: Calcium	7440-70-2	1	mg/L	7	8	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	2	2	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	12	12	0.00	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	1860	1990	6.82	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 306324)									
ES1538304-001	Anonymous	EG020B-F: Strontium	7440-24-6	0.001	mg/L	0.162	0.160	1.18	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
ES1538433-003	WK13	EG020B-F: Strontium	7440-24-6	0.001	mg/L	2.71	2.75	1.55	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 306325)									
ES1538433-003	WK13	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.005	0.004	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	3.20	3.29	2.65	0% - 20%
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.006	0.008	0.00	No Limit
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.014	0.017	13.9	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.02	0.01	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	2.88	2.42	17.3	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.49	0.52	7.13	0% - 50%
		EG020A-F: Bromine	7726-95-6	0.1	mg/L	1.5	1.5	0.00	0% - 50%
EG035F: Dissolved Mercury by FIMS (QC Lot: 306323)									
ES1538177-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1538304-005	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	0.0002	0.0004	51.1	No Limit
EG052G: Silica by Discrete Analyser (QC Lot: 306063)									
ES1538433-001	WK11	EG052G: Reactive Silica	----	0.05	mg/L	54.4	54.3	0.00	0% - 20%
EW1512923-010	Anonymous	EG052G: Reactive Silica	----	0.05	mg/L	8.83	8.86	0.320	0% - 20%
EK010/011: Chlorine (QC Lot: 306096)									
ES1538433-001	WK11	EK010: Chlorine - Free	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
		EK010: Chlorine - Total Residual	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 306125)									
ES1538433-001	WK11	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.6	1.6	0.00	0% - 50%
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 306713)									
ES1538313-005	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.10	0.10	0.00	0% - 50%
ES1538361-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	57.7	56.5	2.03	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 306060)									
ES1538487-010	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1538433-001	WK11	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 306714)									
ES1538325-014	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1538361-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.04	0.03	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 306682)									
ES1538433-001	WK11	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	8.0	7.7	3.31	0% - 20%
ES1538325-013	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 306681)									
ES1538433-001	WK11	EK067G: Total Phosphorus as P	----	0.01	mg/L	1.22	1.18	4.04	0% - 20%
ES1538325-013	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.01	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 306064)									
ES1538433-001	WK11	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.13	0.13	0.00	0% - 50%
EW1512718-010	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK084: Un-ionized Hydrogen Sulfide (QC Lot: 309569)									
ES1538428-001	Anonymous	EK084: Unionized Hydrogen Sulfide	----	0.1	mg/L	<0.1	<0.1	0.00	0% - 20%
ES1538433-003	WK13	EK084: Unionized Hydrogen Sulfide	----	0.1	mg/L	<0.1	<0.1	0.00	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 306981)									
ES1538285-008	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	2	2	0.00	No Limit
EW1512717-002	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	3	3	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 308898)									
ES1538539-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	2	2	0.00	No Limit
EW1512335-003	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	28	25	9.21	0% - 20%
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 306656)									
EB1536776-001	Anonymous	EP033: Butane	106-97-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.00	No Limit
		EP033: Methane	74-82-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.00	No Limit
ES1538395-002	Anonymous	EP033: Butane	106-97-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.00	No Limit
		EP033: Methane	74-82-8	10	µg/L	10	11	0.00	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 306792)									
ES1538395-001	Anonymous	EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.00	No Limit
ES1538433-004	WK14	EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.00	No Limit
EP074B: Oxygenated Compounds (QC Lot: 306792)									
ES1538395-001	Anonymous	EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.00	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.00	No Limit
ES1538433-004	WK14	EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.00	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.00	No Limit
EP074C: Sulfonated Compounds (QC Lot: 306792)									
ES1538395-001	Anonymous	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.00	No Limit
ES1538433-004	WK14	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.00	No Limit
EP074D: Fumigants (QC Lot: 306792)									
ES1538395-001	Anonymous	EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
ES1538433-004	WK14	EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP074D: Fumigants (QC Lot: 306792) - continued									
ES1538433-004	WK14	EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
EP074E: Halogenated Aliphatic Compounds (QC Lot: 306792)									
ES1538395-001	Anonymous	EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit
		EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
ES1538433-004	WK14	EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP074E: Halogenated Aliphatic Compounds (QC Lot: 306792) - continued									
ES1538433-004	WK14	EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit
		EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
EP074F: Halogenated Aromatic Compounds (QC Lot: 306792)									
ES1538395-001	Anonymous	EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit
ES1538433-004	WK14	EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit
EP074G: Trihalomethanes (QC Lot: 306792)									
ES1538395-001	Anonymous	EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP074G: Trihalomethanes (QC Lot: 306792) - continued									
ES1538395-001	Anonymous	EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
ES1538433-004	WK14	EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 306793)									
ES1538395-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1538433-004	WK14	EP080: C6 - C9 Fraction	----	20	µg/L	80	70	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 306793)									
ES1538395-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1538433-004	WK14	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	80	80	0.00	No Limit
EP080: BTEXN (QC Lot: 306793)									
ES1538395-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1538433-004	WK14	EP080: Benzene	71-43-2	1	µg/L	25	24	4.21	0% - 20%
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	3	3	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	20	20	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP262: Ethanolamines (QC Lot: 306309)									
EB1536894-001	Anonymous	EP262: Diethanolamine	111-42-2	1	µg/L	0.003	3	0.00	No Limit
		EP262: Ethanolamine	141-43-5	1	µg/L	<0.001	<1	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 306123)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	106	95	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 307046)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	104	87	109
				<10	293 mg/L	113	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 307045)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	104	83	129
				<5	1000 mg/L	95.3	82	110
ED009: Anions (QCLot: 306594)								
ED009-X: Chloride	16887-00-6	0.1	mg/L	<0.100	2 mg/L	98.6	91	111
ED037P: Alkalinity by PC Titrator (QCLot: 306124)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	102	81	111
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 306059)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	114	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 306062)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	115	75	123
				<1	1000 mg/L	103	78	128
ED093F: Dissolved Major Cations (QCLot: 306326)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	96.2	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.9	90	116
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.9	85	113
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	96.2	82	120
EG020F: Dissolved Metals by ICP-MS (QCLot: 306324)								
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	101	81	113
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 306325)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	104	80	116
EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	0.01 mg/L	101	85	115
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	106	85	114
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	100	82	110
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	103	85	115
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	86.0	85	115
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	----	----	----	----
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	100	84	110

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EG020F: Dissolved Metals by ICP-MS (QCLot: 306325) - continued								
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	106	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	105	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	104	81	111
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	105	82	112
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	102	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	109	82	110
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	99.7	79	113
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	106	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	96.5	85	115
EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	95.5	77	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	107	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	107	81	117
EG035F: Dissolved Mercury by FIMS (QCLot: 306323)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	93.0	83	105
EG052G: Silica by Discrete Analyser (QCLot: 306063)								
EG052G: Reactive Silica	----	0.05	mg/L	<0.05	5 mg/L	102	92	118
EK010/011: Chlorine (QCLot: 306096)								
EK010: Chlorine - Free	----	0.2	mg/L	<0.2	----	----	----	----
EK010: Chlorine - Total Residual	----	0.2	mg/L	<0.2	----	----	----	----
EK040P: Fluoride by PC Titrator (QCLot: 306125)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	110	82	116
EK055G: Ammonia as N by Discrete Analyser (QCLot: 306713)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	101	90	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 306060)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	97.1	82	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 306714)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	98.0	91	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 306682)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	91.7	69	101
				<0.1	1 mg/L	88.6	70	118
				<0.1	5 mg/L	94.1	74	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 306681)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	92.0	71	101
				<0.01	0.442 mg/L	90.8	72	108
				<0.01	1 mg/L	94.4	78	118
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 306064)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	101	85	117

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EK084: Un-ionized Hydrogen Sulfide (QCLot: 309569)								
EK084: Unionized Hydrogen Sulfide	----	0.1	mg/L	<0.1	0.05 mg/L	108	72	126
EP005: Total Organic Carbon (TOC) (QCLot: 306981)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	98.5	72	120
EP005: Total Organic Carbon (TOC) (QCLot: 308898)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	97.2	72	120
EP020: Oil and Grease (O&G) (QCLot: 308946)								
EP020: Oil & Grease	----	5	mg/L	<5	5000 mg/L	99.6	81	121
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 306656)								
EP033: Butane	106-97-8	10	µg/L	<10	102.18 µg/L	98.2	85	115
EP033: Butene	25167-67-3	10	µg/L	<10	99.61 µg/L	95.4	83	115
EP033: Ethane	74-84-0	10	µg/L	<10	54.43 µg/L	99.7	87	111
EP033: Ethene	74-85-1	10	µg/L	<10	50.29 µg/L	98.9	87	111
EP033: Methane	74-82-8	10	µg/L	<10	28.48 µg/L	106	86	114
EP033: Propane	74-98-6	10	µg/L	<10	78.28 µg/L	97.9	84	112
EP033: Propene	115-07-1	10	µg/L	<10	73.97 µg/L	98.0	85	113
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 306792)								
EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	10 µg/L	102	74	116
EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	10 µg/L	102	74	116
EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	10 µg/L	104	76	118
EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	10 µg/L	105	65	123
EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	10 µg/L	101	69	119
EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	10 µg/L	103	71	119
EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	10 µg/L	105	73	119
EP074: Styrene	100-42-5	5	µg/L	<5	10 µg/L	98.1	73	119
EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	10 µg/L	102	72	116
EP074B: Oxygenated Compounds (QCLot: 306792)								
EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	100 µg/L	101	74	130
EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	100 µg/L	99.1	65	137
EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	100 µg/L	99.2	66	132
EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	100 µg/L	94.9	61	134
EP074C: Sulfonated Compounds (QCLot: 306792)								
EP074: Carbon disulfide	75-15-0	5	µg/L	<5	10 µg/L	78.8	73	127
EP074D: Fumigants (QCLot: 306792)								
EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	10 µg/L	95.7	69	117
EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	10 µg/L	103	76	118
EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	10 µg/L	94.9	68	122
EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	10 µg/L	88.0	62	120

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074D: Fumigants (QCLot: 306792) - continued								
EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	10 µg/L	81.8	60	114
EP074E: Halogenated Aliphatic Compounds (QCLot: 306792)								
EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	10 µg/L	85.4	66	114
EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	10 µg/L	91.3	67	119
EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	10 µg/L	101	70	124
EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	10 µg/L	106	72	126
EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	10 µg/L	102	74	120
EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	10 µg/L	94.9	70	124
EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	10 µg/L	104	73	119
EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	10 µg/L	107	74	126
EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	10 µg/L	83.7	66	136
EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	10 µg/L	102	73	123
EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	10 µg/L	101	71	129
EP074: Bromomethane	74-83-9	50	µg/L	<50	100 µg/L	98.6	56	140
EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	10 µg/L	88.1	62	120
EP074: Chloroethane	75-00-3	50	µg/L	<50	100 µg/L	93.7	61	139
EP074: Chloromethane	74-87-3	50	µg/L	<50	100 µg/L	90.1	67	130
EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	10 µg/L	102	77	119
EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	10 µg/L	98.3	71	128
EP074: Dibromomethane	74-95-3	5	µg/L	<5	10 µg/L	96.3	73	119
EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	100 µg/L	67.1	61	138
EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	10 µg/L	107	58	130
EP074: Iodomethane	74-88-4	5	µg/L	<5	10 µg/L	74.0	70	128
EP074: Pentachloroethane	76-01-7	5	µg/L	<5	10 µg/L	82.3	72	126
EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	10 µg/L	105	72	124
EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	10 µg/L	99.1	74	118
EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	10 µg/L	98.4	60	120
EP074: Trichloroethene	79-01-6	5	µg/L	<5	10 µg/L	106	76	118
EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	100 µg/L	93.2	69	131
EP074: Vinyl chloride	75-01-4	50	µg/L	<50	100 µg/L	88.2	69	129
EP074F: Halogenated Aromatic Compounds (QCLot: 306792)								
EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	10 µg/L	109	67	123
EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	10 µg/L	104	61	125
EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	10 µg/L	108	75	117
EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	10 µg/L	106	75	117
EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	10 µg/L	106	74	118
EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	10 µg/L	105	73	119
EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	10 µg/L	105	73	119
EP074: Bromobenzene	108-86-1	5	µg/L	<5	10 µg/L	104	76	116

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP074F: Halogenated Aromatic Compounds (QCLot: 306792) - continued								
EP074: Chlorobenzene	108-90-7	5	µg/L	<5	10 µg/L	108	79	117
EP074G: Trihalomethanes (QCLot: 306792)								
EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	10 µg/L	84.9	64	118
EP074: Bromoform	75-25-2	5	µg/L	<5	10 µg/L	86.4	74	126
EP074: Chloroform	67-66-3	5	µg/L	<5	10 µg/L	102	72	120
EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	10 µg/L	82.6	65	115
EP075(SIM)A: Phenolic Compounds (QCLot: 306640)								
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	5 µg/L	73.0	51	105
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	5 µg/L	63.1	50	106
EP075(SIM): 2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	5 µg/L	71.9	53	105
EP075(SIM): 2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	5 µg/L	59.6	49	99
EP075(SIM): 2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	5 µg/L	71.6	57	105
EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	5 µg/L	70.5	52	90
EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	5 µg/L	71.9	51	91
EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	5 µg/L	63.5	48	100
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	10 µg/L	60.9	44	88
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	5 µg/L	72.4	53	99
EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	10 µg/L	16.5	10	95
EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	5 µg/L	36.9	25	62
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 306640)								
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	75.4	62	113
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	77.0	64	114
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	103	64	116
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	78.6	64	117
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	81.2	63	117
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	75.6	62	119
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	82.0	59	118
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	93.8	63	115
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	81.2	63	116
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	83.0	61	117
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	104	64	118
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	78.6	64	115
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	81.7	60	118
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	92.0	50	94
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	97.4	63	116
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	108	63	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 306641)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 306641) - continued								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	101	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	96.8	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	95.7	75	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 306793)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	105	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 306641)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	93.4	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	94.2	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	106	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 306793)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	104	75	127
EP080: BTEXN (QCLot: 306793)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	108	70	122
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	98.2	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	98.0	69	121
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	99.5	70	120
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	101	72	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	105	69	123
EP262: Ethanolamines (QCLot: 306309)								
EP262: Diethanolamine	111-42-2	1	µg/L	<1	10 µg/L	128	50	130
EP262: Ethanolamine	141-43-5	1	µg/L	<1	10 µg/L	79.2	50	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	Recovery Limits (%) High
ED009: Anions (QCLot: 306594)							
ES1538404-001	Anonymous	ED009-X: Chloride	16887-00-6	4 mg/L	94.7	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 306059)							
ES1538433-001	WK11	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	125	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 306062)							
ES1538433-001	WK11	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 306325)							
ES1538407-002	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	118	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	115	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	110	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	108	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	107	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	109	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	108	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	104	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	99.9	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	109	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	109	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	# Not Determined	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 306323)							
ES1538177-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	99.9	70	130
EG052G: Silica by Discrete Analyser (QCLot: 306063)							
ES1538433-001	WK11	EG052G: Reactive Silica	----	5 mg/L	# Not Determined	70	130
EK040P: Fluoride by PC Titrator (QCLot: 306125)							
ES1538433-001	WK11	EK040P: Fluoride	16984-48-8	5 mg/L	120	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 306713)							
ES1538313-005	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	90.7	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 306060)							
ES1538433-001	WK11	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	101	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 306714)							
ES1538325-014	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	105	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 306682)							
ES1538325-014	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	92.3	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 306681)							
ES1538325-014	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	91.9	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 306064)							
ES1538433-001	WK11	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	104	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 306981)							
ES1538285-011	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	100	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 308898)							

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EP005: Total Organic Carbon (TOC) (QCLot: 308898) - continued							
ES1538539-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	93.8	70	130
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 306656)							
EB1536790-001	Anonymous	EP033: Butane	106-97-8	102.18 µg/L	101	70	130
		EP033: Butene	25167-67-3	99.61 µg/L	97.0	70	130
		EP033: Ethane	74-84-0	54.43 µg/L	100	70	130
		EP033: Ethene	74-85-1	50.29 µg/L	99.8	70	130
		EP033: Methane	74-82-8	28.48 µg/L	# Not Determined	70	130
		EP033: Propane	74-98-6	78.28 µg/L	97.3	70	130
		EP033: Propene	115-07-1	73.97 µg/L	98.5	70	130
EP074E: Halogenated Aliphatic Compounds (QCLot: 306792)							
ES1538395-001	Anonymous	EP074: 1.1-Dichloroethene	75-35-4	25 µg/L	83.5	70	130
		EP074: Trichloroethene	79-01-6	25 µg/L	94.7	70	130
EP074F: Halogenated Aromatic Compounds (QCLot: 306792)							
ES1538395-001	Anonymous	EP074: Chlorobenzene	108-90-7	25 µg/L	99.5	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 306793)							
ES1538395-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	123	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 306793)							
ES1538395-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	120	70	130
EP080: BTEXN (QCLot: 306793)							
ES1538395-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	103	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	107	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	105	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	98.1	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	109	70	130
		EP080: Toluene	108-88-3	25 µg/L	114	70	130
EP262: Ethanolamines (QCLot: 306309)							
EB1536894-001	Anonymous	EP262: Diethanolamine	111-42-2	10 µg/L	94.4	50	130
		EP262: Ethanolamine	141-43-5	10 µg/L	82.6	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1538433**	Page	: 1 of 9
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Telephone	: +61 2 8784 8503
Project	: 2268523A	Date Samples Received	: 10-Dec-2015
Site	: ----	Issue Date	: 16-Dec-2015
Sampler	: DAVID WATSON	No. of samples received	: 4
Order number	: ----	No. of samples analysed	: 4

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED045G: Chloride by Discrete Analyser	ES1538433--001	WK11	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG020F: Dissolved Metals by ICP-MS	ES1538407--002	Anonymous	**Zinc**	7440-66-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG052G: Silica by Discrete Analyser	ES1538433--001	WK11	**Reactive Silica**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP033: C1 - C4 Hydrocarbon Gases	EB1536790--001	Anonymous	**Methane**	74-82-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Regular Sample Surrogates

Sub-Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP075(SIM)T: PAH Surrogates	ES1538433-002	WK12	**Anthracene-d10**	1719-06-8	119 %	27-113 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	ES1538433-003	WK13	**Anthracene-d10**	1719-06-8	119 %	27-113 %	**Recovery greater than upper data quality objective**

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EA005: pH							
Clear Plastic Bottle - Natural (EA005) WK11, WK12, WK13, WK14	**10-Dec-2015**	**----**	----	----	**10-Dec-2015**	10-Dec-2015	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P)								
WK11,	WK12,	**10-Dec-2015**	**----**	----	----	**10-Dec-2015**	07-Jan-2016	✓
WK13,	WK14							
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
WK11,	WK12,	**10-Dec-2015**	**----**	----	----	**11-Dec-2015**	17-Dec-2015	✓
WK13,	WK14							
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)								
WK11,	WK12,	**10-Dec-2015**	**----**	----	----	**11-Dec-2015**	17-Dec-2015	✓
WK13,	WK14							
ED009: Anions								
Clear Plastic Bottle - Natural (ED009-X)								
WK11,	WK12,	**10-Dec-2015**	**----**	----	----	**11-Dec-2015**	07-Jan-2016	✓
WK13,	WK14							
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
WK11,	WK12,	**10-Dec-2015**	**----**	----	----	**10-Dec-2015**	24-Dec-2015	✓
WK13,	WK14							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
WK11,	WK12,	**10-Dec-2015**	**----**	----	----	**10-Dec-2015**	07-Jan-2016	✓
WK13,	WK14							
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
WK11,	WK12,	**10-Dec-2015**	**----**	----	----	**10-Dec-2015**	07-Jan-2016	✓
WK13,	WK14							
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)								
WK11,	WK12,	**10-Dec-2015**	**----**	----	----	**11-Dec-2015**	07-Jan-2016	✓
WK13,	WK14							
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)								
WK11,	WK12,	**10-Dec-2015**	**----**	----	----	**11-Dec-2015**	07-Jun-2016	✓
WK13,	WK14							
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F)								
WK11,	WK12,	**10-Dec-2015**	**----**	----	----	**11-Dec-2015**	07-Jun-2016	✓
WK13,	WK14							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)								
WK11,	WK12,	**10-Dec-2015**	**----**	----	----	**14-Dec-2015**	07-Jan-2016	✓
WK13,	WK14							
EG052G: Silica by Discrete Analyser								
Clear Plastic Bottle - Natural (EG052G)								
WK11,	WK12,	**10-Dec-2015**	**----**	----	----	**10-Dec-2015**	07-Jan-2016	✓
WK13,	WK14							
EK010/011: Chlorine								
Clear Plastic Bottle - Natural (EK010)								
WK11,	WK12,	**10-Dec-2015**	**----**	----	----	**10-Dec-2015**	10-Dec-2015	✓
WK13,	WK14							
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P)								
WK11,	WK12,	**10-Dec-2015**	**----**	----	----	**10-Dec-2015**	07-Jan-2016	✓
WK13,	WK14							
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G)								
WK11,	WK12,	**10-Dec-2015**	**----**	----	----	**11-Dec-2015**	07-Jan-2016	✓
WK13,	WK14							
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G)								
WK11,	WK12,	**10-Dec-2015**	**----**	----	----	**10-Dec-2015**	12-Dec-2015	✓
WK13,	WK14							
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G)								
WK11,	WK12,	**10-Dec-2015**	**----**	----	----	**11-Dec-2015**	07-Jan-2016	✓
WK13,	WK14							
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G)								
WK11,	WK12,	**10-Dec-2015**	**11-Dec-2015**	07-Jan-2016	✓	**11-Dec-2015**	07-Jan-2016	✓
WK13,	WK14							
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G)								
WK11,	WK12,	**10-Dec-2015**	**11-Dec-2015**	07-Jan-2016	✓	**11-Dec-2015**	07-Jan-2016	✓
WK13,	WK14							
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G)								
WK11,	WK12,	**10-Dec-2015**	**----**	----	----	**10-Dec-2015**	12-Dec-2015	✓
WK13,	WK14							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulfuric Acid (EP005)								
WK11, WK13,	WK12, WK14	**10-Dec-2015**	**----**	----	----	**11-Dec-2015**	07-Jan-2016	✓
EP020: Oil and Grease (O&G)								
Amber Jar - Sulfuric Acid or Sodium Bisulfate (EP020)								
WK11, WK13,	WK12, WK14	**10-Dec-2015**	**----**	----	----	**14-Dec-2015**	07-Jan-2016	✓
EP033: C1 - C4 Hydrocarbon Gases								
Amber VOC Vial - Sulfuric Acid (EP033)								
WK11, WK13,	WK12, WK14	**10-Dec-2015**	**----**	----	----	**11-Dec-2015**	24-Dec-2015	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071)								
WK11, WK13,	WK12, WK14	**10-Dec-2015**	**11-Dec-2015**	17-Dec-2015	✓	**12-Dec-2015**	20-Jan-2016	✓
EP074A: Monocyclic Aromatic Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP074)								
WK11, WK13,	WK12, WK14	**10-Dec-2015**	**11-Dec-2015**	24-Dec-2015	✓	**11-Dec-2015**	24-Dec-2015	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM))								
WK11, WK13,	WK12, WK14	**10-Dec-2015**	**11-Dec-2015**	17-Dec-2015	✓	**12-Dec-2015**	20-Jan-2016	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080)								
WK11, WK13,	WK12, WK14	**10-Dec-2015**	**11-Dec-2015**	24-Dec-2015	✓	**11-Dec-2015**	24-Dec-2015	✓
EP262: Ethanolamines								
Amber Glass Bottle - Unpreserved (EP262)								
WK11, WK13,	WK12, WK14	**10-Dec-2015**	**----**	----	----	**11-Dec-2015**	17-Dec-2015	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	33	176	**18.75**	**9.66**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	25	176	**14.20**	**5.80**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	17	176	**9.66**	**4.67**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	14	176	**7.95**	**3.38**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH	EA005	WATER	In house: Referenced to APHA 4500 H+ B. pH of water samples is determined by ISE either manually or by automated pH meter. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Standard Anions -by IC (Extended Method)	ED009-X	WATER	In house: Referenced to APHA 4110. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45 um filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Silica (Reactive) by Discrete Analyser	EG052G	WATER	In house: Referenced to APHA 4500-SiO2 D: Under Acdic conditions reactive silicon combines with ammonium molybdate to form a yellow molybdosilicic acid complex. This is reduced by 1-amino-2-naphthol-4-sulfonic acid to a silicomolybdenum blue complex which is measured by discrete analyser at 670 nm. This method is compliant with NEPM (2013) Schedule B(3)
Chlorine	EK010	WATER	In-house (DPD colourimetry)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ammonium as N	EK055G-NH4	WATER	Ammonium in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH and Temperature. Ammonia is determined by direct colorimetry by Discrete Analyser according to APHA 4500-NH3 G. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Un-ionized Hydrogen Sulfide	EK084	WATER	In house: Referenced to APHA 4500-S2- H. Sulfide in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (2013) Schedule B(3)
Oil and Grease	EP020	WATER	In house: Referenced to APHA 5520 B. Oil & grease is a gravimetric procedure to determine the amount of oil & grease residue in an aqueous sample. The sample is serially extracted three times n-hexane. The resultant extracts are combined, dehydrated and concentrated prior to gravimetric determination. This method is compliant with NEPM (2013) Schedule B(3)
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.
TRH - Semivolatile Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Volatile Organic Compounds	EP074	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Ethanolamines by LCMSMS	EP262	WATER	In-house LC-MSMS: Benzoyl derivatives of target compounds are analysed by LC/MSMS in ESI Positive Mode.

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)

QUALITY CONTROL REPORT

Work Order	: **ES1538987**	Page	: 1 of 4
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523A	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: ----	Date Samples Received	: 16-Dec-2015
C-O-C number	: ----	Date Analysis Commenced	: 16-Dec-2015
Sampler	: CAROLINA SARDELLA, REBECCA ROLLINS	Issue Date	: 17-Dec-2015
Site	: ----	No. of samples received	: 1
Quote number	: ----	No. of samples analysed	: 1

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

WORLD RECOGNISED ACCREDITATION

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Phalak Inthakesone	Laboratory Manager - Organics	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA010P: Conductivity by PC Titrator (QC Lot: 313291)									
EN1514345-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	3750	3760	0.262	0% - 20%
EK084: Un-ionized Hydrogen Sulfide (QC Lot: 313093)									
ES1538987-001	AST2	EK084: Unionized Hydrogen Sulfide	----	0.1	mg/L	<0.1	<0.1	0.00	0% - 20%
EP080: BTEXN (QC Lot: 312187)									
ES1538987-001	AST2	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 313291)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	106	95	113
EK084: Un-ionized Hydrogen Sulfide (QCLot: 313093)								
EK084: Unionized Hydrogen Sulfide	----	0.1	mg/L	<0.1	0.05 mg/L	100	72	126
EP080: BTEXN (QCLot: 312187)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	88.1	70	122
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	112	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	110	69	121
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	87.2	70	120
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	110	72	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	121	69	123

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080: BTEXN (QCLot: 312187)							
ES1538987-001	AST2	EP080: Benzene	71-43-2	25 µg/L	83.2	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	122	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	116	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	83.2	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	117	70	130
		EP080: Toluene	108-88-3	25 µg/L	122	70	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1538987**	Page	: 1 of 4
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Telephone	: +61 2 8784 8503
Project	: 2268523A	Date Samples Received	: 16-Dec-2015
Site	: ----	Issue Date	: 17-Dec-2015
Sampler	: CAROLINA SARDELLA, REBECCA ROLLINS	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
AST2	**15-Dec-2015**	**----**	----	----	**17-Dec-2015**	12-Jan-2016	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
AST2	**15-Dec-2015**	**16-Dec-2015**	29-Dec-2015	✓	**16-Dec-2015**	29-Dec-2015	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
TRH Volatiles/BTEX	EP080	2	6	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
TRH Volatiles/BTEX	EP080	2	6	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
TRH Volatiles/BTEX	EP080	2	6	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
TRH Volatiles/BTEX	EP080	1	6	**16.67**	**1.67**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Un-ionized Hydrogen Sulfide	EK084	WATER	In house: Referenced to APHA 4500-S2- H. Sulfide in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1538988**	Page	: 1 of 18
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523A	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: ----	Date Samples Received	: 16-Dec-2015
C-O-C number	: ----	Date Analysis Commenced	: 17-Dec-2015
Sampler	: BECKY ROLLINS, CAROLINA SARDELLA	Issue Date	: 29-Dec-2015
Site	: ----	No. of samples received	: 1
Quote number	: ----	No. of samples analysed	: 1

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA

WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Pabi Subba	Senior Organic Chemist	Sydney Organics, Smithfield, NSW
Phalak Inthakesone	Laboratory Manager - Organics	Sydney Organics, Smithfield, NSW
Shobhna Chandra	Metals Coordinator	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005P: pH by PC Titrator (QC Lot: 314853)									
ES1538988-001	AST2	EA005-P: pH Value	----	0.01	pH Unit	9.40	9.45	0.530	0% - 20%
ES1539056-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.58	7.58	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 314914)									
EM1518440-005	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	7080	7050	0.396	0% - 20%
ES1539080-002	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2460	2370	3.85	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 314915)									
EM1518440-005	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
ES1539080-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	13	11	17.0	No Limit
ED009: Anions (QC Lot: 314356)									
EP1517089-021	Anonymous	ED009-X: Chloride	16887-00-6	0.1	mg/L	109	109	0.334	0% - 20%
ES1539072-001	Anonymous	ED009-X: Chloride	16887-00-6	0.1	mg/L	304	306	0.554	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 314851)									
ES1539001-007	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	289	285	1.25	0% - 20%
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	289	285	1.25	0% - 20%
ES1538938-001	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	190	186	2.59	0% - 20%
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	190	186	2.59	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 313516)									
ES1539001-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	7320	7380	0.896	0% - 20%
ES1538973-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	10	10	0.00	0% - 50%
ED045G: Chloride by Discrete Analyser (QC Lot: 313515)									
ES1539001-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1120	1110	0.919	0% - 20%
ES1538973-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	63	63	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 313937)									
ES1538988-001	AST2	ED093F: Calcium	7440-70-2	1	mg/L	16	17	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	16	15	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	599	589	1.70	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	3040	2980	2.02	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 313935)									
ME1510939-002	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EG020F: Dissolved Metals by ICP-MS (QC Lot: 313935) - continued									
ME1510939-002	Anonymous	EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.024	0.025	0.00	0% - 20%
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.018	0.018	0.00	0% - 50%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.009	0.008	13.3	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	<0.1	0.00	No Limit
ES1538988-001	AST2	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	0.002	0.003	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	3.54	3.56	0.620	0% - 20%
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.015	0.014	0.00	0% - 50%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.023	0.024	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.005	0.006	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.05	0.05	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	3.89	4.29	9.82	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.10	0.10	0.00	No Limit
		EG020A-F: Bromine	7726-95-6	0.1	mg/L	5.0	5.2	2.60	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 313936)									
ES1538988-001	AST2	EG020B-F: Strontium	7440-24-6	0.001	mg/L	4.26	4.37	2.47	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EG020F: Dissolved Metals by ICP-MS (QC Lot: 313936) - continued									
ES1538988-001	AST2	EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 313934)									
ES1538912-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1538988-001	AST2	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG052G: Silica by Discrete Analyser (QC Lot: 313517)									
ES1538988-001	AST2	EG052G: Reactive Silica	----	0.05	mg/L	5.63	5.64	0.241	0% - 20%
EK010/011: Chlorine (QC Lot: 315035)									
ES1538988-001	AST2	EK010: Chlorine - Free	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
		EK010: Chlorine - Total Residual	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
ES1539080-005	Anonymous	EK010: Chlorine - Free	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
		EK010: Chlorine - Total Residual	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 314852)									
ES1539074-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	20.7	20.4	1.44	0% - 20%
ES1538938-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.4	0.4	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 314267)									
ES1538888-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.04	0.00	No Limit
ES1539134-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	2.44	2.46	0.743	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 313513)									
ES1539001-006	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.21	0.20	0.00	0% - 20%
ES1538973-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 314266)									
ES1538888-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.89	0.88	0.00	0% - 20%
ES1539134-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	3.57	3.43	4.12	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 314257)									
ES1538888-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.4	0.4	0.00	No Limit
ES1539134-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	4.6	4.6	0.00	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 314258)									
ES1538888-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.11	0.10	0.00	0% - 50%
ES1539134-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.01	0.02	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 313514)									
ES1538973-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.09	0.08	13.0	No Limit
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 313427)									
EM1518258-007	Anonymous	EP033: Butane	106-97-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.00	No Limit
		EP033: Methane	74-82-8	10	µg/L	7640	7270	5.05	0% - 20%
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 313427) - continued									
EM1518258-007	Anonymous	EP033: Propene	115-07-1	10	µg/L	<10	<10	0.00	No Limit
ES1539028-002	Anonymous	EP033: Butane	106-97-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.00	No Limit
		EP033: Methane	74-82-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.00	No Limit
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 314759)									
ES1539090-001	Anonymous	EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.00	No Limit
ES1539199-001	Anonymous	EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.00	No Limit
EP074B: Oxygenated Compounds (QC Lot: 314759)									
ES1539090-001	Anonymous	EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.00	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.00	No Limit
ES1539199-001	Anonymous	EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.00	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.00	No Limit
EP074C: Sulfonated Compounds (QC Lot: 314759)									
ES1539090-001	Anonymous	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.00	No Limit
ES1539199-001	Anonymous	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP074D: Fumigants (QC Lot: 314759)									
ES1539090-001	Anonymous	EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
ES1539199-001	Anonymous	EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
EP074E: Halogenated Aliphatic Compounds (QC Lot: 314759)									
ES1539090-001	Anonymous	EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit
		EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
ES1539199-001	Anonymous	EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP074E: Halogenated Aliphatic Compounds (QC Lot: 314759) - continued									
ES1539199-001	Anonymous	EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit
		EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
EP074F: Halogenated Aromatic Compounds (QC Lot: 314759)									
ES1539090-001	Anonymous	EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit
ES1539199-001	Anonymous	EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP074F: Halogenated Aromatic Compounds (QC Lot: 314759) - continued									
ES1539199-001	Anonymous	EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit
EP074G: Trihalomethanes (QC Lot: 314759)									
ES1539090-001	Anonymous	EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
ES1539199-001	Anonymous	EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 314758)									
ES1539090-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	20	30	0.00	No Limit
ES1539199-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 314758)									
ES1539090-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	20	30	0.00	No Limit
ES1539199-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 314758)									
ES1539090-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	2	2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	2	3	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	3	3	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	3	3	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1539199-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP262: Ethanolamines (QC Lot: 315568)									
EB1537641-002	Anonymous	EP262: Diethanolamine	111-42-2	1	µg/L	0.004	2	39.8	No Limit
		EP262: Ethanolamine	141-43-5	1	µg/L	0.003	3	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP262: Ethanolamines (QC Lot: 315568) - continued									
ES1539080-003	Anonymous	EP262: Diethanolamine	111-42-2	1	µg/L	<1	<1	0.00	No Limit
		EP262: Ethanolamine	141-43-5	1	µg/L	<1	<1	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 314914)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	106	87	109
				<10	293 mg/L	112	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 314915)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	99.7	83	129
				<5	1000 mg/L	95.6	82	110
ED009: Anions (QCLot: 314356)								
ED009-X: Chloride	16887-00-6	0.1	mg/L	<0.100	2 mg/L	95.0	91	111
ED037P: Alkalinity by PC Titrator (QCLot: 314851)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	94.4	81	111
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 313516)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	116	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 313515)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	112	75	123
				<1	1000 mg/L	93.2	78	128
ED093F: Dissolved Major Cations (QCLot: 313937)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.6	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	108	90	116
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	85	113
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	102	82	120
EG020F: Dissolved Metals by ICP-MS (QCLot: 313935)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	101	80	116
EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	0.01 mg/L	102	85	115
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	98.6	85	114
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	93.8	82	110
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	99.8	85	115
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	114	85	115
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	----	----	----	----
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.6	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	98.6	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	94.9	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.4	81	111
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	97.0	82	112
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.9	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	99.9	82	110

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EG020F: Dissolved Metals by ICP-MS (QCLot: 313935) - continued								
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	99.5	79	113
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.5	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	103	85	115
EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	102	77	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	99.1	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	99.4	81	117
EG020F: Dissolved Metals by ICP-MS (QCLot: 313936)								
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	94.4	81	113
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG035F: Dissolved Mercury by FIMS (QCLot: 313934)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	87.8	83	105
EG052G: Silica by Discrete Analyser (QCLot: 313517)								
EG052G: Reactive Silica	----	0.05	mg/L	<0.05	5 mg/L	106	92	118
EK010/011: Chlorine (QCLot: 315035)								
EK010: Chlorine - Free	----	0.2	mg/L	<0.2	----	----	----	----
EK010: Chlorine - Total Residual	----	0.2	mg/L	<0.2	----	----	----	----
EK040P: Fluoride by PC Titrator (QCLot: 314852)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	95.0	82	116
EK055G: Ammonia as N by Discrete Analyser (QCLot: 314267)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	96.5	90	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 313513)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	99.3	82	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 314266)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	108	91	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 314257)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	81.2	69	101
				<0.1	1 mg/L	106	70	118
				<0.1	5 mg/L	106	74	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 314258)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	98.9	71	101
				<0.01	0.442 mg/L	98.5	72	108
				<0.01	1 mg/L	101	78	118
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 313514)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	105	85	117
EP020: Oil and Grease (O&G) (QCLot: 316798)								
EP020: Oil & Grease	----	5	mg/L	<5	5000 mg/L	101	81	121
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 313427)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 313427) - continued								
EP033: Butane	106-97-8	10	µg/L	<10	102.18 µg/L	103	85	115
EP033: Butene	25167-67-3	10	µg/L	<10	99.61 µg/L	102	83	115
EP033: Ethane	74-84-0	10	µg/L	<10	54.43 µg/L	99.6	87	111
EP033: Ethene	74-85-1	10	µg/L	<10	50.29 µg/L	99.6	87	111
EP033: Methane	74-82-8	10	µg/L	<10	28.48 µg/L	99.6	86	114
EP033: Propane	74-98-6	10	µg/L	<10	78.28 µg/L	101	84	112
EP033: Propene	115-07-1	10	µg/L	<10	73.97 µg/L	101	85	113
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 314759)								
EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	10 µg/L	104	74	116
EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	10 µg/L	104	74	116
EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	10 µg/L	99.0	76	118
EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	10 µg/L	100	65	123
EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	10 µg/L	102	69	119
EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	10 µg/L	100	71	119
EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	10 µg/L	104	73	119
EP074: Styrene	100-42-5	5	µg/L	<5	10 µg/L	98.6	73	119
EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	10 µg/L	102	72	116
EP074B: Oxygenated Compounds (QCLot: 314759)								
EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	100 µg/L	105	74	130
EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	100 µg/L	117	65	137
EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	100 µg/L	103	66	132
EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	100 µg/L	95.2	61	134
EP074C: Sulfonated Compounds (QCLot: 314759)								
EP074: Carbon disulfide	75-15-0	5	µg/L	<5	10 µg/L	84.2	73	127
EP074D: Fumigants (QCLot: 314759)								
EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	10 µg/L	89.6	69	117
EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	10 µg/L	100	76	118
EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	10 µg/L	81.4	68	122
EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	10 µg/L	79.4	62	120
EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	10 µg/L	70.4	60	114
EP074E: Halogenated Aliphatic Compounds (QCLot: 314759)								
EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	10 µg/L	74.8	66	114
EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	10 µg/L	79.5	67	119
EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	10 µg/L	95.5	70	124
EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	10 µg/L	102	72	126
EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	10 µg/L	99.0	74	120
EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	10 µg/L	91.7	70	124
EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	10 µg/L	100	73	119

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074E: Halogenated Aliphatic Compounds (QCLot: 314759) - continued								
EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	10 µg/L	101	74	126
EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	10 µg/L	75.1	66	136
EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	10 µg/L	108	73	123
EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	10 µg/L	113	71	129
EP074: Bromomethane	74-83-9	50	µg/L	<50	100 µg/L	100	56	140
EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	10 µg/L	83.2	62	120
EP074: Chloroethane	75-00-3	50	µg/L	<50	100 µg/L	101	61	139
EP074: Chloromethane	74-87-3	50	µg/L	<50	100 µg/L	107	67	130
EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	10 µg/L	101	77	119
EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	10 µg/L	92.1	71	128
EP074: Dibromomethane	74-95-3	5	µg/L	<5	10 µg/L	93.8	73	119
EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	100 µg/L	101	61	138
EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	10 µg/L	88.4	58	130
EP074: Iodomethane	74-88-4	5	µg/L	<5	10 µg/L	73.9	70	128
EP074: Pentachloroethane	76-01-7	5	µg/L	<5	10 µg/L	72.8	72	126
EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	10 µg/L	94.4	72	124
EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	10 µg/L	94.1	74	118
EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	10 µg/L	94.3	60	120
EP074: Trichloroethene	79-01-6	5	µg/L	<5	10 µg/L	100	76	118
EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	100 µg/L	100.0	69	131
EP074: Vinyl chloride	75-01-4	50	µg/L	<50	100 µg/L	94.6	69	129
EP074F: Halogenated Aromatic Compounds (QCLot: 314759)								
EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	10 µg/L	94.9	67	123
EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	10 µg/L	87.1	61	125
EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	10 µg/L	99.2	75	117
EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	10 µg/L	100	75	117
EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	10 µg/L	98.7	74	118
EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	10 µg/L	105	73	119
EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	10 µg/L	104	73	119
EP074: Bromobenzene	108-86-1	5	µg/L	<5	10 µg/L	96.8	76	116
EP074: Chlorobenzene	108-90-7	5	µg/L	<5	10 µg/L	100	79	117
EP074G: Trihalomethanes (QCLot: 314759)								
EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	10 µg/L	83.2	64	118
EP074: Bromoform	75-25-2	5	µg/L	<5	10 µg/L	77.5	74	126
EP074: Chloroform	67-66-3	5	µg/L	<5	10 µg/L	102	72	120
EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	10 µg/L	79.0	65	115
EP075(SIM)A: Phenolic Compounds (QCLot: 313406)								
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	5 µg/L	66.0	51	105

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075(SIM)A: Phenolic Compounds (QCLot: 313406) - continued								
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	5 µg/L	67.0	50	106
EP075(SIM): 2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	5 µg/L	60.9	53	105
EP075(SIM): 2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	5 µg/L	62.9	49	99
EP075(SIM): 2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	5 µg/L	70.4	57	105
EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	5 µg/L	65.4	52	90
EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	5 µg/L	63.6	51	91
EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	5 µg/L	59.1	48	100
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	10 µg/L	71.3	44	88
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	5 µg/L	71.6	53	99
EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	10 µg/L	19.3	10	95
EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	5 µg/L	33.6	25	62
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 313406)								
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	71.8	62	113
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	71.1	64	114
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	70.6	64	116
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	73.4	64	117
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	74.8	63	117
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	79.8	62	119
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	76.1	59	118
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	84.0	63	115
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	78.0	63	116
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	72.4	61	117
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	73.9	64	118
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	74.7	64	115
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	71.9	60	118
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	67.1	50	94
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	74.7	63	116
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	76.8	63	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 313407)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	100	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	100	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	94.8	75	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 314758)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	95.2	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 313407)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	94.9	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	92.2	81	111

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 313407) - continued								
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	101	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 314758)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	94.7	75	127
EP080: BTEXN (QCLot: 314758)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	102	70	122
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	91.8	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	91.6	69	121
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	92.4	70	120
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	95.4	72	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	96.7	69	123
EP262: Ethanolamines (QCLot: 315568)								
EP262: Diethanolamine	111-42-2	1	µg/L	<1	10 µg/L	84.5	50	130
EP262: Ethanolamine	141-43-5	1	µg/L	<1	10 µg/L	121	50	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
ED009: Anions (QCLot: 314356)							
EP1517089-021	Anonymous	ED009-X: Chloride	16887-00-6	4 mg/L	# Not Determined	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 313516)							
ES1538973-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	119	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 313515)							
ES1538973-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	119	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 313935)							
ES1538942-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	120	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	114	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	120	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	116	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	108	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	116	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	116	70	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	Recovery Limits (%) High
EG020F: Dissolved Metals by ICP-MS (QCLot: 313935) - continued							
ES1538942-001	Anonymous	EG020A-F: Lead	7439-92-1	0.2 mg/L	111	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	108	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	117	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	113	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	124	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 313934)							
ES1538912-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	86.0	70	130
EG052G: Silica by Discrete Analyser (QCLot: 313517)							
ES1538988-001	AST2	EG052G: Reactive Silica	----	5 mg/L	93.9	70	130
EK040P: Fluoride by PC Titrator (QCLot: 314852)							
ES1538938-001	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	98.0	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 314267)							
ES1538888-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	88.2	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 313513)							
ES1538973-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	107	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 314266)							
ES1538888-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	87.0	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 314257)							
ES1538888-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	104	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 314258)							
ES1538888-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	102	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 313514)							
ES1538973-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	107	70	130
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 313427)							
EM1518258-008	Anonymous	EP033: Butane	106-97-8	102.18 µg/L	103	70	130
		EP033: Butene	25167-67-3	99.61 µg/L	99.4	70	130
		EP033: Ethane	74-84-0	54.43 µg/L	98.6	70	130
		EP033: Ethene	74-85-1	50.29 µg/L	98.0	70	130
		EP033: Methane	74-82-8	28.48 µg/L	96.5	70	130
		EP033: Propane	74-98-6	78.28 µg/L	102	70	130
		EP033: Propene	115-07-1	73.97 µg/L	98.0	70	130
EP074E: Halogenated Aliphatic Compounds (QCLot: 314759)							
ES1539090-001	Anonymous	EP074: 1.1-Dichloroethene	75-35-4	25 µg/L	89.5	70	130
		EP074: Trichloroethene	79-01-6	25 µg/L	101	70	130
EP074F: Halogenated Aromatic Compounds (QCLot: 314759)							

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EP074F: Halogenated Aromatic Compounds (QCLot: 314759) - continued							
ES1539090-001	Anonymous	EP074: Chlorobenzene	108-90-7	25 µg/L	107	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 314758)							
ES1539090-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	121	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 314758)							
ES1539090-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	116	70	130
EP080: BTEXN (QCLot: 314758)							
ES1539090-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	96.6	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	102	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	103	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	99.1	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	106	70	130
		EP080: Toluene	108-88-3	25 µg/L	99.8	70	130
EP262: Ethanolamines (QCLot: 315568)							
EB1537641-002	Anonymous	EP262: Diethanolamine	111-42-2	10 µg/L	67.6	50	130
		EP262: Ethanolamine	141-43-5	10 µg/L	113	50	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1538988**	Page	: 1 of 11
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Telephone	: +61 2 8784 8503
Project	: 2268523A	Date Samples Received	: 16-Dec-2015
Site	: ----	Issue Date	: 29-Dec-2015
Sampler	: BECKY ROLLINS, CAROLINA SARDELLA	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED009: Anions	EP1517089--021	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)	*Date extracted*	*Due for extraction*	***Days overdue***	*Date analysed*	*Due for analysis*	***Days overdue***
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
AST2	----	----	----	18-Dec-2015	15-Dec-2015	**3**
EK010/011: Chlorine						
Clear Plastic Bottle - Natural						
AST2	----	----	----	18-Dec-2015	15-Dec-2015	**3**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	2	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	5	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	2	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	5	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
***Container** / Client Sample ID(s)*		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	***Sample Date***	*Extraction / Preparation*			*Analysis*		
***Container** / Client Sample ID(s)*		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) AST2	**15-Dec-2015**	**----**	----	----	**18-Dec-2015**	15-Dec-2015	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) AST2	**15-Dec-2015**	**----**	----	----	**18-Dec-2015**	22-Dec-2015	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H) AST2	**15-Dec-2015**	**----**	----	----	**18-Dec-2015**	22-Dec-2015	✓
ED009: Anions							
Clear Plastic Bottle - Natural (ED009-X) AST2	**15-Dec-2015**	**----**	----	----	**18-Dec-2015**	12-Jan-2016	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) AST2	**15-Dec-2015**	**----**	----	----	**18-Dec-2015**	29-Dec-2015	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) AST2	**15-Dec-2015**	**----**	----	----	**17-Dec-2015**	12-Jan-2016	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) AST2	**15-Dec-2015**	**----**	----	----	**17-Dec-2015**	12-Jan-2016	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) AST2	**15-Dec-2015**	**----**	----	----	**20-Dec-2015**	12-Jan-2016	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) AST2	**15-Dec-2015**	**----**	----	----	**20-Dec-2015**	12-Jun-2016	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F) AST2	**15-Dec-2015**	**----**	----	----	**20-Dec-2015**	12-Jun-2016	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) AST2	**15-Dec-2015**	**----**	----	----	**19-Dec-2015**	12-Jan-2016	✓
EG052G: Silica by Discrete Analyser							
Clear Plastic Bottle - Natural (EG052G) AST2	**15-Dec-2015**	**----**	----	----	**17-Dec-2015**	12-Jan-2016	✓
EK010/011: Chlorine							
Clear Plastic Bottle - Natural (EK010) AST2	**15-Dec-2015**	**----**	----	----	**18-Dec-2015**	15-Dec-2015	×

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P)							
AST2	**15-Dec-2015**	**----**	----	----	**18-Dec-2015**	12-Jan-2016	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
AST2	**15-Dec-2015**	**----**	----	----	**18-Dec-2015**	12-Jan-2016	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
AST2	**15-Dec-2015**	**----**	----	----	**17-Dec-2015**	17-Dec-2015	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
AST2	**15-Dec-2015**	**----**	----	----	**18-Dec-2015**	12-Jan-2016	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
AST2	**15-Dec-2015**	**18-Dec-2015**	12-Jan-2016	✓	**18-Dec-2015**	12-Jan-2016	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
AST2	**15-Dec-2015**	**18-Dec-2015**	12-Jan-2016	✓	**18-Dec-2015**	12-Jan-2016	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
AST2	**15-Dec-2015**	**----**	----	----	**17-Dec-2015**	17-Dec-2015	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
AST2	**15-Dec-2015**	**----**	----	----	**20-Dec-2015**	12-Jan-2016	✓
EP020: Oil and Grease (O&G)							
Amber Jar - Sulfuric Acid or Sodium Bisulfate (EP020)							
AST2	**15-Dec-2015**	**----**	----	----	**21-Dec-2015**	12-Jan-2016	✓
EP033: C1 - C4 Hydrocarbon Gases							
Amber VOC Vial - Sulfuric Acid (EP033)							
AST2	**15-Dec-2015**	**----**	----	----	**17-Dec-2015**	29-Dec-2015	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
AST2	**15-Dec-2015**	**18-Dec-2015**	22-Dec-2015	✓	**21-Dec-2015**	27-Jan-2016	✓
EP074A: Monocyclic Aromatic Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP074)							
AST2	**15-Dec-2015**	**18-Dec-2015**	29-Dec-2015	✓	**18-Dec-2015**	29-Dec-2015	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
AST2	**15-Dec-2015**	**18-Dec-2015**	22-Dec-2015	✓	**21-Dec-2015**	27-Jan-2016	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080) AST2	**15-Dec-2015**	**18-Dec-2015**	29-Dec-2015	✓	**18-Dec-2015**	29-Dec-2015	✓
EP262: Ethanolamines							
Amber Glass Bottle - Unpreserved (EP262) AST2	**15-Dec-2015**	**----**	----	----	**19-Dec-2015**	22-Dec-2015	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
C1 - C4 Gases	EP033	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorine	EK010	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	2	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Silica (Reactive) by Discrete Analyser	EG052G	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Standard Anions -by IC (Extended Method)	ED009-X	2	9	**22.22**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	14	**14.29**	**9.52**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	5	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
C1 - C4 Gases	EP033	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Major Cations - Dissolved	ED093F	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Silica (Reactive) by Discrete Analyser	EG052G	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Standard Anions -by IC (Extended Method)	ED009-X	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	14	**14.29**	**9.52**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	16	**18.75**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	20	**15.00**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
C1 - C4 Gases	EP033	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorine	EK010	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Silica (Reactive) by Discrete Analyser	EG052G	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Standard Anions -by IC (Extended Method)	ED009-X	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	14	**7.14**	**4.76**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
TRH Volatiles/BTEX	EP080	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
C1 - C4 Gases	EP033	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	2	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Silica (Reactive) by Discrete Analyser	EG052G	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Standard Anions -by IC (Extended Method)	ED009-X	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	5	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Standard Anions -by IC (Extended Method)	ED009-X	WATER	In house: Referenced to APHA 4110. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45 um filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Silica (Reactive) by Discrete Analyser	EG052G	WATER	In house: Referenced to APHA 4500-SiO2 D: Under Acdic conditions reactive silicon combines with ammonium molybdate to form a yellow molybdosilicic acid complex. This is reduced by 1-amino-2-naphthol-4-sulfonic acid to a silicomolybdenum blue complex which is measured by discrete analyser at 670 nm. This method is compliant with NEPM (2013) Schedule B(3)
Chlorine	EK010	WATER	In-house (DPD colourimetry)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ammonium as N	EK055G-NH4	WATER	Ammonium in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH and Temperature. Ammonia is determined by direct colorimetry by Discrete Analyser according to APHA 4500-NH3 G. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (2013) Schedule B(3)
Oil and Grease	EP020	WATER	In house: Referenced to APHA 5520 B. Oil & grease is a gravimetric procedure to determine the amount of oil & grease residue in an aqueous sample. The sample is serially extracted three times n-hexane. The resultant extracts are combined, dehydrated and concentrated prior to gravimetric determination. This method is compliant with NEPM (2013) Schedule B(3)
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.
TRH - Semivolatile Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Volatile Organic Compounds	EP074	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Ethanolamines by LCMSMS	EP262	WATER	In-house LC-MSMS: Benzoyl derivatives of target compounds are analysed by LC/MSMS in ESI Positive Mode.

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1538990**	Page	: 1 of 18
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523B	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: ----	Date Samples Received	: 16-Dec-2015
C-O-C number	: ----	Date Analysis Commenced	: 16-Dec-2015
Sampler	: CAROLINA SARDELLA, REBECCA ROLLINS	Issue Date	: 29-Dec-2015
Site	: ----	No. of samples received	: 4
Quote number	: ----	No. of samples analysed	: 4

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA

WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Phalak Inthakesone	Laboratory Manager - Organics	Sydney Organics, Smithfield, NSW
Shobhna Chandra	Metals Coordinator	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005P: pH by PC Titrator (QC Lot: 313467)									
ES1538973-005	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.53	8.42	1.30	0% - 20%
ES1538990-003	WKSW02	EA005-P: pH Value	----	0.01	pH Unit	7.38	7.36	0.271	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 313466)									
ES1538967-014	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	363	386	6.24	0% - 20%
ES1538990-003	WKSW02	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	472	465	1.45	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 313235)									
ES1538850-021	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2450	2400	2.06	0% - 20%
ES1538990-003	WKSW02	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	275	274	0.547	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 313234)									
ES1538850-021	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	22	22	0.00	No Limit
ES1538990-003	WKSW02	EA025H: Suspended Solids (SS)	----	5	mg/L	5	<5	0.00	No Limit
ED009: Anions (QC Lot: 313191)									
ES1538970-010	Anonymous	ED009-X: Chloride	16887-00-6	0.1	mg/L	98.8	98.6	0.198	0% - 20%
ES1538973-002	Anonymous	ED009-X: Chloride	16887-00-6	0.1	mg/L	351	350	0.139	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 313468)									
ES1539032-003	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	1	0.00	No Limit
ES1538990-003	WKSW02	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	120	115	3.69	0% - 20%
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	120	115	3.69	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 312221)									
ES1538978-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	60	60	0.00	0% - 20%
ES1538990-001	WKMB06A	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	53	52	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 312219)									
ES1538978-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	48	49	0.00	0% - 20%
ES1538958-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	27	33	20.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 312614)									
ES1538815-014	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	5	5	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	10	10	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	13	13	0.00	0% - 50%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093F: Dissolved Major Cations (QC Lot: 312614) - continued									
ES1538990-001	WKMB06A	ED093F: Calcium	7440-70-2	1	mg/L	111	111	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	61	60	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	441	438	0.741	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 312615)									
ES1538815-014	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.118	0.111	5.50	0% - 20%
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.907	0.913	0.674	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.075	0.077	3.33	0% - 50%
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	<0.1	0.00	No Limit
ES1538990-001	WKMB06A	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.537	0.556	3.60	0% - 20%
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.274	0.283	3.12	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.009	0.008	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EG020F: Dissolved Metals by ICP-MS (QC Lot: 312615) - continued									
ES1538990-001	WKMB06A	EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	10.6	11.0	3.86	0% - 20%
		EG020A-F: Bromine	7726-95-6	0.1	mg/L	1.5	1.6	8.70	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 312617)									
ES1538990-001	WKMB06A	EG020B-F: Strontium	7440-24-6	0.001	mg/L	1.64	1.70	3.83	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 312616)									
ES1538841-007	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG052G: Silica by Discrete Analyser (QC Lot: 312223)									
ES1538990-001	WKMB06A	EG052G: Reactive Silica	----	0.05	mg/L	36.9	37.3	0.994	0% - 20%
EK010/011: Chlorine (QC Lot: 315035)									
ES1538988-001	Anonymous	EK010: Chlorine - Free	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
		EK010: Chlorine - Total Residual	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
ES1539080-005	Anonymous	EK010: Chlorine - Free	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
		EK010: Chlorine - Total Residual	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 313460)									
ES1538824-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
ES1538990-003	WKSW02	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	0.2	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 313929)									
ES1538990-001	WKMB06A	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.29	0.29	0.00	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 312222)									
ES1538990-001	WKMB06A	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 313928)									
ES1538990-001	WKMB06A	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.02	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 314012)									
EN1514361-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	5.2	4.7	8.20	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 314013)									
EN1514361-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	1.21	1.23	1.54	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 312217)									
ES1538958-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 313319)									
ES1538816-011	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	8	7	0.00	No Limit
ES1538990-003	WKSW02	EP005: Total Organic Carbon	----	1	mg/L	8	10	18.6	0% - 50%
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 312818)									
EM1518337-001	Anonymous	EP033: Butane	106-97-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 312818) - continued									
EM1518337-001	Anonymous	EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.00	No Limit
		EP033: Methane	74-82-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.00	No Limit
ES1538973-001	Anonymous	EP033: Butane	106-97-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.00	No Limit
		EP033: Methane	74-82-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.00	No Limit
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 313179)									
ES1538958-001	Anonymous	EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.00	No Limit
ES1538973-001	Anonymous	EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.00	No Limit
EP074B: Oxygenated Compounds (QC Lot: 313179)									
ES1538958-001	Anonymous	EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.00	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.00	No Limit
ES1538973-001	Anonymous	EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.00	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP074C: Sulfonated Compounds (QC Lot: 313179)									
ES1538958-001	Anonymous	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.00	No Limit
ES1538973-001	Anonymous	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.00	No Limit
EP074D: Fumigants (QC Lot: 313179)									
ES1538958-001	Anonymous	EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
ES1538973-001	Anonymous	EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
EP074E: Halogenated Aliphatic Compounds (QC Lot: 313179)									
ES1538958-001	Anonymous	EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP074E: Halogenated Aliphatic Compounds (QC Lot: 313179) - continued									
ES1538958-001	Anonymous	EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
ES1538973-001	Anonymous	EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit
		EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
EP074F: Halogenated Aromatic Compounds (QC Lot: 313179)									
ES1538958-001	Anonymous	EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP074F: Halogenated Aromatic Compounds (QC Lot: 313179) - continued									
ES1538973-001	Anonymous	EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit
EP074G: Trihalomethanes (QC Lot: 313179)									
ES1538958-001	Anonymous	EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
ES1538973-001	Anonymous	EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 313178)									
ES1538958-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1538973-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 313178)									
ES1538958-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1538973-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 313178)									
ES1538958-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1538973-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP262: Ethanolamines (QC Lot: 312392)									
ES1538990-001	WKMB06A	EP262: Diethanolamine	111-42-2	1	µg/L	<1	<1	0.00	No Limit
		EP262: Ethanolamine	141-43-5	1	µg/L	<1	<1	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 313466)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	104	95	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 313235)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	100	87	109
				<10	293 mg/L	121	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 313234)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	92.7	83	129
				<5	1000 mg/L	102	82	110
ED009: Anions (QCLot: 313191)								
ED009-X: Chloride	16887-00-6	0.1	mg/L	<0.100	2 mg/L	98.7	91	111
ED037P: Alkalinity by PC Titrator (QCLot: 313468)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	101	81	111
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 312221)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	116	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 312219)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	110	75	123
				<1	1000 mg/L	102	78	128
ED093F: Dissolved Major Cations (QCLot: 312614)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	105	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.5	90	116
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.7	85	113
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	103	82	120
EG020F: Dissolved Metals by ICP-MS (QCLot: 312615)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	111	80	116
EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	0.01 mg/L	94.1	85	115
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	107	85	114
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	107	82	110
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	103	85	115
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	102	85	115
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	----	----	----	----
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	106	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	107	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	105	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	107	81	111

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 312615) - continued								
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	107	82	112
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	108	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	107	82	110
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	101	79	113
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	106	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	101	85	115
EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	102	77	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	108	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	105	81	117
EG020F: Dissolved Metals by ICP-MS (QCLot: 312617)								
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	105	81	113
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG035F: Dissolved Mercury by FIMS (QCLot: 312616)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	91.2	83	105
EG052G: Silica by Discrete Analyser (QCLot: 312223)								
EG052G: Reactive Silica	----	0.05	mg/L	<0.05	5 mg/L	105	92	118
EK010/011: Chlorine (QCLot: 315035)								
EK010: Chlorine - Free	----	0.2	mg/L	<0.2	----	----	----	----
EK010: Chlorine - Total Residual	----	0.2	mg/L	<0.2	----	----	----	----
EK040P: Fluoride by PC Titrator (QCLot: 313460)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	96.2	82	116
EK055G: Ammonia as N by Discrete Analyser (QCLot: 313929)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	99.4	90	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 312222)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	96.3	82	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 313928)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	109	91	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 314012)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	87.0	69	101
				<0.1	1 mg/L	97.8	70	118
				<0.1	5 mg/L	103	74	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 314013)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	83.9	71	101
				<0.01	0.442 mg/L	85.8	72	108
				<0.01	1 mg/L	96.5	78	118
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 312217)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	96.1	85	117

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP005: Total Organic Carbon (TOC) (QCLot: 313319)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	95.1	72	120
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 312818)								
EP033: Butane	106-97-8	10	µg/L	<10	102.18 µg/L	98.5	85	115
EP033: Butene	25167-67-3	10	µg/L	<10	99.61 µg/L	96.0	83	115
EP033: Ethane	74-84-0	10	µg/L	<10	54.43 µg/L	103	87	111
EP033: Ethene	74-85-1	10	µg/L	<10	50.29 µg/L	103	87	111
EP033: Methane	74-82-8	10	µg/L	<10	28.48 µg/L	110	86	114
EP033: Propane	74-98-6	10	µg/L	<10	78.28 µg/L	103	84	112
EP033: Propene	115-07-1	10	µg/L	<10	73.97 µg/L	101	85	113
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 313179)								
EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	10 µg/L	94.4	74	116
EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	10 µg/L	94.4	74	116
EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	10 µg/L	92.6	76	118
EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	10 µg/L	86.6	65	123
EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	10 µg/L	89.1	69	119
EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	10 µg/L	90.1	71	119
EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	10 µg/L	92.1	73	119
EP074: Styrene	100-42-5	5	µg/L	<5	10 µg/L	93.0	73	119
EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	10 µg/L	92.2	72	116
EP074B: Oxygenated Compounds (QCLot: 313179)								
EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	100 µg/L	97.9	74	130
EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	100 µg/L	107	65	137
EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	100 µg/L	128	66	132
EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	100 µg/L	91.0	61	134
EP074C: Sulfonated Compounds (QCLot: 313179)								
EP074: Carbon disulfide	75-15-0	5	µg/L	<5	10 µg/L	88.4	73	127
EP074D: Fumigants (QCLot: 313179)								
EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	10 µg/L	84.4	69	117
EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	10 µg/L	90.3	76	118
EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	10 µg/L	74.0	68	122
EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	10 µg/L	85.0	62	120
EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	10 µg/L	68.5	60	114
EP074E: Halogenated Aliphatic Compounds (QCLot: 313179)								
EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	10 µg/L	73.0	66	114
EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	10 µg/L	74.0	67	119
EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	10 µg/L	90.7	70	124
EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	10 µg/L	100	72	126
EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	10 µg/L	93.4	74	120

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074E: Halogenated Aliphatic Compounds (QCLot: 313179) - continued								
EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	10 µg/L	81.0	70	124
EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	10 µg/L	90.6	73	119
EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	10 µg/L	105	74	126
EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	10 µg/L	80.6	66	136
EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	10 µg/L	108	73	123
EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	10 µg/L	96.8	71	129
EP074: Bromomethane	74-83-9	50	µg/L	<50	100 µg/L	87.2	56	140
EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	10 µg/L	78.1	62	120
EP074: Chloroethane	75-00-3	50	µg/L	<50	100 µg/L	86.0	61	139
EP074: Chloromethane	74-87-3	50	µg/L	<50	100 µg/L	86.8	67	130
EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	10 µg/L	90.6	77	119
EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	10 µg/L	81.3	71	128
EP074: Dibromomethane	74-95-3	5	µg/L	<5	10 µg/L	88.2	73	119
EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	100 µg/L	84.9	61	138
EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	10 µg/L	88.8	58	130
EP074: Iodomethane	74-88-4	5	µg/L	<5	10 µg/L	71.8	70	128
EP074: Pentachloroethane	76-01-7	5	µg/L	<5	10 µg/L	72.9	72	126
EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	10 µg/L	89.7	72	124
EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	10 µg/L	84.8	74	118
EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	10 µg/L	82.0	60	120
EP074: Trichloroethene	79-01-6	5	µg/L	<5	10 µg/L	90.8	76	118
EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	100 µg/L	92.7	69	131
EP074: Vinyl chloride	75-01-4	50	µg/L	<50	100 µg/L	93.1	69	129
EP074F: Halogenated Aromatic Compounds (QCLot: 313179)								
EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	10 µg/L	92.7	67	123
EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	10 µg/L	81.2	61	125
EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	10 µg/L	93.9	75	117
EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	10 µg/L	93.0	75	117
EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	10 µg/L	90.8	74	118
EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	10 µg/L	94.6	73	119
EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	10 µg/L	95.1	73	119
EP074: Bromobenzene	108-86-1	5	µg/L	<5	10 µg/L	92.9	76	116
EP074: Chlorobenzene	108-90-7	5	µg/L	<5	10 µg/L	93.6	79	117
EP074G: Trihalomethanes (QCLot: 313179)								
EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	10 µg/L	78.5	64	118
EP074: Bromoform	75-25-2	5	µg/L	<5	10 µg/L	80.0	74	126
EP074: Chloroform	67-66-3	5	µg/L	<5	10 µg/L	98.0	72	120
EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	10 µg/L	79.3	65	115

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075(SIM)A: Phenolic Compounds (QCLot: 312819)								
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	5 µg/L	90.0	51	105
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	5 µg/L	91.8	50	106
EP075(SIM): 2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	5 µg/L	82.8	53	105
EP075(SIM): 2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	5 µg/L	76.4	49	99
EP075(SIM): 2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	5 µg/L	82.7	57	105
EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	5 µg/L	73.3	52	90
EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	5 µg/L	70.9	51	91
EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	5 µg/L	73.3	48	100
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	10 µg/L	64.0	44	88
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	5 µg/L	79.7	53	99
EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	10 µg/L	79.2	10	95
EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	5 µg/L	34.2	25	62
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 312819)								
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	82.8	62	113
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	84.3	64	114
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	# 62.6	64	116
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	97.0	64	117
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	88.1	63	117
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	103	62	119
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	94.8	59	118
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	98.2	63	115
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	86.4	63	116
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	87.0	61	117
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	67.7	64	118
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	84.7	64	115
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	85.0	60	118
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	79.6	50	94
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	69.7	63	116
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	70.4	63	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 312820)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	99.4	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	98.8	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	97.9	75	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 313178)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	87.7	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 312820)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	88.7	76	114

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 312820) - continued								
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	92.9	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	104	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 313178)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	86.9	75	127
EP080: BTEXN (QCLot: 313178)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	97.3	70	122
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	89.3	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	92.3	69	121
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	94.3	70	120
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	96.5	72	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	91.8	69	123
EP262: Ethanolamines (QCLot: 312392)								
EP262: Diethanolamine	111-42-2	1	µg/L	<1	10 µg/L	102	50	130
EP262: Ethanolamine	141-43-5	1	µg/L	<1	10 µg/L	98.8	50	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
ED009: Anions (QCLot: 313191)							
ES1538970-010	Anonymous	ED009-X: Chloride	16887-00-6	4 mg/L	# Not Determined	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 312221)							
ES1538978-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 312219)							
ES1538958-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	112	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 312615)							
ES1538815-015	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	104	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	103	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	109	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	106	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	101	70	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 312615) - continued							
ES1538815-015	Anonymous	EG020A-F: Cobalt	7440-48-4	0.2 mg/L	99.2	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	101	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	100	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	103	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	96.0	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	108	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	110	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 312616)							
ES1538841-006	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	108	70	130
EG052G: Silica by Discrete Analyser (QCLot: 312223)							
ES1538990-001	WKMB06A	EG052G: Reactive Silica	----	5 mg/L	# Not Determined	70	130
EK040P: Fluoride by PC Titrator (QCLot: 313460)							
ES1538824-001	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	98.8	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 313929)							
ES1538990-001	WKMB06A	EK055G: Ammonia as N	7664-41-7	1 mg/L	84.4	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 312222)							
ES1538978-011	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	96.7	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 313928)							
ES1538990-001	WKMB06A	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	101	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 314012)							
ES1538990-001	WKMB06A	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	90.6	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 314013)							
ES1538990-001	WKMB06A	EK067G: Total Phosphorus as P	----	1 mg/L	87.0	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 312217)							
ES1538958-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	94.7	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 313319)							
ES1538849-001	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	99.7	70	130
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 312818)							
EM1518318-004	Anonymous	EP033: Butane	106-97-8	102.18 µg/L	94.9	70	130
		EP033: Butene	25167-67-3	99.61 µg/L	94.2	70	130
		EP033: Ethane	74-84-0	54.43 µg/L	102	70	130
		EP033: Ethene	74-85-1	50.29 µg/L	102	70	130
		EP033: Methane	74-82-8	28.48 µg/L	# Not Determined	70	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 312818) - continued							
EM1518318-004	Anonymous	EP033: Propane	74-98-6	78.28 µg/L	105	70	130
		EP033: Propene	115-07-1	73.97 µg/L	98.3	70	130
EP074E: Halogenated Aliphatic Compounds (QCLot: 313179)							
ES1538958-001	Anonymous	EP074: 1.1-Dichloroethene	75-35-4	25 µg/L	77.2	70	130
		EP074: Trichloroethene	79-01-6	25 µg/L	84.3	70	130
EP074F: Halogenated Aromatic Compounds (QCLot: 313179)							
ES1538958-001	Anonymous	EP074: Chlorobenzene	108-90-7	25 µg/L	96.7	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 313178)							
ES1538958-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	113	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 313178)							
ES1538958-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	108	70	130
EP080: BTEXN (QCLot: 313178)							
ES1538958-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	93.5	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	94.8	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	95.4	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	93.3	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	99.9	70	130
		EP080: Toluene	108-88-3	25 µg/L	99.8	70	130
EP262: Ethanolamines (QCLot: 312392)							
ES1538990-001	WKMB06A	EP262: Diethanolamine	111-42-2	10 µg/L	76.7	50	130
		EP262: Ethanolamine	141-43-5	10 µg/L	95.3	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1538990**	Page	: 1 of 12
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Telephone	: +61 2 8784 8503
Project	: 2268523B	Date Samples Received	: 16-Dec-2015
Site	: ----	Issue Date	: 29-Dec-2015
Sampler	: CAROLINA SARDELLA, REBECCA ROLLINS	No. of samples received	: 4
Order number	: ----	No. of samples analysed	: 4

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **Laboratory Control outliers exist - please see following pages for full details.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-312819-002	----	**Anthracene**	120-12-7	62.6 %	64-116%	**Recovery less than lower control limit**
Matrix Spike (MS) Recoveries							
ED009: Anions	ES1538970--010	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1538978--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG052G: Silica by Discrete Analyser	ES1538990--001	WKMB06A	**Reactive Silica**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP033: C1 - C4 Hydrocarbon Gases	EM1518318--004	Anonymous	**Methane**	74-82-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Regular Sample Surrogates

Sub-Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP075(SIM)T: PAH Surrogates	ES1538990-001	WKMB06A	**Anthracene-d10**	1719-06-8	116 %	27-113 %	**Recovery greater than upper data quality objective**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural WKMB06A, WKMB06B, WKSW02, WKSW03	----	----	----	17-Dec-2015	15-Dec-2015	**2**
EK010/011: Chlorine						
Clear Plastic Bottle - Natural WKMB06A, WKMB06B, WKSW02, WKSW03	----	----	----	18-Dec-2015	15-Dec-2015	**3**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP) - Continued					
PAH/Phenols (GC/MS - SIM)	0	12	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	13	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	12	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	13	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✘ = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Date extracted	Due for extraction	Evaluation (Extraction)	Date analysed	Due for analysis	Evaluation (Analysis)
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) WKMB06A, WKMB06B, WKSW02, WKSW03	**15-Dec-2015**	**----**	----	----	**17-Dec-2015**	15-Dec-2015	✘
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) WKMB06A, WKMB06B, WKSW02, WKSW03	**15-Dec-2015**	**----**	----	----	**17-Dec-2015**	12-Jan-2016	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) WKMB06A, WKMB06B, WKSW02, WKSW03	**15-Dec-2015**	**----**	----	----	**17-Dec-2015**	22-Dec-2015	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H) WKMB06A, WKMB06B, WKSW02, WKSW03	**15-Dec-2015**	**----**	----	----	**17-Dec-2015**	22-Dec-2015	✓
ED009: Anions							
Clear Plastic Bottle - Natural (ED009-X) WKMB06A, WKMB06B, WKSW02, WKSW03	**15-Dec-2015**	**----**	----	----	**17-Dec-2015**	12-Jan-2016	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) WKMB06A, WKMB06B, WKSW02, WKSW03	**15-Dec-2015**	**----**	----	----	**17-Dec-2015**	29-Dec-2015	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
WKMB06A,	WKMB06B,	**15-Dec-2015**	**----**	----	----	**16-Dec-2015**	12-Jan-2016	✓
WKSW02,	WKSW03							
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
WKMB06A,	WKMB06B,	**15-Dec-2015**	**----**	----	----	**16-Dec-2015**	12-Jan-2016	✓
WKSW02,	WKSW03							
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)								
WKMB06A,	WKMB06B,	**15-Dec-2015**	**----**	----	----	**20-Dec-2015**	12-Jan-2016	✓
WKSW02,	WKSW03							
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)								
WKMB06A,	WKMB06B,	**15-Dec-2015**	**----**	----	----	**20-Dec-2015**	12-Jun-2016	✓
WKSW02,	WKSW03							
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F)								
WKMB06A,	WKMB06B,	**15-Dec-2015**	**----**	----	----	**20-Dec-2015**	12-Jun-2016	✓
WKSW02,	WKSW03							
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)								
WKMB06A,	WKMB06B,	**15-Dec-2015**	**----**	----	----	**21-Dec-2015**	12-Jan-2016	✓
WKSW02,	WKSW03							
EG052G: Silica by Discrete Analyser								
Clear Plastic Bottle - Natural (EG052G)								
WKMB06A,	WKMB06B,	**15-Dec-2015**	**----**	----	----	**16-Dec-2015**	12-Jan-2016	✓
WKSW02,	WKSW03							
EK010/011: Chlorine								
Clear Plastic Bottle - Natural (EK010)								
WKMB06A,	WKMB06B,	**15-Dec-2015**	**----**	----	----	**18-Dec-2015**	15-Dec-2015	×
WKSW02,	WKSW03							
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P)								
WKMB06A,	WKMB06B,	**15-Dec-2015**	**----**	----	----	**17-Dec-2015**	12-Jan-2016	✓
WKSW02,	WKSW03							
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G)								
WKMB06A,	WKMB06B,	**15-Dec-2015**	**----**	----	----	**18-Dec-2015**	12-Jan-2016	✓
WKSW02,	WKSW03							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G)								
WKMB06A,	WKMB06B,	**15-Dec-2015**	**----**	----	----	**16-Dec-2015**	17-Dec-2015	✓
WKSW02,	WKSW03							
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G)								
WKMB06A,	WKMB06B,	**15-Dec-2015**	**----**	----	----	**18-Dec-2015**	12-Jan-2016	✓
WKSW02,	WKSW03							
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G)								
WKMB06A,	WKMB06B,	**15-Dec-2015**	**18-Dec-2015**	12-Jan-2016	✓	**18-Dec-2015**	12-Jan-2016	✓
WKSW02,	WKSW03							
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G)								
WKMB06A,	WKMB06B,	**15-Dec-2015**	**18-Dec-2015**	12-Jan-2016	✓	**18-Dec-2015**	12-Jan-2016	✓
WKSW02,	WKSW03							
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G)								
WKMB06A,	WKMB06B,	**15-Dec-2015**	**----**	----	----	**16-Dec-2015**	17-Dec-2015	✓
WKSW02,	WKSW03							
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulfuric Acid (EP005)								
WKMB06A,	WKMB06B,	**15-Dec-2015**	**----**	----	----	**17-Dec-2015**	12-Jan-2016	✓
WKSW02,	WKSW03							
EP033: C1 - C4 Hydrocarbon Gases								
Amber VOC Vial - Sulfuric Acid (EP033)								
WKMB06A,	WKMB06B,	**15-Dec-2015**	**----**	----	----	**17-Dec-2015**	29-Dec-2015	✓
WKSW02,	WKSW03							
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071)								
WKMB06A,	WKMB06B,	**15-Dec-2015**	**17-Dec-2015**	22-Dec-2015	✓	**18-Dec-2015**	26-Jan-2016	✓
WKSW02,	WKSW03							
EP074A: Monocyclic Aromatic Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP074)								
WKMB06A,	WKMB06B,	**15-Dec-2015**	**17-Dec-2015**	29-Dec-2015	✓	**17-Dec-2015**	29-Dec-2015	✓
WKSW02,	WKSW03							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM))								
WKMB06A,	WKMB06B,	**15-Dec-2015**	**17-Dec-2015**	22-Dec-2015	✓	**18-Dec-2015**	26-Jan-2016	✓
WKSW02,	WKSW03							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080)								
WKMB06A, WKSW02,	WKMB06B, WKSW03	**15-Dec-2015**	**17-Dec-2015**	29-Dec-2015	✓	**17-Dec-2015**	29-Dec-2015	✓
EP262: Ethanolamines								
Amber Glass Bottle - Unpreserved (EP262)								
WKMB06A, WKSW02,	WKMB06B, WKSW03	**15-Dec-2015**	**----**	----	----	**17-Dec-2015**	22-Dec-2015	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
C1 - C4 Gases	EP033	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorine	EK010	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	12	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Silica (Reactive) by Discrete Analyser	EG052G	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Standard Anions -by IC (Extended Method)	ED009-X	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	15	**13.33**	**9.52**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	13	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
C1 - C4 Gases	EP033	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Silica (Reactive) by Discrete Analyser	EG052G	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Standard Anions -by IC (Extended Method)	ED009-X	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	15	**13.33**	**9.52**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	9	**33.33**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	10	**30.00**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
C1 - C4 Gases	EP033	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorine	EK010	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Silica (Reactive) by Discrete Analyser	EG052G	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Standard Anions -by IC (Extended Method)	ED009-X	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	15	**6.67**	**4.76**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
C1 - C4 Gases	EP033	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	12	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Silica (Reactive) by Discrete Analyser	EG052G	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Standard Anions -by IC (Extended Method)	ED009-X	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	13	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Standard Anions -by IC (Extended Method)	ED009-X	WATER	In house: Referenced to APHA 4110. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocyanate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45 um filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Silica (Reactive) by Discrete Analyser	EG052G	WATER	In house: Referenced to APHA 4500-SiO2 D: Under Acdic conditions reactive silicon combines with ammonium molybdate to form a yellow molybdosilicic acid complex. This is reduced by 1-amino-2-naphthol-4-sulfonic acid to a silicomolybdenum blue complex which is measured by discrete analyser at 670 nm. This method is compliant with NEPM (2013) Schedule B(3)
Chlorine	EK010	WATER	In-house (DPD colourimetry)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ammonium as N	EK055G-NH4	WATER	Ammonium in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH and Temperature. Ammonia is determined by direct colorimetry by Discrete Analyser according to APHA 4500-NH3 G. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (2013) Schedule B(3)
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.
TRH - Semivolatile Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Volatile Organic Compounds	EP074	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Ethanolamines by LCMSMS	EP262	WATER	In-house LC-MSMS: Benzoyl derivatives of target compounds are analysed by LC/MSMS in ESI Positive Mode.

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1539080**	Page	: 1 of 17
Amendment	: **2**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523B	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: ----	Date Samples Received	: 17-Dec-2015
C-O-C number	: ----	Date Analysis Commenced	: 17-Dec-2015
Sampler	: BECKY ROLLINS, CAROLINA SARDELLA	Issue Date	: 08-Jan-2016
Site	: ----	No. of samples received	: 5
Quote number	: ----	No. of samples analysed	: 5

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA

WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out ir compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Barbara Coupland	Quality Officer	Newcastle - Inorganics, Mayfield West, NSW
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Phalak Inthakesone	Laboratory Manager - Organics	Sydney Organics, Smithfield, NSW
Shobhna Chandra	Metals Coordinator	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005: pH (QC Lot: 314048)									
EN1514361-001	Anonymous	EA005: pH Value	----	0.01	pH Unit	7.34	7.36	0.272	0% - 20%
ES1539026-002	Anonymous	EA005: pH Value	----	0.01	pH Unit	6.37	6.39	0.313	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 314850)									
ES1538938-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	14200	14200	0.639	0% - 20%
ES1539056-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	93	93	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 314914)									
EM1518440-005	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	7080	7050	0.396	0% - 20%
ES1539080-002	GR-P3	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2460	2370	3.85	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 314915)									
EM1518440-005	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
ES1539080-002	GR-P3	EA025H: Suspended Solids (SS)	----	5	mg/L	13	11	17.0	No Limit
ED009: Anions (QC Lot: 314357)									
ES1539074-002	Anonymous	ED009-X: Chloride	16887-00-6	0.1	mg/L	1900	1920	0.749	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 314855)									
ES1539074-001	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	11900	12400	4.00	0% - 20%
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	20400	20100	1.20	0% - 20%
		ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	32200	32500	0.749	0% - 20%
ES1539097-006	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	59	58	0.00	0% - 20%
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	59	58	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 313761)									
ES1539029-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10	<10	0.00	No Limit
ES1539080-004	WKMB01	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	45	45	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 313766)									
ES1539156-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1420	1410	0.305	0% - 20%
ES1539080-001	GW080487	ED045G: Chloride	16887-00-6	1	mg/L	707	705	0.190	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 313902)									
ES1538788-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	22	22	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	6	7	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	31	32	0.00	0% - 20%
ES1539080-004	WKMB01	ED093F: Calcium	7440-70-2	1	mg/L	15	14	0.00	0% - 50%

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093F: Dissolved Major Cations (QC Lot: 313902) - continued									
ES1539080-004	WKMB01	ED093F: Magnesium	7439-95-4	1	mg/L	1	1	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	3	2	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	1080	974	10.4	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 313903)									
ES1538788-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.163	0.167	2.42	0% - 20%
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.202	0.212	4.93	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.13	0.14	0.00	0% - 50%
		EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 313905)									
ES1539080-004	WKMB01	EG020B-F: Strontium	7440-24-6	0.001	mg/L	1.47	1.33	10.0	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 313904)									
ES1539080-002	GR-P3	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG052G: Silica by Discrete Analyser (QC Lot: 313764)									
ES1539073-005	Anonymous	EG052G: Reactive Silica	----	0.05	mg/L	60.3	60.6	0.432	0% - 20%
ES1539080-004	WKMB01	EG052G: Reactive Silica	----	0.05	mg/L	16.4	16.6	1.13	0% - 20%
EK010/011: Chlorine (QC Lot: 315035)									
ES1538988-001	Anonymous	EK010: Chlorine - Free	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
		EK010: Chlorine - Total Residual	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
ES1539080-005	WKMB02	EK010: Chlorine - Free	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
		EK010: Chlorine - Total Residual	----	0.2	mg/L	<0.2	<0.2	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 314852)									
ES1539074-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	20.7	20.4	1.44	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK040P: Fluoride by PC Titrator (QC Lot: 314852) - continued									
ES1538938-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.4	0.4	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 314097)									
ES1539080-001	GW080487	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.55	0.55	0.00	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 313762)									
ES1539073-006	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1539029-003	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 314098)									
ES1539080-001	GW080487	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.03	0.02	35.8	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 314012)									
EN1514361-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	5.2	4.7	8.20	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 314013)									
EN1514361-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	1.21	1.23	1.54	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 313765)									
ES1539080-001	GW080487	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 315747)									
ES1538893-017	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	3	3	0.00	No Limit
ES1538970-017	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	2	2	0.00	No Limit
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 314925)									
ES1539080-001	GW080487	EP033: Butane	106-97-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.00	No Limit
		EP033: Methane	74-82-8	10	µg/L	190	185	2.67	0% - 50%
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.00	No Limit
ES1539080-003	WKSW01	EP033: Butane	106-97-8	10	µg/L	<10	<10	0.00	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.00	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.00	No Limit
		EP033: Methane	74-82-8	10	µg/L	17	16	0.00	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.00	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.00	No Limit
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 313734)									
ES1539080-001	GW080487	EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 313734) - continued									
ES1539080-001	GW080487	EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.00	No Limit
EP074B: Oxygenated Compounds (QC Lot: 313734)									
ES1539080-001	GW080487	EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.00	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.00	No Limit
EP074C: Sulfonated Compounds (QC Lot: 313734)									
ES1539080-001	GW080487	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.00	No Limit
EP074D: Fumigants (QC Lot: 313734)									
ES1539080-001	GW080487	EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
EP074E: Halogenated Aliphatic Compounds (QC Lot: 313734)									
ES1539080-001	GW080487	EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP074E: Halogenated Aliphatic Compounds (QC Lot: 313734) - continued									
ES1539080-001	GW080487	EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit
		EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
EP074F: Halogenated Aromatic Compounds (QC Lot: 313734)									
ES1539080-001	GW080487	EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit
EP074G: Trihalomethanes (QC Lot: 313734)									
ES1539080-001	GW080487	EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 314165)									
ES1539080-001	GW080487	EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	<2.0	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	<2.0	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 314165)									
ES1539080-001	GW080487	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 314165) - continued									
ES1539080-001	GW080487	EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	<1.0	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 313735)									
ES1539080-001	GW080487	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 314166)									
ES1539080-001	GW080487	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 313735)									
ES1539080-001	GW080487	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 314166)									
ES1539080-001	GW080487	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080: BTEXN (QC Lot: 313735)									
ES1539080-001	GW080487	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP262: Ethanolamines (QC Lot: 315568)									
EB1537641-002	Anonymous	EP262: Diethanolamine	111-42-2	1	µg/L	0.004	2	39.8	No Limit
		EP262: Ethanolamine	141-43-5	1	µg/L	0.003	3	0.00	No Limit
ES1539080-003	WKSW01	EP262: Diethanolamine	111-42-2	1	µg/L	<1	<1	0.00	No Limit
		EP262: Ethanolamine	141-43-5	1	µg/L	<1	<1	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EA010P: Conductivity by PC Titrator (QCLot: 314850)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	103	95	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 314914)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	106	87	109
				<10	293 mg/L	112	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 314915)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	99.7	83	129
				<5	1000 mg/L	95.6	82	110
ED009: Anions (QCLot: 314357)								
ED009-X: Chloride	16887-00-6	0.1	mg/L	<0.100	2 mg/L	98.9	91	111
ED037P: Alkalinity by PC Titrator (QCLot: 314855)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	96.1	81	111
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 313761)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	110	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 313766)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	111	75	123
				<1	1000 mg/L	100	78	128
ED093F: Dissolved Major Cations (QCLot: 313902)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	106	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	112	90	116
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	113	85	113
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	117	82	120
EG020F: Dissolved Metals by ICP-MS (QCLot: 313903)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	96.2	80	116
EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	0.01 mg/L	85.5	85	115
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.2	85	114
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	97.4	82	110
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	89.4	85	115
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	90.0	85	115
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	----	----	----	----
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.3	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.7	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	97.0	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	94.4	81	111

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 313903) - continued								
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	94.2	82	112
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.7	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	96.4	82	110
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	82.8	79	113
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.2	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	88.5	85	115
EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	83.3	77	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	90.9	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	98.0	81	117
EG020F: Dissolved Metals by ICP-MS (QCLot: 313905)								
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	98.7	81	113
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG035F: Dissolved Mercury by FIMS (QCLot: 313904)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	97.9	83	105
EG052G: Silica by Discrete Analyser (QCLot: 313764)								
EG052G: Reactive Silica	----	0.05	mg/L	<0.05	5 mg/L	108	92	118
EK010/011: Chlorine (QCLot: 315035)								
EK010: Chlorine - Free	----	0.2	mg/L	<0.2	----	----	----	----
EK010: Chlorine - Total Residual	----	0.2	mg/L	<0.2	----	----	----	----
EK040P: Fluoride by PC Titrator (QCLot: 314852)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	95.0	82	116
EK055G: Ammonia as N by Discrete Analyser (QCLot: 314097)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	101	90	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 313762)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	92.4	82	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 314098)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	108	91	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 314012)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	87.0	69	101
				<0.1	1 mg/L	97.8	70	118
				<0.1	5 mg/L	103	74	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 314013)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	83.9	71	101
				<0.01	0.442 mg/L	85.8	72	108
				<0.01	1 mg/L	96.5	78	118
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 313765)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	96.6	85	117

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP005: Total Organic Carbon (TOC) (QCLot: 315747)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	101	72	120
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 314925)								
EP033: Butane	106-97-8	10	µg/L	<10	102.18 µg/L	101	85	115
EP033: Butene	25167-67-3	10	µg/L	<10	99.61 µg/L	100	83	115
EP033: Ethane	74-84-0	10	µg/L	<10	54.43 µg/L	104	87	111
EP033: Ethene	74-85-1	10	µg/L	<10	50.29 µg/L	103	87	111
EP033: Methane	74-82-8	10	µg/L	<10	28.48 µg/L	111	86	114
EP033: Propane	74-98-6	10	µg/L	<10	78.28 µg/L	101	84	112
EP033: Propene	115-07-1	10	µg/L	<10	73.97 µg/L	102	85	113
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 313734)								
EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	10 µg/L	92.4	74	116
EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	10 µg/L	94.0	74	116
EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	10 µg/L	93.2	76	118
EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	10 µg/L	91.6	65	123
EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	10 µg/L	92.1	69	119
EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	10 µg/L	91.1	71	119
EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	10 µg/L	94.4	73	119
EP074: Styrene	100-42-5	5	µg/L	<5	10 µg/L	90.6	73	119
EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	10 µg/L	95.7	72	116
EP074B: Oxygenated Compounds (QCLot: 313734)								
EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	100 µg/L	90.4	74	130
EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	100 µg/L	90.4	65	137
EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	100 µg/L	86.3	66	132
EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	100 µg/L	75.8	61	134
EP074C: Sulfonated Compounds (QCLot: 313734)								
EP074: Carbon disulfide	75-15-0	5	µg/L	<5	10 µg/L	90.3	73	127
EP074D: Fumigants (QCLot: 313734)								
EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	10 µg/L	86.8	69	117
EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	10 µg/L	87.4	76	118
EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	10 µg/L	85.6	68	122
EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	10 µg/L	75.8	62	120
EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	10 µg/L	75.9	60	114
EP074E: Halogenated Aliphatic Compounds (QCLot: 313734)								
EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	10 µg/L	80.2	66	114
EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	10 µg/L	79.3	67	119
EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	10 µg/L	93.5	70	124
EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	10 µg/L	88.7	72	126
EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	10 µg/L	96.6	74	120

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074E: Halogenated Aliphatic Compounds (QCLot: 313734) - continued								
EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	10 µg/L	95.4	70	124
EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	10 µg/L	87.4	73	119
EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	10 µg/L	82.0	74	126
EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	10 µg/L	91.9	66	136
EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	10 µg/L	83.3	73	123
EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	10 µg/L	87.7	71	129
EP074: Bromomethane	74-83-9	50	µg/L	<50	100 µg/L	107	56	140
EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	10 µg/L	73.9	62	120
EP074: Chloroethane	75-00-3	50	µg/L	<50	100 µg/L	102	61	139
EP074: Chloromethane	74-87-3	50	µg/L	<50	100 µg/L	91.7	67	130
EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	10 µg/L	92.4	77	119
EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	10 µg/L	71.3	71	128
EP074: Dibromomethane	74-95-3	5	µg/L	<5	10 µg/L	86.7	73	119
EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	100 µg/L	86.5	61	138
EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	10 µg/L	93.2	58	130
EP074: Iodomethane	74-88-4	5	µg/L	<5	10 µg/L	92.5	70	128
EP074: Pentachloroethane	76-01-7	5	µg/L	<5	10 µg/L	77.1	72	126
EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	10 µg/L	100	72	124
EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	10 µg/L	84.2	74	118
EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	10 µg/L	78.7	60	120
EP074: Trichloroethene	79-01-6	5	µg/L	<5	10 µg/L	87.8	76	118
EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	100 µg/L	101	69	131
EP074: Vinyl chloride	75-01-4	50	µg/L	<50	100 µg/L	100	69	129
EP074F: Halogenated Aromatic Compounds (QCLot: 313734)								
EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	10 µg/L	82.8	67	123
EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	10 µg/L	90.6	61	125
EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	10 µg/L	88.0	75	117
EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	10 µg/L	93.3	75	117
EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	10 µg/L	90.4	74	118
EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	10 µg/L	96.7	73	119
EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	10 µg/L	93.3	73	119
EP074: Bromobenzene	108-86-1	5	µg/L	<5	10 µg/L	90.3	76	116
EP074: Chlorobenzene	108-90-7	5	µg/L	<5	10 µg/L	90.2	79	117
EP074G: Trihalomethanes (QCLot: 313734)								
EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	10 µg/L	75.7	64	118
EP074: Bromoform	75-25-2	5	µg/L	<5	10 µg/L	82.8	74	126
EP074: Chloroform	67-66-3	5	µg/L	<5	10 µg/L	93.8	72	120
EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	10 µg/L	80.0	65	115

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075(SIM)A: Phenolic Compounds (QCLot: 314165)								
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	5 µg/L	85.5	51	105
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	5 µg/L	82.2	50	106
EP075(SIM): 2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	5 µg/L	79.2	53	105
EP075(SIM): 2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	5 µg/L	75.1	49	99
EP075(SIM): 2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	5 µg/L	75.6	57	105
EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	5 µg/L	71.4	52	90
EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	5 µg/L	71.0	51	91
EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	5 µg/L	70.9	48	100
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	10 µg/L	69.0	44	88
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	5 µg/L	77.2	53	99
EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	10 µg/L	89.3	10	95
EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	5 µg/L	37.9	25	62
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 314165)								
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	69.0	62	113
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	71.0	64	114
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	65.1	64	116
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	77.4	64	117
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	72.0	63	117
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	79.8	62	119
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	77.9	59	118
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	76.6	63	115
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	71.4	63	116
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	72.0	61	117
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	71.0	64	118
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	71.0	64	115
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	71.5	60	118
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	69.7	50	94
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	71.1	63	116
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	74.0	63	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 313735)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	111	75	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 314166)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	95.2	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	99.3	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	92.7	75	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 313735)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	114	75	127

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 314166)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	91.1	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	96.5	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	100	77	119
EP080: BTEXN (QCLot: 313735)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	110	70	122
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	115	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	119	69	121
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	104	70	120
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	118	72	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	123	69	123
EP262: Ethanolamines (QCLot: 315568)								
EP262: Diethanolamine	111-42-2	1	µg/L	<1	10 µg/L	84.5	50	130
EP262: Ethanolamine	141-43-5	1	µg/L	<1	10 µg/L	121	50	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	Recovery Limits (%) High
ED009: Anions (QCLot: 314357)							
ES1539074-002	Anonymous	ED009-X: Chloride	16887-00-6	4 mg/L	# Not Determined	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 313761)							
ES1539029-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	70.4	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 313766)							
ES1539080-001	GW080487	ED045G: Chloride	16887-00-6	250 mg/L	87.6	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 313903)							
ES1539080-001	GW080487	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	102	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	120	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	114	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	70.3	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	126	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	93.5	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	91.4	70	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 313903) - continued							
ES1539080-001	GW080487	EG020A-F: Lead	7439-92-1	0.2 mg/L	120	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	93.4	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	91.6	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	130	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	96.2	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 313904)							
ES1539080-001	GW080487	EG035F: Mercury	7439-97-6	0.01 mg/L	79.3	70	130
EG052G: Silica by Discrete Analyser (QCLot: 313764)							
ES1539073-005	Anonymous	EG052G: Reactive Silica	----	5 mg/L	# Not Determined	70	130
EK040P: Fluoride by PC Titrator (QCLot: 314852)							
ES1538938-001	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	98.0	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 314097)							
ES1539080-001	GW080487	EK055G: Ammonia as N	7664-41-7	1 mg/L	83.6	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 313762)							
ES1539029-003	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	92.1	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 314098)							
ES1539080-001	GW080487	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	104	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 314012)							
ES1538990-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	90.6	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 314013)							
ES1538990-001	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	87.0	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 313765)							
ES1539080-001	GW080487	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	97.0	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 315747)							
ES1538893-018	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	103	70	130
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 314925)							
ES1539080-002	GR-P3	EP033: Butane	106-97-8	102.18 µg/L	97.3	70	130
		EP033: Butene	25167-67-3	99.61 µg/L	96.9	70	130
		EP033: Ethane	74-84-0	54.43 µg/L	101	70	130
		EP033: Ethene	74-85-1	50.29 µg/L	101	70	130
		EP033: Methane	74-82-8	28.48 µg/L	109	70	130
		EP033: Propane	74-98-6	78.28 µg/L	99.1	70	130
		EP033: Propene	115-07-1	73.97 µg/L	98.9	70	130
EP074E: Halogenated Aliphatic Compounds (QCLot: 313734)							

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	Recovery Limits (%) High
EP074E: Halogenated Aliphatic Compounds (QCLot: 313734) - continued							
ES1539080-001	GW080487	EP074: 1.1-Dichloroethene	75-35-4	25 µg/L	73.7	70	130
		EP074: Trichloroethene	79-01-6	25 µg/L	93.6	70	130
EP074F: Halogenated Aromatic Compounds (QCLot: 313734)							
ES1539080-001	GW080487	EP074: Chlorobenzene	108-90-7	25 µg/L	97.2	70	130
EP075(SIM)A: Phenolic Compounds (QCLot: 314165)							
ES1539080-002	GR-P3	EP075(SIM): 2-Chlorophenol	95-57-8	2 µg/L	73.2	60	130
		EP075(SIM): 2-Nitrophenol	88-75-5	2 µg/L	82.5	60	130
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	2 µg/L	87.1	70	130
		EP075(SIM): Pentachlorophenol	87-86-5	2 µg/L	46.5	20	130
		EP075(SIM): Phenol	108-95-2	2 µg/L	37.5	20	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 314165)							
ES1539080-002	GR-P3	EP075(SIM): Acenaphthene	83-32-9	2 µg/L	87.6	70	130
		EP075(SIM): Pyrene	129-00-0	2 µg/L	77.9	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 313735)							
ES1539080-001	GW080487	EP080: C6 - C9 Fraction	----	325 µg/L	124	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 314166)							
ES1539080-002	GR-P3	EP071: C10 - C14 Fraction	----	2000 µg/L	91.8	74	150
		EP071: C15 - C28 Fraction	----	2500 µg/L	118	77	153
		EP071: C29 - C36 Fraction	----	2000 µg/L	122	67	153
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 313735)							
ES1539080-001	GW080487	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	121	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 314166)							
ES1539080-002	GR-P3	EP071: >C10 - C16 Fraction	----	2500 µg/L	103	74	150
		EP071: >C16 - C34 Fraction	----	3500 µg/L	114	77	153
		EP071: >C34 - C40 Fraction	----	1500 µg/L	139	67	153
EP080: BTEXN (QCLot: 313735)							
ES1539080-001	GW080487	EP080: Benzene	71-43-2	25 µg/L	92.9	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	98.9	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	106	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	95.1	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	98.7	70	130
		EP080: Toluene	108-88-3	25 µg/L	114	70	130
EP262: Ethanolamines (QCLot: 315568)							
EB1537641-002	Anonymous	EP262: Diethanolamine	111-42-2	10 µg/L	67.6	50	130
		EP262: Ethanolamine	141-43-5	10 µg/L	113	50	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1539080**	Page	: 1 of 12
Amendment	: **2**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Telephone	: +61 2 8784 8503
Project	: 2268523B	Date Samples Received	: 17-Dec-2015
Site	: ----	Issue Date	: 08-Jan-2016
Sampler	: BECKY ROLLINS, CAROLINA SARDELLA	No. of samples received	: 5
Order number	: ----	No. of samples analysed	: 5

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED009: Anions	ES1539074--002	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG052G: Silica by Discrete Analyser	ES1539073--005	Anonymous	**Reactive Silica**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Regular Sample Surrogates

Sub-Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP075(SIM)T: PAH Surrogates	ES1539080-001	GW080487	**Anthracene-d10**	1719-06-8	115 %	27-113 %	**Recovery greater than upper data quality objective**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)	Date extracted	Due for extraction	**Days overdue**	Date analysed	Due for analysis	**Days overdue**
EA005: pH						
Clear Plastic Bottle - Natural GR-P3, WKSW01, WKMB01, WKMB02	----	----	----	17-Dec-2015	16-Dec-2015	**1**
EK010/011: Chlorine						
Clear Plastic Bottle - Natural GR-P3, WKSW01, WKMB01, WKMB02	----	----	----	18-Dec-2015	16-Dec-2015	**2**
Clear Plastic Bottle - Natural GW080487	----	----	----	18-Dec-2015	17-Dec-2015	**1**

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005: pH								
Clear Plastic Bottle - Natural (EA005)								
GR-P3, WKMB01,	WKSW01, WKMB02	**16-Dec-2015**	----	----	----	**17-Dec-2015**	16-Dec-2015	×
Clear Plastic Bottle - Natural (EA005)								
GW080487		**17-Dec-2015**	----	----	----	**17-Dec-2015**	17-Dec-2015	✓
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P)								
GR-P3, WKMB01,	WKSW01, WKMB02	**16-Dec-2015**	----	----	----	**18-Dec-2015**	13-Jan-2016	✓
Clear Plastic Bottle - Natural (EA010-P)								
GW080487		**17-Dec-2015**	----	----	----	**18-Dec-2015**	14-Jan-2016	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
GR-P3, WKMB01,	WKSW01, WKMB02	**16-Dec-2015**	----	----	----	**18-Dec-2015**	23-Dec-2015	✓
Clear Plastic Bottle - Natural (EA015H)								
GW080487		**17-Dec-2015**	----	----	----	**18-Dec-2015**	24-Dec-2015	✓
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)								
GR-P3, WKMB01,	WKSW01, WKMB02	**16-Dec-2015**	----	----	----	**18-Dec-2015**	23-Dec-2015	✓
Clear Plastic Bottle - Natural (EA025H)								
GW080487		**17-Dec-2015**	----	----	----	**18-Dec-2015**	24-Dec-2015	✓
ED009: Anions								
Clear Plastic Bottle - Natural (ED009-X)								
GR-P3, WKMB01,	WKSW01, WKMB02	**16-Dec-2015**	----	----	----	**18-Dec-2015**	13-Jan-2016	✓
Clear Plastic Bottle - Natural (ED009-X)								
GW080487		**17-Dec-2015**	----	----	----	**18-Dec-2015**	14-Jan-2016	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
GR-P3, WKMB01,	WKSW01, WKMB02	**16-Dec-2015**	----	----	----	**18-Dec-2015**	30-Dec-2015	✓
Clear Plastic Bottle - Natural (ED037-P)								
GW080487		**17-Dec-2015**	----	----	----	**18-Dec-2015**	31-Dec-2015	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
GR-P3, WKMB01,	WKSW01, WKMB02	**16-Dec-2015**	----	----	----	**17-Dec-2015**	13-Jan-2016	✓
Clear Plastic Bottle - Natural (ED041G)								
GW080487		**17-Dec-2015**	----	----	----	**17-Dec-2015**	14-Jan-2016	✓

Matrix: **WATER**

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) GR-P3, WKSW01, WKMB01, WKMB02	**16-Dec-2015**	----	----	----	**17-Dec-2015**	13-Jan-2016	✓
Clear Plastic Bottle - Natural (ED045G) GW080487	**17-Dec-2015**	----	----	----	**17-Dec-2015**	14-Jan-2016	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) GR-P3, WKSW01, WKMB01, WKMB02	**16-Dec-2015**	----	----	----	**21-Dec-2015**	13-Jan-2016	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) GW080487	**17-Dec-2015**	----	----	----	**21-Dec-2015**	14-Jan-2016	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) GR-P3, WKSW01, WKMB01, WKMB02	**16-Dec-2015**	----	----	----	**21-Dec-2015**	13-Jun-2016	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) GW080487	**17-Dec-2015**	----	----	----	**21-Dec-2015**	14-Jun-2016	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F) GR-P3, WKSW01, WKMB01, WKMB02	**16-Dec-2015**	----	----	----	**21-Dec-2015**	13-Jun-2016	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F) GW080487	**17-Dec-2015**	----	----	----	**21-Dec-2015**	14-Jun-2016	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) GR-P3, WKSW01, WKMB01, WKMB02	**16-Dec-2015**	----	----	----	**18-Dec-2015**	13-Jan-2016	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) GW080487	**17-Dec-2015**	----	----	----	**18-Dec-2015**	14-Jan-2016	✓
EG052G: Silica by Discrete Analyser							
Clear Plastic Bottle - Natural (EG052G) GR-P3, WKSW01, WKMB01, WKMB02	**16-Dec-2015**	----	----	----	**17-Dec-2015**	13-Jan-2016	✓
Clear Plastic Bottle - Natural (EG052G) GW080487	**17-Dec-2015**	----	----	----	**17-Dec-2015**	14-Jan-2016	✓
EK010/011: Chlorine							
Clear Plastic Bottle - Natural (EK010) GR-P3, WKSW01, WKMB01, WKMB02	**16-Dec-2015**	----	----	----	**18-Dec-2015**	16-Dec-2015	✗
Clear Plastic Bottle - Natural (EK010) GW080487	**17-Dec-2015**	----	----	----	**18-Dec-2015**	17-Dec-2015	✗

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P) GR-P3, WKSW01, WKMB01, WKMB02	**16-Dec-2015**	----	----	----	**18-Dec-2015**	13-Jan-2016	✓
Clear Plastic Bottle - Natural (EK040P) GW080487	**17-Dec-2015**	----	----	----	**18-Dec-2015**	14-Jan-2016	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) GR-P3, WKSW01, WKMB01, WKMB02	**16-Dec-2015**	----	----	----	**18-Dec-2015**	13-Jan-2016	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) GW080487	**17-Dec-2015**	----	----	----	**18-Dec-2015**	14-Jan-2016	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) GR-P3, WKSW01, WKMB01, WKMB02	**16-Dec-2015**	----	----	----	**17-Dec-2015**	18-Dec-2015	✓
Clear Plastic Bottle - Natural (EK057G) GW080487	**17-Dec-2015**	----	----	----	**17-Dec-2015**	19-Dec-2015	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) GR-P3, WKSW01, WKMB01, WKMB02	**16-Dec-2015**	----	----	----	**18-Dec-2015**	13-Jan-2016	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) GW080487	**17-Dec-2015**	----	----	----	**18-Dec-2015**	14-Jan-2016	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G) GR-P3, WKSW01, WKMB01, WKMB02	**16-Dec-2015**	**18-Dec-2015**	13-Jan-2016	✓	**18-Dec-2015**	13-Jan-2016	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) GW080487	**17-Dec-2015**	**18-Dec-2015**	14-Jan-2016	✓	**18-Dec-2015**	14-Jan-2016	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) GR-P3, WKSW01, WKMB01, WKMB02	**16-Dec-2015**	**18-Dec-2015**	13-Jan-2016	✓	**18-Dec-2015**	13-Jan-2016	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) GW080487	**17-Dec-2015**	**18-Dec-2015**	14-Jan-2016	✓	**18-Dec-2015**	14-Jan-2016	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) GR-P3, WKSW01, WKMB01, WKMB02	**16-Dec-2015**	----	----	----	**17-Dec-2015**	18-Dec-2015	✓
Clear Plastic Bottle - Natural (EK071G) GW080487	**17-Dec-2015**	----	----	----	**17-Dec-2015**	19-Dec-2015	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulfuric Acid (EP005)								
GR-P3, WKMB01,	WKSW01, WKMB02	**16-Dec-2015**	**----**	----	----	**20-Dec-2015**	13-Jan-2016	✓
Amber TOC Vial - Sulfuric Acid (EP005)								
GW080487		**17-Dec-2015**	**----**	----	----	**20-Dec-2015**	14-Jan-2016	✓
EP033: C1 - C4 Hydrocarbon Gases								
Amber VOC Vial - Sulfuric Acid (EP033)								
GR-P3, WKMB01,	WKSW01, WKMB02	**16-Dec-2015**	**----**	----	----	**18-Dec-2015**	30-Dec-2015	✓
Amber VOC Vial - Sulfuric Acid (EP033)								
GW080487		**17-Dec-2015**	**----**	----	----	**18-Dec-2015**	31-Dec-2015	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071)								
GR-P3, WKMB01,	WKSW01, WKMB02	**16-Dec-2015**	**18-Dec-2015**	23-Dec-2015	✓	**18-Dec-2015**	27-Jan-2016	✓
Amber Glass Bottle - Unpreserved (EP071)								
GW080487		**17-Dec-2015**	**18-Dec-2015**	24-Dec-2015	✓	**18-Dec-2015**	27-Jan-2016	✓
EP074A: Monocyclic Aromatic Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP074)								
GR-P3, WKMB01,	WKSW01, WKMB02	**16-Dec-2015**	**17-Dec-2015**	30-Dec-2015	✓	**17-Dec-2015**	30-Dec-2015	✓
Amber VOC Vial - Sulfuric Acid (EP074)								
GW080487		**17-Dec-2015**	**17-Dec-2015**	31-Dec-2015	✓	**17-Dec-2015**	31-Dec-2015	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM))								
GR-P3, WKMB01,	WKSW01, WKMB02	**16-Dec-2015**	**18-Dec-2015**	23-Dec-2015	✓	**18-Dec-2015**	27-Jan-2016	✓
Amber Glass Bottle - Unpreserved (EP075(SIM))								
GW080487		**17-Dec-2015**	**18-Dec-2015**	24-Dec-2015	✓	**18-Dec-2015**	27-Jan-2016	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080)								
GR-P3, WKMB01,	WKSW01, WKMB02	**16-Dec-2015**	**17-Dec-2015**	30-Dec-2015	✓	**17-Dec-2015**	30-Dec-2015	✓
Amber VOC Vial - Sulfuric Acid (EP080)								
GW080487		**17-Dec-2015**	**17-Dec-2015**	31-Dec-2015	✓	**17-Dec-2015**	31-Dec-2015	✓
EP262: Ethanolamines								
Amber Glass Bottle - Unpreserved (EP262)								
GR-P3, WKMB01,	WKSW01, WKMB02	**16-Dec-2015**	**----**	----	----	**19-Dec-2015**	23-Dec-2015	✓
Amber Glass Bottle - Unpreserved (EP262)								
GW080487		**17-Dec-2015**	**----**	----	----	**19-Dec-2015**	24-Dec-2015	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
C1 - C4 Gases	EP033	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorine	EK010	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH	EA005	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Silica (Reactive) by Discrete Analyser	EG052G	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Standard Anions -by IC (Extended Method)	ED009-X	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	14	**14.29**	**9.52**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
C1 - C4 Gases	EP033	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type / *Analytical Methods*	*Method*	*Count* *QC*	*Regular*	*Rate (%)* ***Actual***	***Expected***	*Evaluation*	*Quality Control Specification*
Laboratory Control Samples (LCS) - Continued							
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Silica (Reactive) by Discrete Analyser	EG052G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Standard Anions -by IC (Extended Method)	ED009-X	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	14	**14.29**	**9.52**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	9	**33.33**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	10	**30.00**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
C1 - C4 Gases	EP033	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorine	EK010	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Silica (Reactive) by Discrete Analyser	EG052G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Standard Anions -by IC (Extended Method)	ED009-X	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	14	**7.14**	**4.76**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
C1 - C4 Gases	EP033	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Silica (Reactive) by Discrete Analyser	EG052G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Standard Anions -by IC (Extended Method)	ED009-X	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH	EA005	WATER	In house: Referenced to APHA 4500 H+ B. pH of water samples is determined by ISE either manually or by automated pH meter. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Standard Anions -by IC (Extended Method)	ED009-X	WATER	In house: Referenced to APHA 4110. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45 um filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Silica (Reactive) by Discrete Analyser	EG052G	WATER	In house: Referenced to APHA 4500-SiO2 D: Under Acdic conditions reactive silicon combines with ammonium molybdate to form a yellow molybdosilicic acid complex. This is reduced by 1-amino-2-naphthol-4-sulfonic acid to a silicomolybdenum blue complex which is measured by discrete analyser at 670 nm. This method is compliant with NEPM (2013) Schedule B(3)
Chlorine	EK010	WATER	In-house (DPD colourimetry)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ammonium as N	EK055G-NH4	WATER	Ammonium in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH and Temperature. Ammonia is determined by direct colorimetry by Discrete Analyser according to APHA 4500-NH3 G. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (2013) Schedule B(3)
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.
TRH - Semivolatile Fraction	EP071	WATER	USEPA SW 846 - 8015C The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Volatile Organic Compounds	EP074	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Ethanolamines by LCMSMS	EP262	WATER	In-house LC-MSMS: Benzoyl derivatives of target compounds are analysed by LC/MSMS in ESI Positive Mode.

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)

Appendix D

Summary results of water quality

Table D.1 Waukivory groundwater quality results

	Analyte[a]	Units	LOR	GR-P3	GW080487	WKMB01	WKMB02	WKMB06A	WKMB06B
Sample date				16/12/2015	17/12/2015	16/12/2015	16/12/2015	15/12/2015	15/12/2015
Field	Electrical conductivity	uS/cm		4082	4113	4526	1010	3250	1507
	pH	pH units		6.42	6.8	7.95	9.46	6.28	8.69
	TDS	mg/L		2653	2674	2942	656	2113	1365
	DO %	%		40.4	29.2	15	18.9	56.7	21.1
	DO mg/L	mg/L		3.69	2.53	1.33	1.67	4.9	1.86
	Redox	mV		-6.6	-101.7	-200.2	-198.7	-85.9	-296.6
	Temperature	°C		19.13	21.17	20.57	21.31	21.88	20.04
	Chlorine Free	mg/L		0.01	0	0	0.02	0	0.01
	Chlorine Total	mg/L		0.03	0	0	0	0	0.06
Key analytes	Ethanolamine	µg/L	1	<1	2	<1	<1	<1	<1
	Diethanolamine	µg/L	1	<1	<1	<1	<1	<1	<1
	Boron	mg/L	0.05	<0.05	<0.05	0.08	<0.05	<0.05	0.12
	Chloride (Method analysis ED045)	mg/L	1	1090	707	916	67	823	211
	Chloride (Method analysis ED009)	mg/L	0.1	1150	696	962	66.6	803	196
	Chlorine - Free	mg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Chlorine - Total Residual	mg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Nitrogen (Total)	mg/L	0.1	<0.1	0.5	0.7	0.4	0.4	0.5
	Sulfate as SO4	mg/L	1	82	92	45	28	53	21
	Phosphorus	mg/L	0.01	0.01	<0.01	0.08	0.09	0.14	0.84
Lab physical parameters	Electrical conductivity	µS/cm	1	4140	3960	4410	956	3060	1450
	pH (Lab)[b]	pH units	0.01	6.53	7	8.03	9.54	6.91	8.63
	TDS	mg/L	10	2460	2270	2540	538	2000	853
	TSS	mg/L	5	13	16	<5	<5	29	<5
Major/minor ions	Bicarbonate Alkalinity-mg CaCO3/L	mg/L	1	364	1030	853	218	275	405
	Carbonate Alkalinity-mg CaCO3/L	mg/L	1	<1	<1	<1	136	<1	36
	Alkalinity (Hydroxide) as CaCO3	mg/L	1	<1	<1	<1	<1	<1	<1
	Alkalinity (total) as CaCO3	mg/L	1	364	1030	853	354	275	441
	Calcium	mg/L	1	130	92	15	1	111	4
	Magnesium	mg/L	1	72	38	1	<1	61	<1
	Potassium	mg/L	1	2	6	3	8	2	1
	Sodium	mg/L	1	632	812	1080	208	441	343
	Fluoride	mg/L	0.1	0.2	0.2	1.8	0.5	0.2	0.6
	Reactive Silica	mg/L	0.05	36.5	21.2	16.4	21.7	36.9	14
	Bromine	mg/L	0.1	1.8	1.5	2	0.2	1.5	0.4
	Ionic Balance	%	0.01	0.28	0.85	4.39	1.35	0.04	0.23
Nutrients	Ammonia as N	mg/L	0.01	0.04	0.55	0.55	0.42	0.29	0.44
	Ammonium as N	mg/L	0.01	0.04	0.55	0.53	0.19	0.29	0.37
	Nitrate (as N)	mg/L	0.01	0.08	0.03	0.1	0.03	0.02	<0.01
	Nitrite (as N)	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Nitrite + Nitrate as N	mg/L	0.01	0.08	0.03	0.1	0.03	0.02	<0.01
	Kjeldahl Nitrogen Total	mg/L	0.1	<0.1	0.5	0.6	0.4	0.4	0.5
	Reactive Phosphorus as P	mg/L	0.01	<0.01	<0.01	0.06	0.1	<0.01	0.86
	Total Organic Carbon	mg/L	1	2	4	20	8	2	1
Dissolved gas	Methane	mg/L	0.01	<0.01	0.19	18.5	7.24	0.013	21.6
Dissolved metals	Aluminium	mg/L	0.01	<0.01	<0.01	0.02	0.2	<0.01	0.03
	Antimony	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Arsenic	mg/L	0.001	<0.001	<0.001	<0.001	0.001	0.006	<0.001
	Barium	mg/L	0.001	0.44	0.224	0.242	0.098	0.537	0.083
	Berryllium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Cadmium	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Chromium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Cobalt	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001
	Copper	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Iron	mg/L	0.05	0.24	0.57	<0.05	<0.05	10.6	<0.05
	Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Vanadium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Zinc	mg/L	0.005	0.017	0.009	<0.005	<0.005	0.009	<0.005
	Manganese	mg/L	0.001	0.607	0.046	0.009	0.005	0.274	0.012
	Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Molybdenum	mg/L	0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.002
	Nickel	mg/L	0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001
	Selenium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Strontium	mg/L	0.001	2.03	4.9	1.47	0.28	1.64	0.238
	Tin	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Uranium	mg/L	0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Phenolic compounds	2,4,5-trichlorophenol	µg/L	1	<1	<1	<1	<1	<1	<1
	2.4.6-Trichlorophenol	µg/L	1	<1	<1	<1	<1	<1	<1
	2,4-dichlorophenol	µg/L	1	<1	<1	<1	<1	<1	<1
	2,4-dimethylphenol	µg/L	1	<1	<1	<1	<1	<1	<1
	2,6-dichlorophenol	µg/L	1	<1	<1	<1	<1	<1	<1
	2-chlorophenol	µg/L	1	<1	<1	<1	<1	<1	<1
	2-methylphenol	µg/L	1	<1	<1	<1	<1	<1	<1
	2-nitrophenol	µg/L	1	<1	<1	<1	<1	<1	<1
	3-&4-methylphenol	µg/L	2	<2	<2	<2	<2	<2	<2
	4-chloro-3-methylphenol	µg/L	1	<1	<1	<1	<1	<1	<1
	Pentachlorophenol	µg/L	2	<2	<2	<2	<2	<2	<2
	Phenol	µg/L	1	<1	<1	<1	<1	<1	<1
PAH	Acenaphthene	µg/L	1	<1	<1	<1	<1	<1	<1
	Acenaphthylene	µg/L	1	<1	<1	<1	<1	<1	<1
	Anthracene	µg/L	1	<1	<1	<1	<1	<1	<1
	Benz(a)anthracene	µg/L	1	<1	<1	<1	<1	<1	<1
	Benzo(a) pyrene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Benzo(b&j)fluoranthene	µg/L	1	<1	<1	<1	<1	<1	<1
	Benzo(g,h,i)perylene	µg/L	1	<1	<1	<1	<1	<1	<1
	Benzo(k)fluoranthene	µg/L	1	<1	<1	<1	<1	<1	<1
	Benzo(a)pyrene TEQ (zero)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Chrysene	µg/L	1	<1	<1	<1	<1	<1	<1
	Dibenz(a,h)anthracene	µg/L	1	<1	<1	<1	<1	<1	<1
	Fluoranthene	µg/L	1	<1	<1	<1	<1	<1	<1
	Fluorene	µg/L	1	<1	<1	<1	<1	<1	<1
	Indeno(1,2,3-c,d)pyrene	µg/L	1	<1	<1	<1	<1	<1	<1
	Phenanthrene	µg/L	1	<1	<1	<1	<1	<1	<1
	Pyrene	µg/L	1	<1	<1	<1	<1	<1	<1
	Polycylic aromatic hydrocarbons EPA448	ug/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TRH	TPH C6-C10	µg/L	20	<20	<20	<20	<20	<20	<20
	C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20	<20
	C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100	<100
	C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100	<100
	C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100	<100
	C10 - C40 Fraction (Sum)	µg/L	100	<100	<100	<100	<100	<100	<100
	TRH >C10-C16 less Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100	<100
TPH	C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20	<20
	C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50	<50
	C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100	<100
	C29-C36 Fraction	µg/L	50	<50	<50	<50	<50	<50	<50
	+C10 - C36 (Sum of total)	µg/L	50	<50	<50	<50	<50	<50	<50
BTEX	Benzene	µg/L	1	<1	<1	<1	<1	<1	<1
	Toluene	µg/L	2	<2	<2	<2	<2	<2	<2
	Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2	<2
	Xylene (m & p)	µg/L	2	<2	<2	<2	<2	<2	<2
	Xylene (o)	µg/L	2	<2	<2	<2	<2	<2	<2
	Xylene Total	µg/L	2	<2	<2	<2	<2	<2	<2
	Total BTEX	µg/L	1	<1	<1	<1	<1	<1	<1
	Naphthalene	µg/L	1	<1	<1	<1	<1	<1	<1

Notes:
- not analysed
a - All data is from ALS
b - Laboratory readings of pH (lab) is outside of the holding time, therefore field measurements of pH should be relied upon for accuracy.

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Table D.2 Waukivory surface water quality results

	Analyte[a]	Units	LOR	WKSW01	WKSW01	WKSW01	WKSW02	WKSW02	WKSW02	WKSW03	WKSW03	WKSW03
Sample date				21/10/2015	18/11/2015	16/12/2015	21/10/2015	18/11/2015	15/12/2015	21/10/2015	18/11/2015	15/12/2015
Field	Electrical conductivity	uS/cm		669	187	371	622	262	519	633	208	408
	pH	pH units		7.97	7.32	7.89	6.89	7.21	7.17	7.27	6.99	7.41
	TDS	mg/L		435	121	242	404	170	338	411	135	432
	DO %	%		51.3	31.6	76.2	5.8	22.4	101.1	10.5	57.6	74.4
	DO mg/L	mg/L		4.5	10.96	6.13	0.5	5.34	8.22	0.9	7.64	5.8
	Redox	mV		-125.3	31.6	-42.9	-142.3	22.4	44.1	-186.6	57.6	13.5
	Temperature	°C		21.38	20.53	26.05	22.77	20.6	25.76	21.09	20.43	28.09
	Chlorine Free	mg/L		0.13	0	0	0.03	0	0.09	0.05	0	0.34
	Chlorine Total	mg/L		0.12	0	0	0.11	0	0.02	0	0	0.26
Key analytes	Ethanolamine	µg/L	1	<1	<1	<1	2	<1	<1	3	<1	<1
	Diethanolamine	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Boron	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Chloride (Method analysis ED045)	mg/L	1	138	34	59	98	37	74	109	35	60
	Chloride (Method analysis ED009)	mg/L	0.1	143	33.3	61	105	36.8	75.4	115	33.9	59.9
	Chlorine - Free	mg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Chlorine - Total Residual	mg/L	0.2	<0.2	<0.2	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Nitrogen (Total)	mg/L	0.1	0.7	1.6	0.6	0.6	1.1	0.6	1.2	1.6	1.5
	Sulfate as SO4	mg/L	1	24	5	<1	<1	12	<1	5	7	<10
	Phosphorus	mg/L	0.01	0.03	0.21	0.04	0.13	0.18	0.06	0.24	0.21	0.29
Lab physical parameters	Electrical conductivity	µS/cm	1	681	202	337	607	267	472	623	214	346
	pH (Lab)[b]	pH units	0.01	7.38	7.24	7.27	7.02	7.6	7.38	7.23	7.33	7.34
	TDS	mg/L	10	328	218	214	290	194	275	285	202	217
	TSS	mg/L	5	<5	12	26	15	<5	5	30	8	58
Major/minor ions	Bicarbonate Alkalinity-mg CaCO3/L	mg/L	1	75	25	70	121	54	120	105	35	78
	Carbonate Alkalinity-mg CaCO3/L	mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Alkalinity (Hydroxide) as CaCO3	mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Alkalinity (total) as CaCO3	mg/L	1	75	25	70	121	54	120	105	35	78
	Calcium	mg/L	1	22	7	13	29	15	24	27	9	16
	Magnesium	mg/L	1	17	5	10	17	7	13	16	5	8
	Potassium	mg/L	1	4	4	3	4	4	4	4	4	3
	Sodium	mg/L	1	78	24	41	53	27	50	60	25	36
	Fluoride	mg/L	0.1	0.2	<0.1	0.1	0.2	0.1	0.1	0.1	<0.1	<0.1
	Reactive Silica	mg/L	0.05	0.24	15.6	10.8	8.17	16.7	11	7.72	15.7	12.7
	Bromine	mg/L	0.1	0.3	<0.1	0.2	0.3	<0.1	0.2	0.3	<0.1	0.2
	Ionic Balance	%	0.01	0.84	n/a[c]	4.19	0.69	n/a[c]	0.65	0.93	n/a[c]	2.39
Nutrients	Ammonia as N	mg/L	0.01	<0.01	0.04	0.04	<0.01	0.09	0.02	<0.01	0.04	0.02
	Ammonium as N	mg/L	0.01	<0.01	0.04	0.04	<0.01	0.09	0.02	<0.01	0.04	0.02
	Nitrate (as N)	mg/L	0.01	<0.01	0.03	0.05	<0.01	0.09	0.01	<0.01	0.03	<0.01
	Nitrite (as N)	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Nitrite + Nitrate as N	mg/L	0.01	<0.01	0.03	0.05	<0.01	0.09	0.01	<0.01	0.03	<0.01
	Kjeldahl Nitrogen Total	mg/L	0.1	0.7	1.6	0.6	0.6	1	0.6	1.2	1.6	1.5
	Reactive Phosphorus as P	mg/L	0.01	0.02	0.09	0.02	<0.01	0.1	<0.01	0.03	0.09	<0.01
	Total Organic Carbon	mg/L	1	4	25	10	5	12	8	8	22	16
Dissolved gas	Methane	mg/L	0.01	0.025	0.011	0.017	1.77	0.026	1.06	0.568	0.015	0.101
Dissolved metals	Aluminium	mg/L	0.01	<0.01	0.28	<0.01	<0.01	0.04	<0.01	<0.01	0.13	<0.01
	Antimony	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Arsenic	mg/L	0.001	<0.001	0.001	0.001	0.002	0.001	0.002	0.002	0.001	0.002
	Barium	mg/L	0.001	0.055	0.03	0.044	0.067	0.027	0.034	0.099	0.03	0.048
	Berryllium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Cadmium	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Chromium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Cobalt	mg/L	0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.002	<0.001	<0.001
	Copper	mg/L	0.001	<0.001	0.003	0.002	<0.001	0.001	0.001	<0.001	0.002	0.001
	Iron	mg/L	0.05	0.27	0.56	0.14	1.49	0.24	0.07	1.71	0.51	0.14
	Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Vanadium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Zinc	mg/L	0.005	0.005	0.016	0.007	<0.005	0.019	0.01	0.01	0.008	0.006
	Manganese	mg/L	0.001	0.169	0.03	0.195	1.27	0.02	0.241	2.41	0.04	0.4
	Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Molybdenum	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Nickel	mg/L	0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001
	Selenium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Strontium	mg/L	0.001	0.317	0.082	0.221	0.356	0.149	0.207	0.331	0.102	0.192
	Tin	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Uranium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Phenols	2,4,5-trichlorophenol	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	2.4.6-Trichlorophenol	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	2,4-dichlorophenol	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	2,4-dimethylphenol	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	2,6-dichlorophenol	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	2-chlorophenol	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	2-methylphenol	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	2-nitrophenol	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	3-&4-methylphenol	µg/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	4-chloro-3-methylphenol	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Pentachlorophenol	µg/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	Phenol	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
PAH	Acenaphthene	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Acenaphthylene	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Anthracene	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Benz(a)anthracene	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Benzo(a) pyrene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Benzo(b&j)fluoranthene	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Benzo(g,h,i)perylene	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Benzo(k)fluoranthene	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Benzo(a)pyrene TEQ (zero)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Chrysene	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Dibenz(a,h)anthracene	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Fluoranthene	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Fluorene	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Indeno(1,2,3-c,d)pyrene	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Phenanthrene	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Pyrene	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Polycylic aromatic hydrocarbons EPA448	ug/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TRH	TPH C6-C10	µg/L	20	<20	<20	<20	<20	<20	<20	<20	<20	<20
	C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20	<20	<20	<20	<20
	C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100	<100	<100	<100	<100
	C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100	<100	<100	<100	<100
	C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100	<100	<100	<100	<100
	C10 - C40 Fraction (Sum)	µg/L	100	<100	<100	<100	<100	<100	<100	<100	<100	<100
	TRH >C10-C16 less Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100	<100	<100	<100	<100
TPH	C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20	<20	<20	<20	<20
	C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100	<100	<100	<100	<100
	C29-C36 Fraction	µg/L	50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	+C10 - C36 (Sum of total)	µg/L	50	<50	<50	<50	<50	<50	<50	<50	<50	<50
BTEX	Benzene	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Toluene	µg/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	Xylene (m & p)	µg/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	Xylene (o)	µg/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	Xylene Total	µg/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	Total BTEX	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Naphthalene	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1

Notes:
- not analysed
a - All data is from ALS
b - Laboratory readings of pH (lab) is outside of the holding time, therefore field measurements of pH should be relied upon for accuracy.
c - out of acceptable limits

Table D.3 AST2 and Pilot wells.

	Analyte[a]	Units	LOR	AST2	AST2	AST2	WK11	WK12	WK12	WK12	WK13	WK13	WK14	WK14
Sample date				21/10/2015	18/11/2015	15/12/2015	10/12/2015	22/10/2015	18/11/2015	10/12/2015	18/11/2015	10/12/2015	18/11/2015	10/12/2015
Field	Electrical conductivity	uS/cm		9061	10,407	17,278	14,615	-	19,326	14,856	7233	7099	12,230	12,345
	pH	pH units		9.4	9.31	9.45	8.06	-	7.48	7.09	8.42	8.53	7.85	7.78
	TDS	mg/L		5890	6769	11,220	9500	-	12,560	9664	4702	4615	7956	8025
	DO %	%		29.1	115.2	160.9	31.5	-	17.2	61.1	22	55.5	26.8	55
	DO mg/L	mg/L		2.48	9.95	10.12	2.59	-	1.35	4.74	1.76	4.42	2.27	4.39
	Redox	mV		-157.6	63.2	-40.3	-174.8	-	-232.6	-207.4	-163.4	-265.6	-185.1	190.6
	Temperature	°C		21.67	20.93	36.8	22.83	-	23.91	25.12	24.43	25.38	20.73	24.97
	Chlorine Free	mg/L		0.22	0	1.76	0.02	-	0.28	0.25	0.05	0.04	0.08	0
	Chlorine Total	mg/L		0.16	0.4	0	0.03	-	0.06	0.16	0.04	0.02	0.02	0.02
Key analytes	Ethanolamine	µg/L	1	32	<1	19	31	-	25	23	23	6	28	23
	Diethanolamine	µg/L	1	<1	36	<1	8	-	6	2	13	<1	9	2
	Boron	mg/L	0.05	6.12	3.93	3.89	3.43	-	1.11	1.38	2.06	2.88	2.42	2.67
	Chloride (Method analysis ED045)	mg/L	1	852	1900	3970	4180	-	5900	4490	662	690	1890	1780
	Chloride (Method analysis ED009)	mg/L	0.1	883	2000	3990	3980	-	6110	4320	675	686	1980	1890
	Chlorine - Free	mg/L	0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Chlorine - Total Residual	mg/L	0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Nitrogen (Total)	mg/L	0.1	10.7	6.6	108	8	-	9.8	6.1	6.4	5.1	7	5.4
	Sulfate as SO4	mg/L	1	<1	1	<1	<10	-	<10	<10	<1	<10	<1	<10
	Phosphorus	mg/L	0.01	2.54	1.24	7.39	1.22	-	0.79	1.19	1.73	1.59	1.48	1.22
Lab physical parameters	Electrical conductivity	µS/cm	1	9560	10,300	15,200	14,900	-	19,400	15,400	7340	7240	12,600	12,600
	pH (Lab)[b]	pH units	0.01	9.51	9.28	9.4	8.31	-	7.82	7.46	8.87	8.74	8.69	7.98
	TDS	mg/L	10	5010	6320	9700	9700	-	11,700	9810	4410	5710	8340	9400
	TSS	mg/L	5	110	<5	2770	<5	-	124	78	<5	16	<5	<5
Major/minor ions	Bicarbonate Alkalinity-mg CaCO3/L	mg/L	1	2700	1560	1360	1890	-	1150	1830	2720	2820	4120	4720
	Carbonate Alkalinity-mg CaCO3/L	mg/L	1	1650	869	1290	93	-	<1	<1	500	300	350	<1
	Alkalinity (Hydroxide) as CaCO3	mg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	Alkalinity (total) as CaCO3	mg/L	1	4350	2420	2650	1980	-	1150	1830	3220	3120	4480	4720
	Calcium	mg/L	1	10	14	16	27	-	213	122	6	7	21	48
	Magnesium	mg/L	1	3	12	16	12	-	38	24	2	2	11	13
	Potassium	mg/L	1	22	284	599	375	-	927	622	11	12	15	15
	Sodium	mg/L	1	2140	2370	3040	3360	-	3500	2960	1950	1860	3300	3190
	Fluoride	mg/L	0.1	2	1.6	1.9	1.6	-	1.6	1.8	2.4	2.5	1.2	1
	Reactive Silica	mg/L	0.05	1.26	3.23	5.63	54.4	-	32.5	36.3	25.2	25.4	34.9	37.8
	Bromine	mg/L	0.1	1.4	2.9	5	1.7	-	12	8.4	1.6	1.5	1.2	<1
	Ionic Balance	%	0.01	8.12	4.67	4.88	0.17	-	0.08	3.33	1.46	0.1	1	0.72
Nutrients	Ammonia as N	mg/L	0.01	0.12	1.03	0.02	8.41	-	7.9	5.81	4.5	4.63	4.85	5.1
	Ammonium as N	mg/L	0.01	0.06	0.55	<0.01	7.97	-	7.78	5.77	3.94	3.86	4.71	4.94
	Nitrate (as N)	mg/L	0.01	<0.01	0.04	0.01	<0.01	-	0.02	0.06	0.03	0.01	<0.01	<0.01
	Nitrite (as N)	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	0.02	<0.01
	Nitrite + Nitrate as N	mg/L	0.01	<0.01	0.04	0.01	<0.01	-	0.02	0.06	0.03	0.01	0.02	<0.01
	Kjeldahl Nitrogen Total	mg/L	0.1	10.7	6.6	108	8	-	9.8	6	6.4	5.1	7	5.4
	Reactive Phosphorus as P	mg/L	0.01	0.02	<0.01	0.04	0.13	-	0.07	0.06	0.54	0.11	0.21	0.4
	Nonpurgeable Organic Carbon[c]	mg/L	1	-	-	92	28	-	-	-	-	19	-	6
	Total Organic Carbon	mg/L	1	61	33	-	-	-	8	13	3	-	<1	-
Dissolved gas	Methane	mg/L	0.01	0.046	0.161	0.053	21.5	-	17.2	25.8	18.1	22.9	13.4	24
Dissolved metals	Aluminium	mg/L	0.01	0.12	0.07	0.05	0.01	-	<0.01	<0.01	0.02	0.02	<0.01	<0.1
	Antimony	mg/L	0.001	0.002	0.001	0.002	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01
	Arsenic	mg/L	0.001	0.007	0.006	0.005	0.004	-	0.002	0.004	0.008	0.005	0.003	<0.01
	Barium	mg/L	0.001	5.32	2.2	3.54	14.5	-	33.4	25.2	2.24	3.2	7.24	8.36
	Berryllium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01
	Cadmium	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001
	Chromium	mg/L	0.001	0.003	<0.001	<0.001	0.002	-	0.003	0.002	<0.001	<0.001	0.004	<0.01
	Cobalt	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01
	Copper	mg/L	0.001	0.008	0.004	0.015	<0.001	-	<0.001	0.003	0.003	<0.001	<0.001	<0.01
	Iron	mg/L	0.05	0.26	0.06	0.1	0.57	-	21.8	32.6	0.11	0.49	0.09	0.2
	Lead	mg/L	0.001	0.002	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01
	Vanadium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1
	Zinc	mg/L	0.005	0.007	<0.005	0.005	0.082	-	0.015	0.017	<0.005	<0.005	<0.005	<0.05
	Manganese	mg/L	0.001	0.01	0.005	0.004	0.013	-	0.236	0.34	0.003	0.006	0.012	0.014
	Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Molybdenum	mg/L	0.001	0.013	0.01	0.023	0.033	-	0.024	0.021	0.013	0.014	0.01	<0.01
	Nickel	mg/L	0.001	0.004	0.003	0.005	0.003	-	0.002	0.002	0.002	0.002	0.002	<0.01
	Selenium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1
	Strontium	mg/L	0.001	3.64	2.82	4.26	8.64	-	25	19	1.78	2.71	6.02	6.64
	Tin	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01
	Uranium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01
Oil and Grease	Oil and Grease	mg/L	5	7	<5	7	<5	-	7	10	<5	9	<5	7
Phenols	2,4,5-trichlorophenol	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	2.4.6-Trichlorophenol	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	2,4-dichlorophenol	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	2,4-dimethylphenol	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	2,6-dichlorophenol	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	2-chlorophenol	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	2-methylphenol	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	3.2	<1	<1
	2-nitrophenol	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	3-&4-methylphenol	µg/L	2	<2	<2	<2	<2	-	<2	<2	<2	6.8	<2	<2
	4-chloro-3-methylphenol	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	Pentachlorophenol	µg/L	2	<2	<2	<2	<2	-	<2	<2	<2	<2	<2	<2
	Phenol	µg/L	1	<1	<1	<1	1.5	-	<1	<1	<1	<1	<1	<1
PAH	Acenaphthene	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	Acenaphthylene	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	Anthracene	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	Benz(a)anthracene	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	Benzo(a) pyrene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Benzo(b&j)fluoranthene	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	Benzo(g,h,i)perylene	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	Benzo(k)fluoranthene	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	Benzo(a)pyrene TEQ (zero)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Chrysene	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	Dibenz(a,h)anthracene	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	Fluoranthene	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	Fluorene	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	Indeno(1,2,3-c,d)pyrene	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	Phenanthrene	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	Pyrene	µg/L	1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1
	Polycylic aromatic hydrocarbons EPA448	ug/L	0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TRH	TPH C6-C10	µg/L	20	<20	<20	<20	130	-	<20	<20	120	120	60	80
	C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	70	-	<20	<20	50	60	20	30
	C10 - C16 Fraction	µg/L	100	<100	<100	<100	150	-	<100	<100	<100	<100	<100	<100
	C16 - C34 Fraction	µg/L	100	<100	<100	800	100	-	<100	200	<100	<100	<100	<100
	C34 - C40 Fraction	µg/L	100	<100	<100	280	<100	-	<100	<100	<100	<100	<100	<100
	C10 - C40 Fraction (Sum)	µg/L	100	<100	<100	1080	250	-	<100	200	<100	<100	<100	<100
	TRH >C10-C16 less Naphthalene (F2)	µg/L	100	<100	<100	<100	150	-	<100	<100	<100	<100	<100	<100
TPH	C6 - C9 Fraction	µg/L	20	<20	<20	<20	120	-	<20	<20	120	110	60	80
	C10 - C14 Fraction	µg/L	50	<50	<50	<50	150	-	<50	<50	<50	60	<50	<50
	C15 - C28 Fraction	µg/L	100	<100	<100	460	<100	-	<100	140	<100	<100	<100	<100
	C29-C36 Fraction	µg/L	50	<50	<50	550	<50	-	<50	80	<50	<50	<50	<50
	+C10 - C36 (Sum of total)	µg/L	50	<50	<50	1010	150	-	<50	220	<50	60	<50	<50
BTEX	Benzene	µg/L	1	<1	<1	<1	28	2	2	<1	42	30	21	25
	Toluene	µg/L	2	<2	<2	<2	27	3	<2	<2	32	26	18	20
	Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	Xylene (m & p)	µg/L	2	<2	<2	<2	7	<2	<2	<2	5	5	3	3
	Xylene (o)	µg/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	Xylene Total	µg/L	2	<2	<2	<2	7	<2	<2	<2	5	5	3	3
	Total BTEX	µg/L	1	<1	<1	<1	62	5	2	<1	79	61	42	48
	Naphthalene	µg/L	1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1
Microbiology suite	Unionized Hydrogen Sulfide	µg/L	100	<100	<100	<100	<100	-	<100	<100	<100	<100	<100	<100
	Iron Related Bacteria	cfu/mL	25	570,000	-	-	-	-	-	-	-	-	-	-
	Sulphate Reducing Bacteria	cfu/mL	200	500,000	-	-	-	-	-	-	-	-	-	-

Notes:
- not analysed
a - All data is from ALS
b - Laboratory readings of pH (lab) is outside of the holding time, therefore field measurements of pH should be relied upon for accuracy.
c - NPOC analysis was carried out instead of TOC due to high inorganic carbon content

Appendix E

Pilot well analyte time-series hydrographs

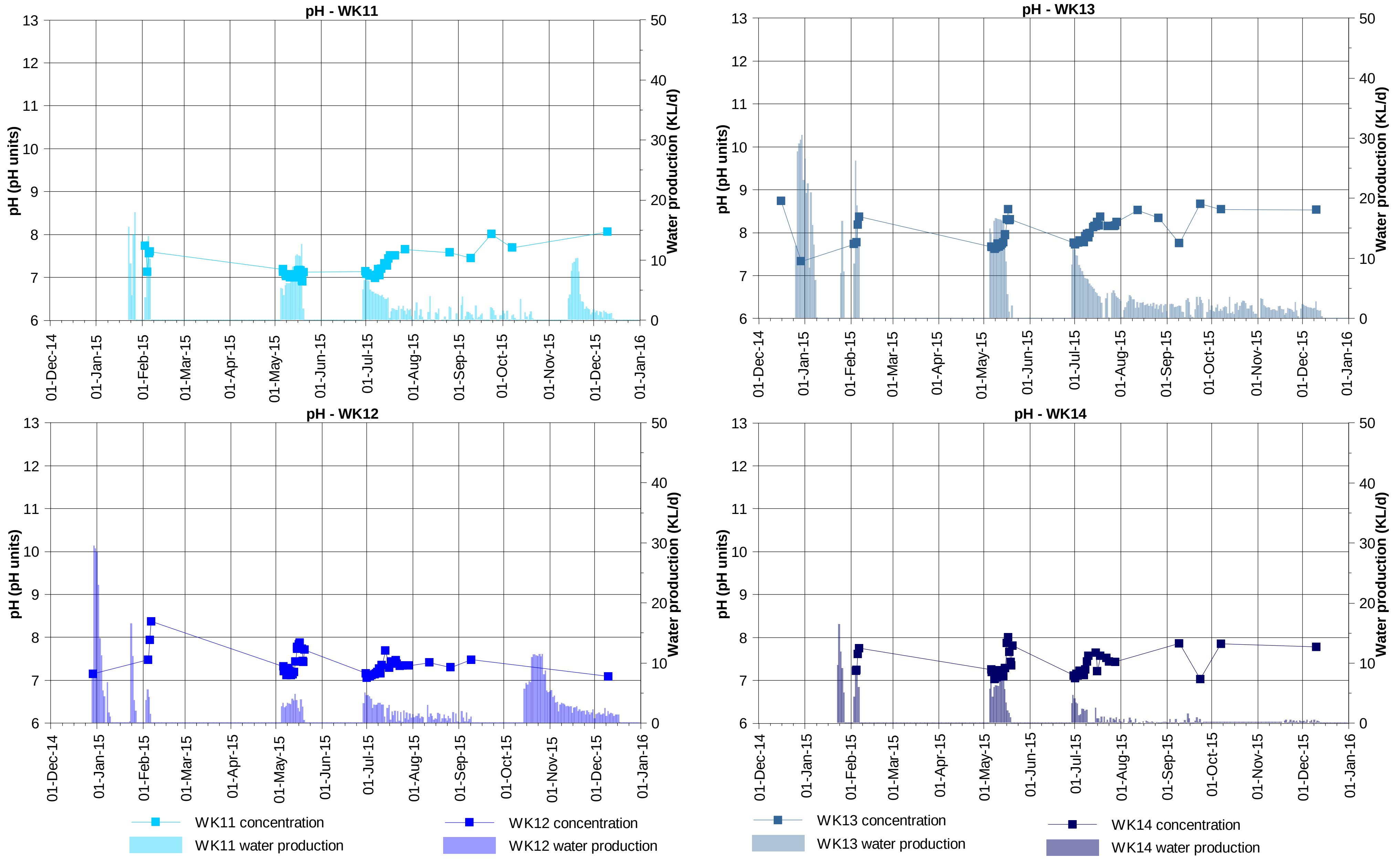

Figure E1.1: Field pH measurements at the Waukivory pilot wells

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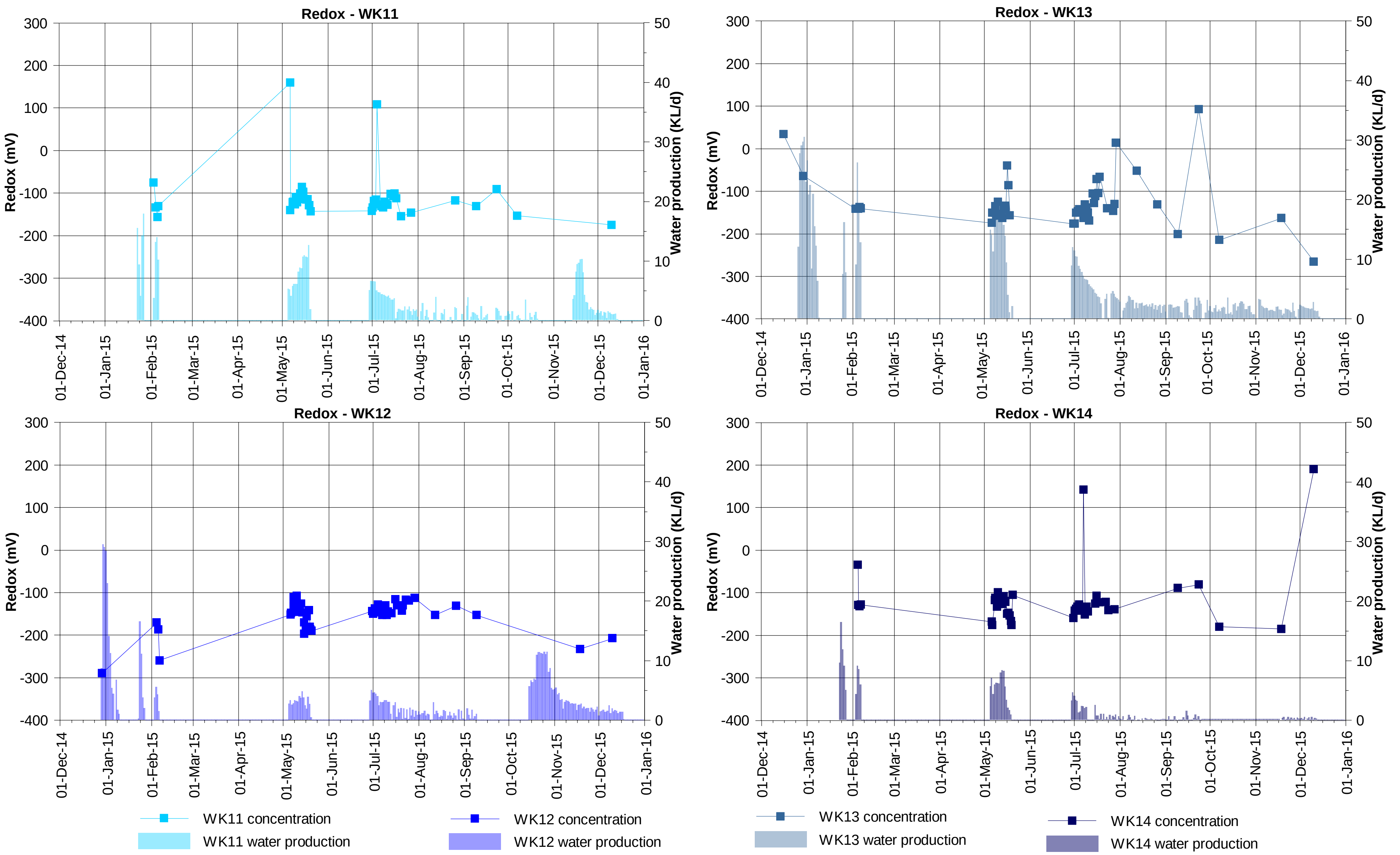

Figure E1.2: Field redox measurements at the Waukivory pilot wells

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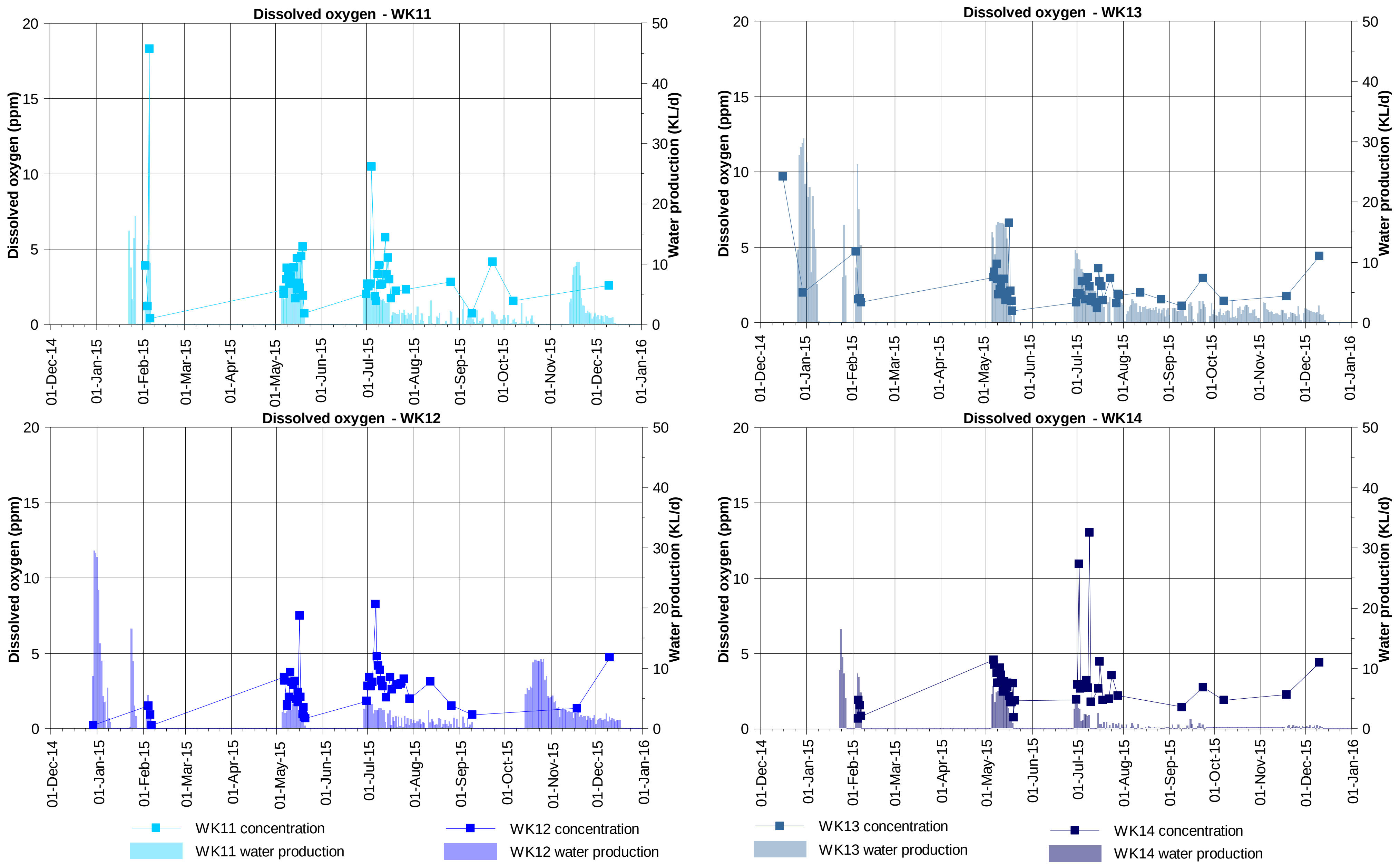

Figure E1.3: Field dissolved oxygen measurements at the Waukivory pilot wells

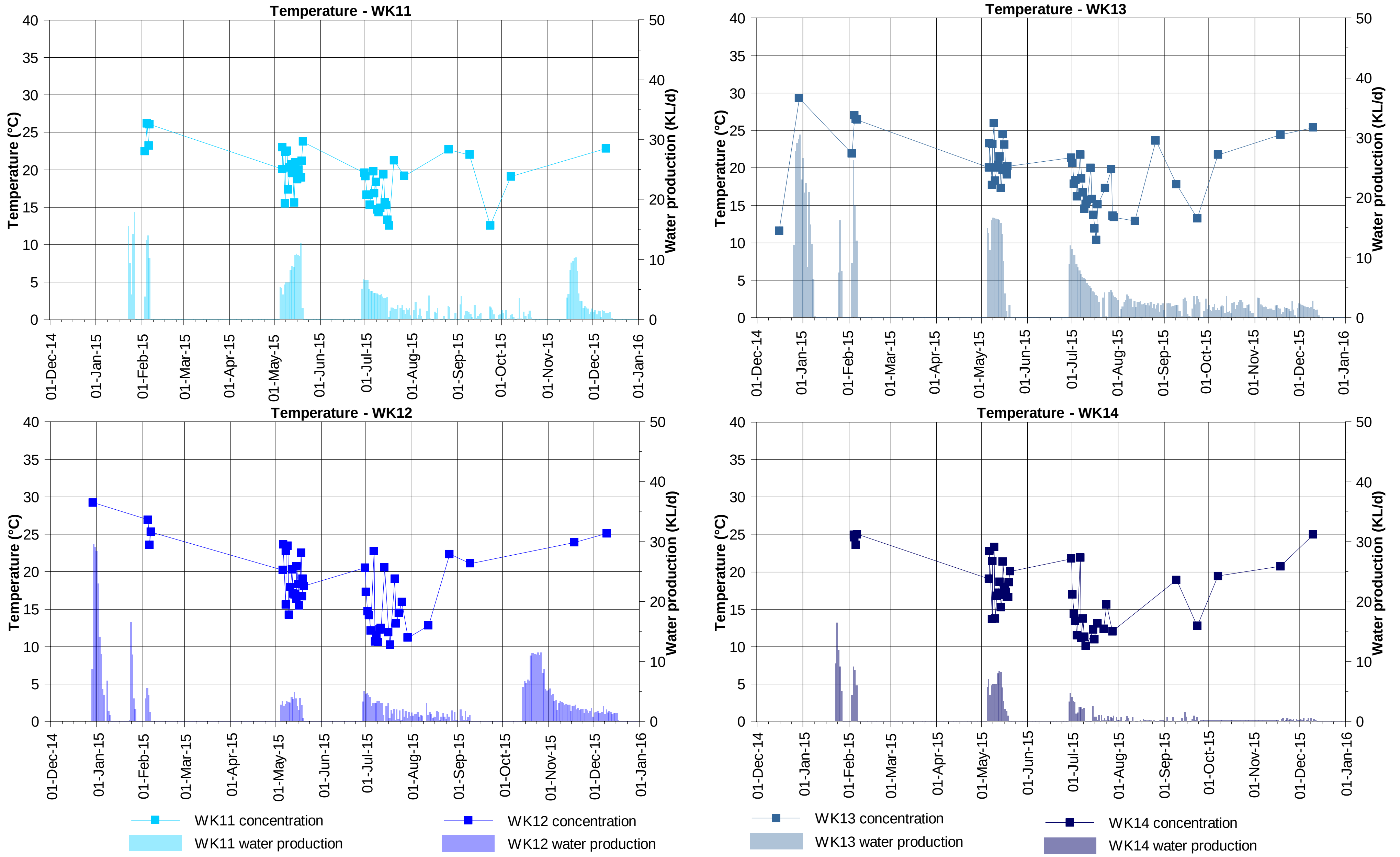

Figure E1.4: Field temperature measurements at the Waukivory pilot wells

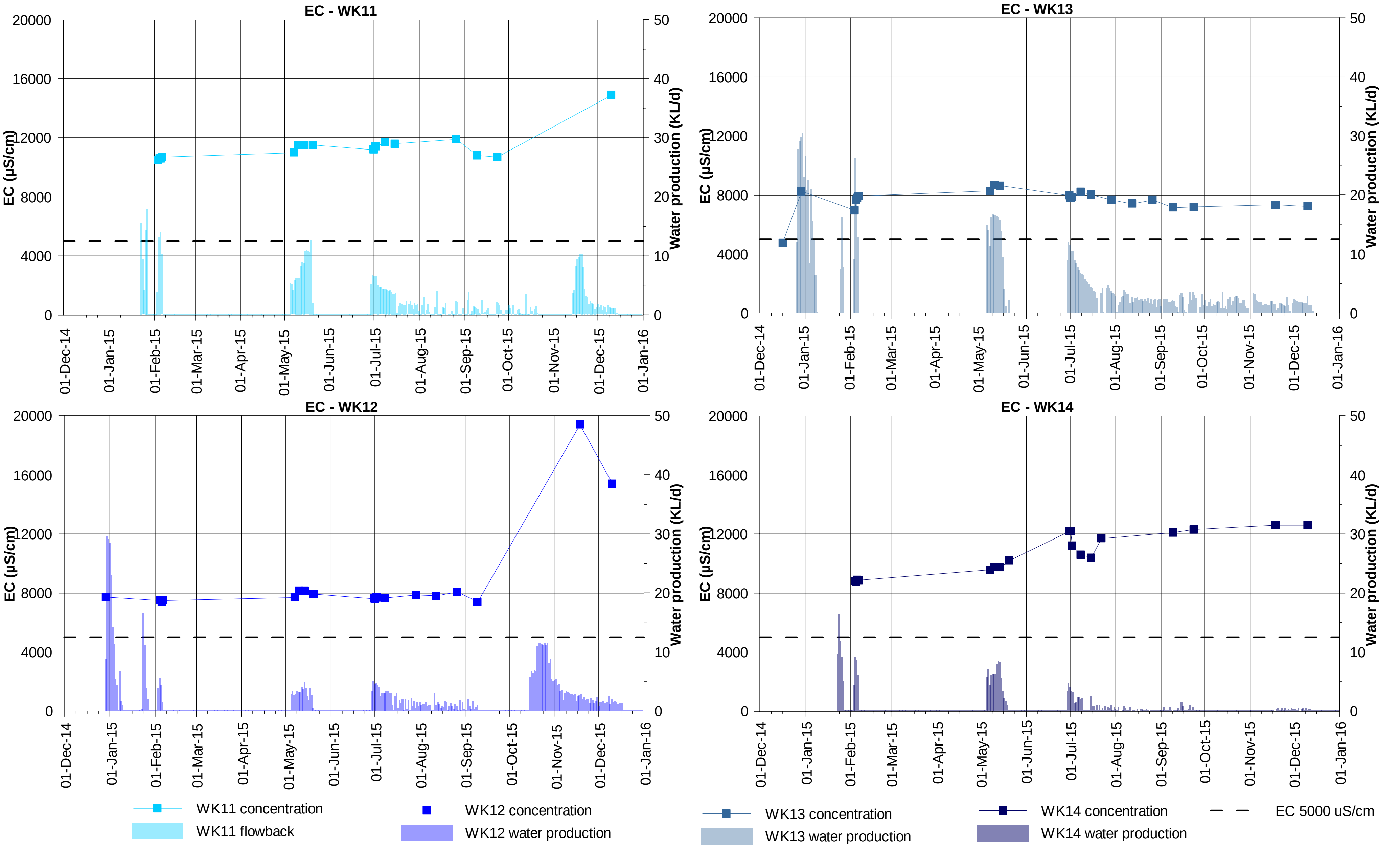

Figure E1.5: Laboratory electrical conductivity (EC) measurements at the Waukivory pilot wells

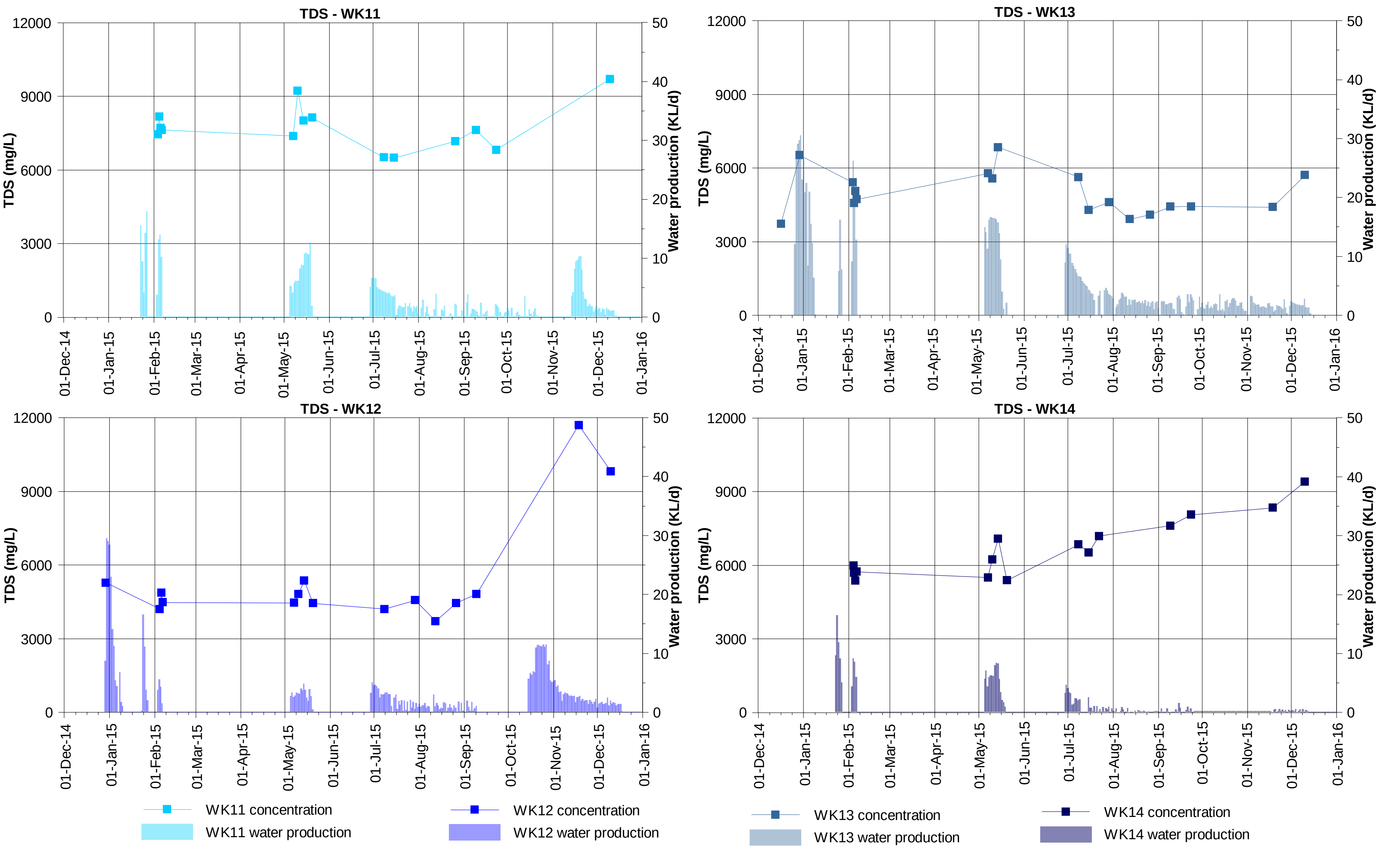

Figure E1.6: Laboratory total dissolved solids (TDS) measurements at the Waukivory pilot wells

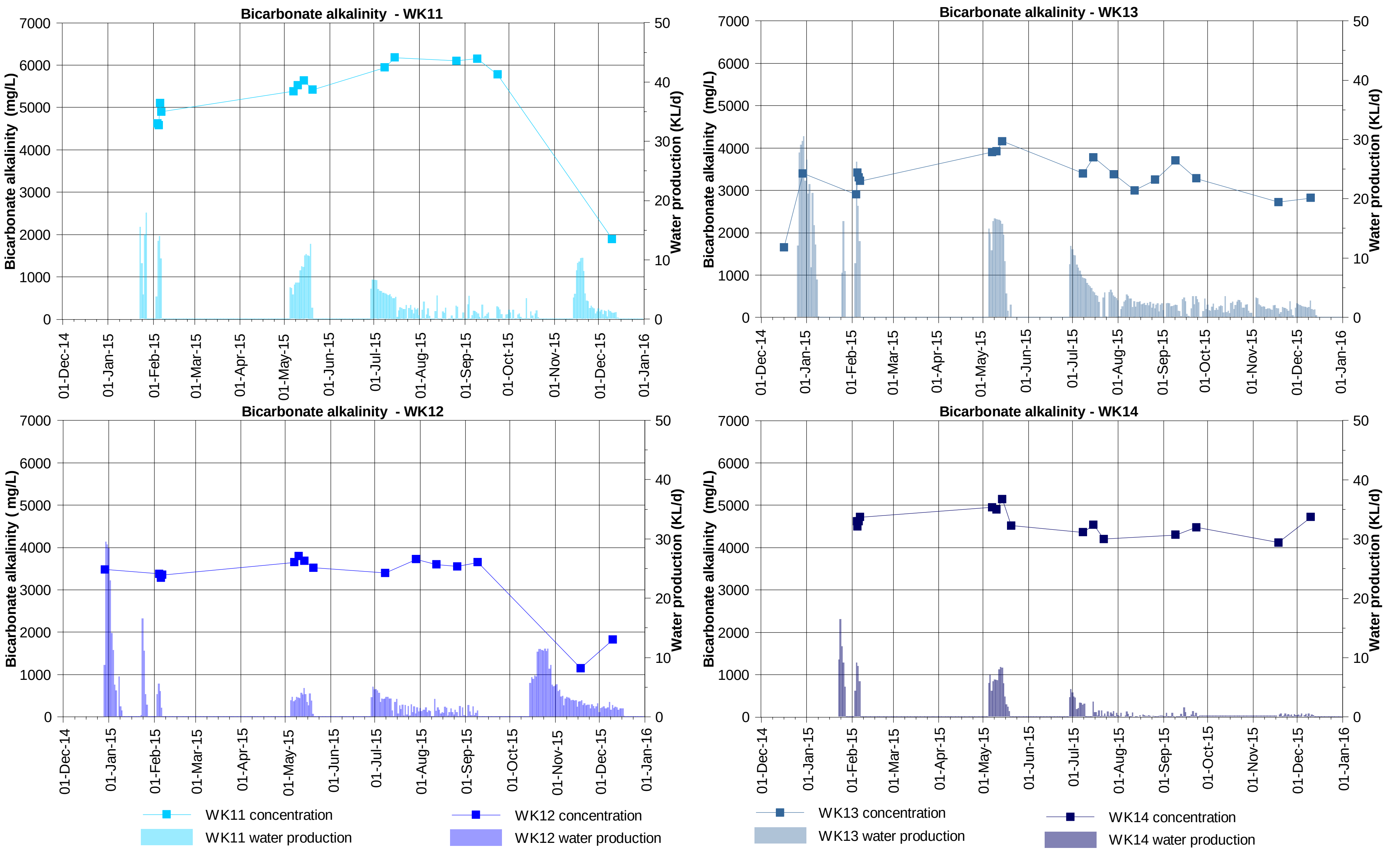

Figure E2.1: Bicarbonate alkalinity concentrations at the Waukivory pilot wells

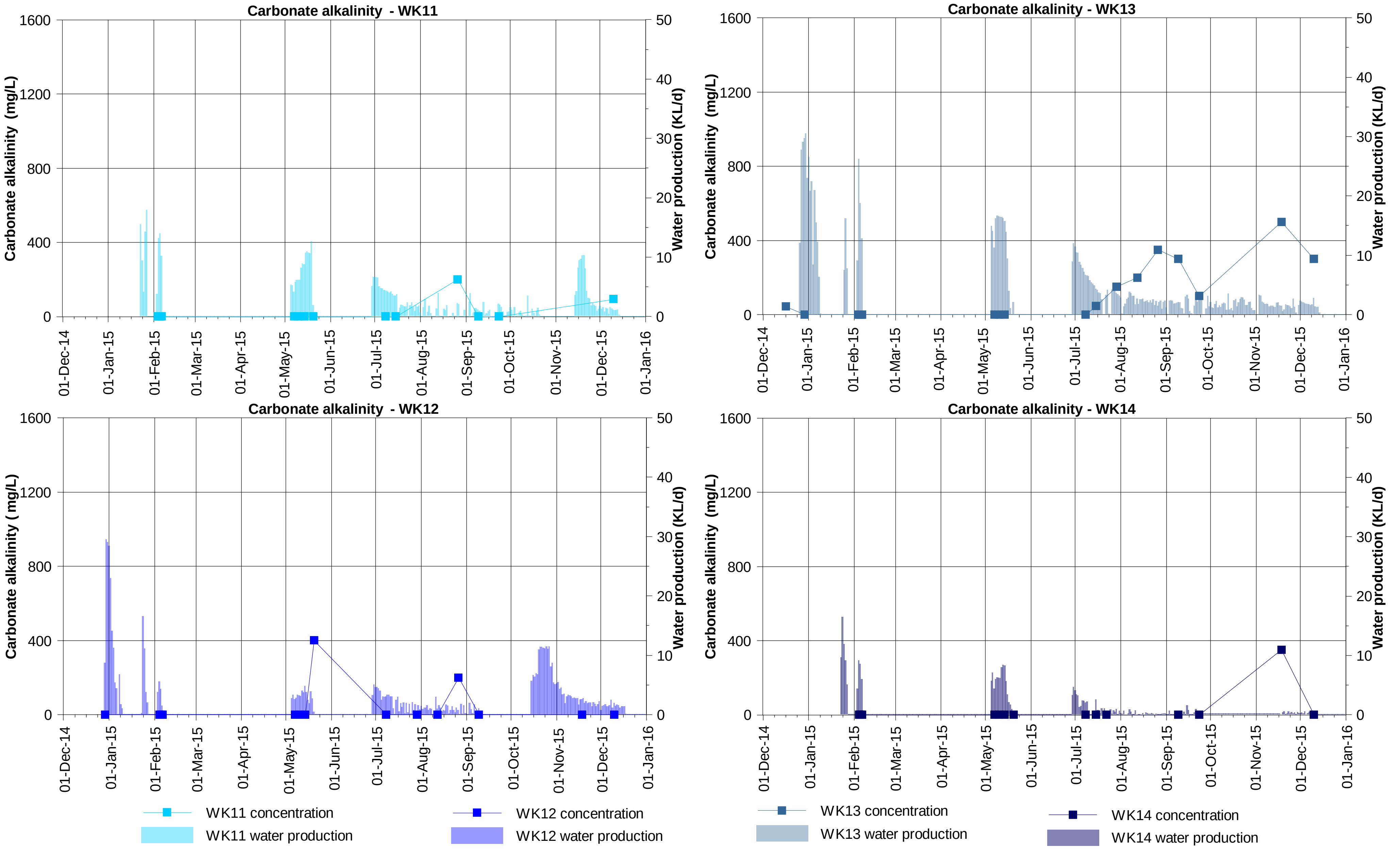

Figure E2.2: Carbonate alkalinity concentrations at the Waukivory pilot wells

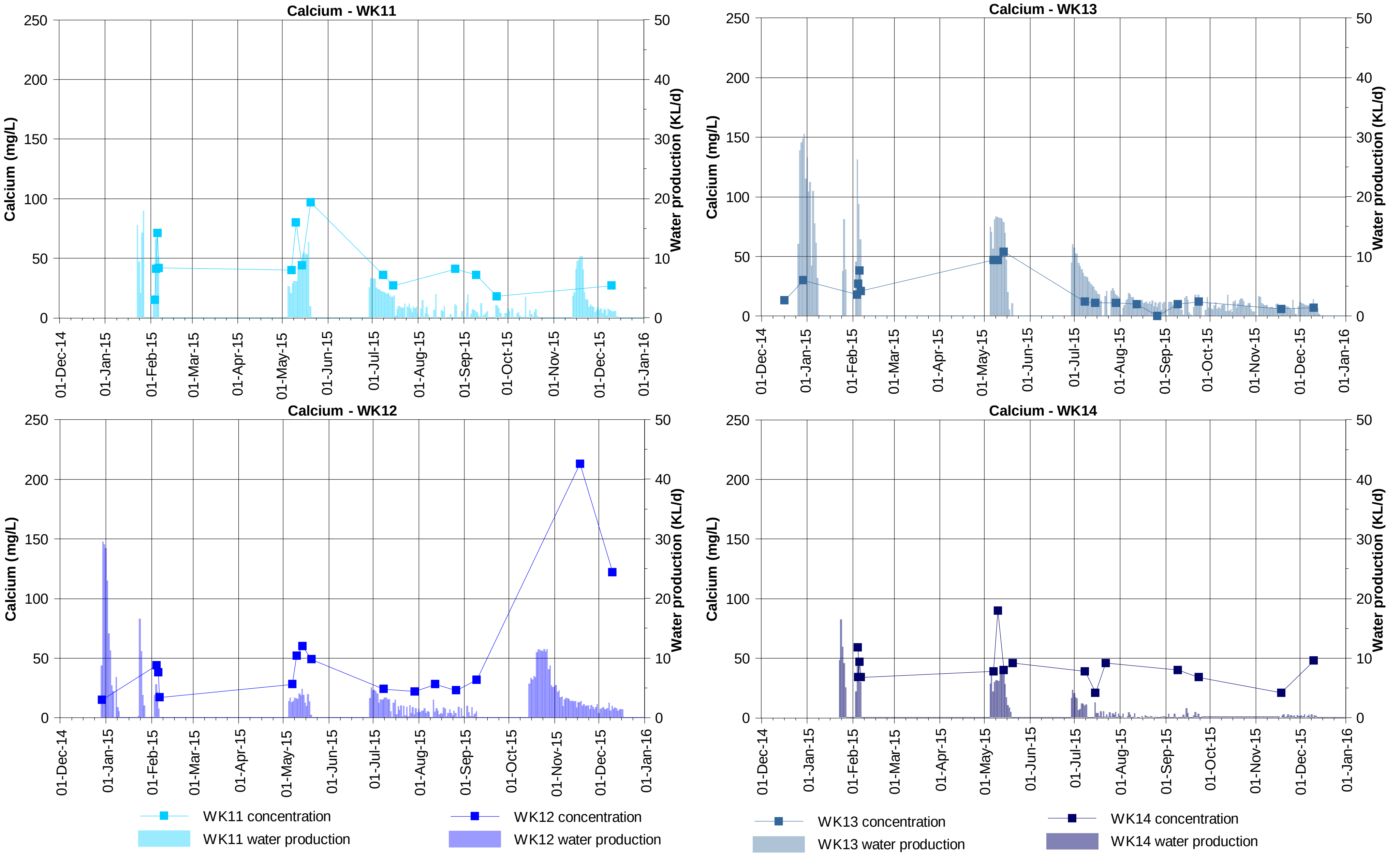

Figure E2.3: Calcium concentrations at the Waukivory pilot wells

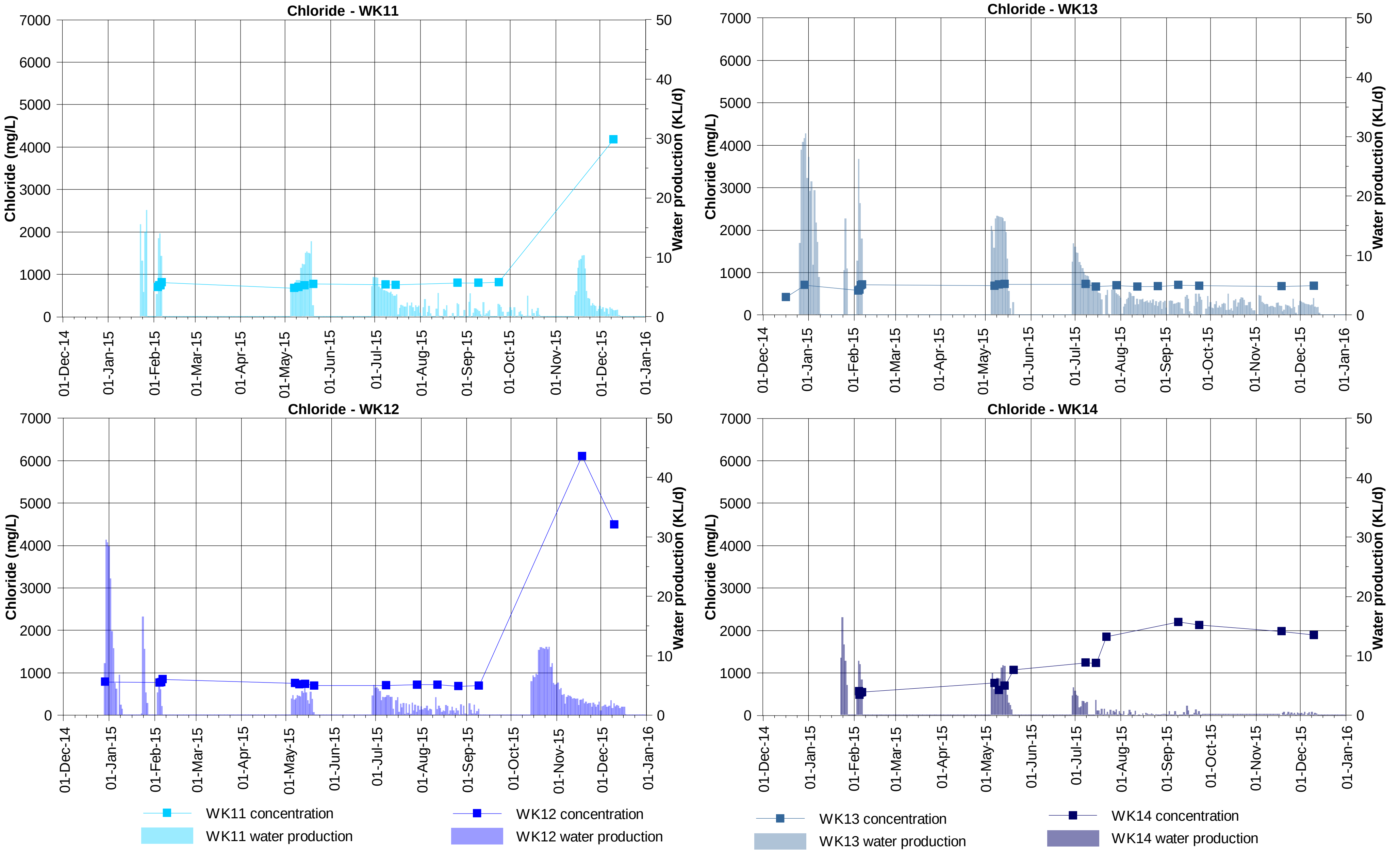

Figure E2.4: Chloride concentrations at the Waukivory pilot wells

Chloride method analysis ED0045

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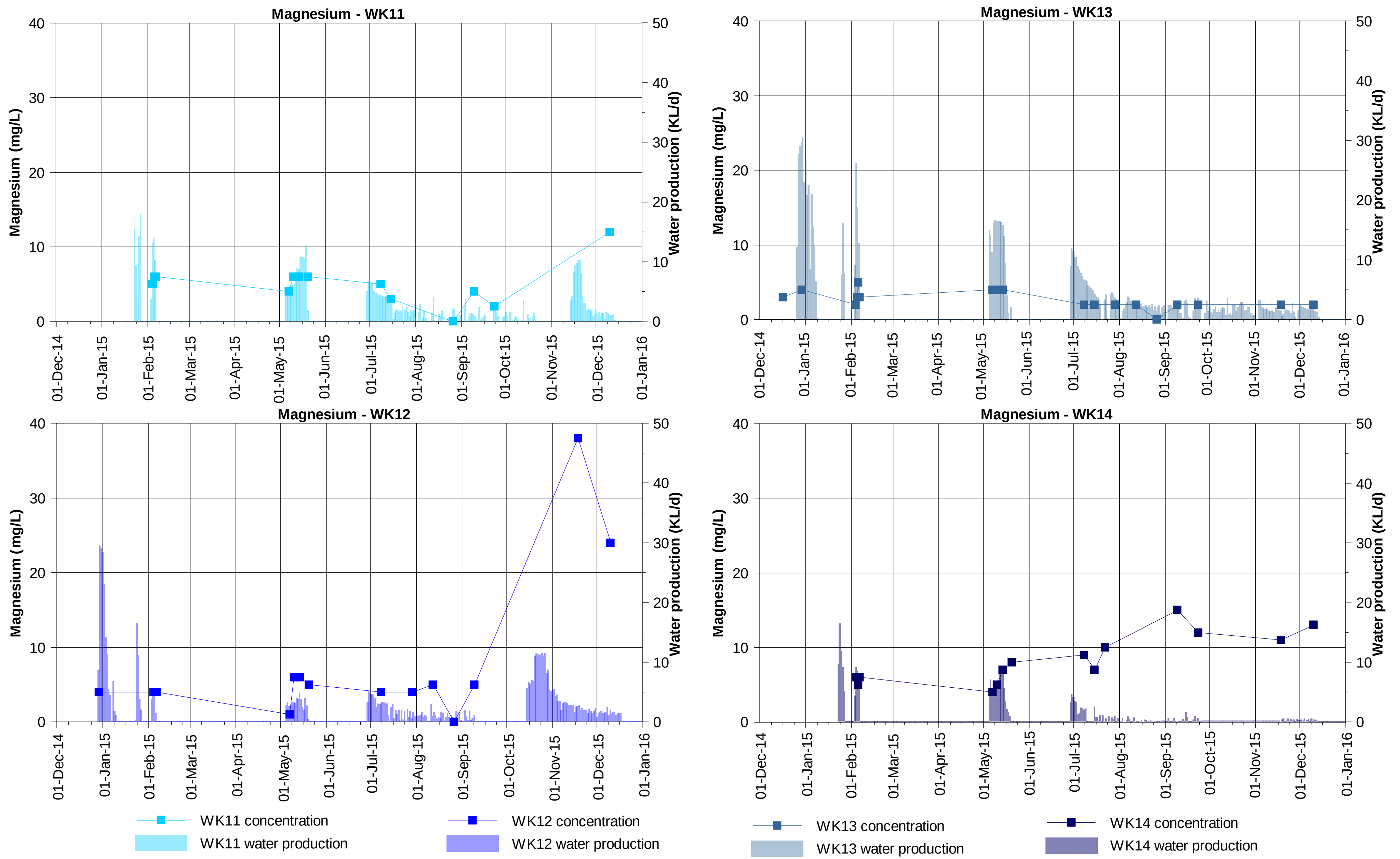

Figure E2.5: Magnesium concentrations at the Waukivory pilot wells

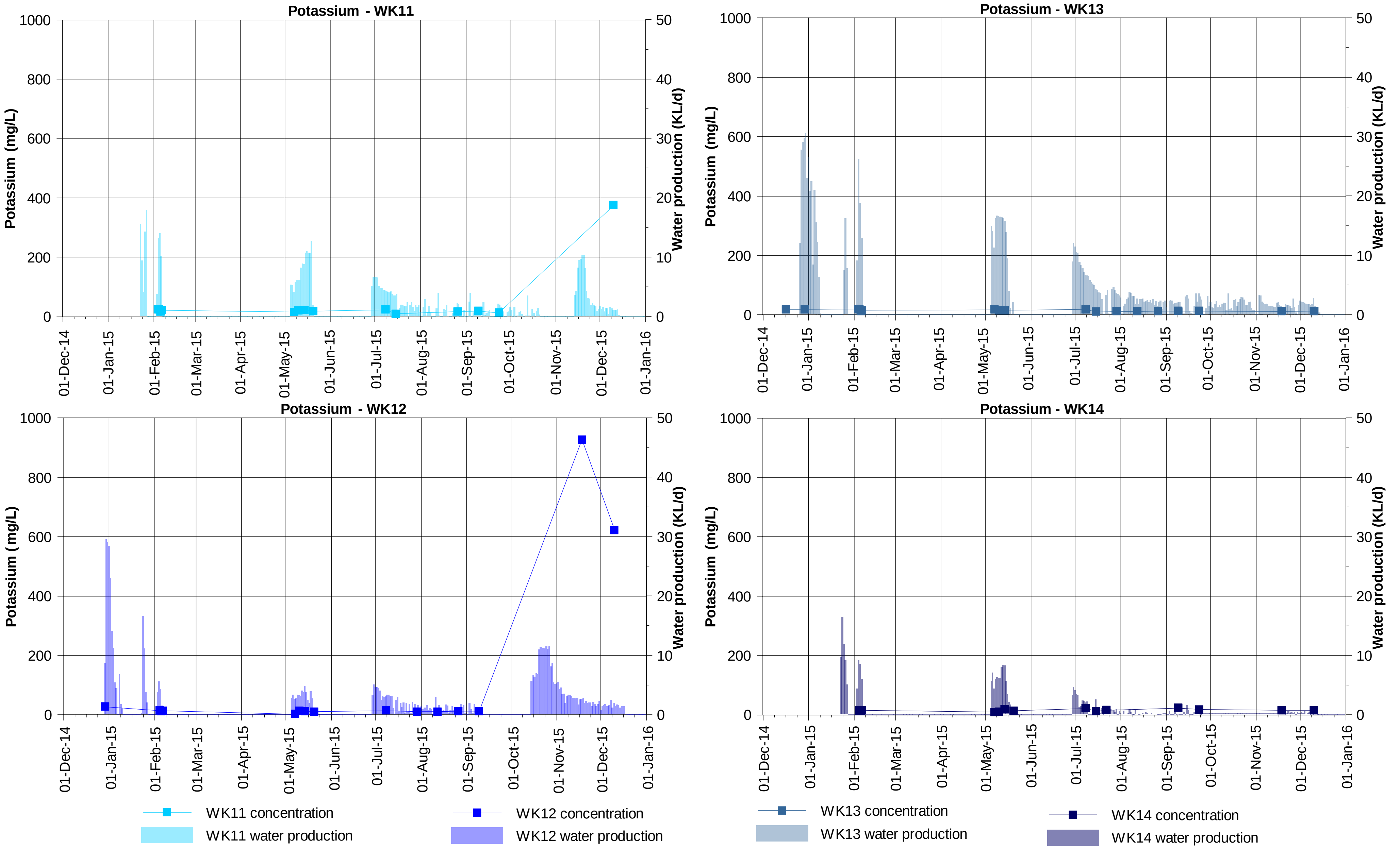

Figure E2.6: Potassium concentrations at the Waukivory pilot wells

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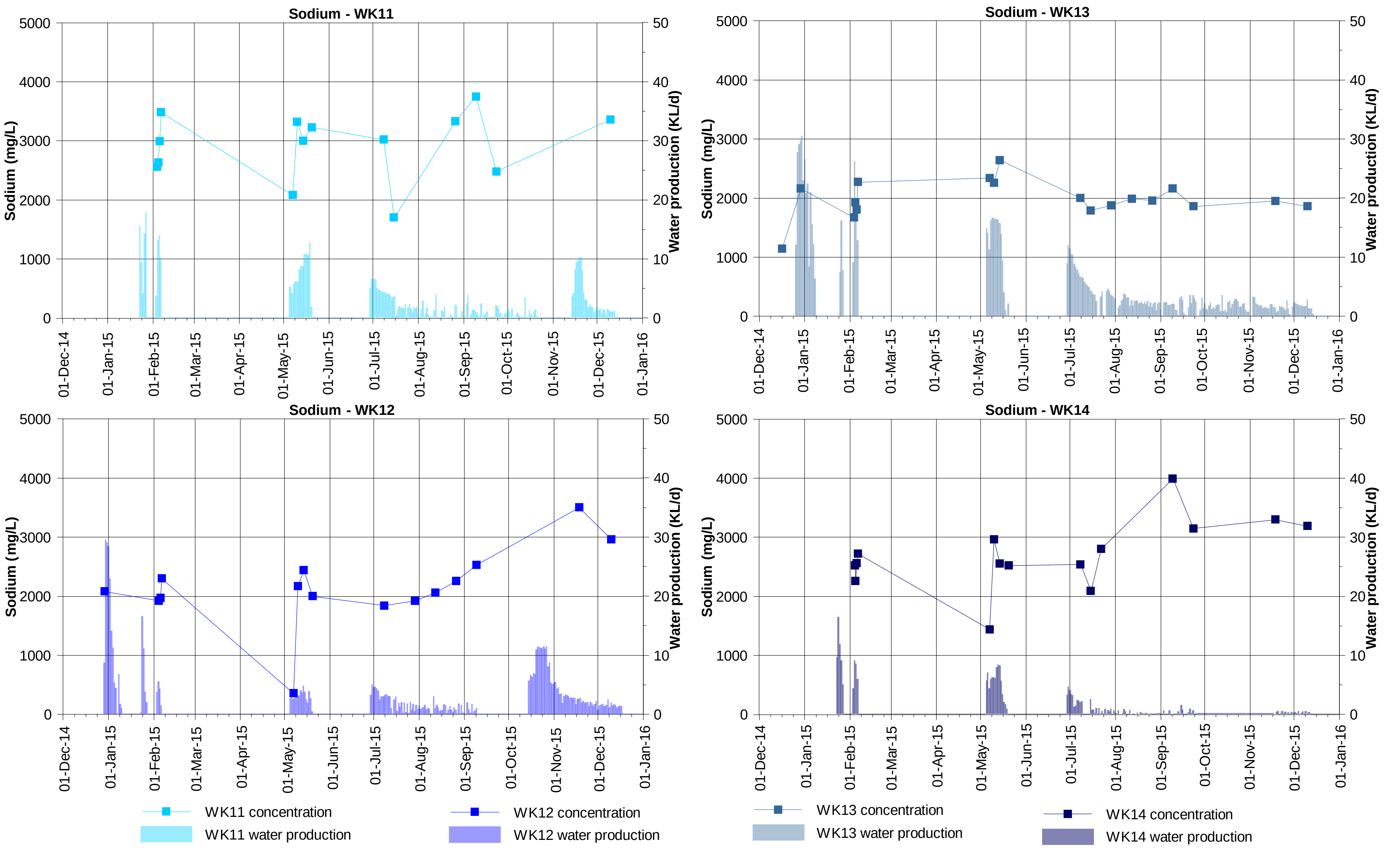

Figure E2.7: Sodium concentrations at the Waukivory pilot wells

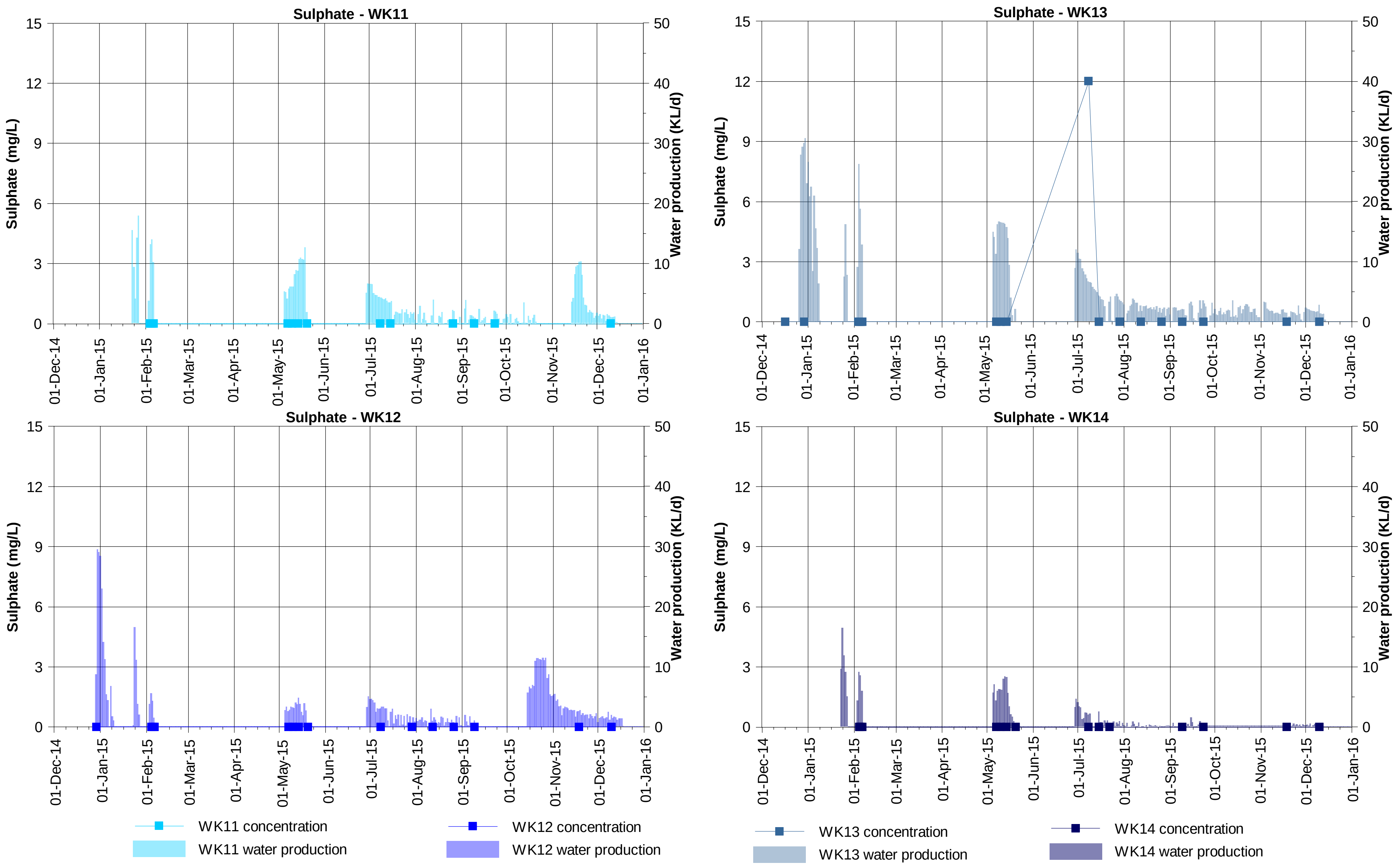

Figure E2.8: Sulphate concentrations at the Waukivory pilot wells

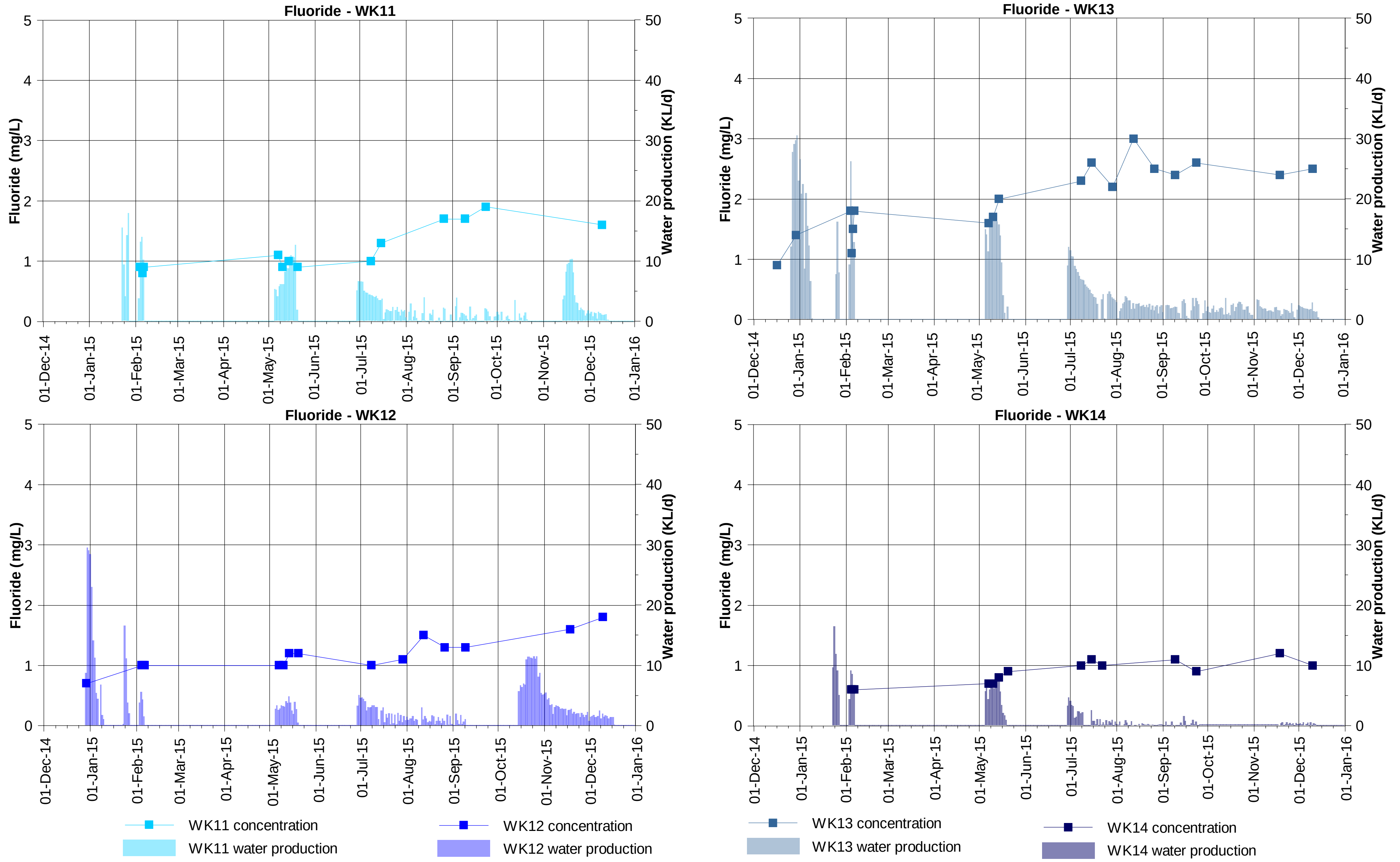

Figure E2.9: Fluoride concentrations at the Waukivory pilot wells

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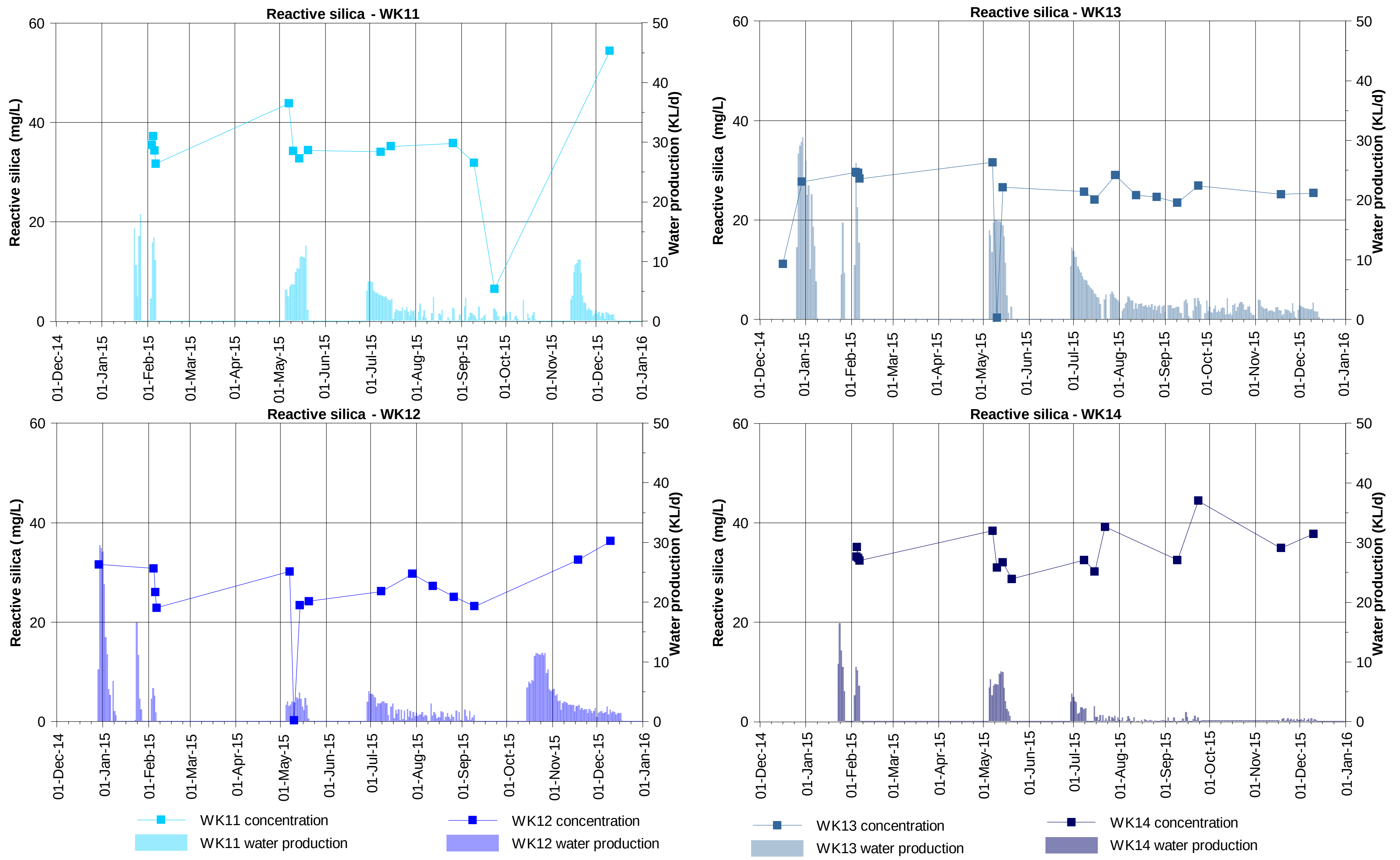

Figure E2.10: Reactive silica concentrations at the Waukivory pilot wells

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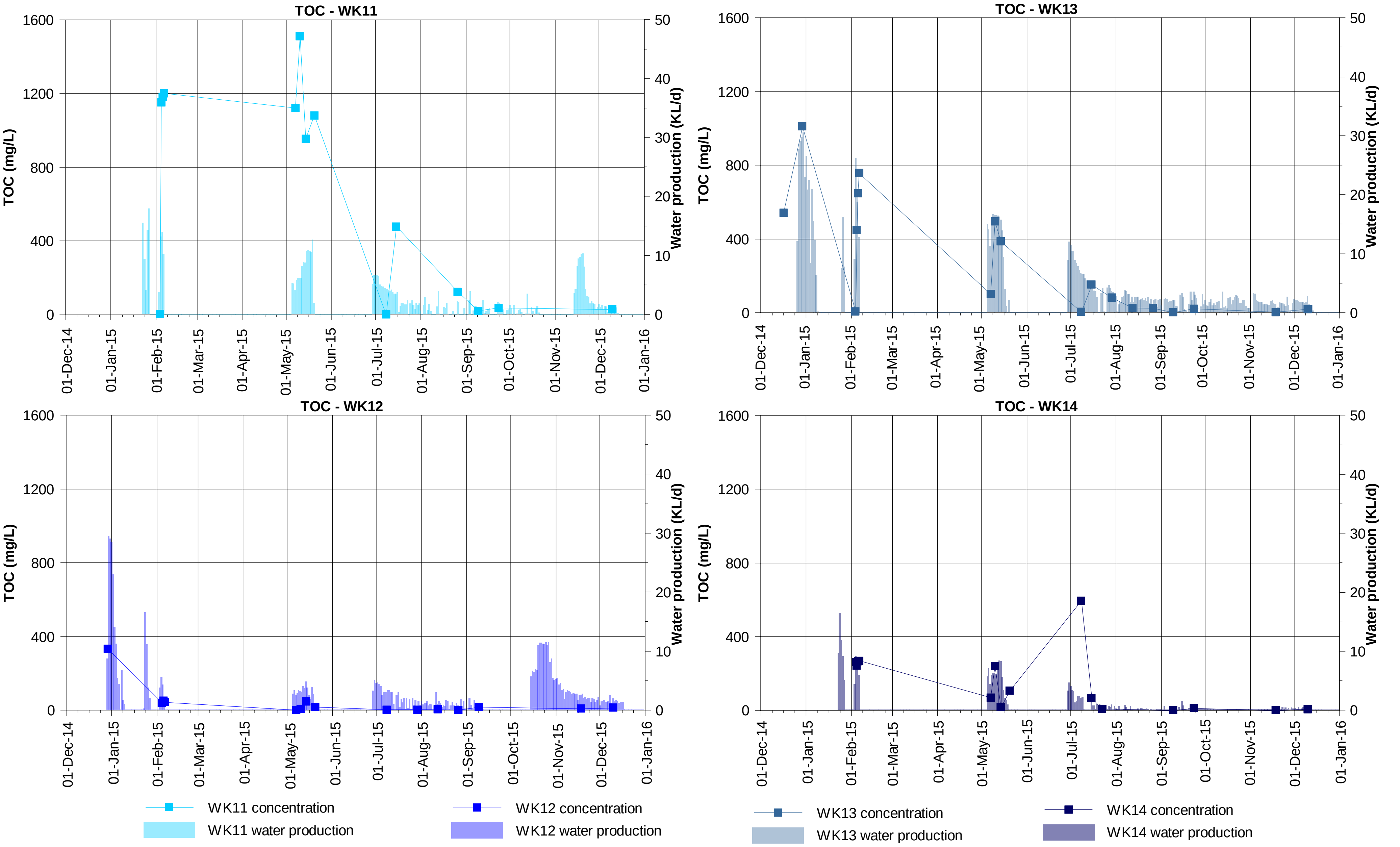

Figure E2.11: Total organic carbon (TOC) concentrations at the Waukivory pilot wells

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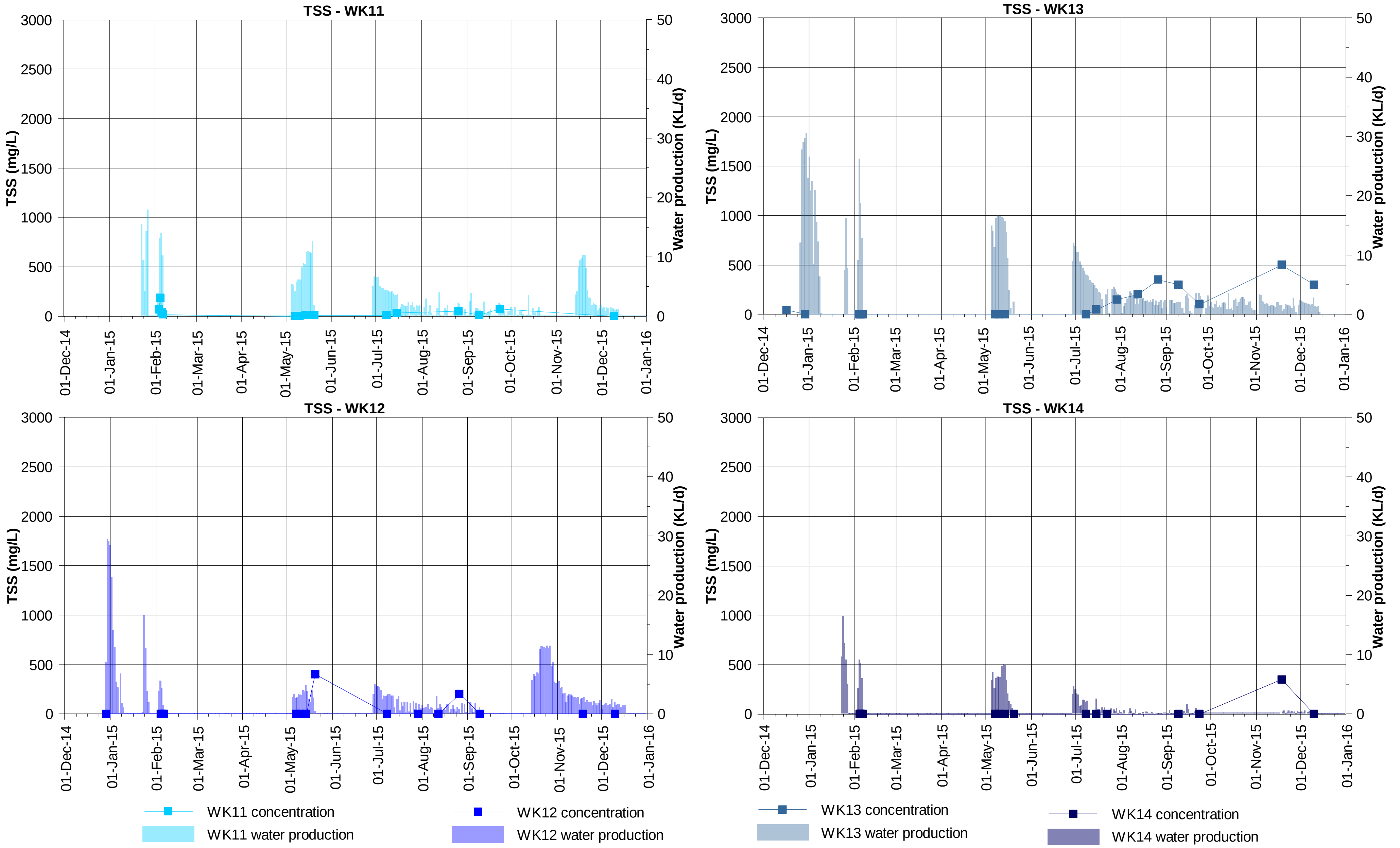

Figure E2.12: Total Suspended Solids at the Waukivory pilot wells

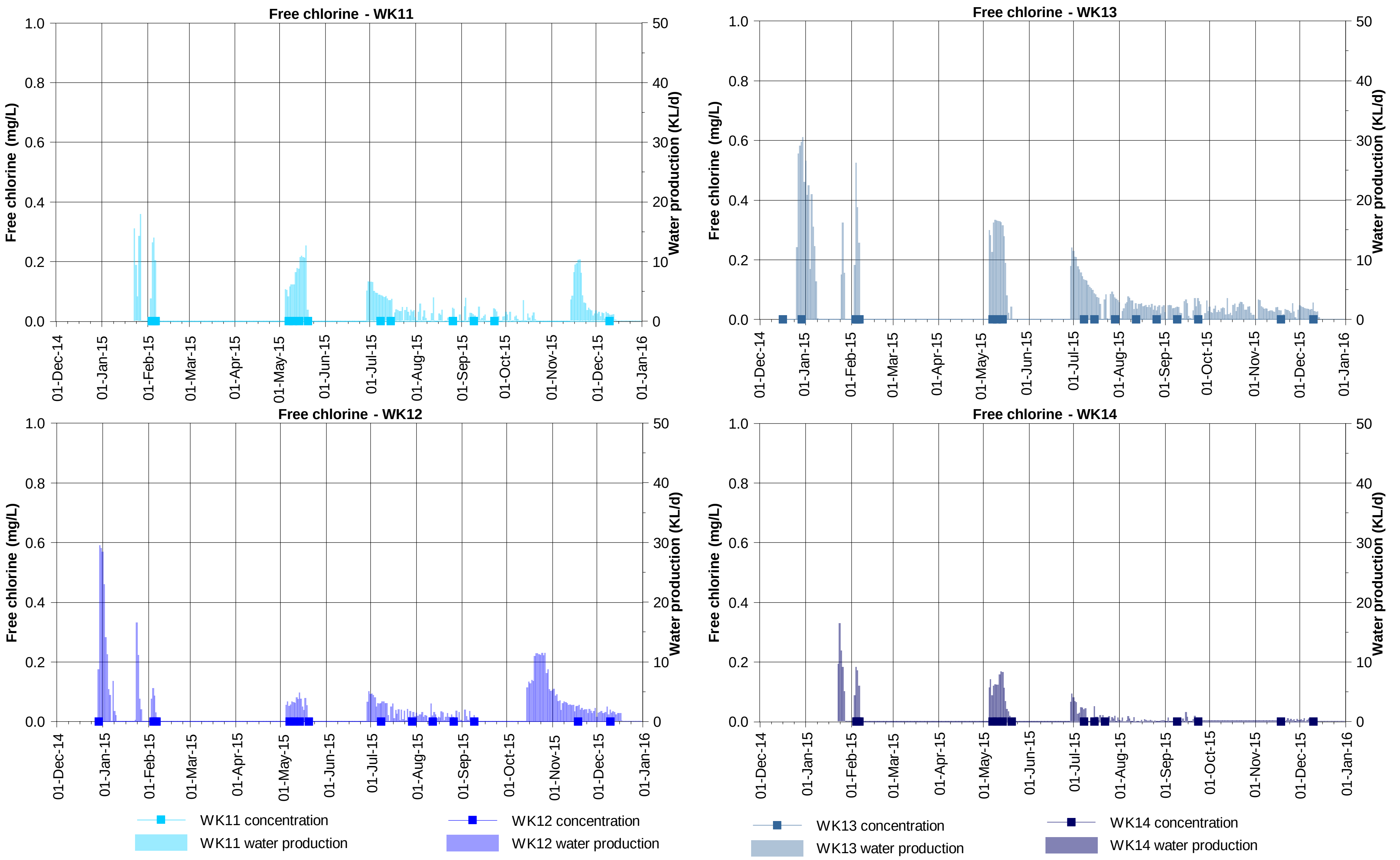

Figure E2.13: Laboratory measurements of free chlorine at the Waukivory pilot wells

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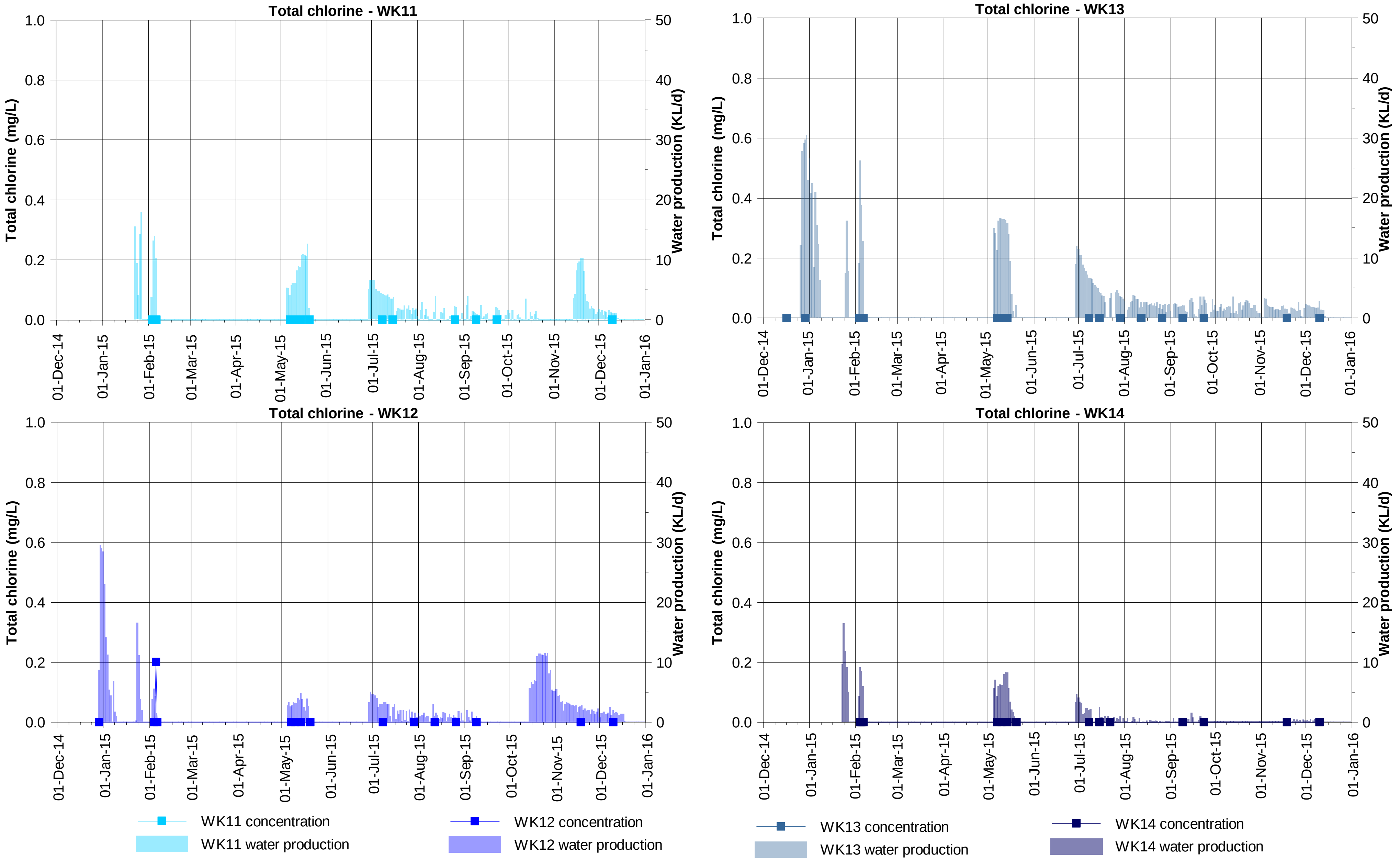

Figure E2.14: Laboratory measurements of total chlorine at the Waukivory pilot wells

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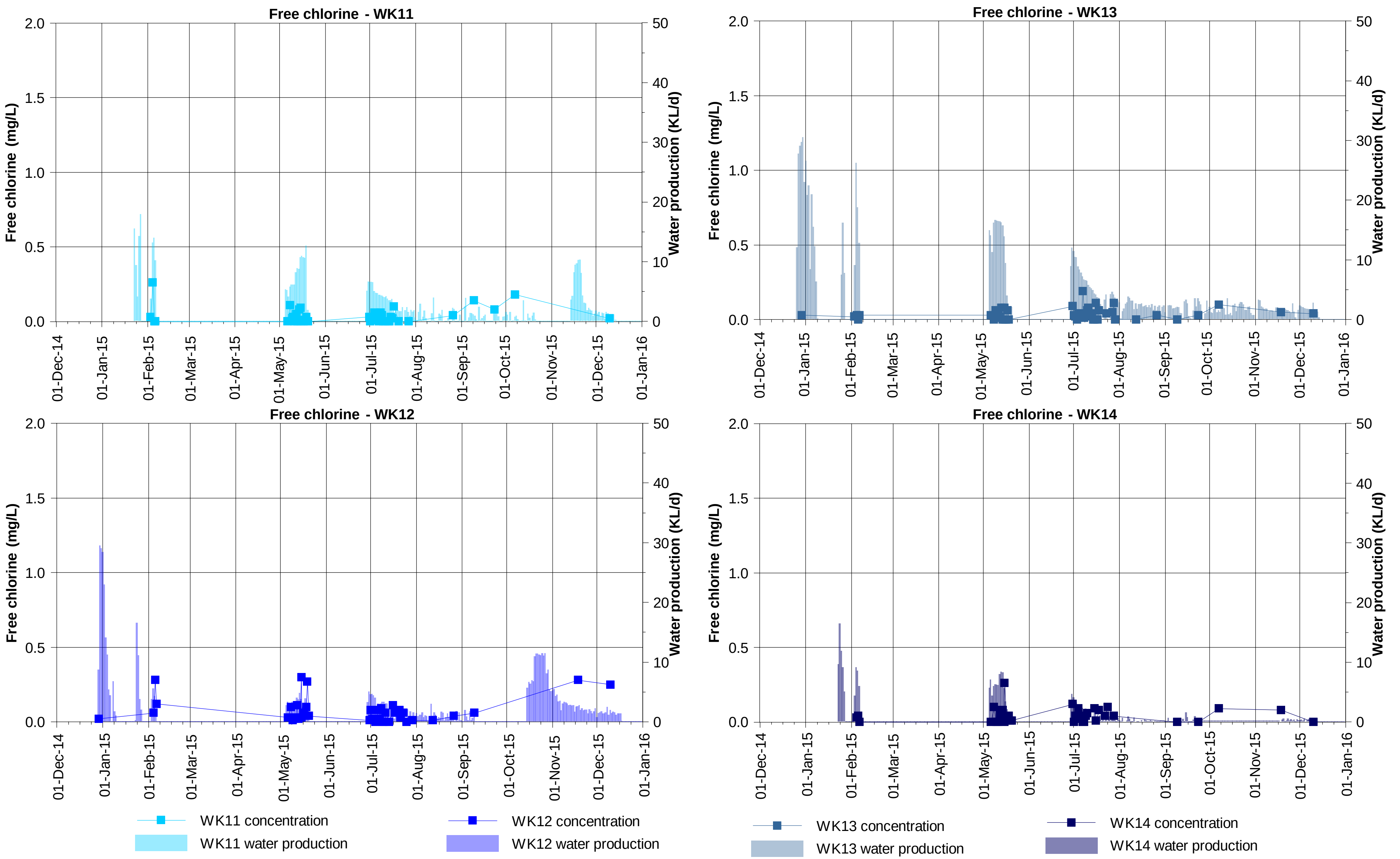

Figure E2.15: Field measurements of free chlorine at the Waukivory pilot wells

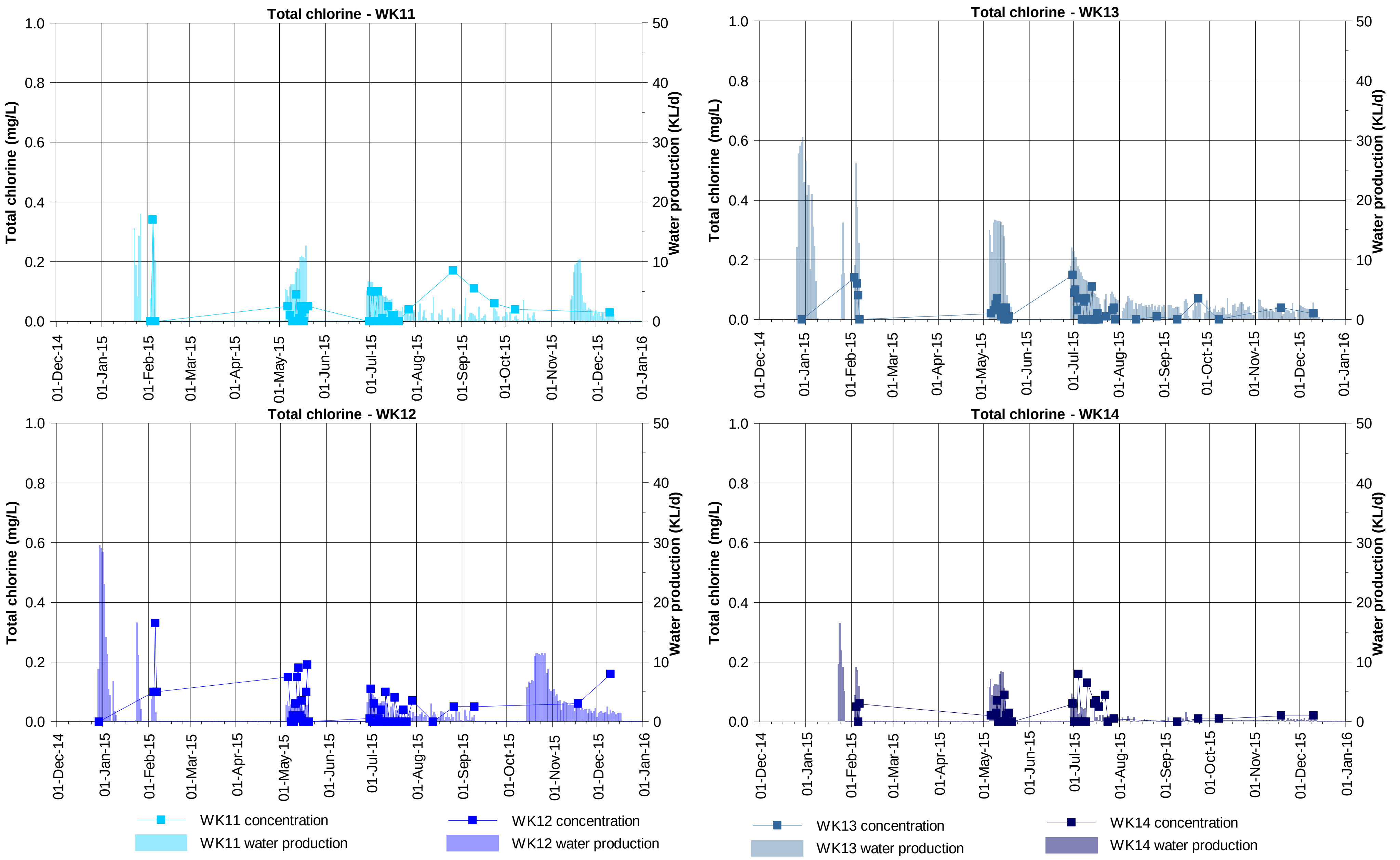

Figure E2.16: Field measurements of total chlorine at the Waukivory pilot wells

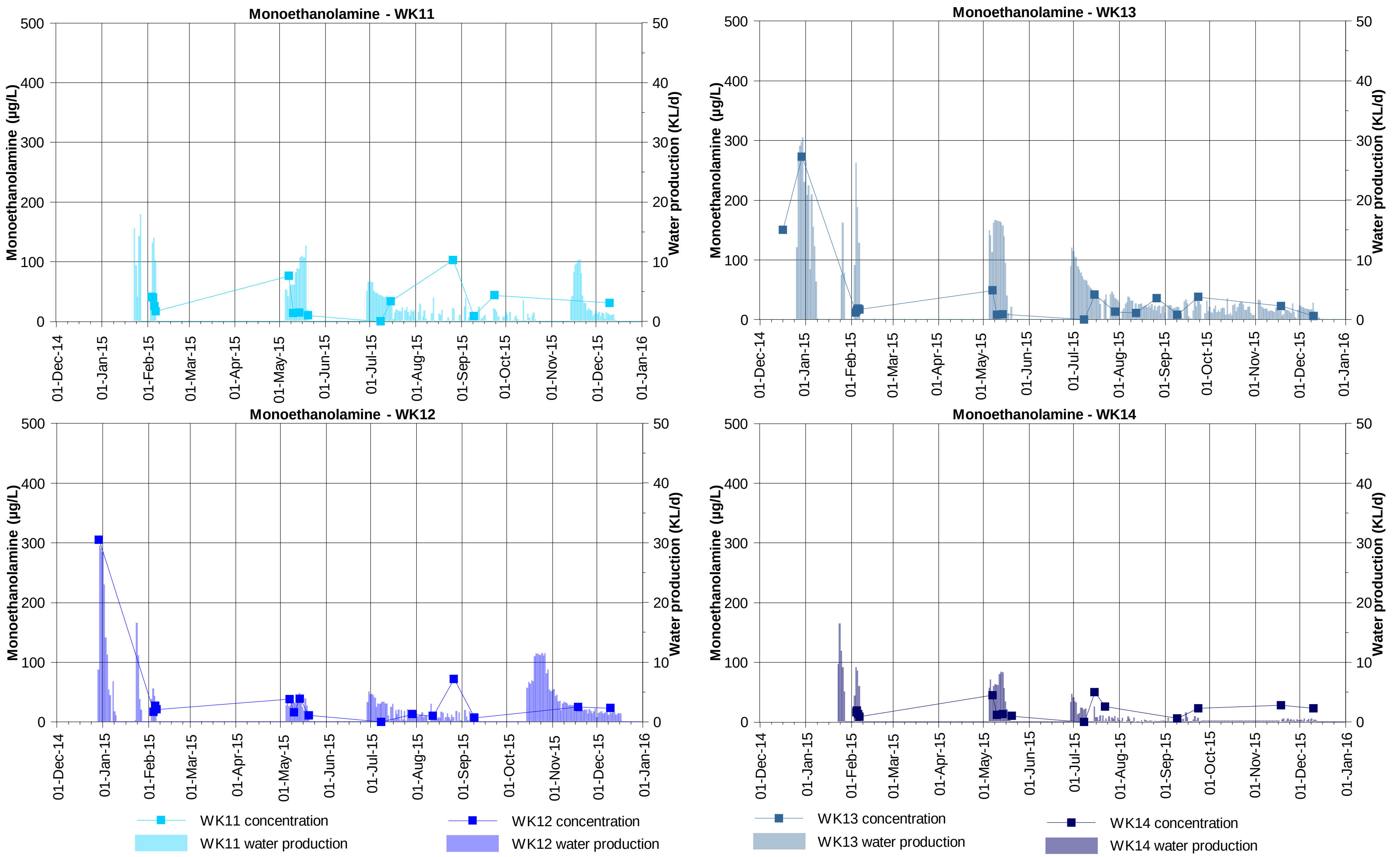

Figure E2.17: Monoethanolamoine concentrations at the Waukivory pilot wells

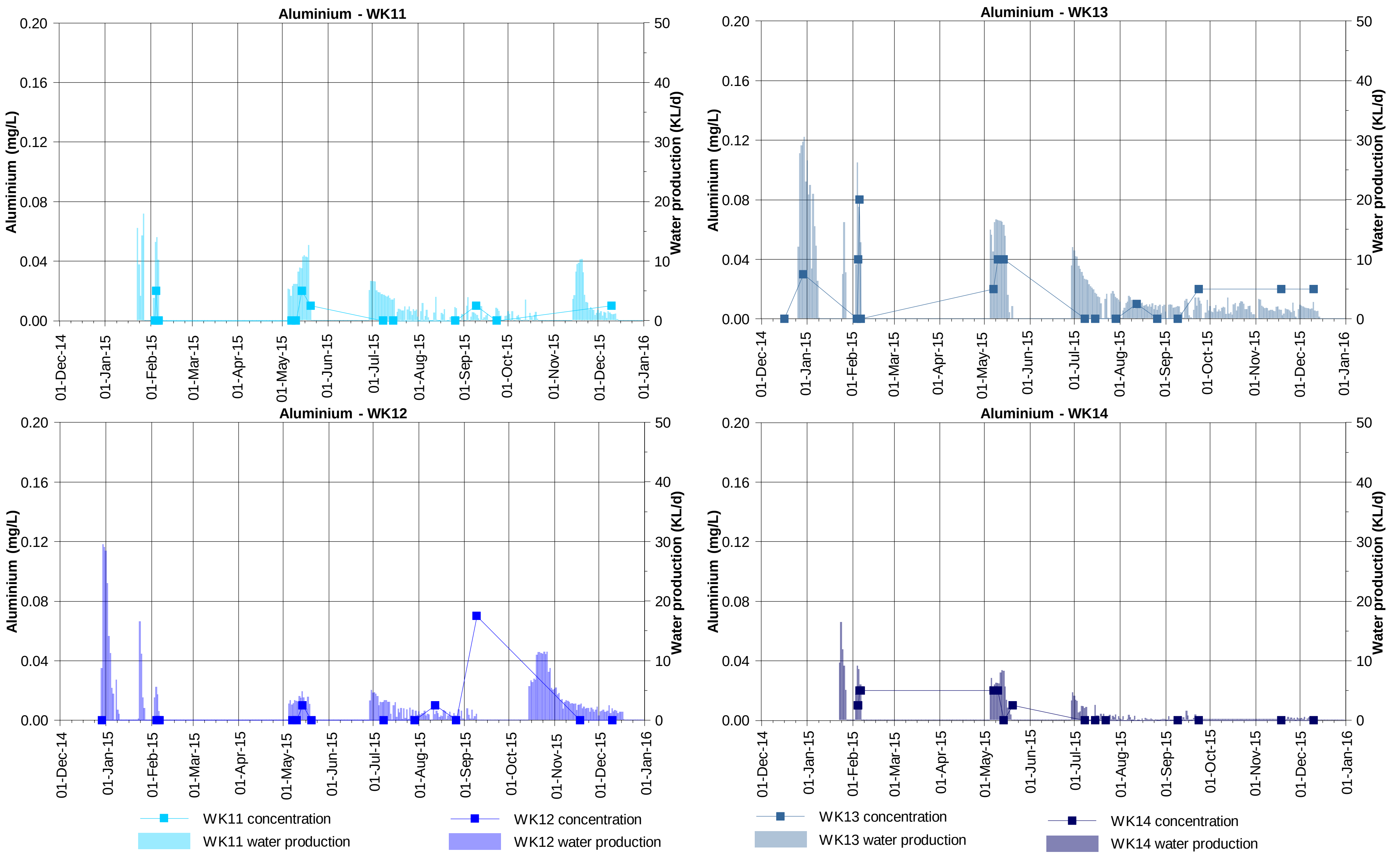

Figure E3.1: Aluminium concentrations at the Waukivory pilot wells

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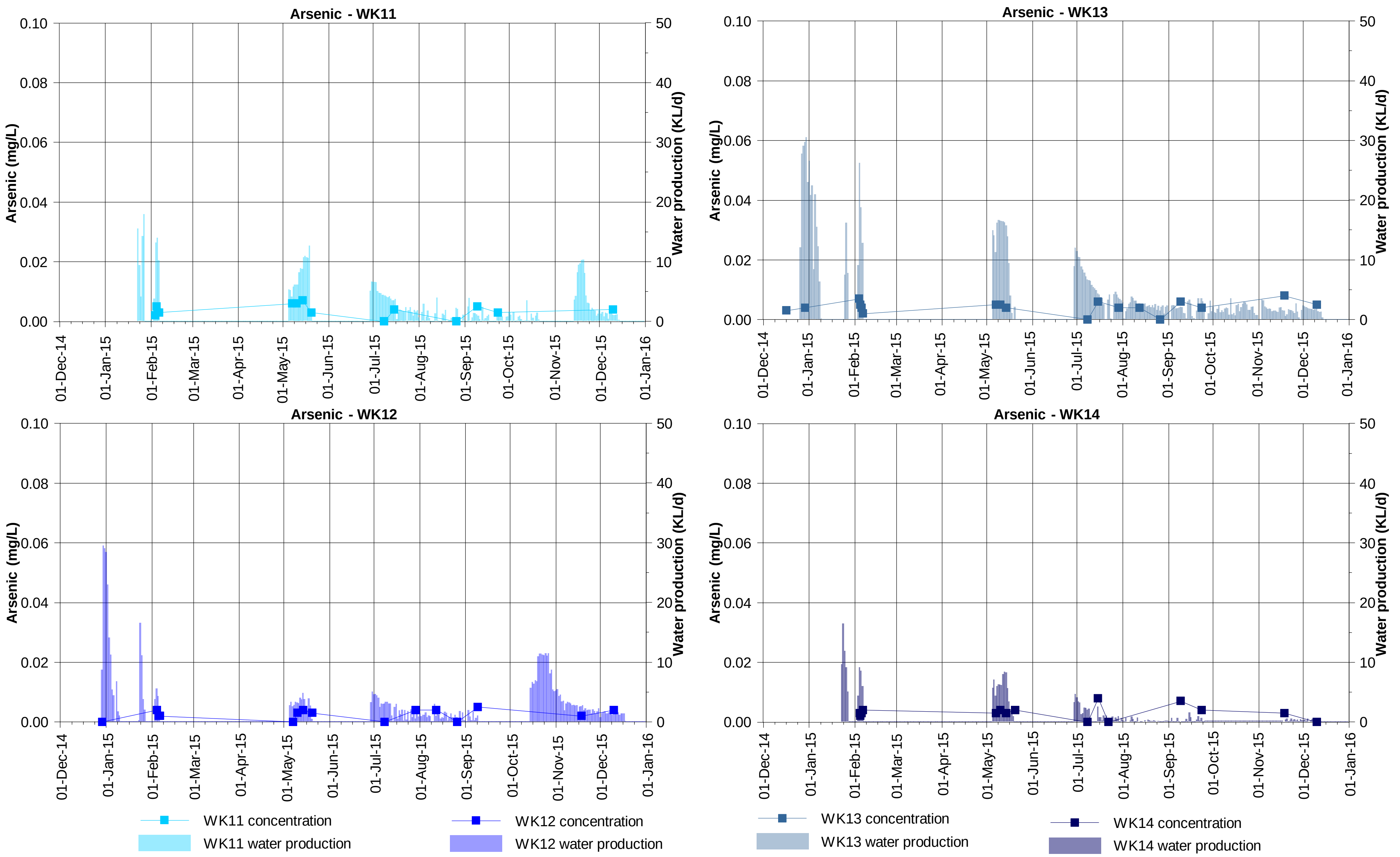

Figure E3.2: Arsenic concentrations at the Waukivory pilot wells

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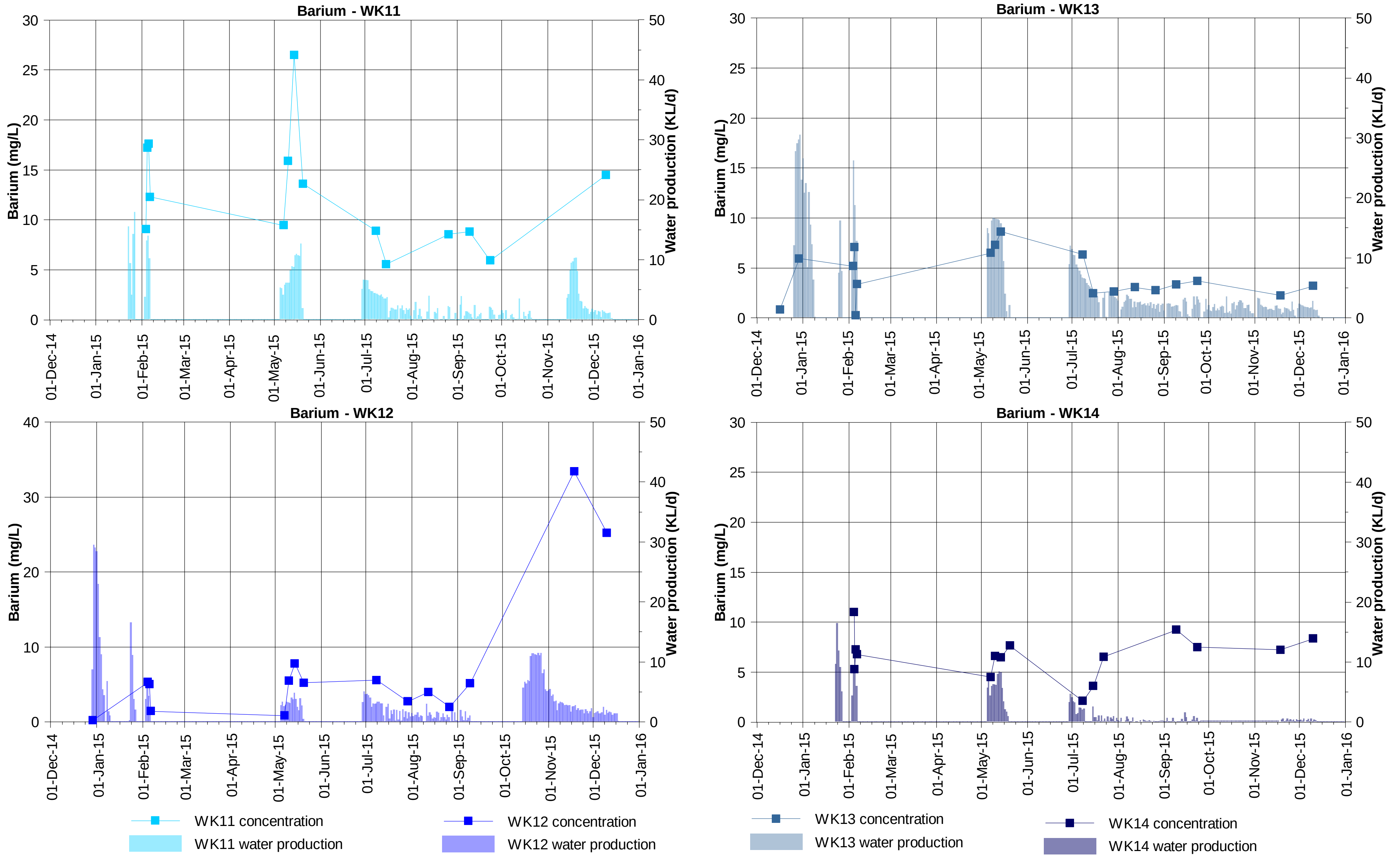

Figure E3.3: Barium concentrations at the Waukivory pilot wells

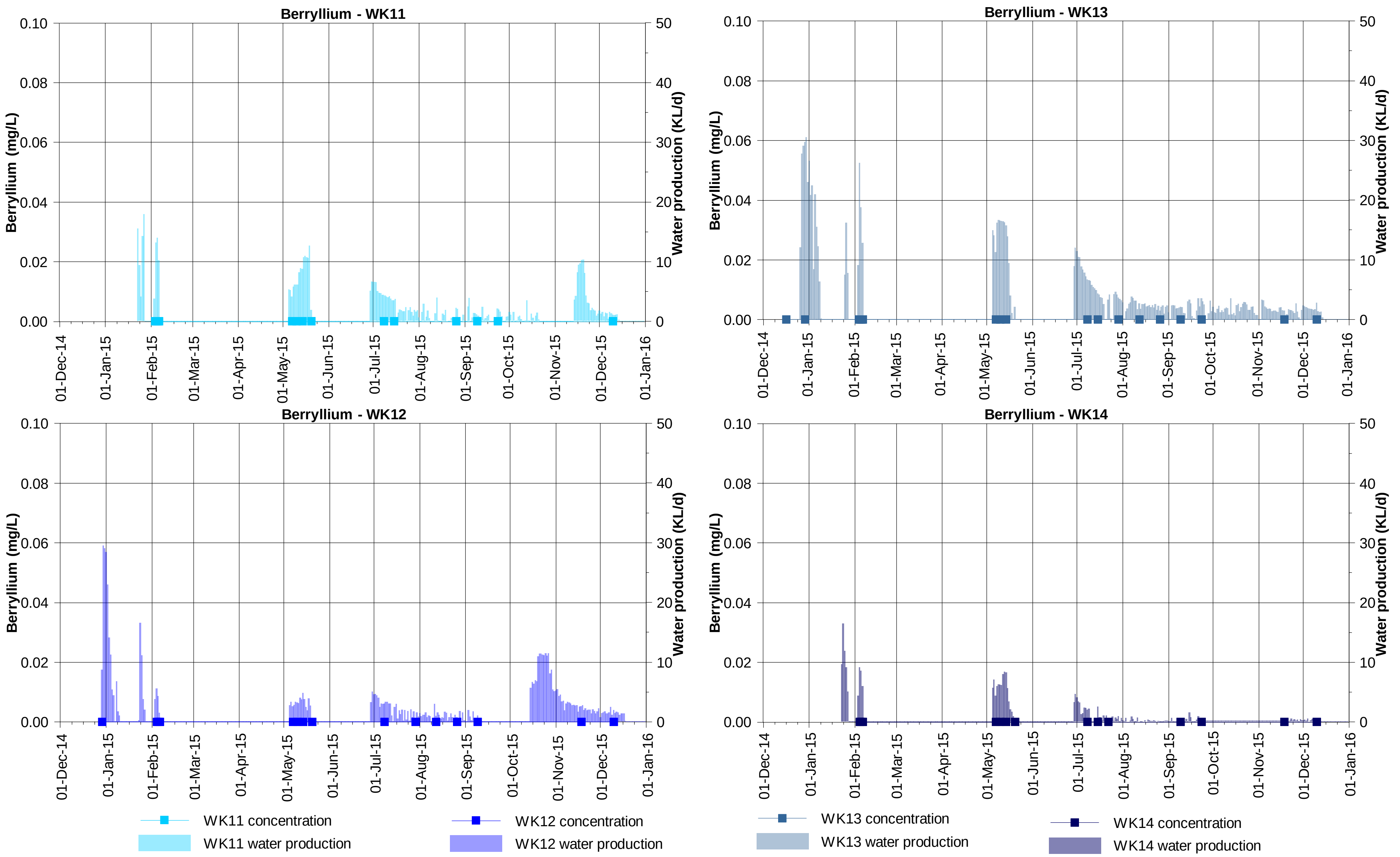

Figure E3.4: Berryllium concentrations at the Waukivory pilot wells

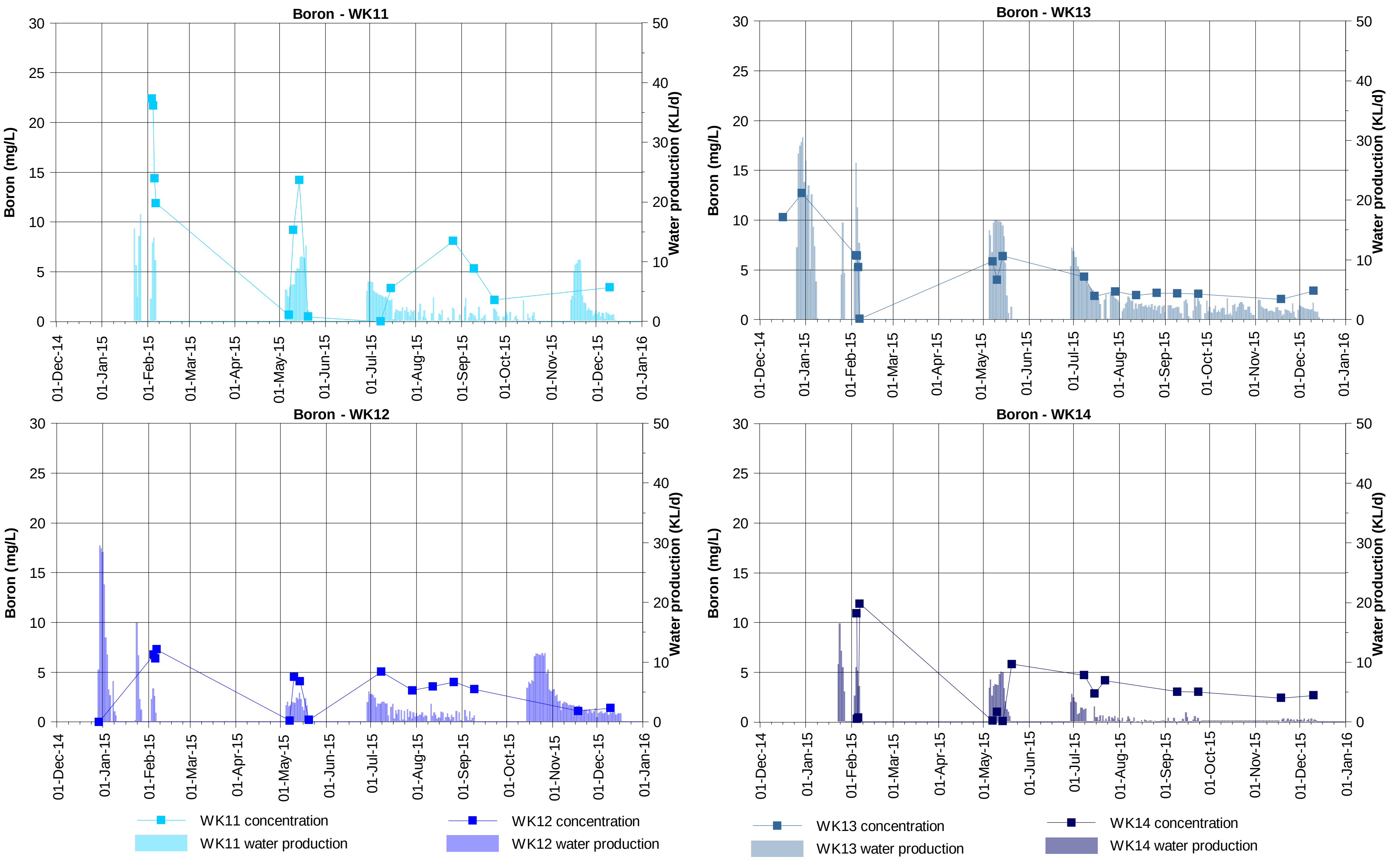

Figure E3.5: Boron concentrations at the Waukivory pilot wells

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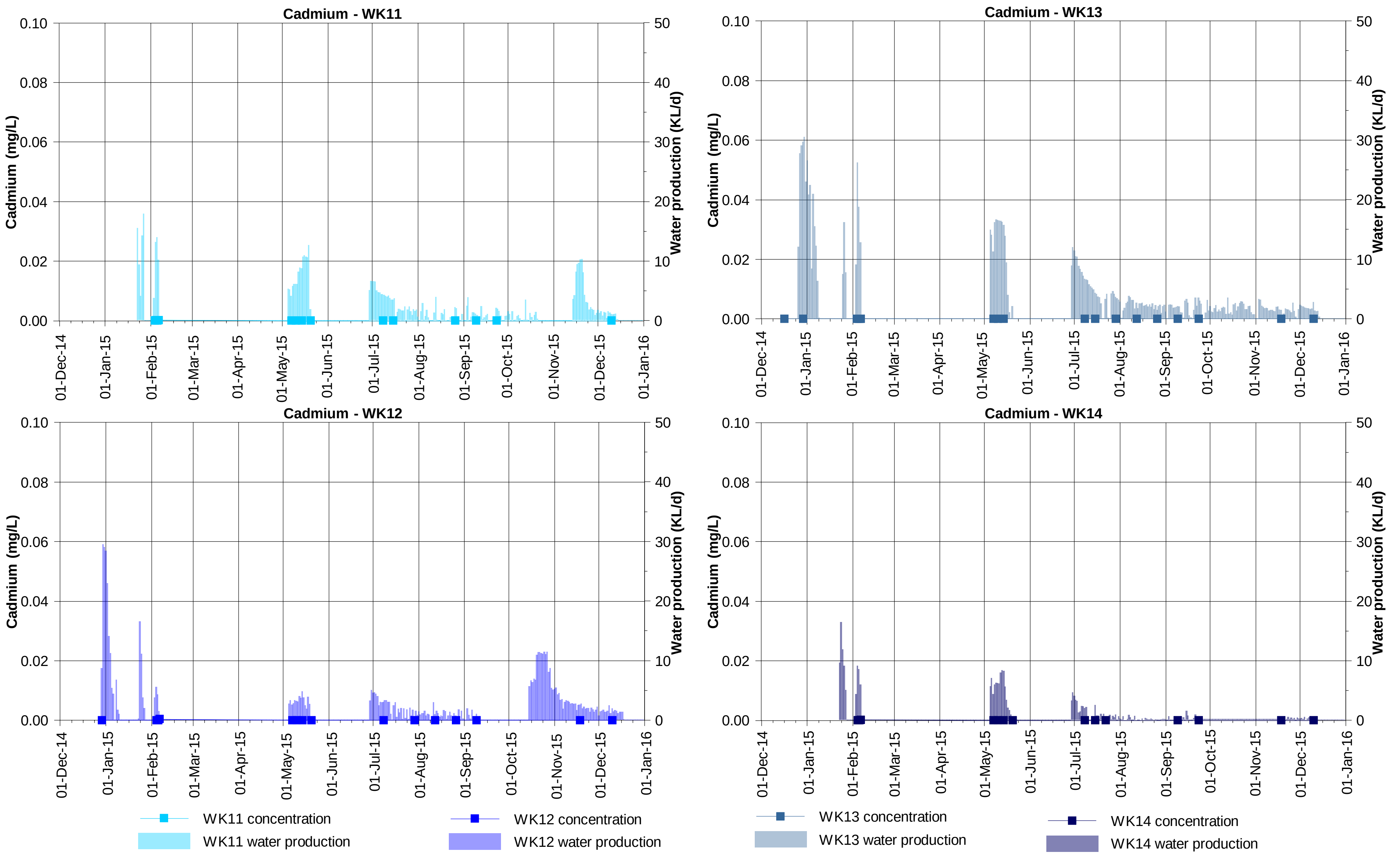

Figure E3.6: Cadmium concentrations at the Waukivory pilot wells

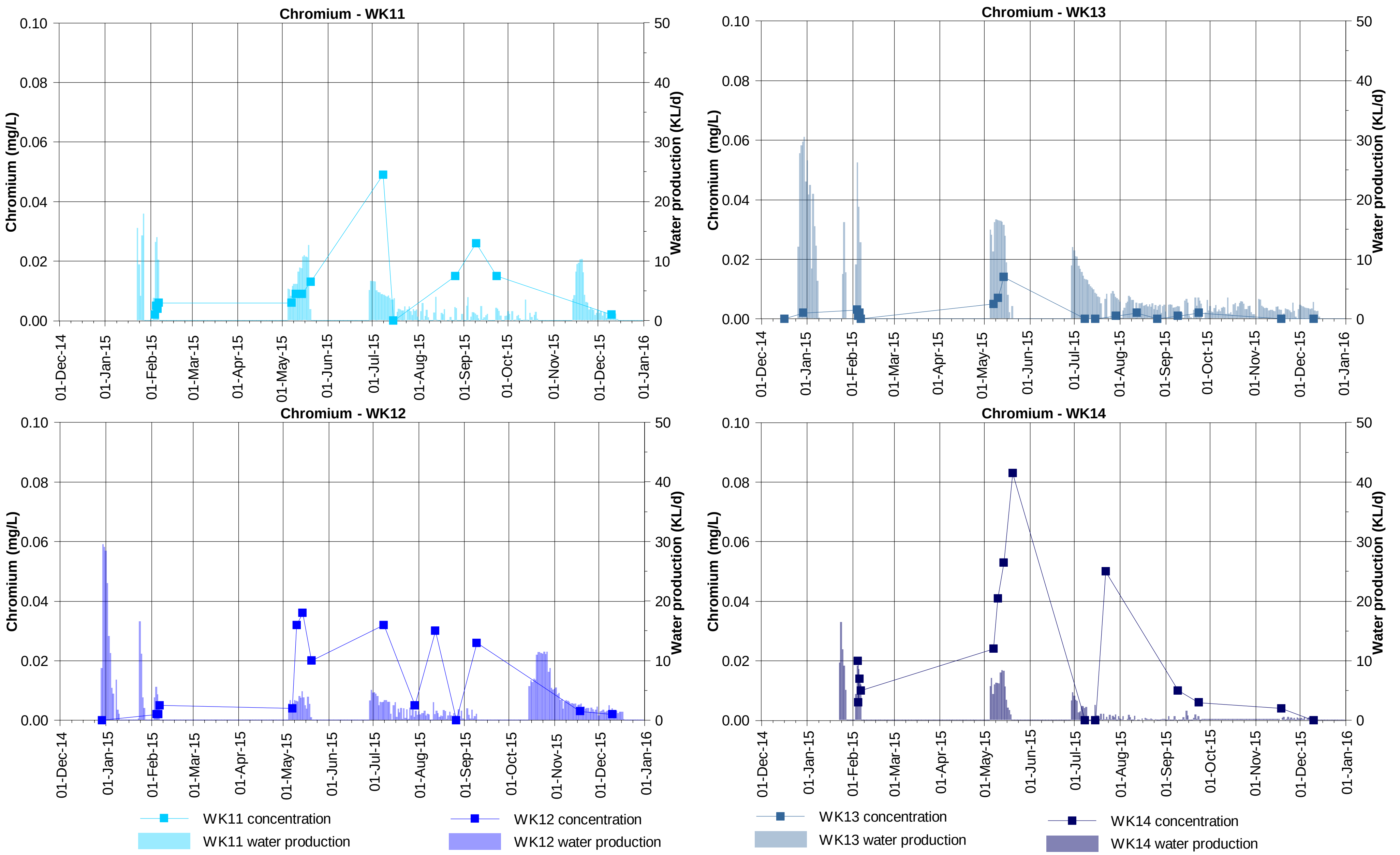

Figure E3.7: Chromium concentrations at the Waukivory pilot wells

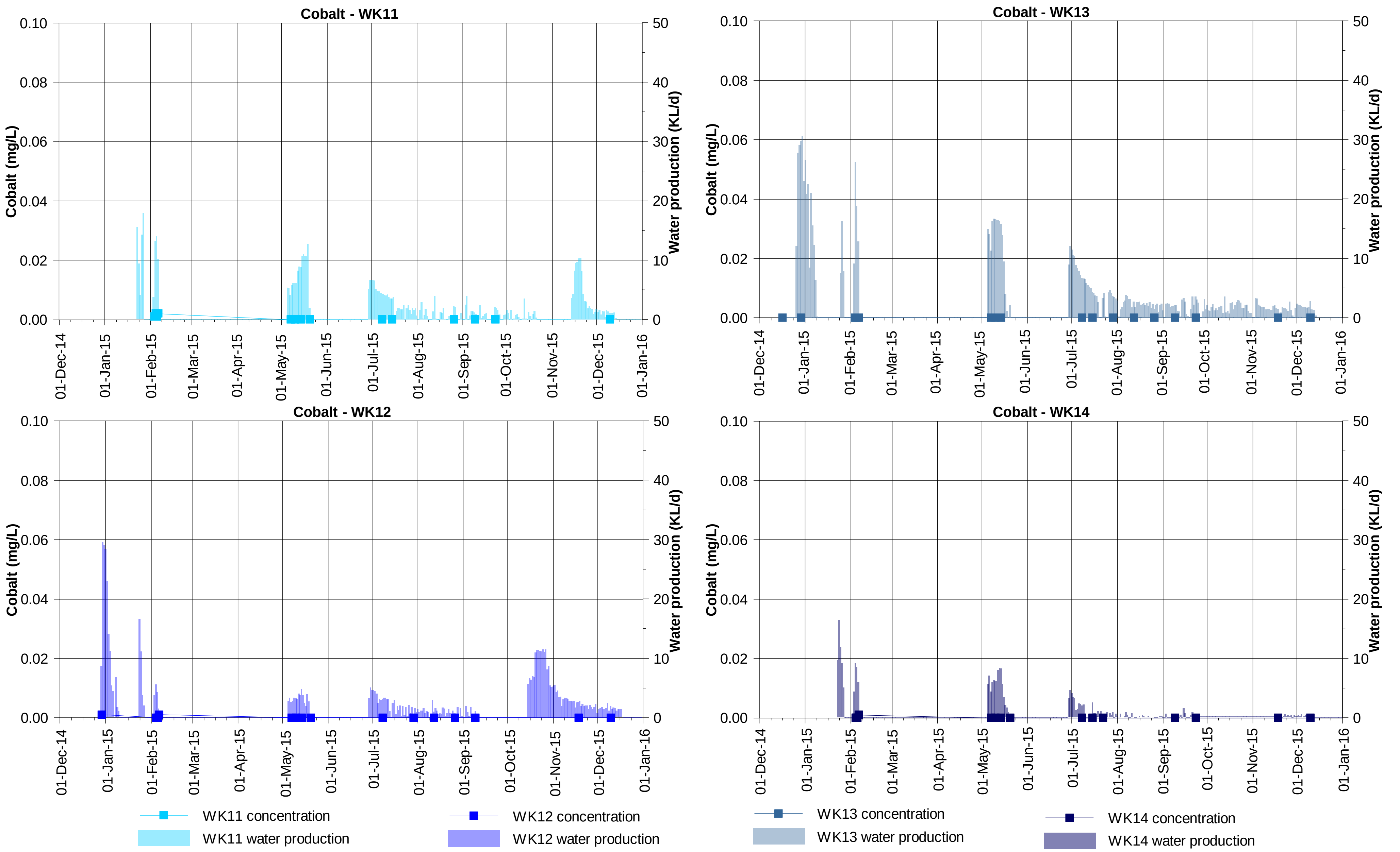

Figure E3.8: Cobalt concentrations at the Waukivory pilot wells

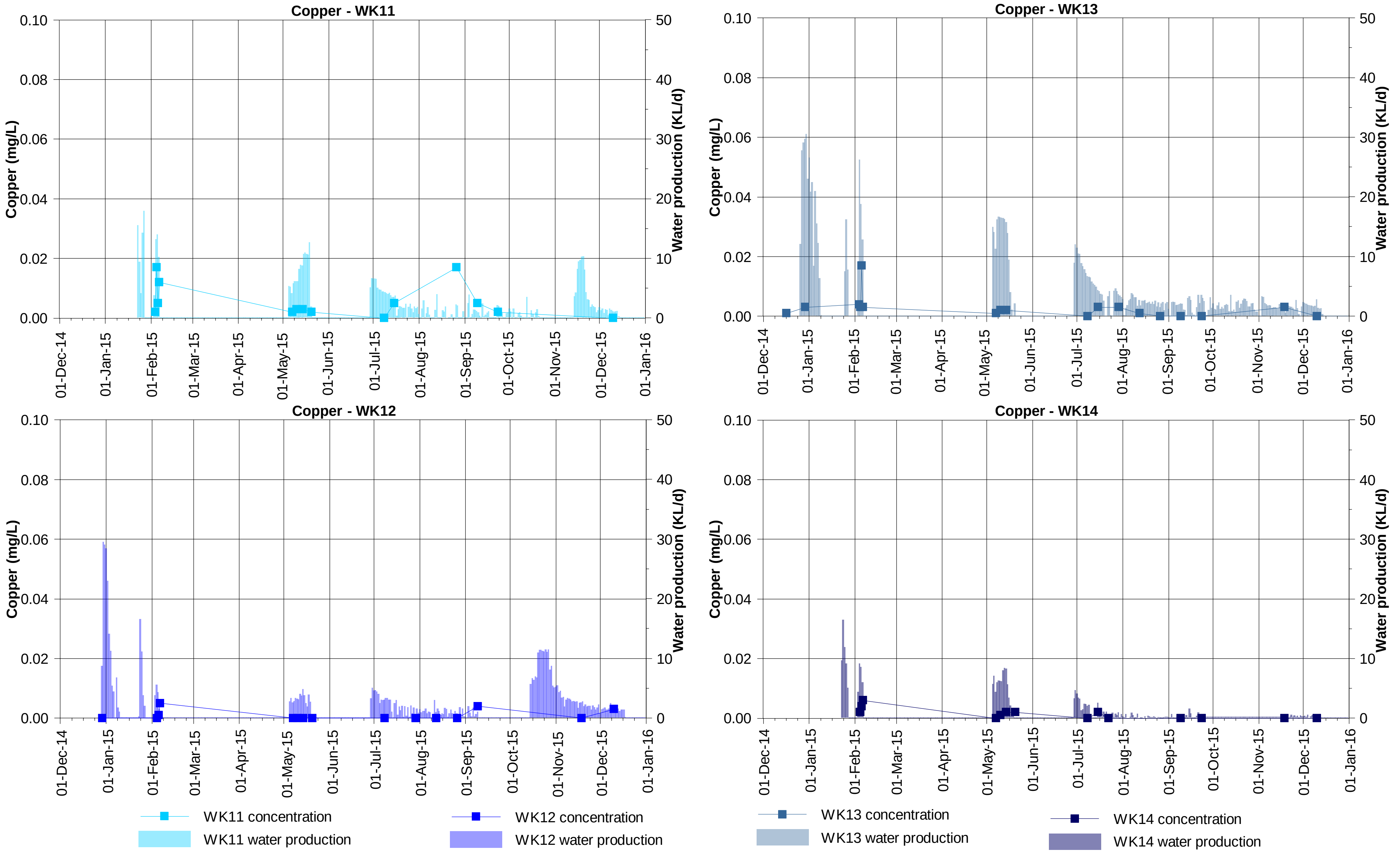

Figure E3.9: Copper concentrations at the Waukivory pilot wells

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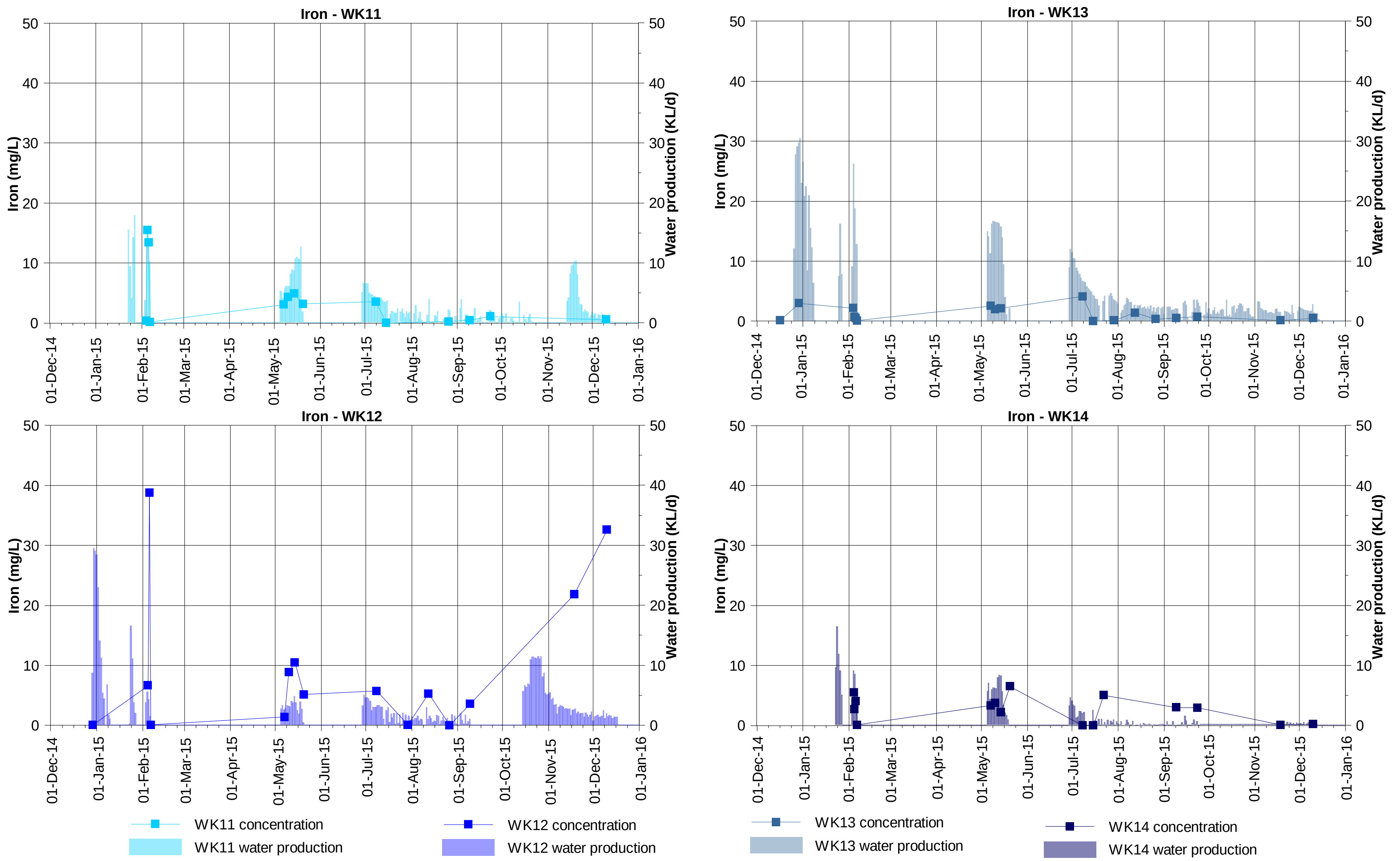

Figure E3.10: Iron concentrations at the Waukivory pilot wells

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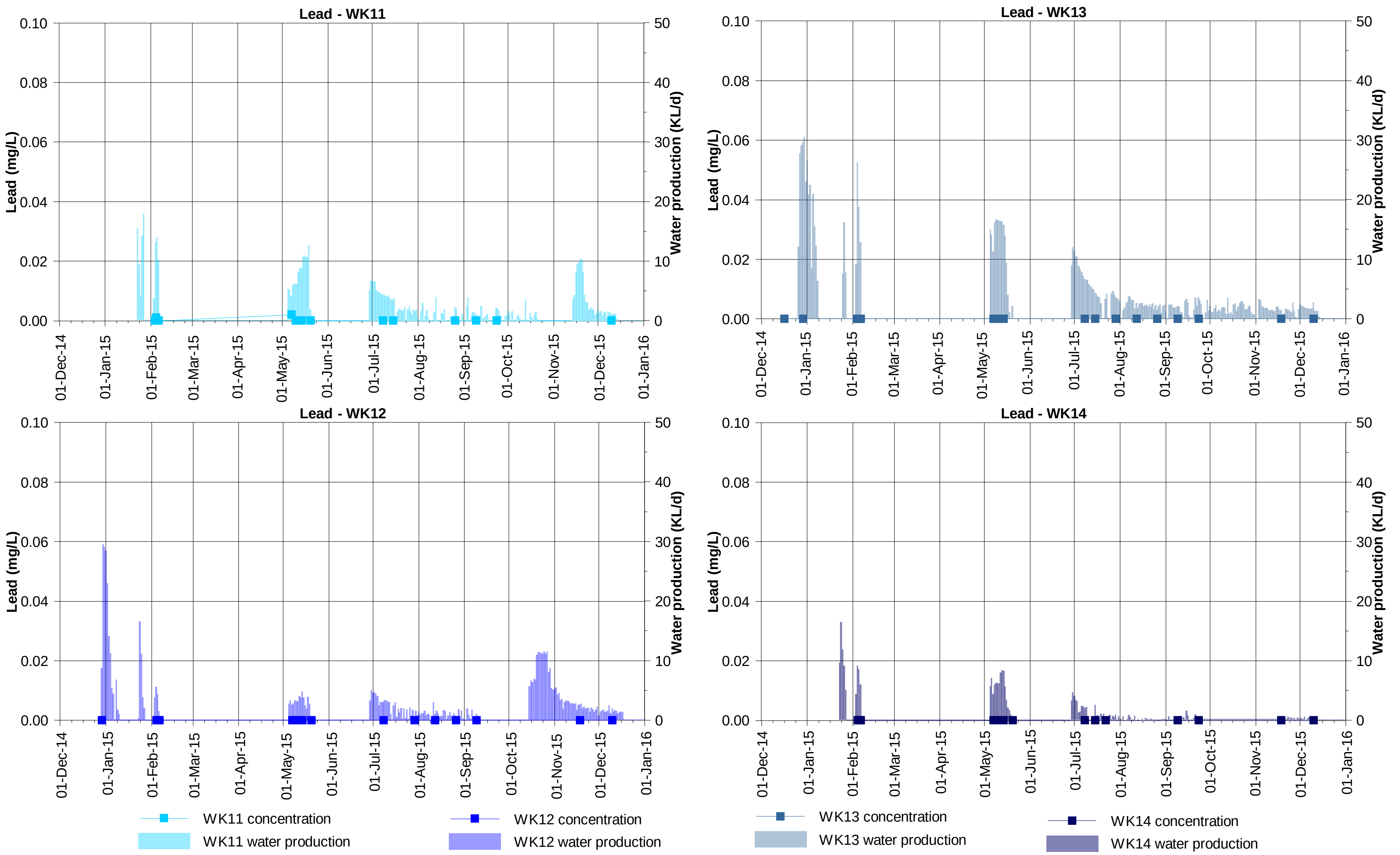

Figure E3.11: Lead concentrations at the Waukivory pilot wells

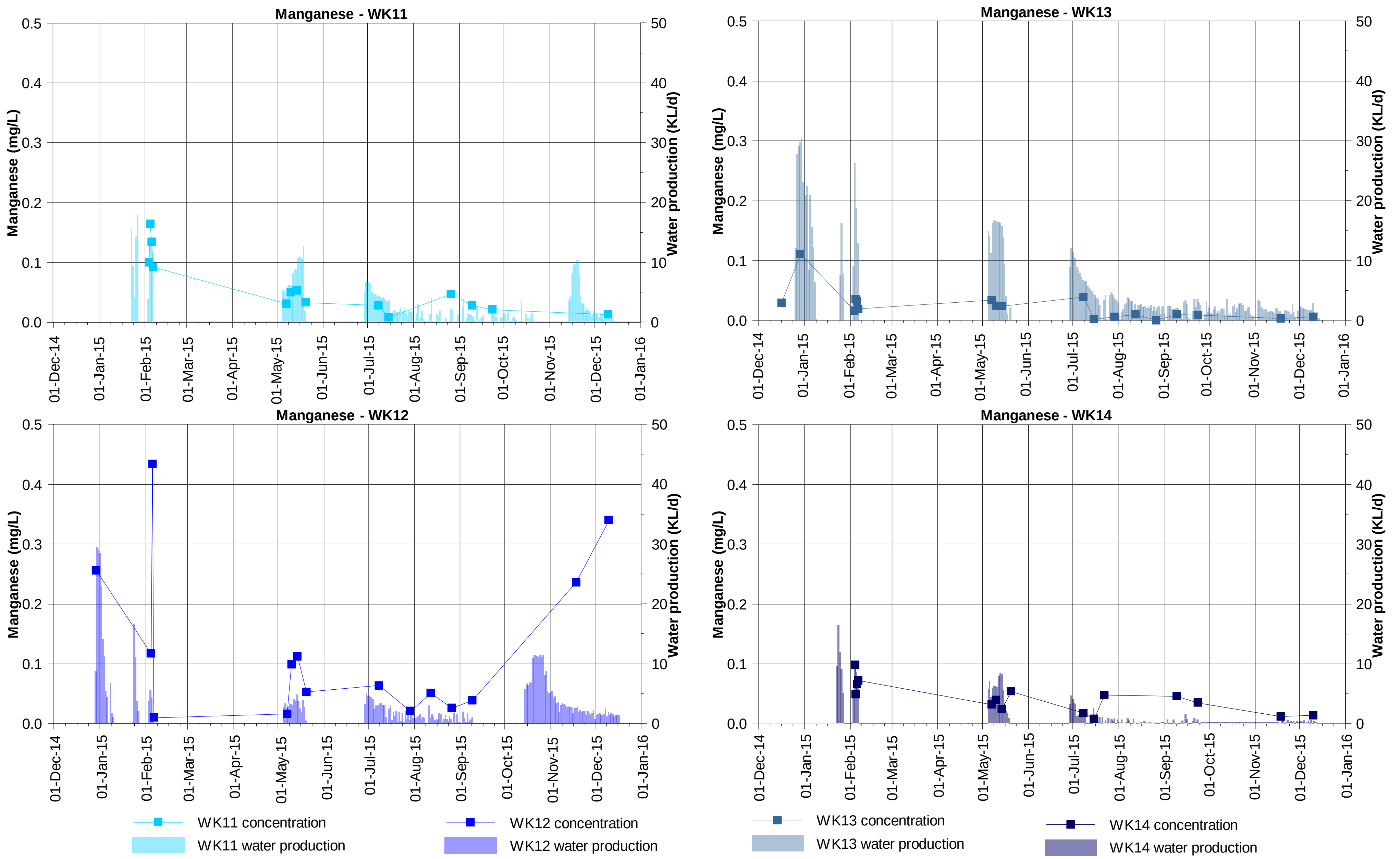

Figure E3.12: Manganese concentrations at the Waukivory pilot wells

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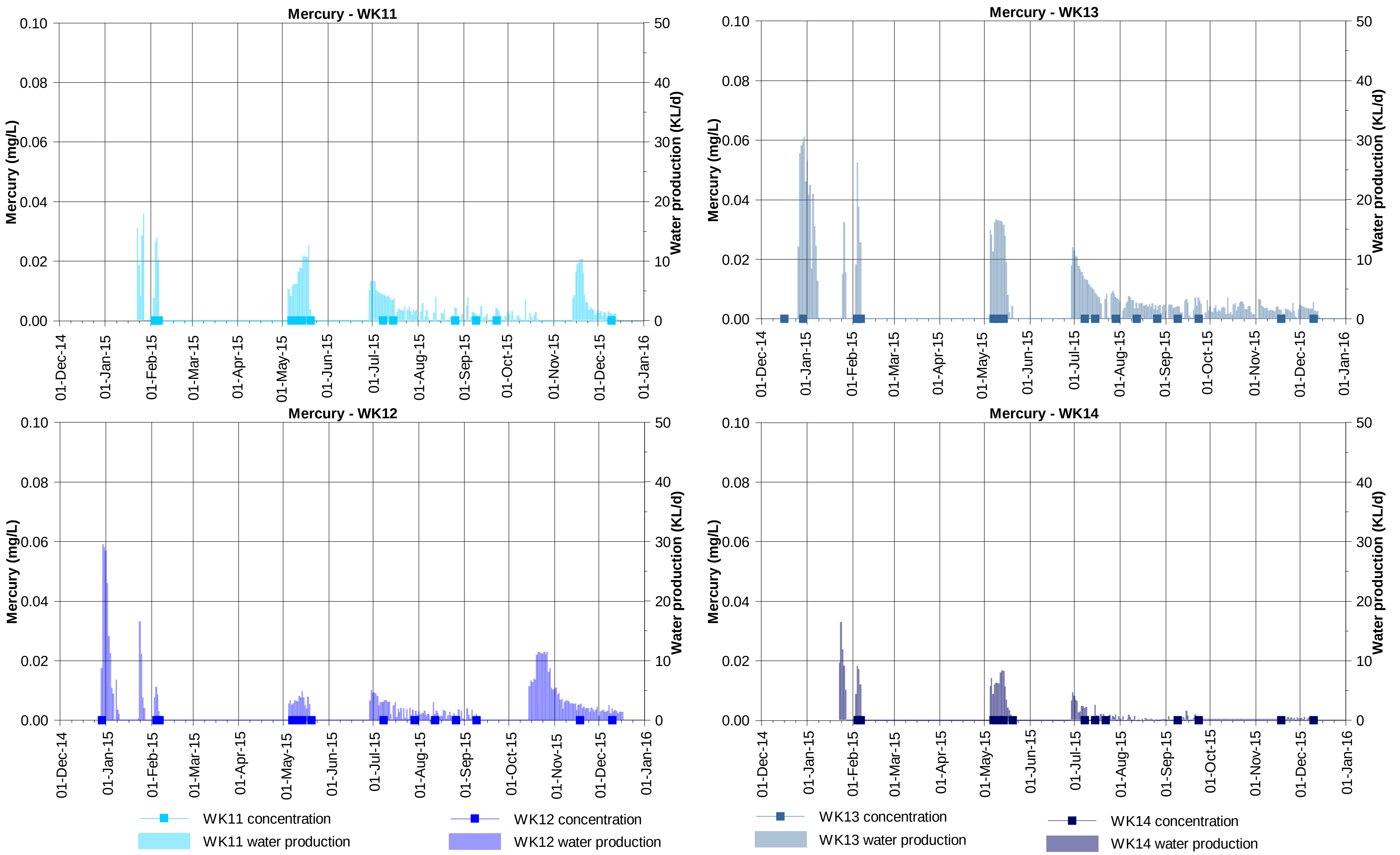

Figure E3.13: Mercury concentrations at the Waukivory pilot wells

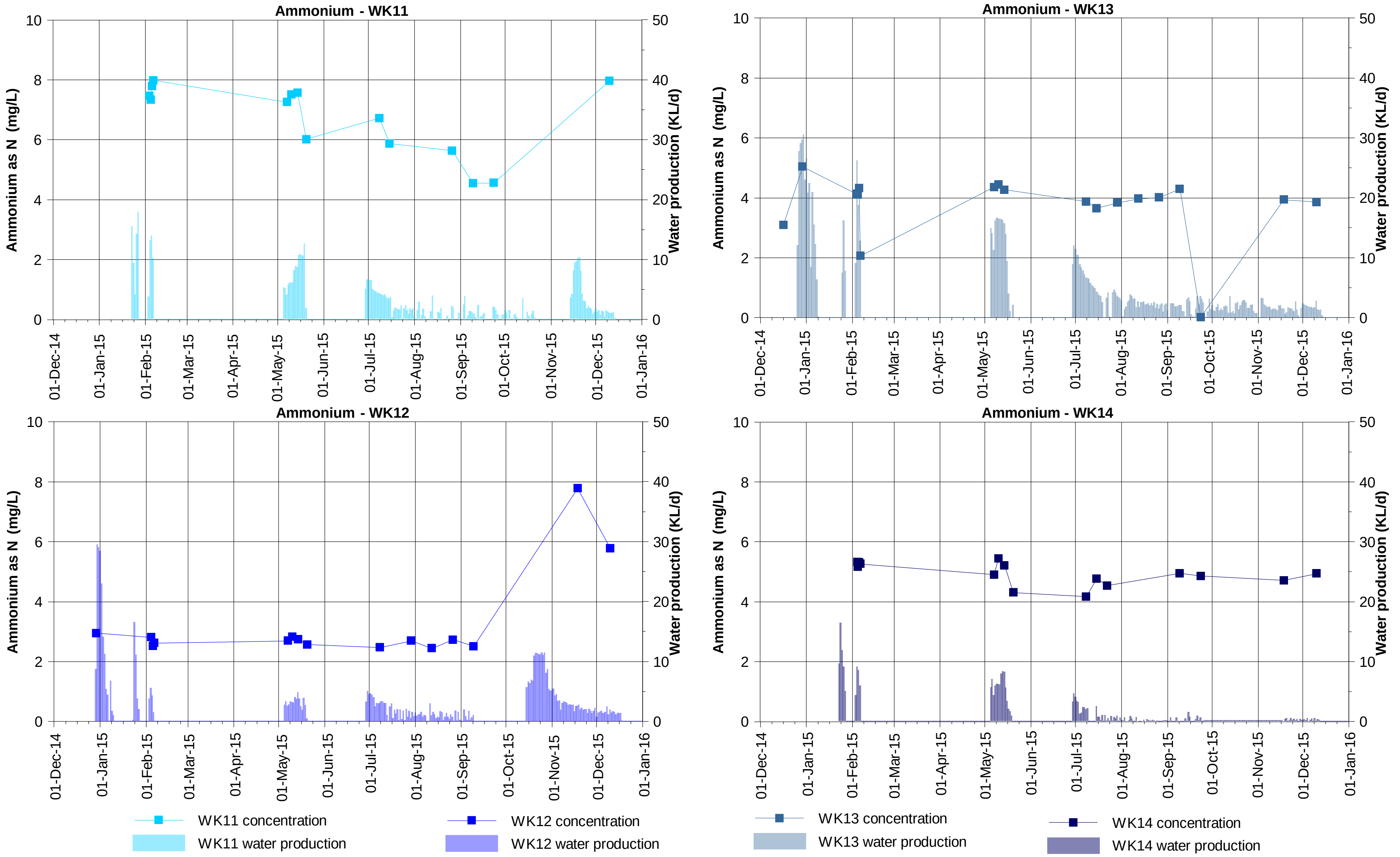

Figure E4.2: Ammonium concentrations at the Waukivory pilot wells

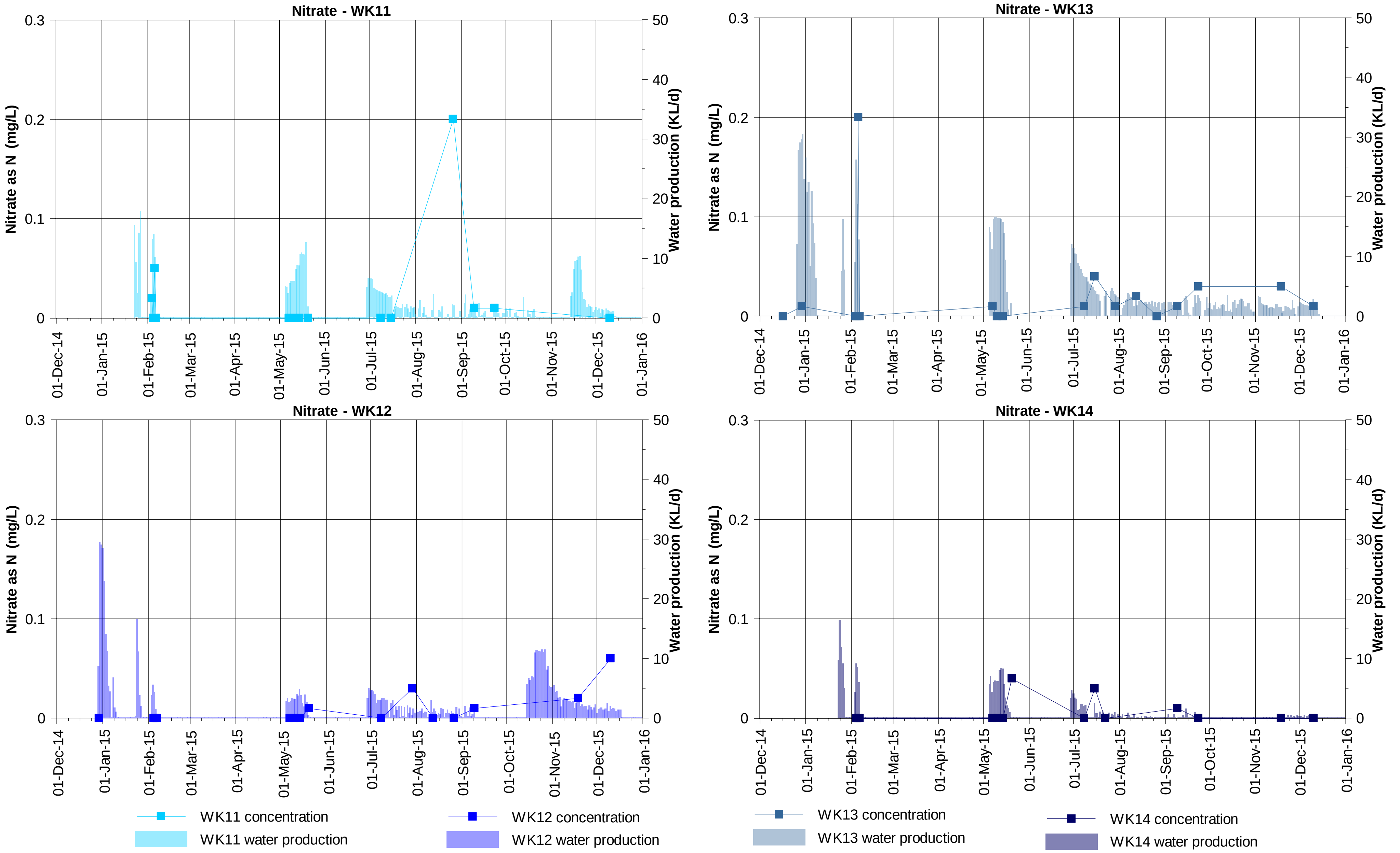

Figure E4.3: Nitrate concentrations at the Waukivory pilot wells

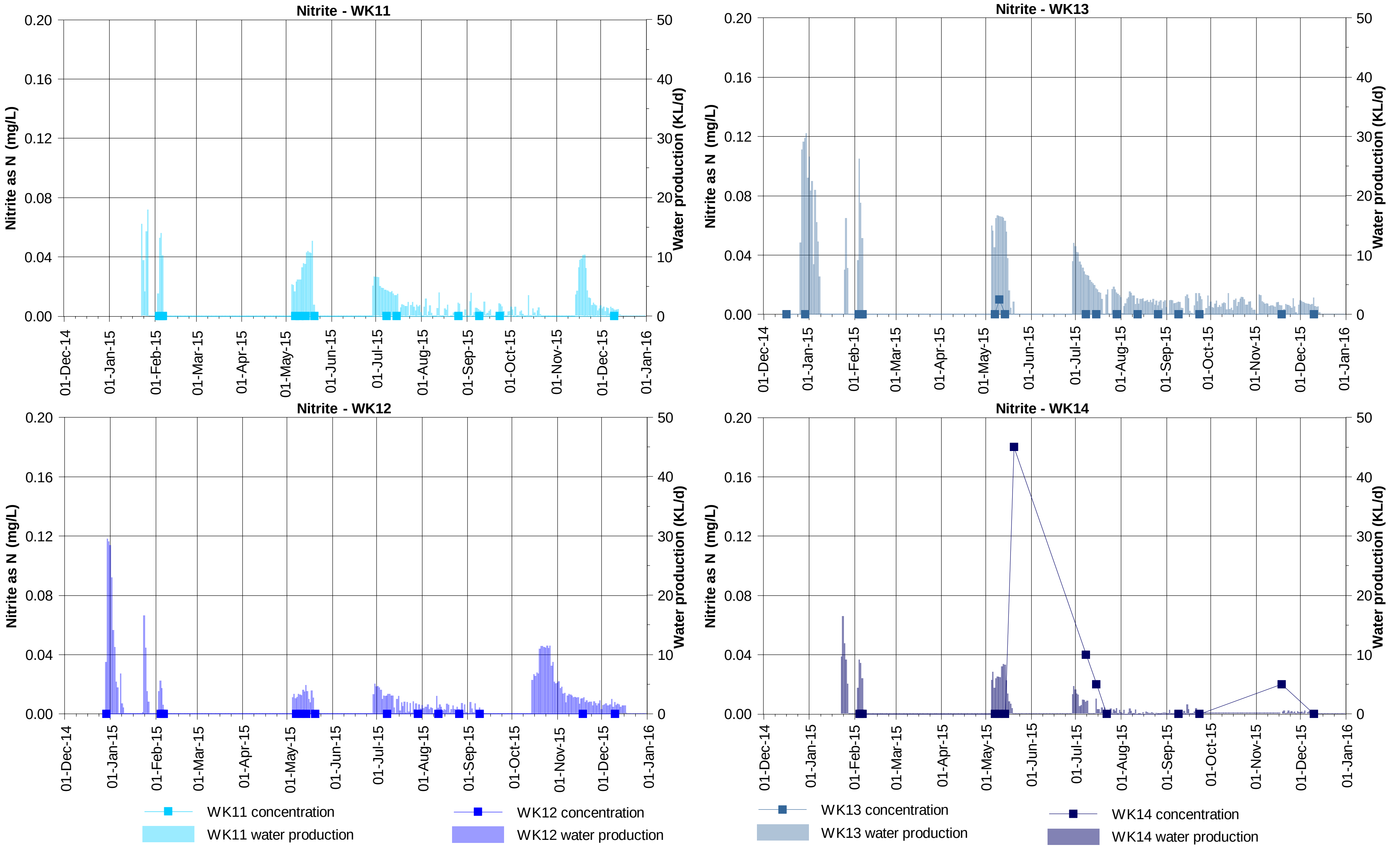

Figure E4.4: Nitrite concentrations at the Waukivory pilot wells

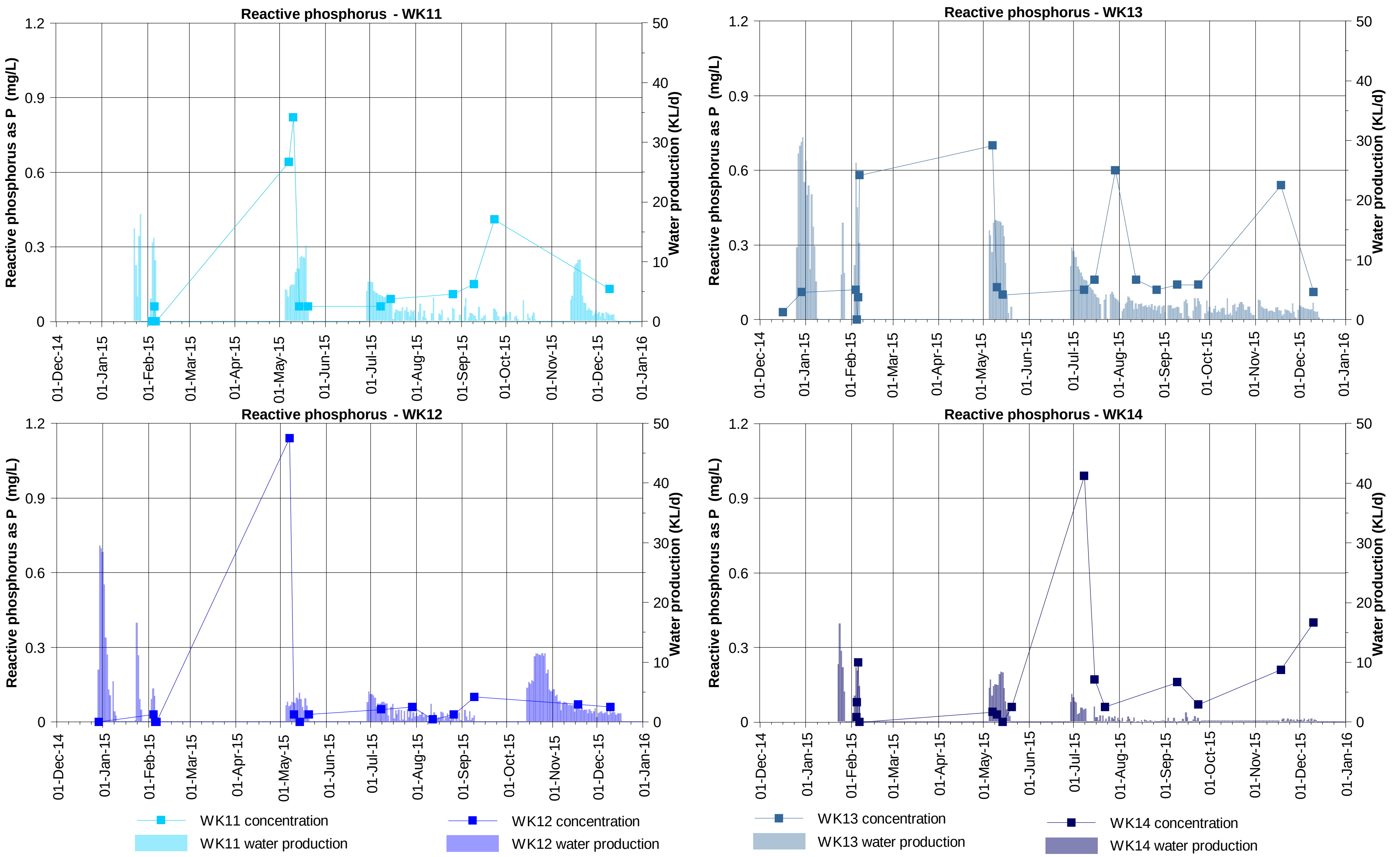

Figure E4.5: Reactive phosphorus concentrations at the Waukivory pilot wells

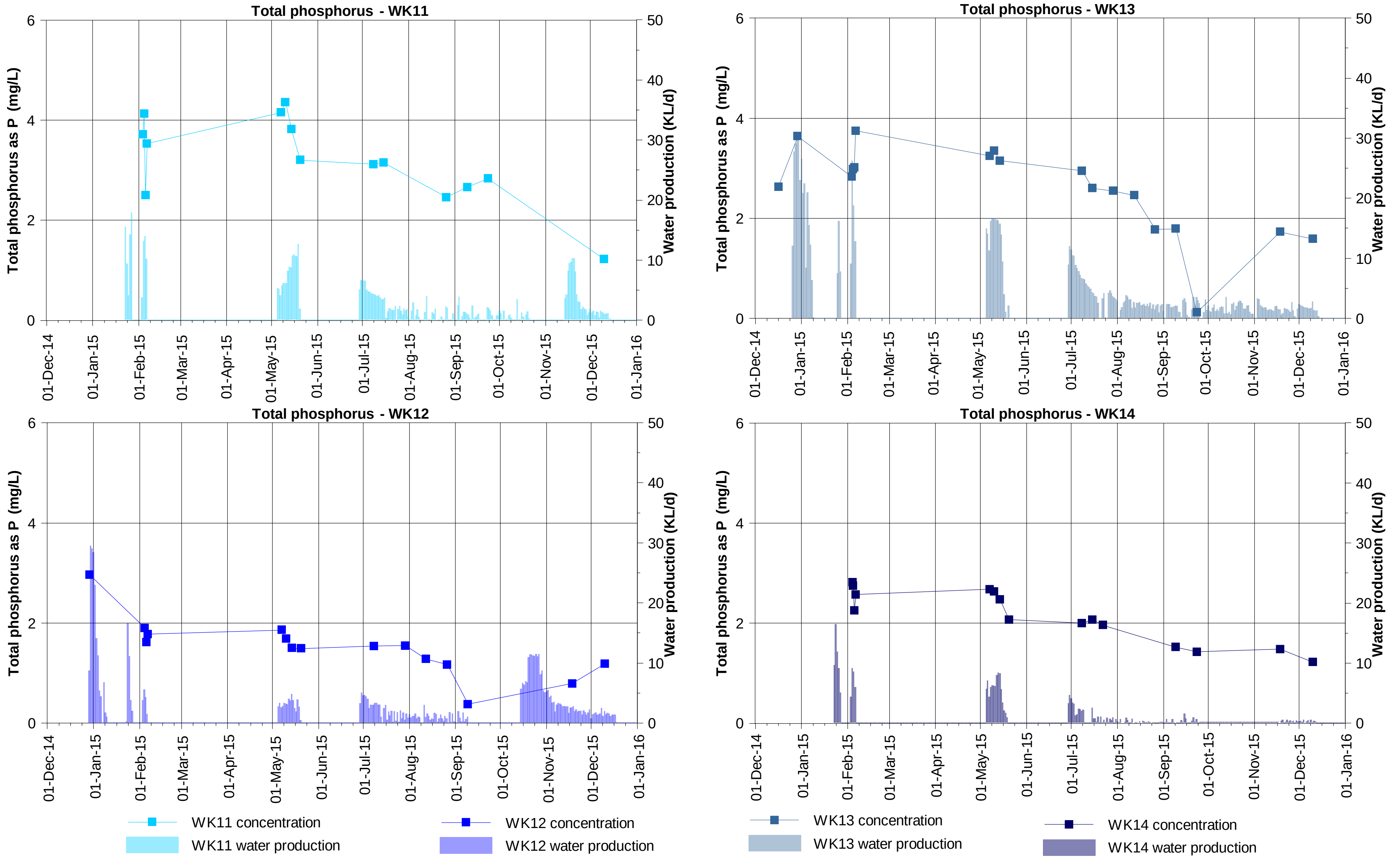

Figure E4.6: Total phosphorus concentrations at the Waukivory pilot wells

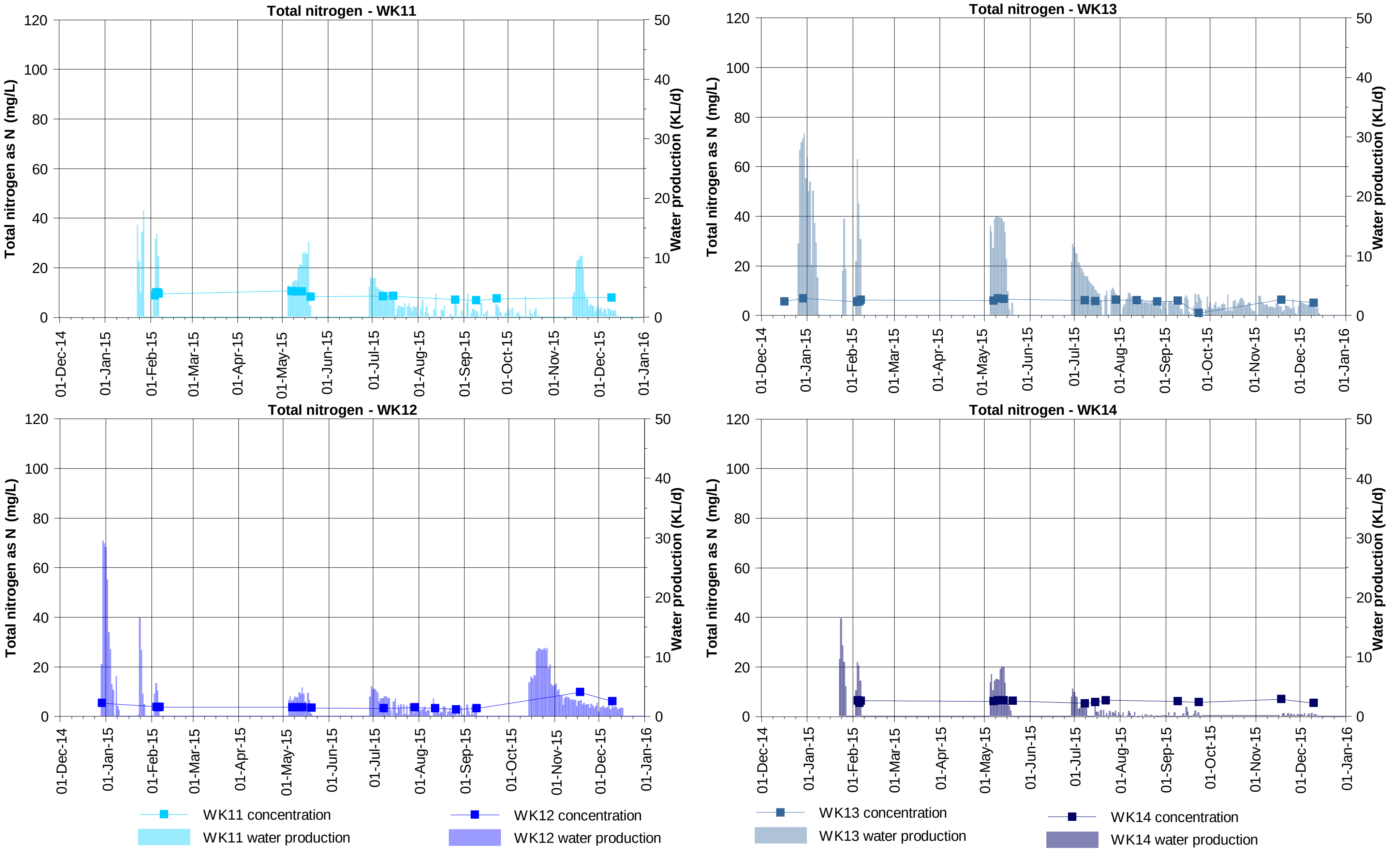

Figure E4.7: Total nitrogen concentrations at the Waukivory pilot wells

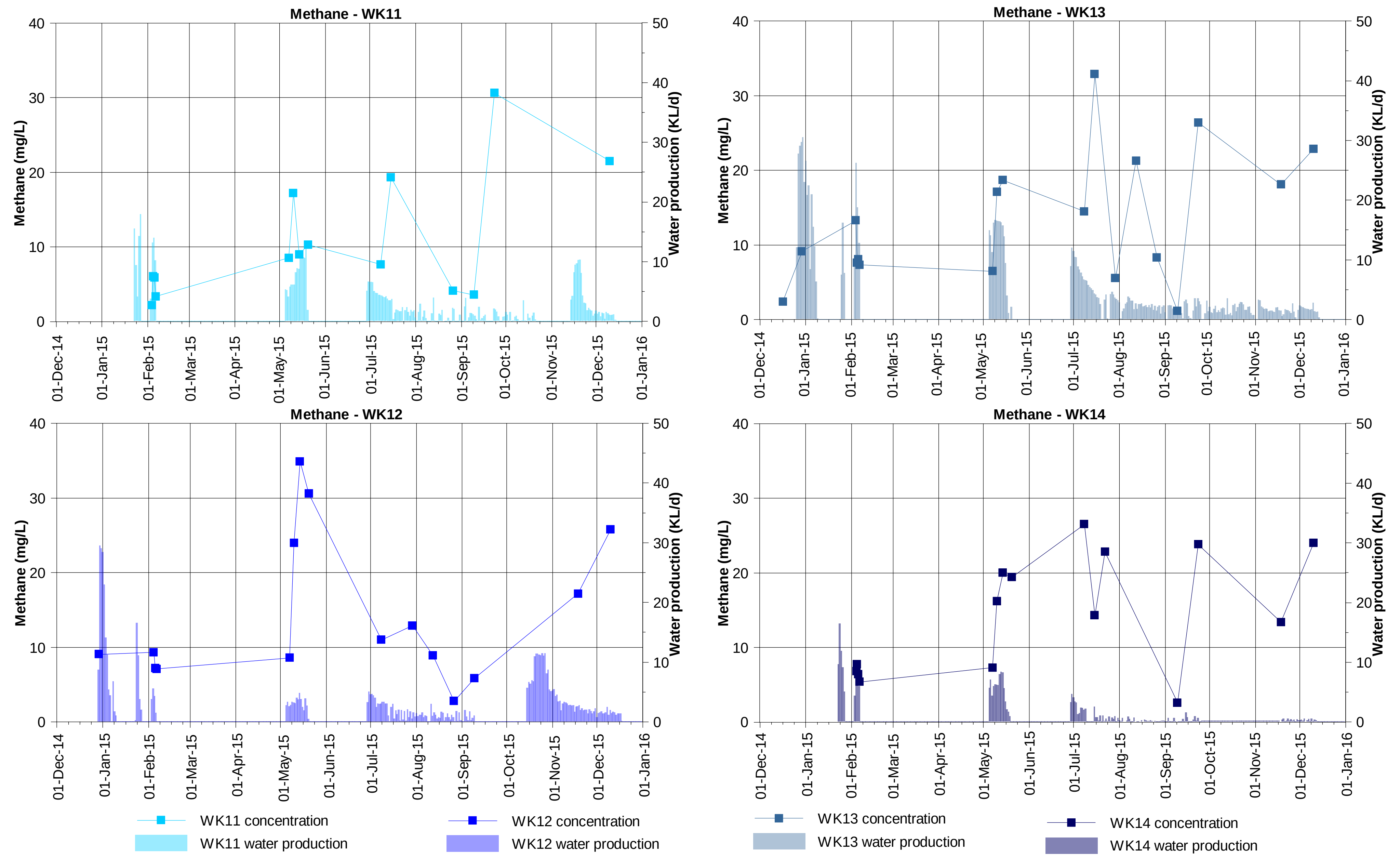

Figure E5.1: Methane concentrations at the Waukivory pilot wells

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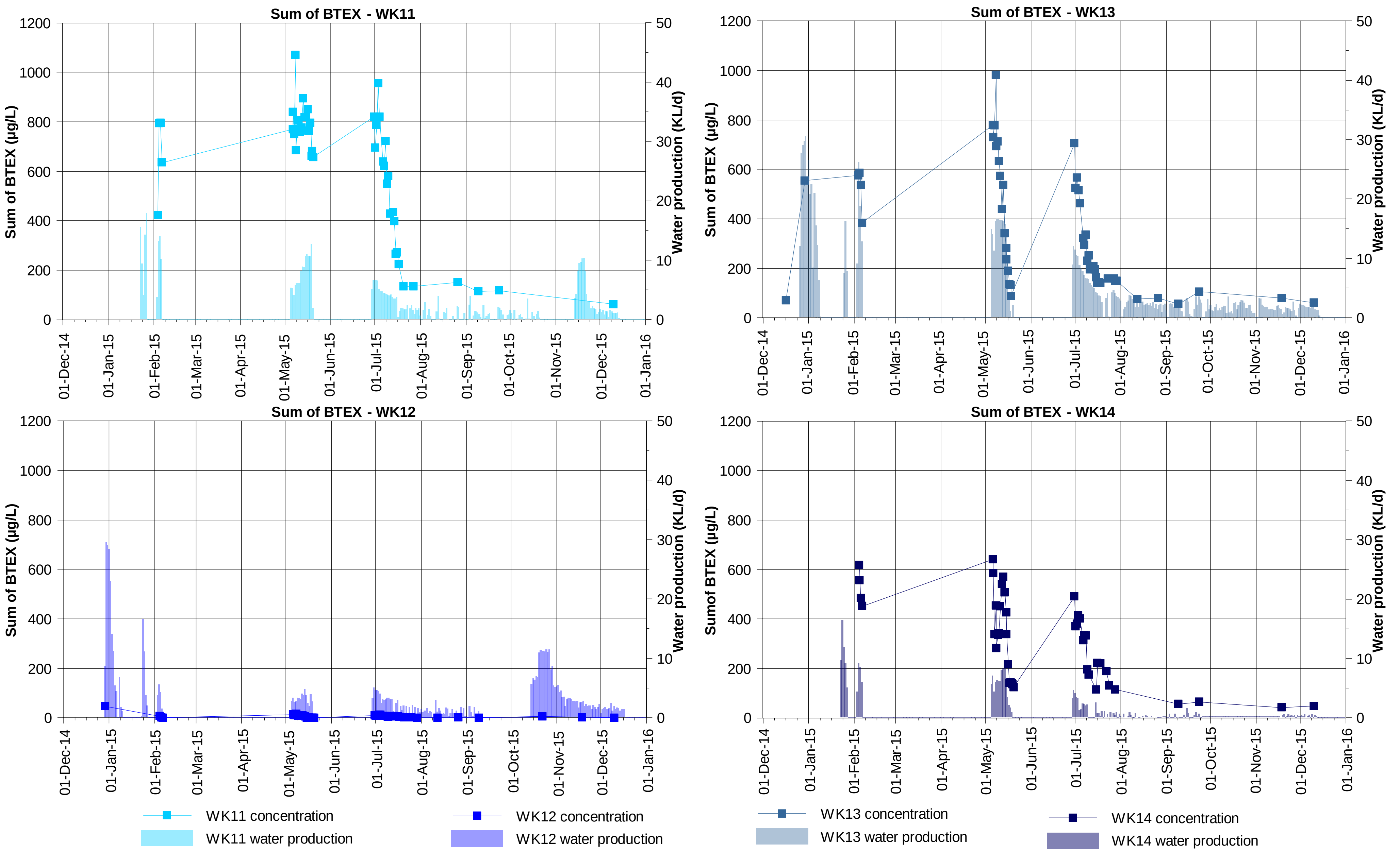

Figure E6.1: Sum of BTEX concentrations at the Waukivory pilot wells

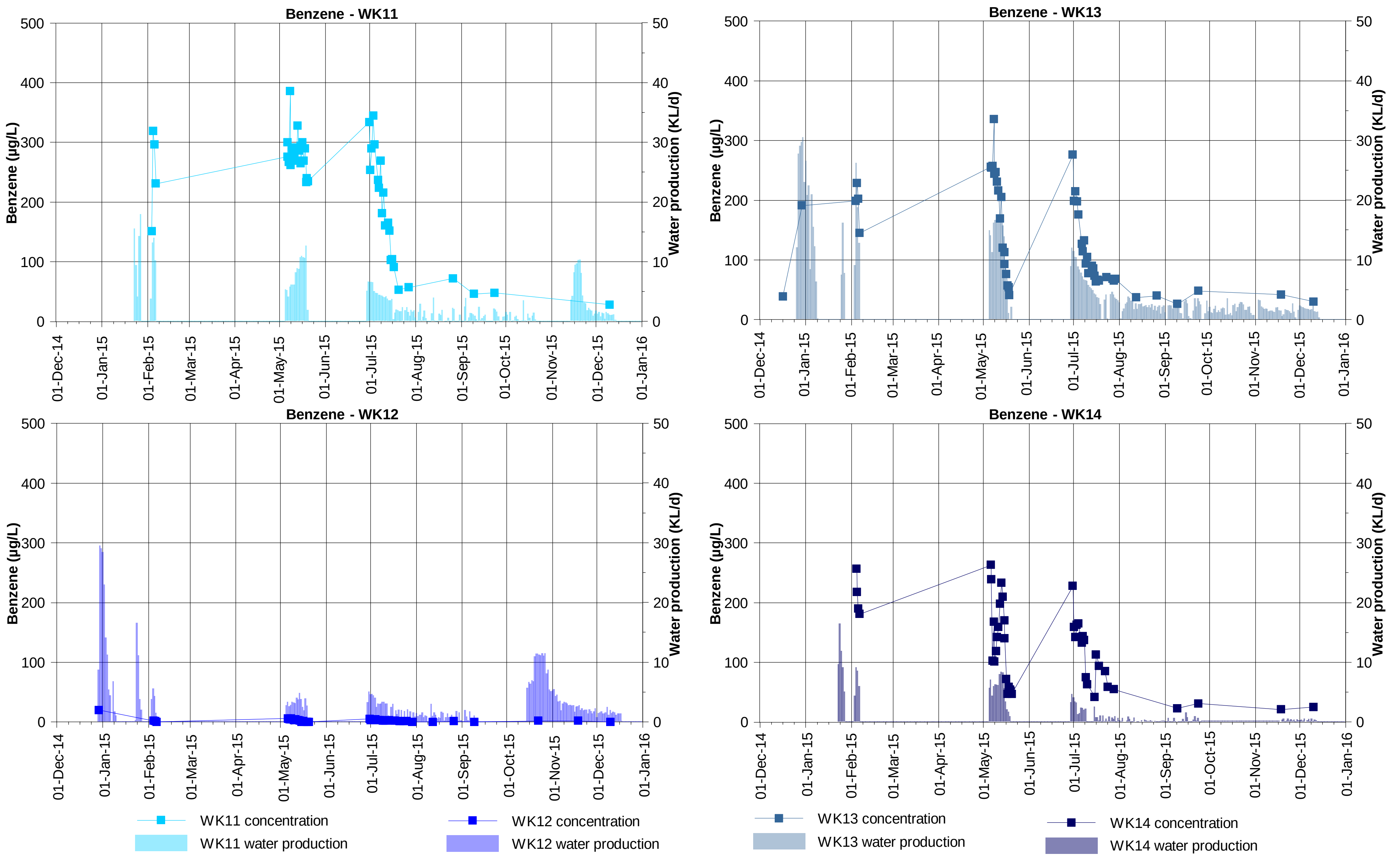

Figure E6.2: Benzene concentrations at the Waukivory pilot wells

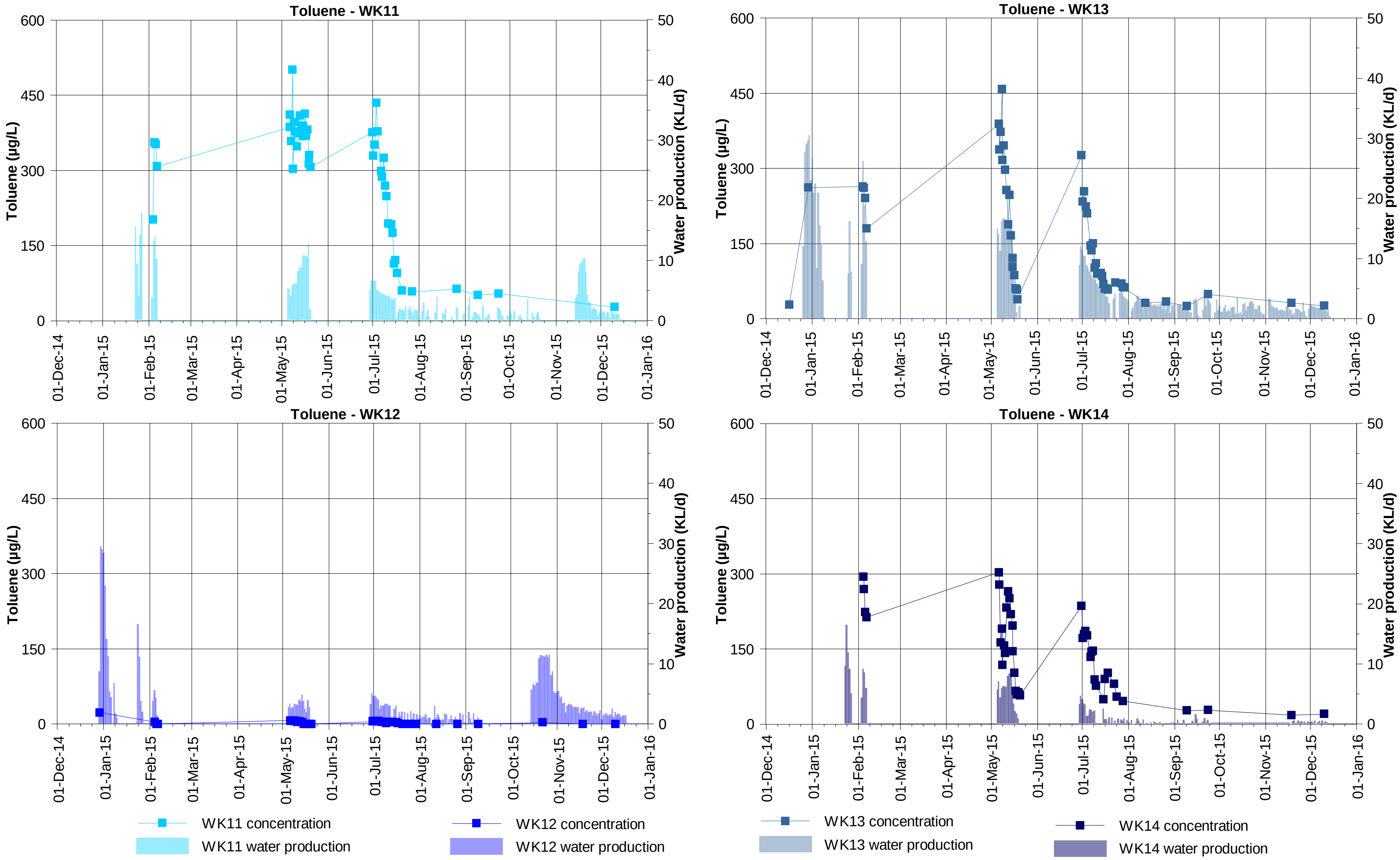

Figure E6.3: Toluene concentrations at the Waukivory pilot wells

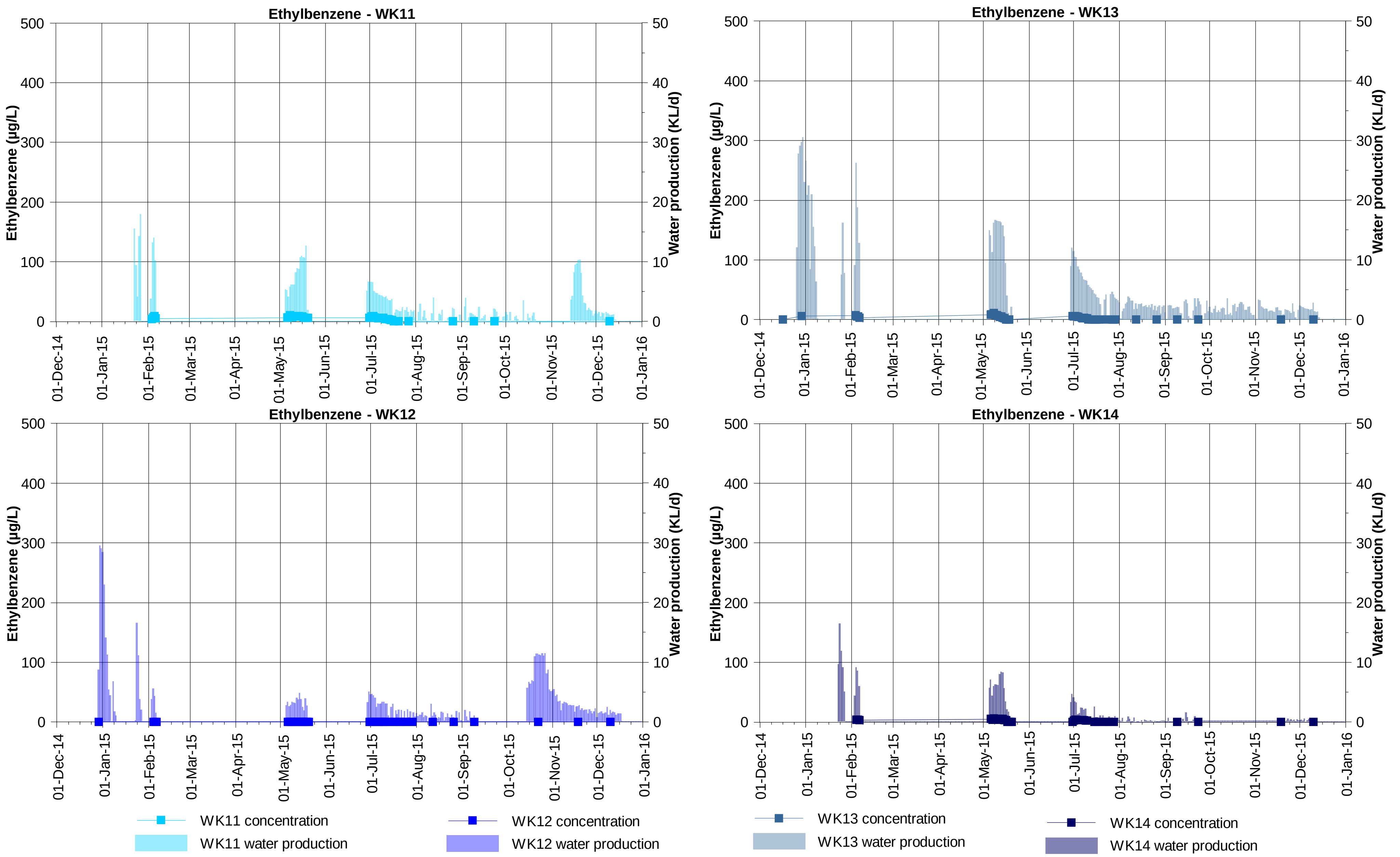

Figure E6.4: Ethylbenzene total concentrations at the Waukivory pilot wells

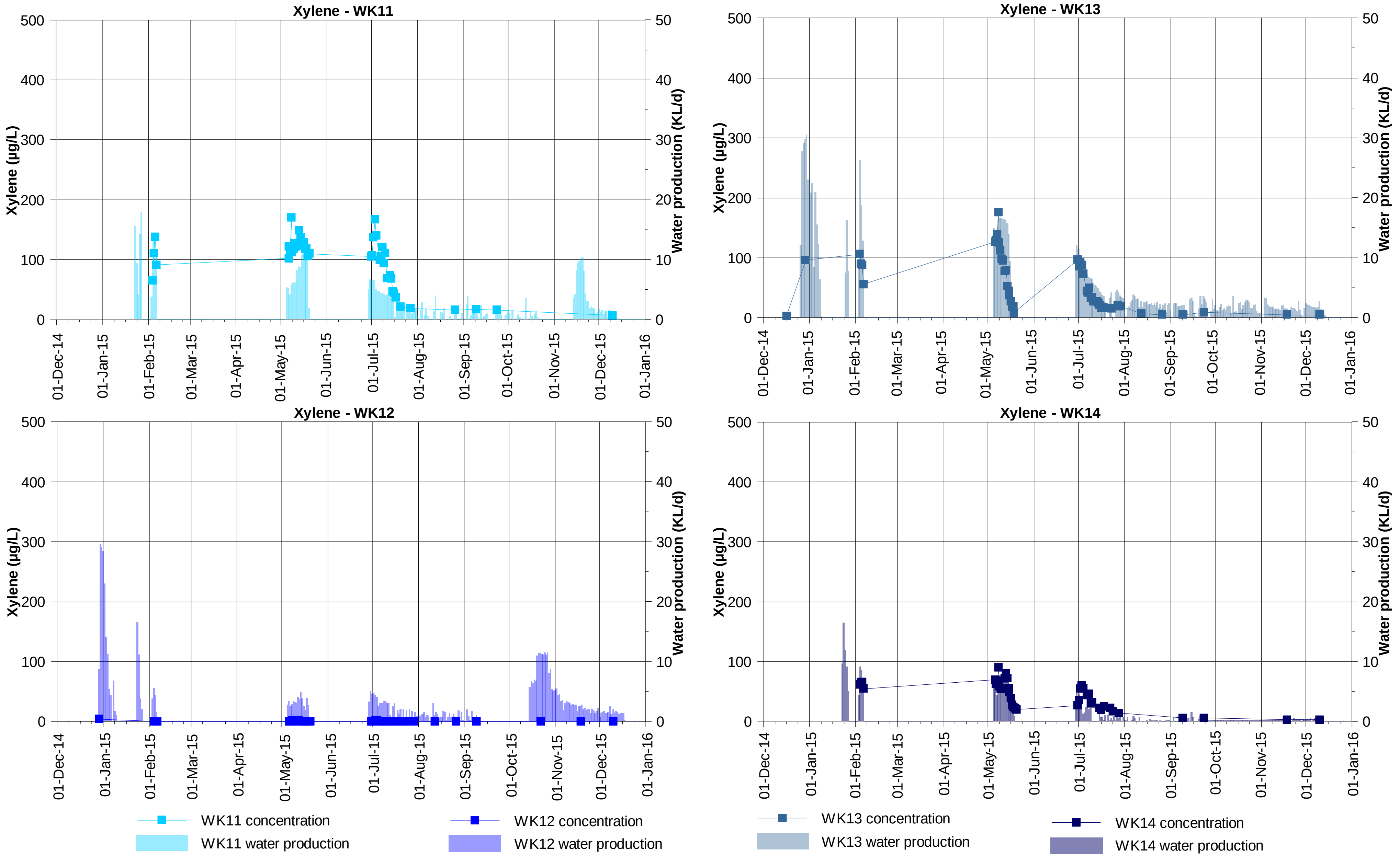

Figure E6.5: Xylene total concentrations at the Waukivory pilot wells

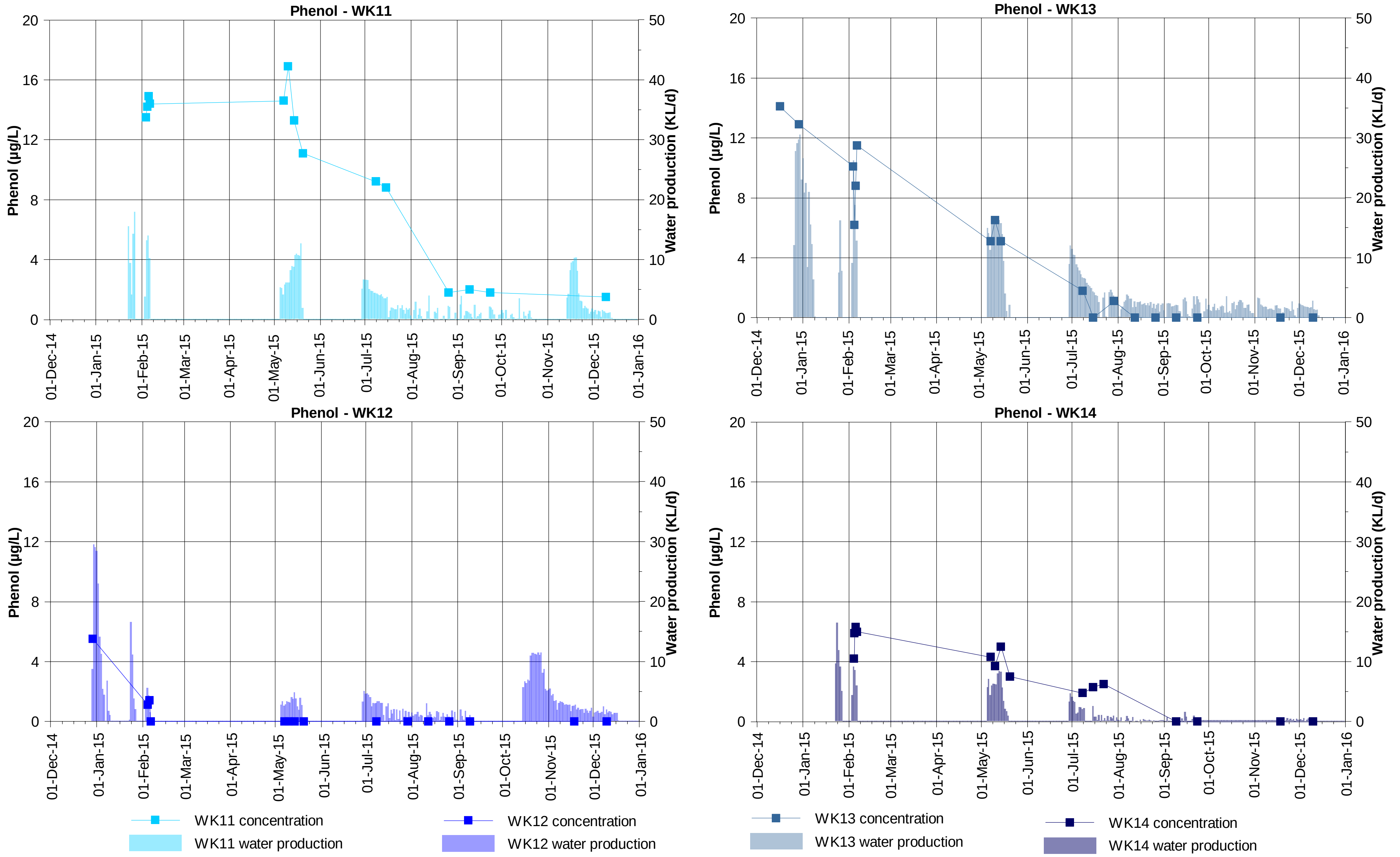

Figure E7.1: Phenol concentrations at the Waukivory pilot wells

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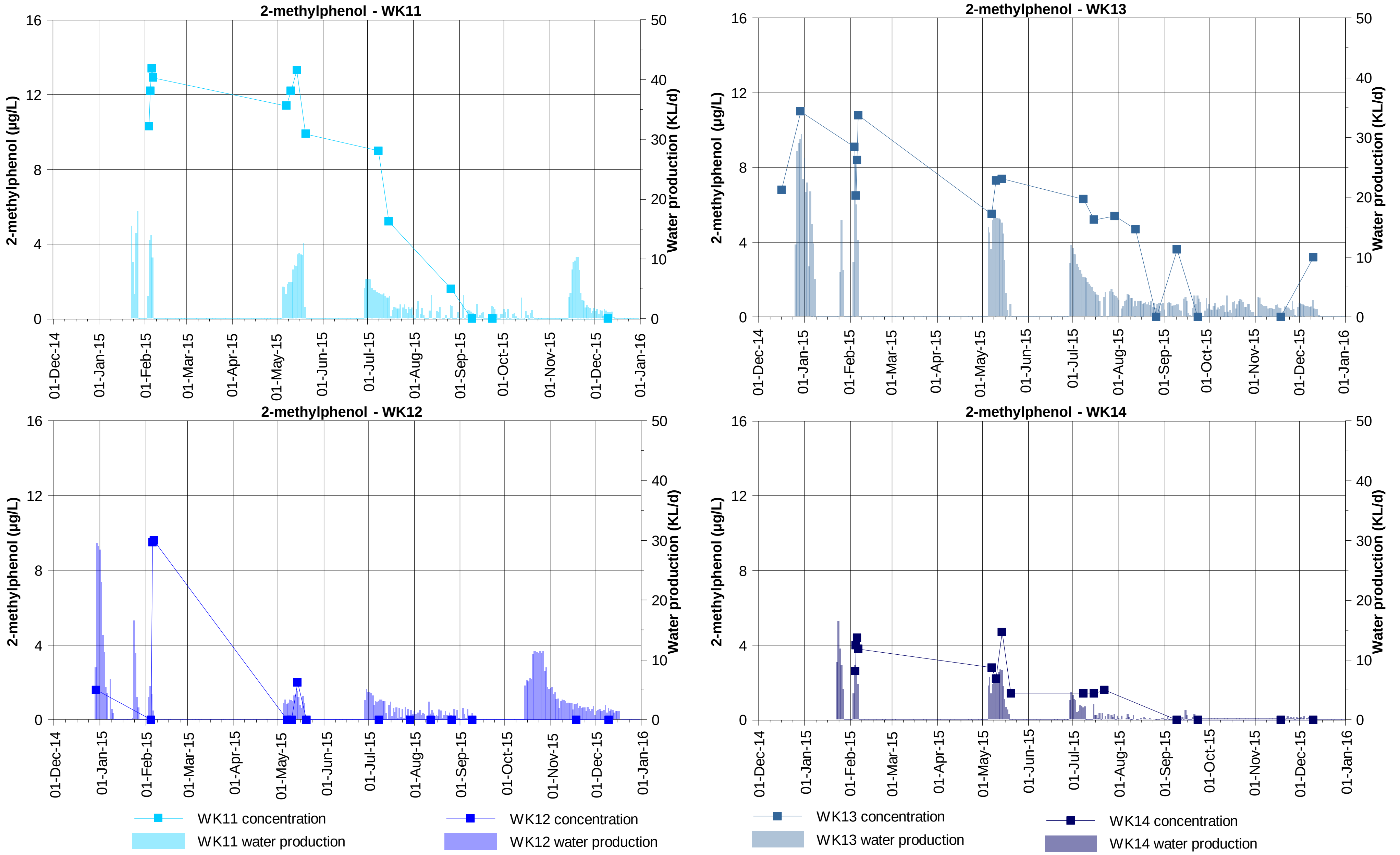

Figure E7.2: 2-methylphenol concentrations at the Waukivory pilot wells

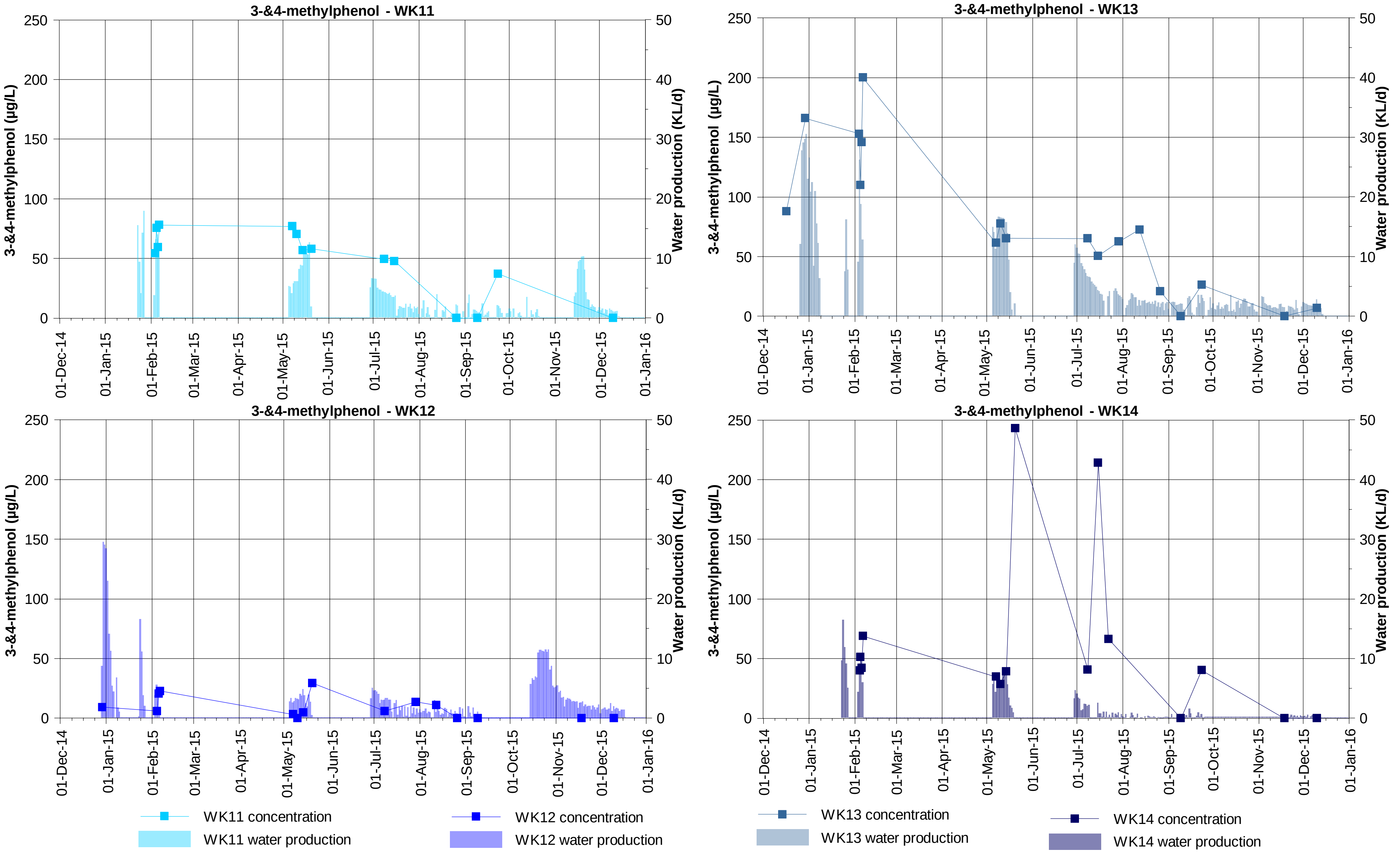

Figure E7.3: 3-&4-methylphenol concentrations at the Waukivory pilot wells

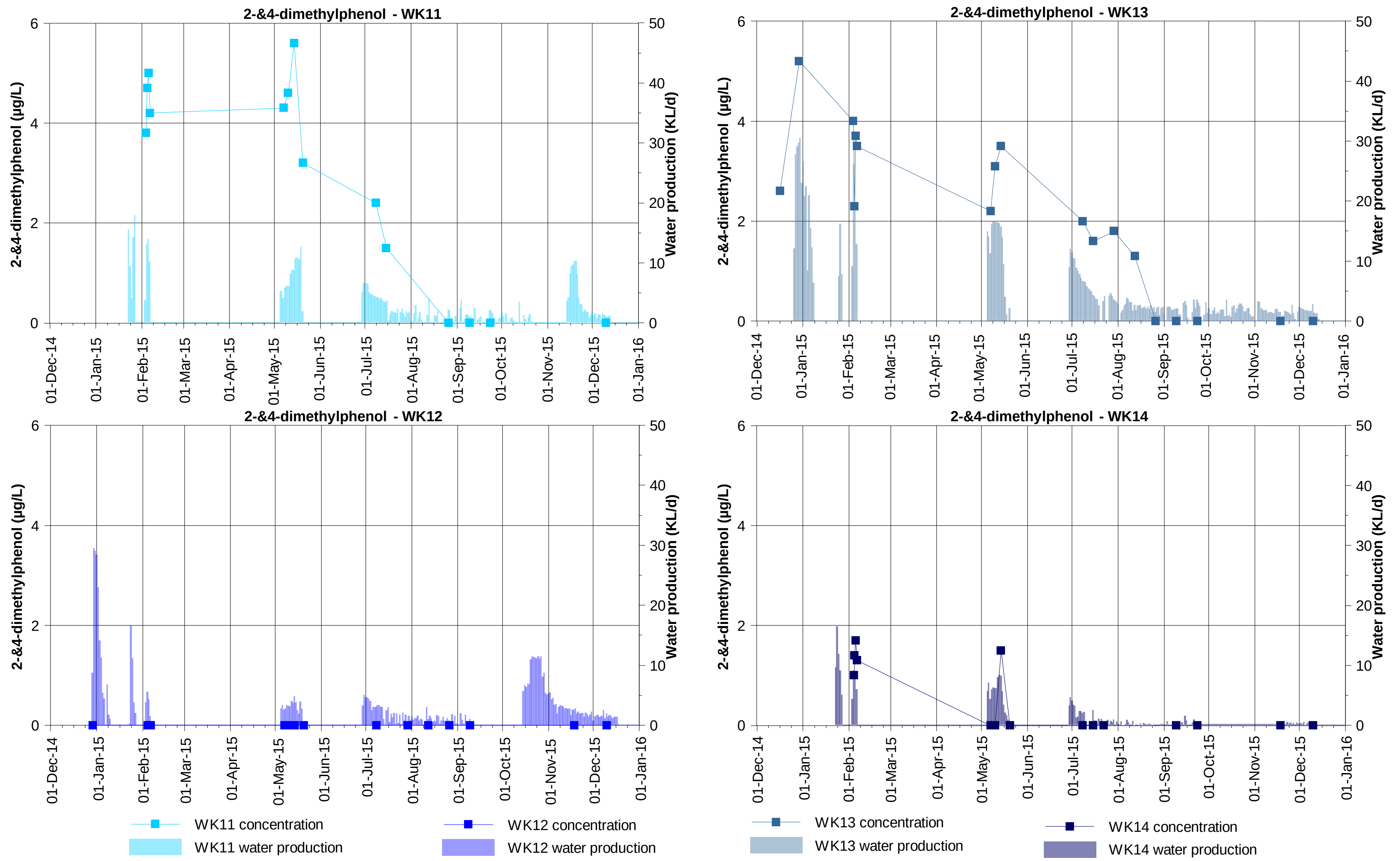

Figure E7.4: 2-&4-dimethylphenol concentrations at the Waukivory pilot wells

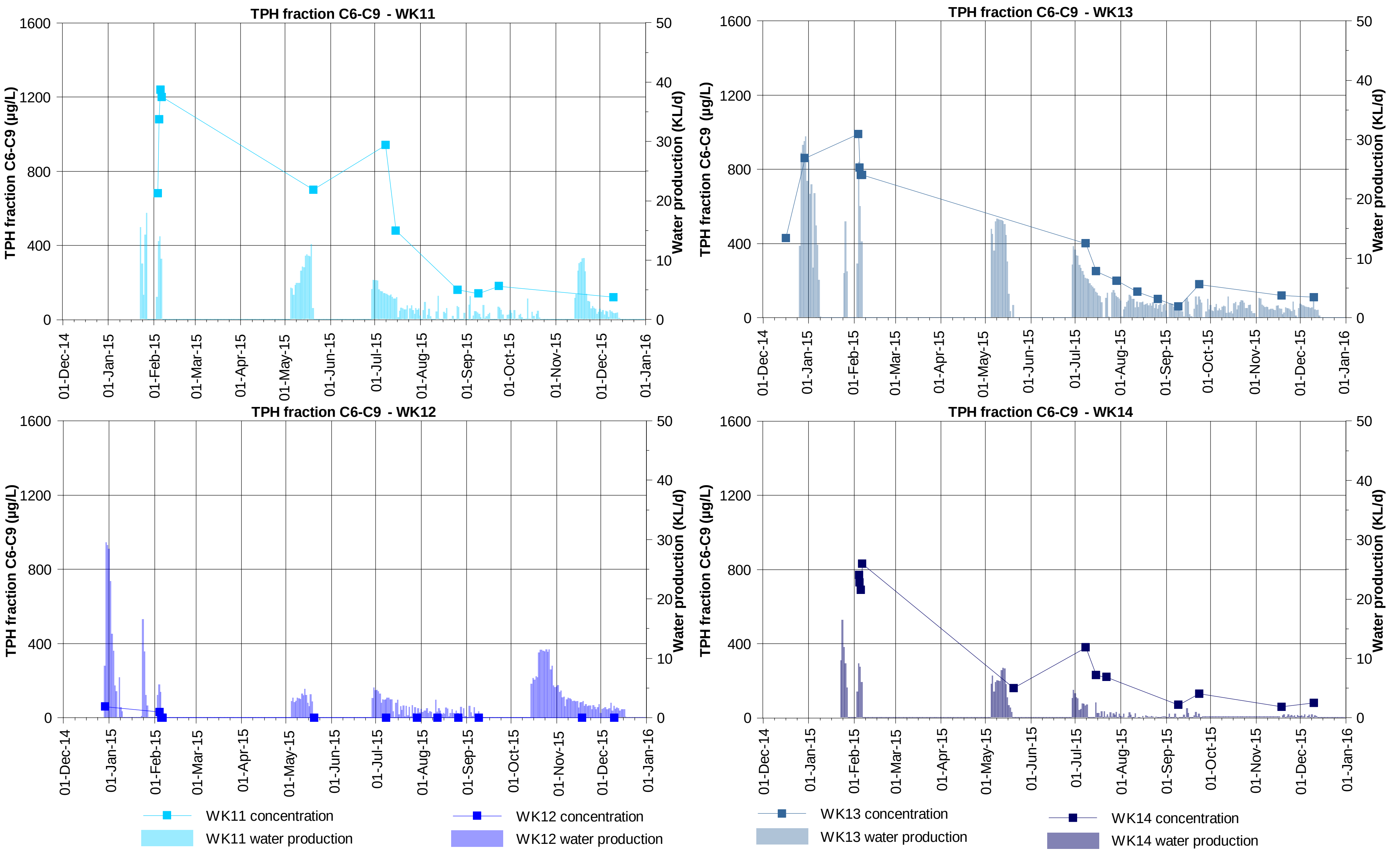

Figure E7.5: TPH fractions C6-C9 at the Waukivory pilot wells

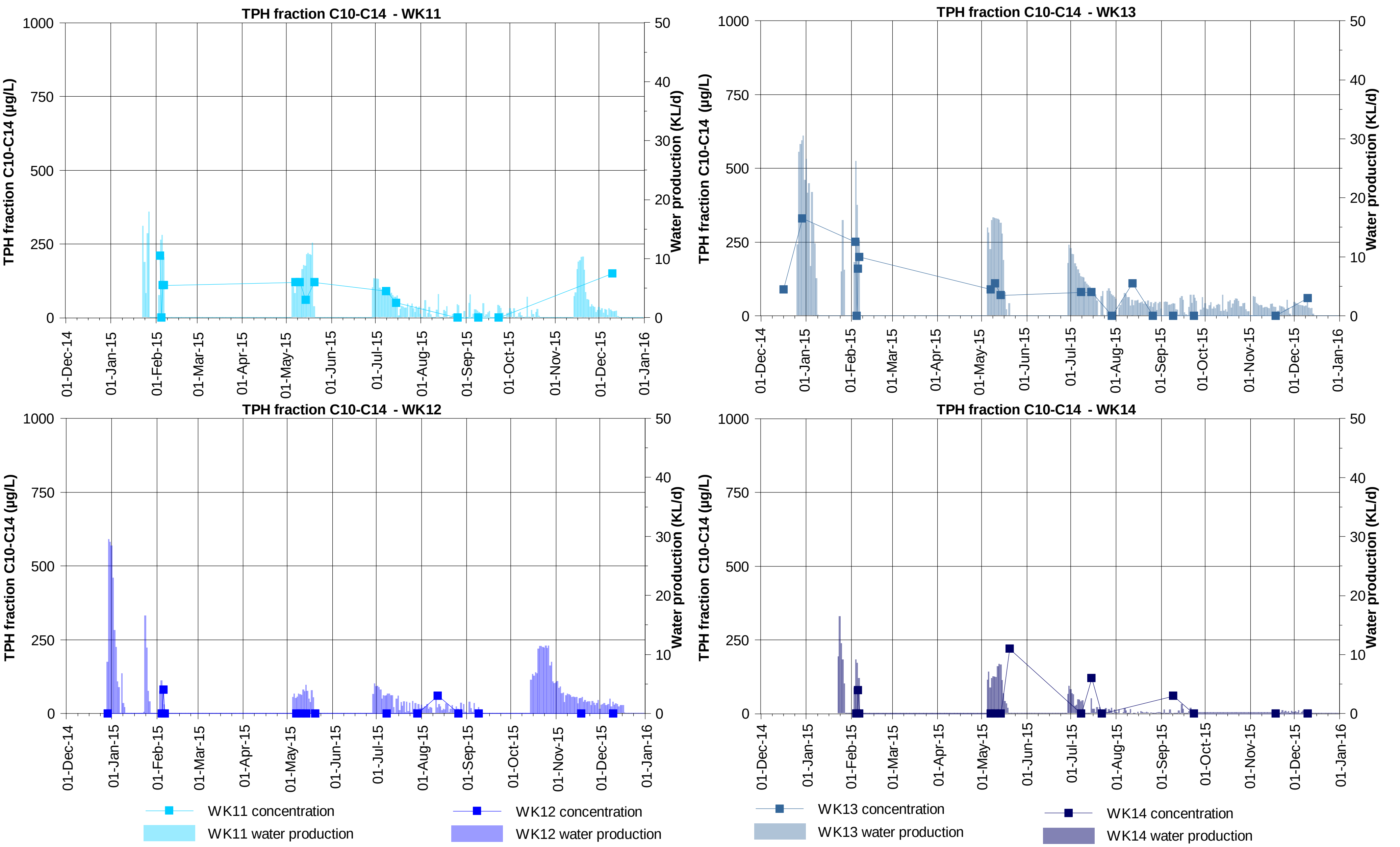

Figure E7.6: TPH fractions C10-C14 at the Waukivory pilot wells

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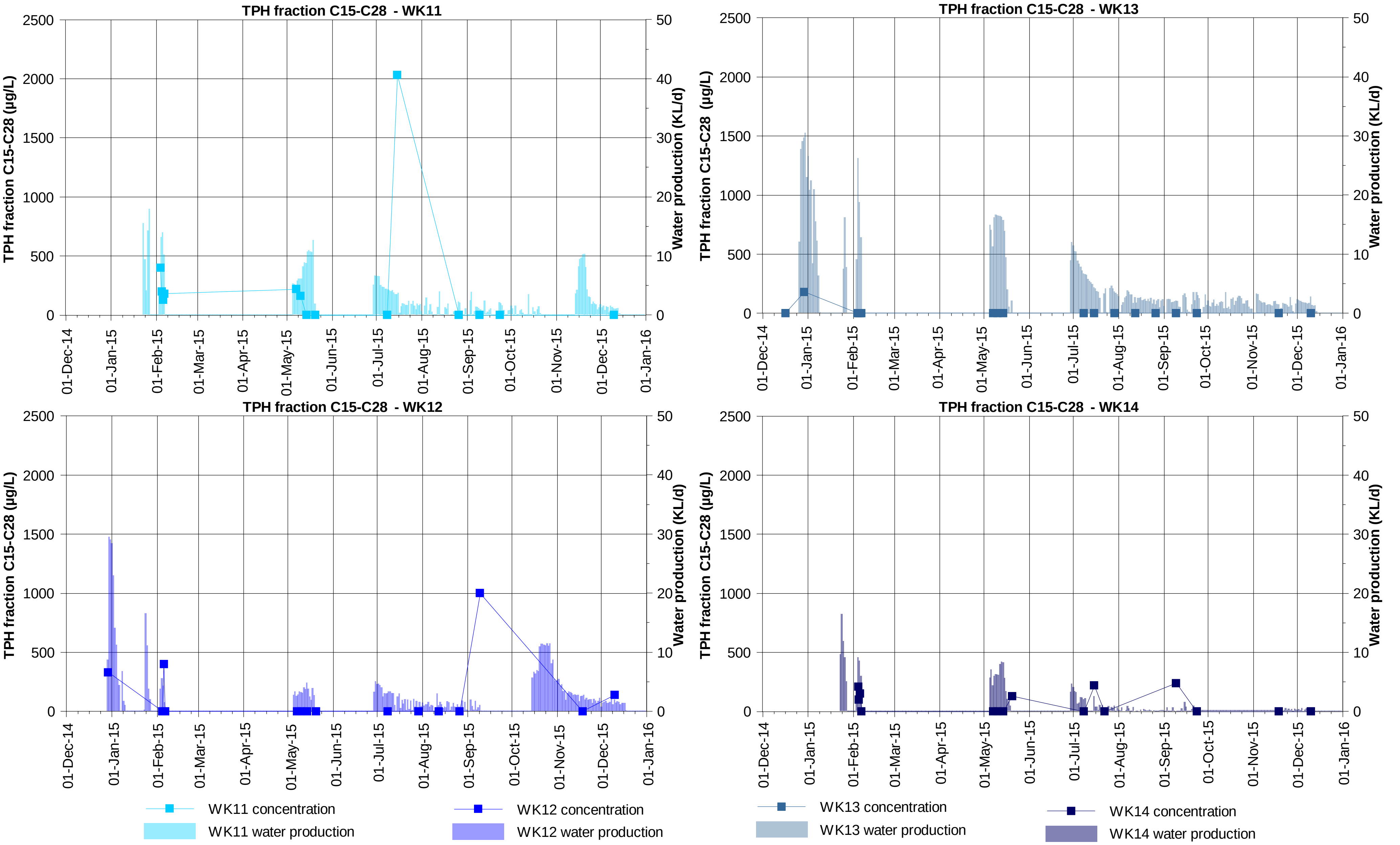

Figure E7.7: TPH fractions C15-C28 at the Waukivory pilot wells

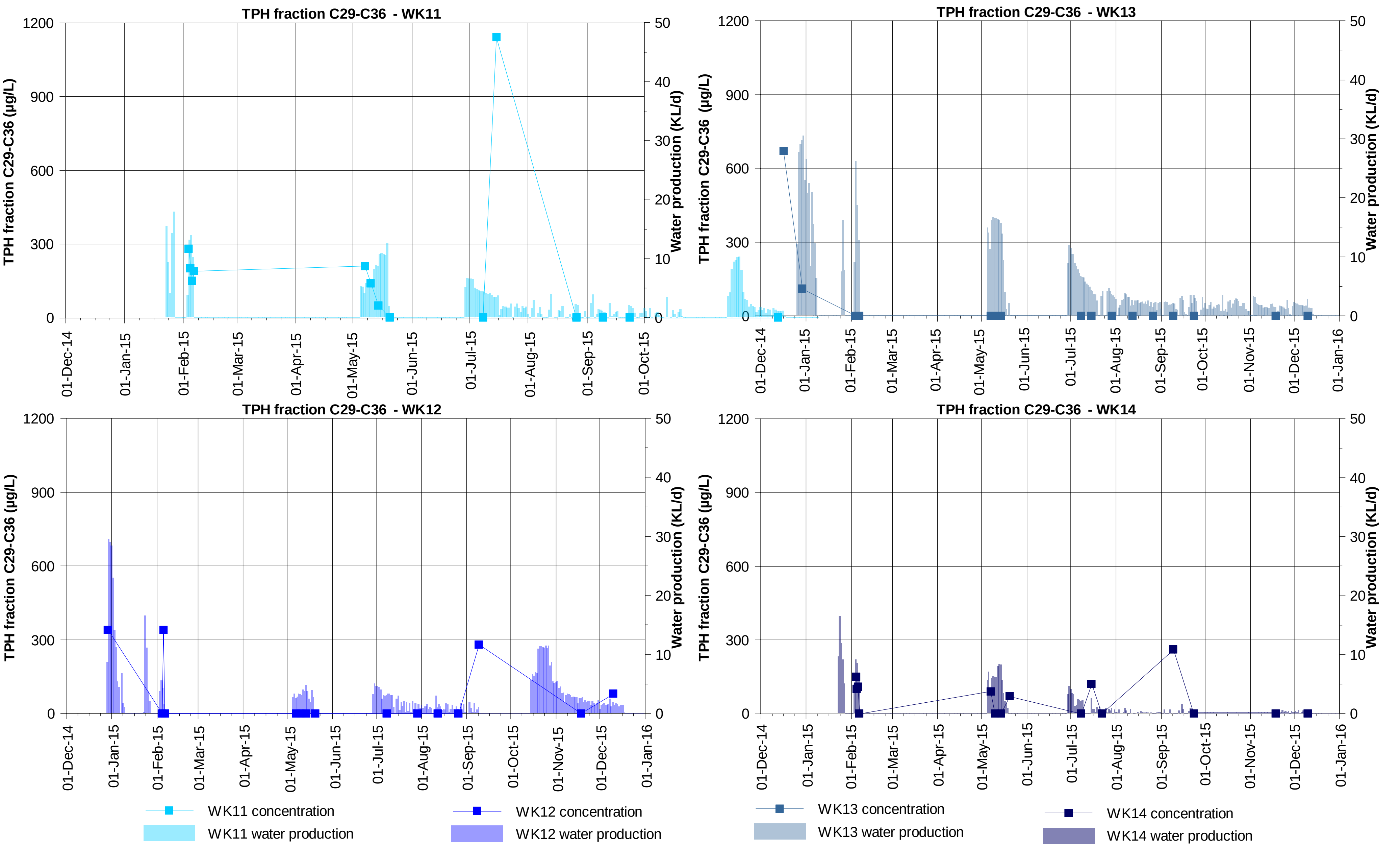

Figure E7.8: TPH fractions C29-C36 at the Waukivory pilot wells

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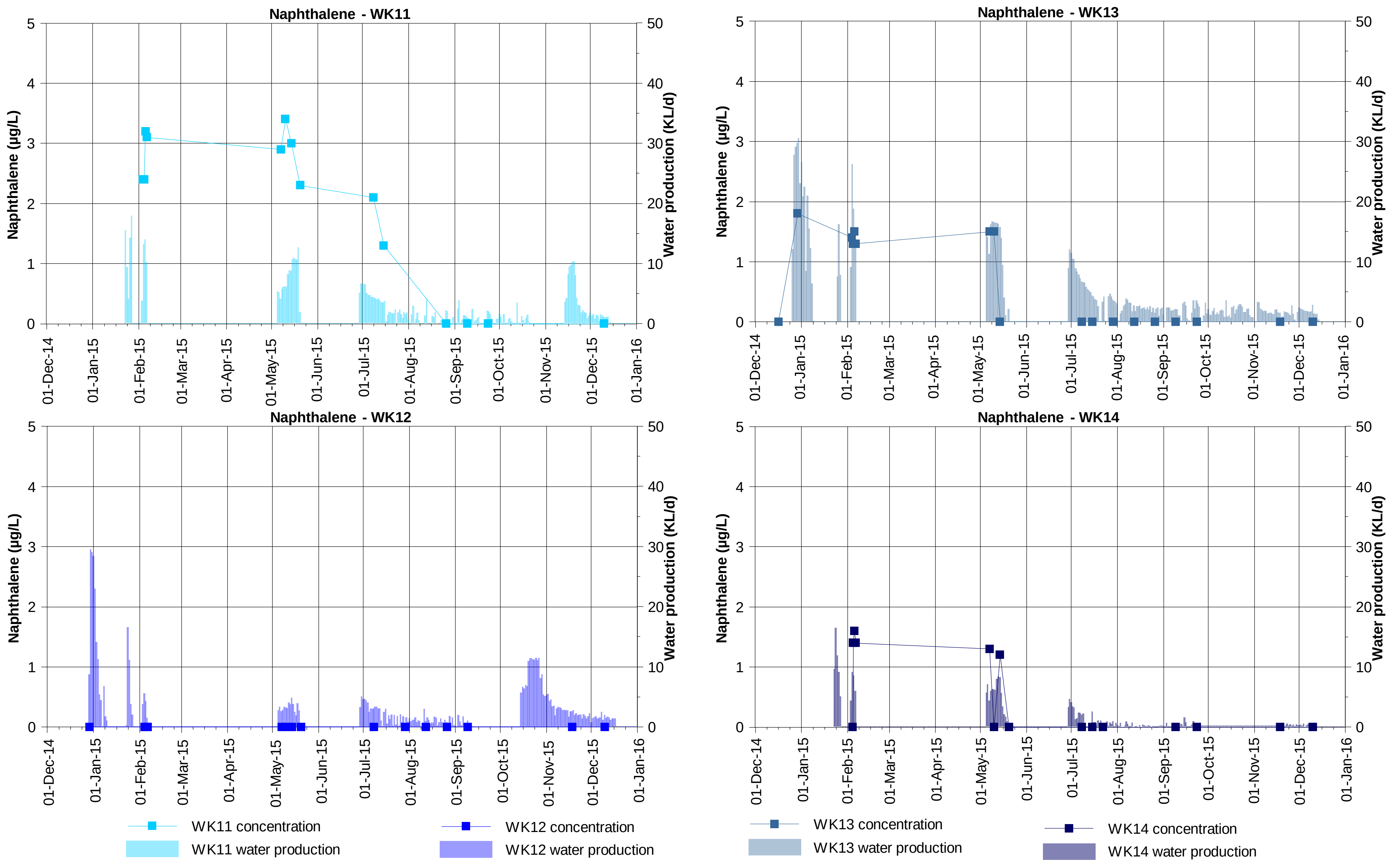


Figure E7.9: Naphthalene at the Waukivory pilot wells

Naphthalene method analysis EP075(SIM)B

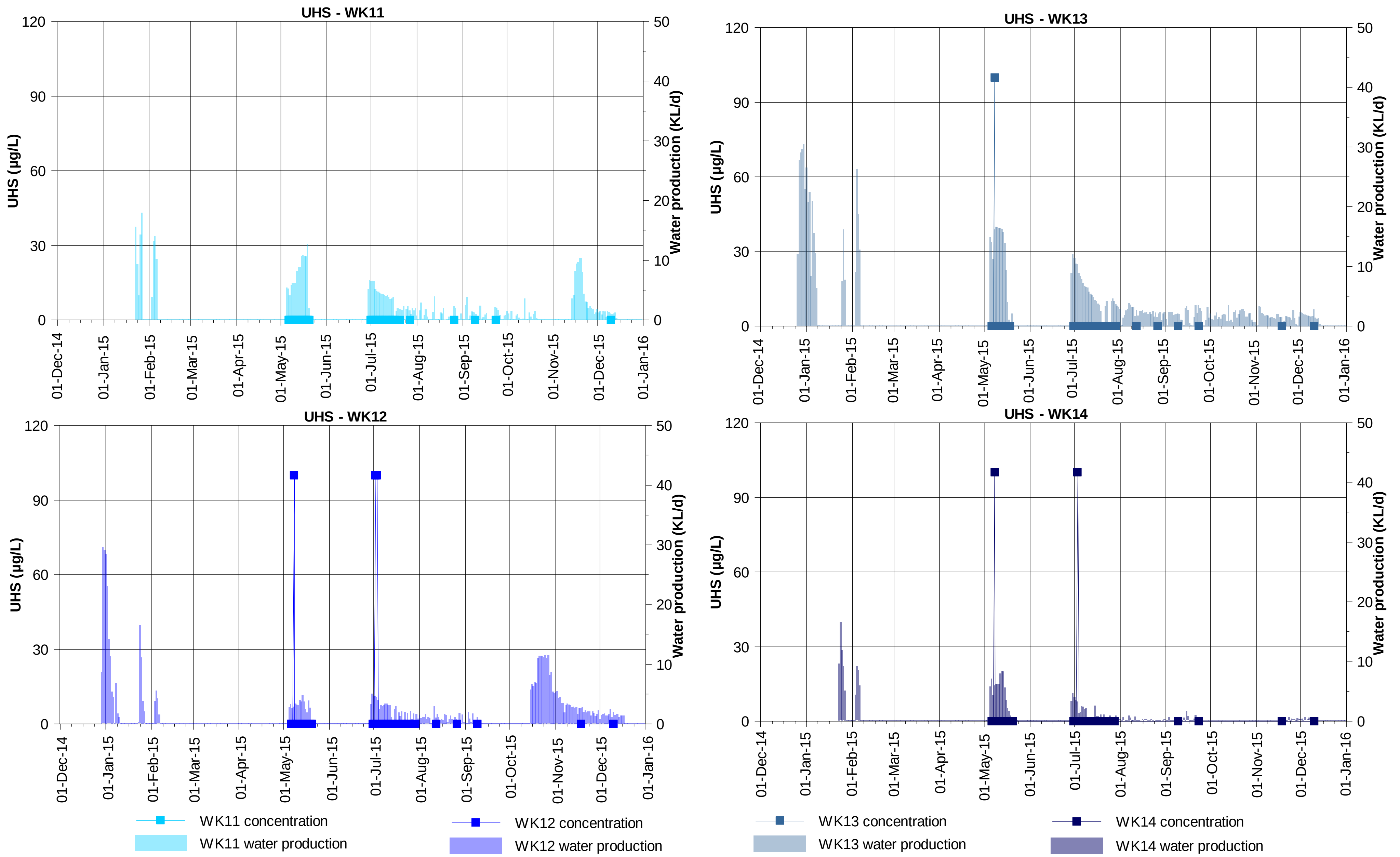


Figure 8.1: Unionized hydrogen sulphide concentrations at the Waukivory pilot wells

Appendix F

AST2 analyte time-series hydrographs

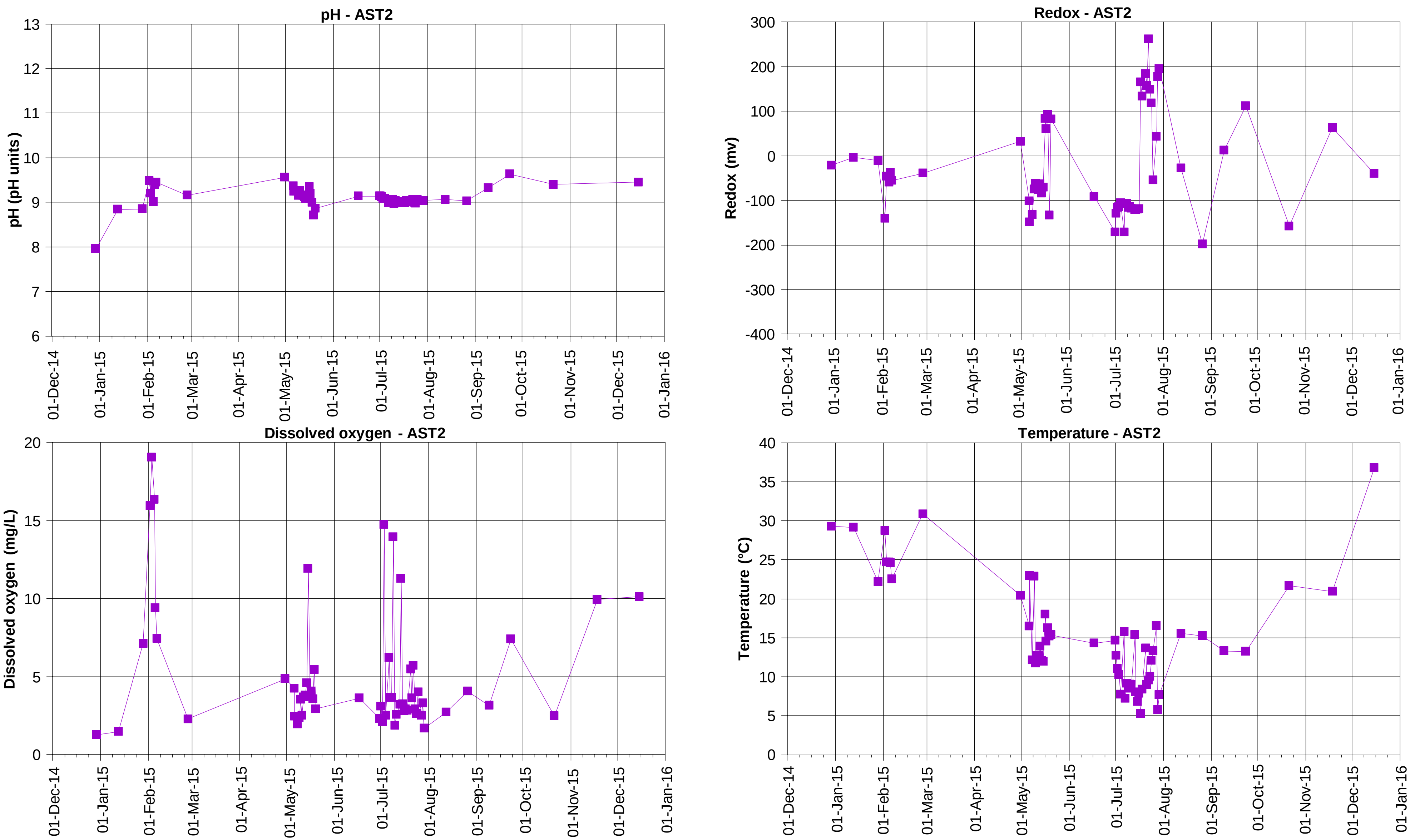
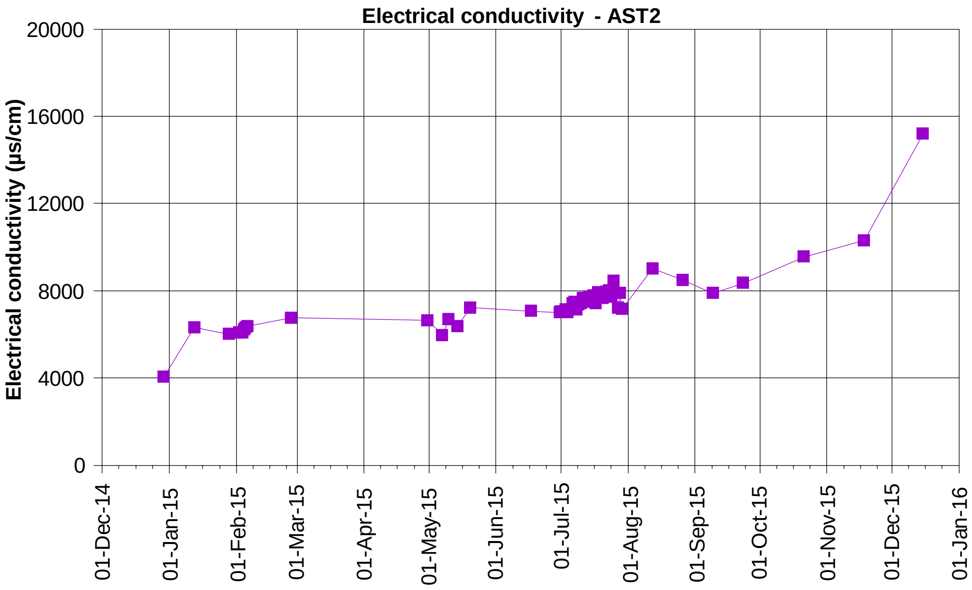


Figure F1.1: Field measurements of pH, redox, dissolved oxygen and temperature at AST2.



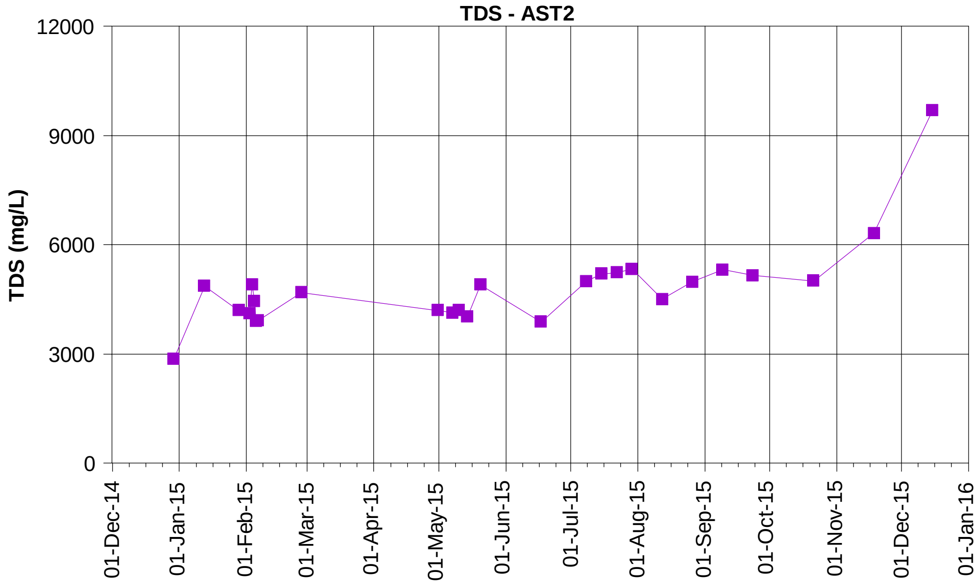


Figure F1.2: Laboratory measurements of electrical conductivity and Total Dissolved Solids (TDS) at AST2.

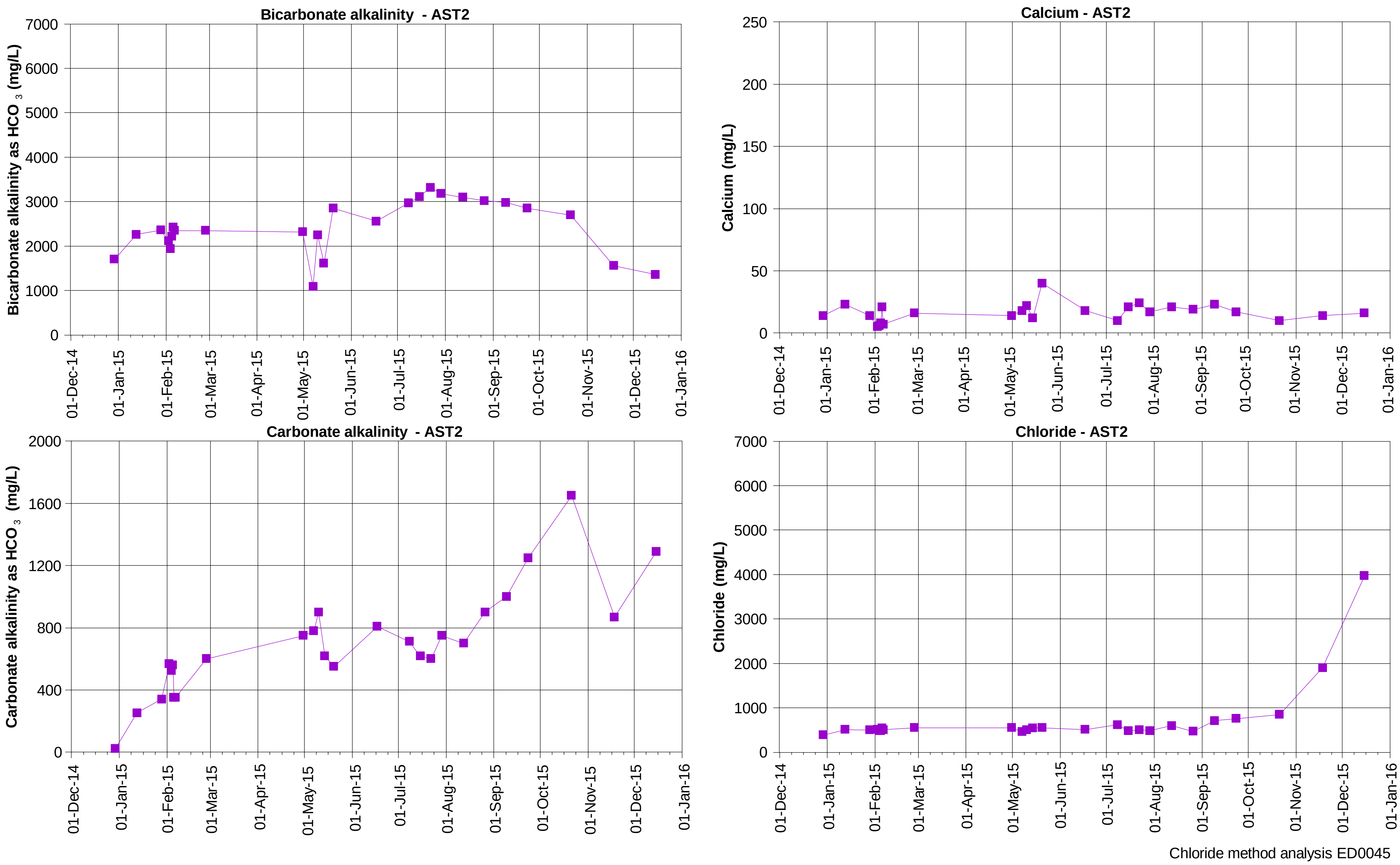


Figure F2.1: Bicarbonate alkalinity, carbonate alkalinity, calcium and chloride concentrations at AST2

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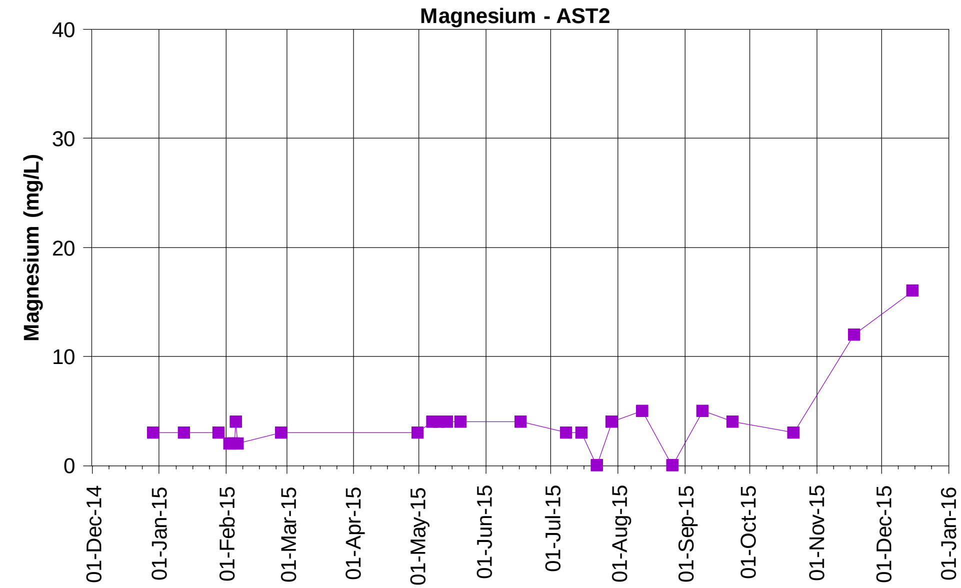

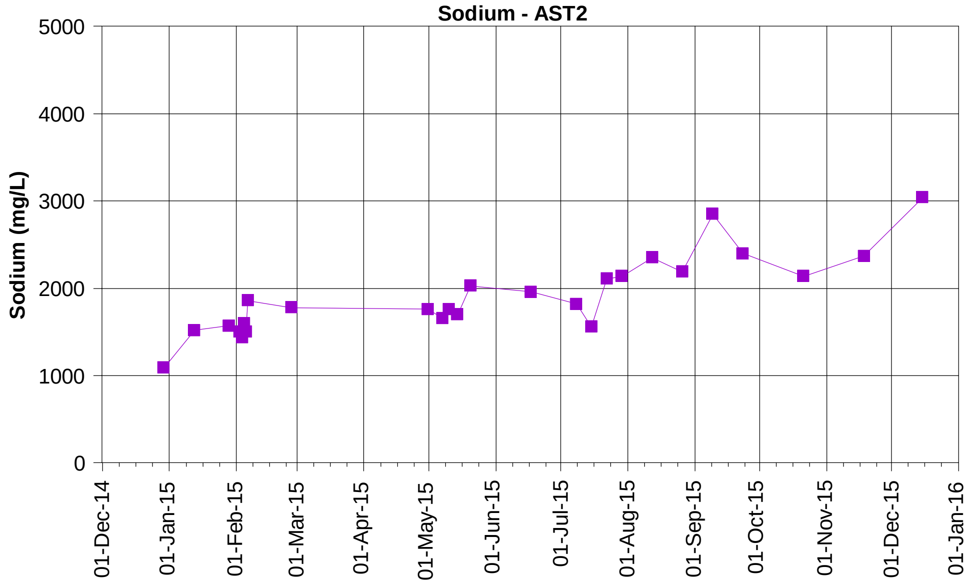

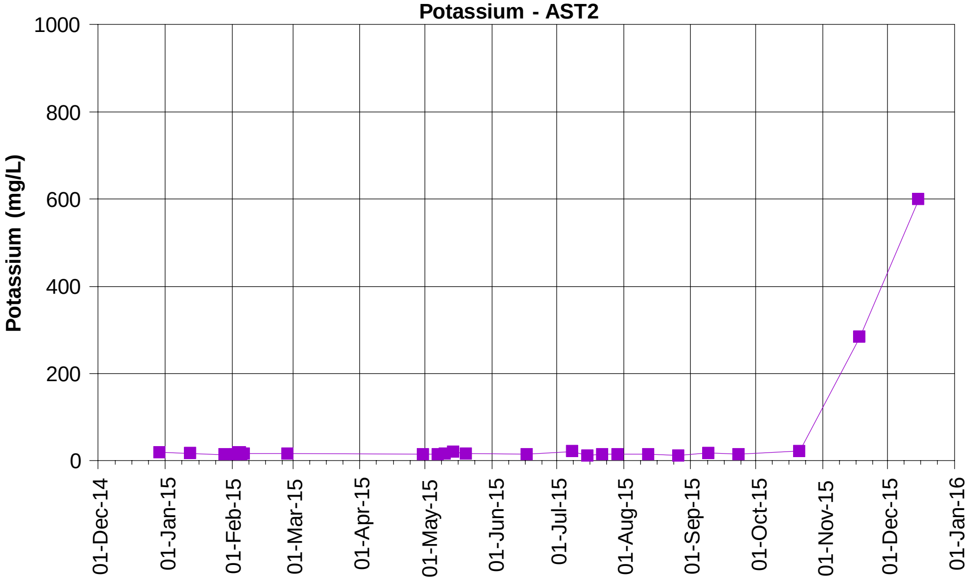

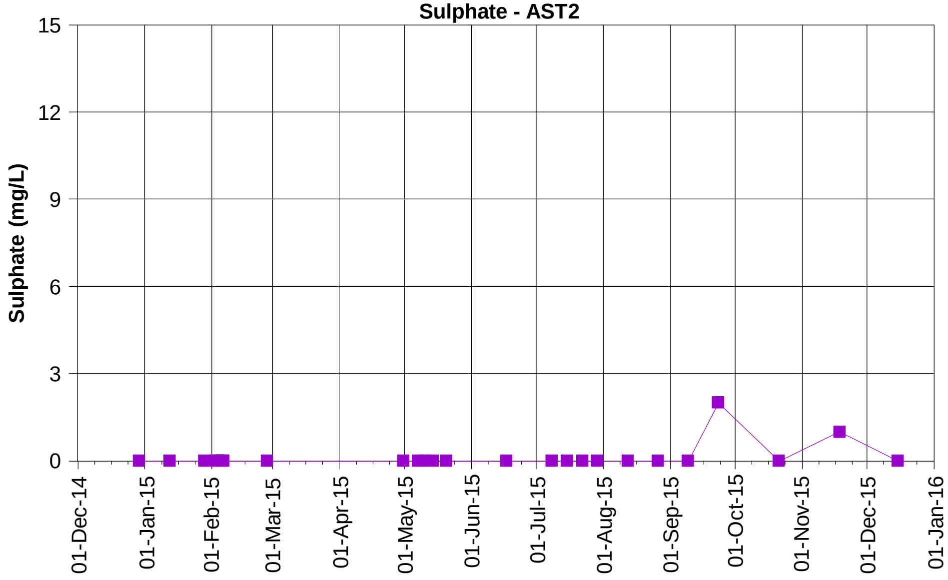

Figure F2.2: Magnesium, potassium, sodium and sulphate concentrations at AST2

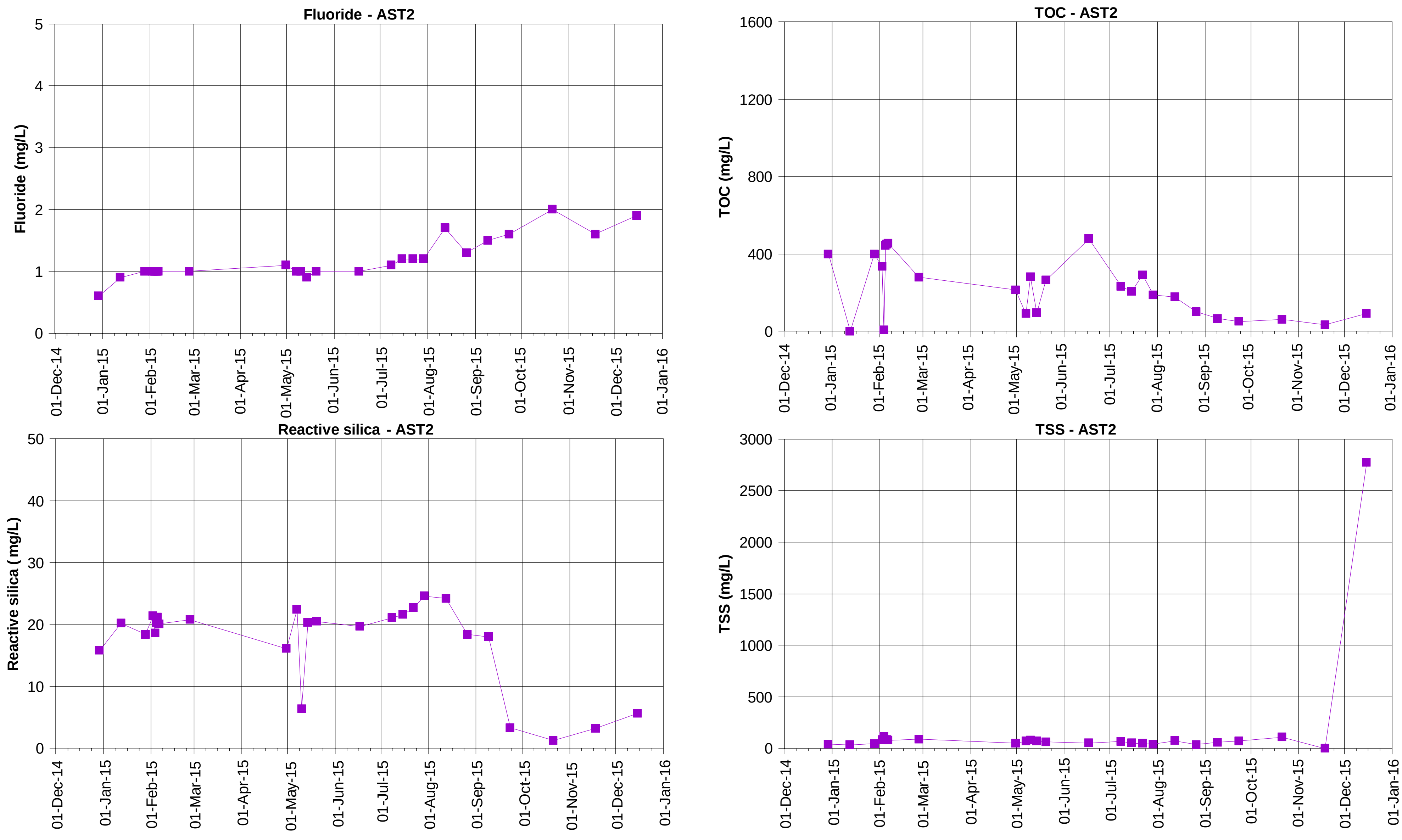

Figure F2.3: Fluoride, reactive silica, total organic carbon (TOC) and total suspended solids (TSS) concentrations at AST2

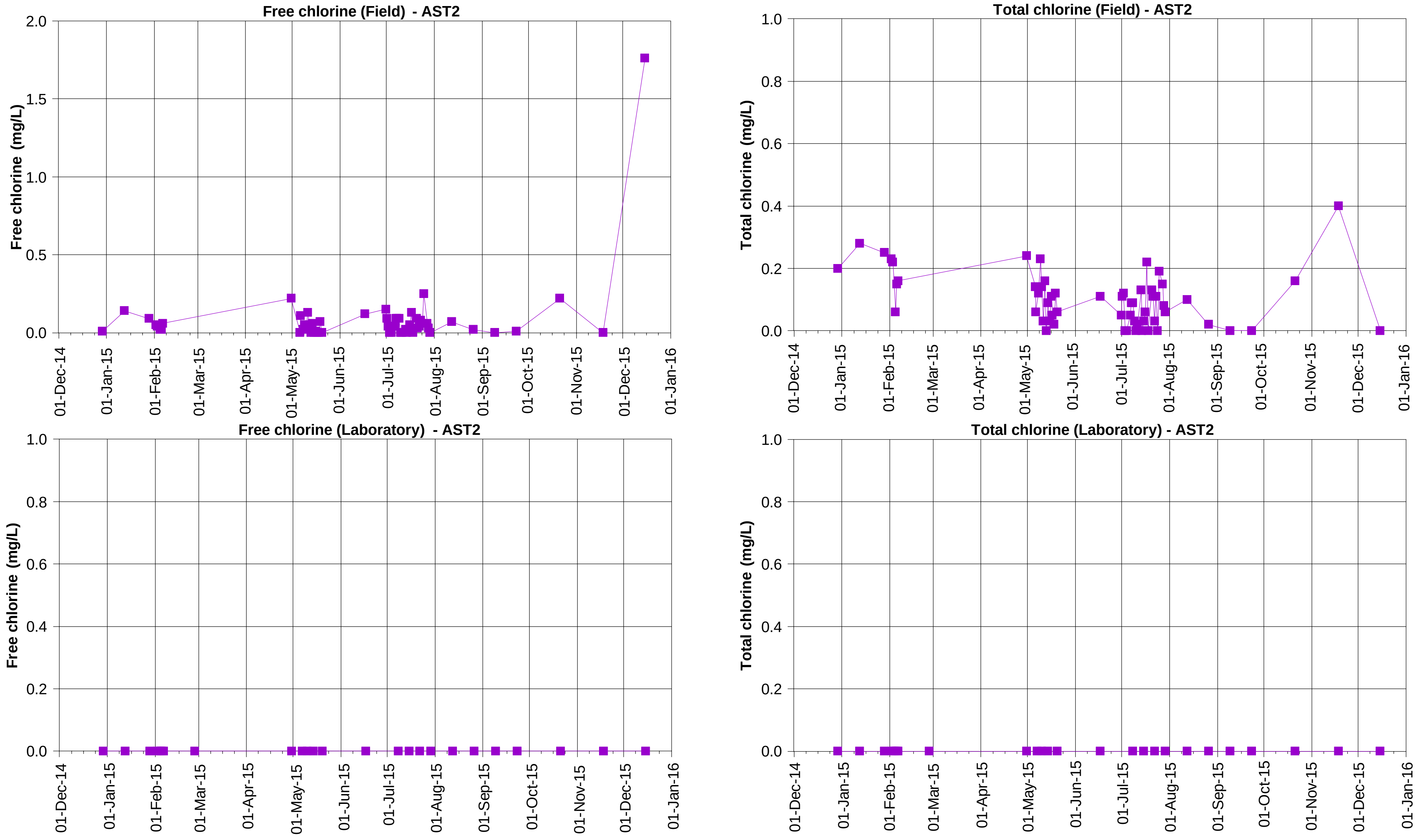

Figure F2.4: Field and laboratory measurements of free and total chlorine at AST2.

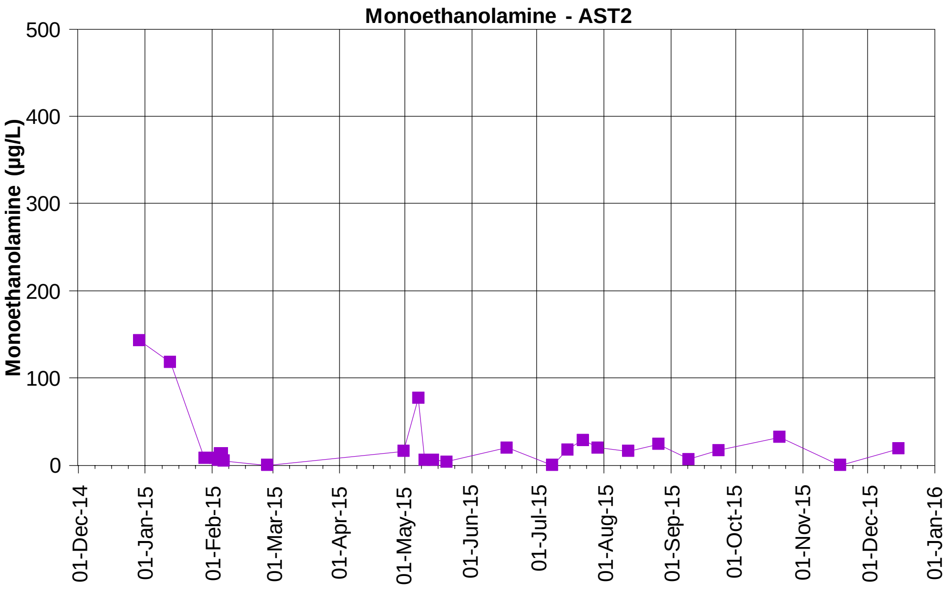

Figure F2.5: Monoethanolamine concentrations at AST2.

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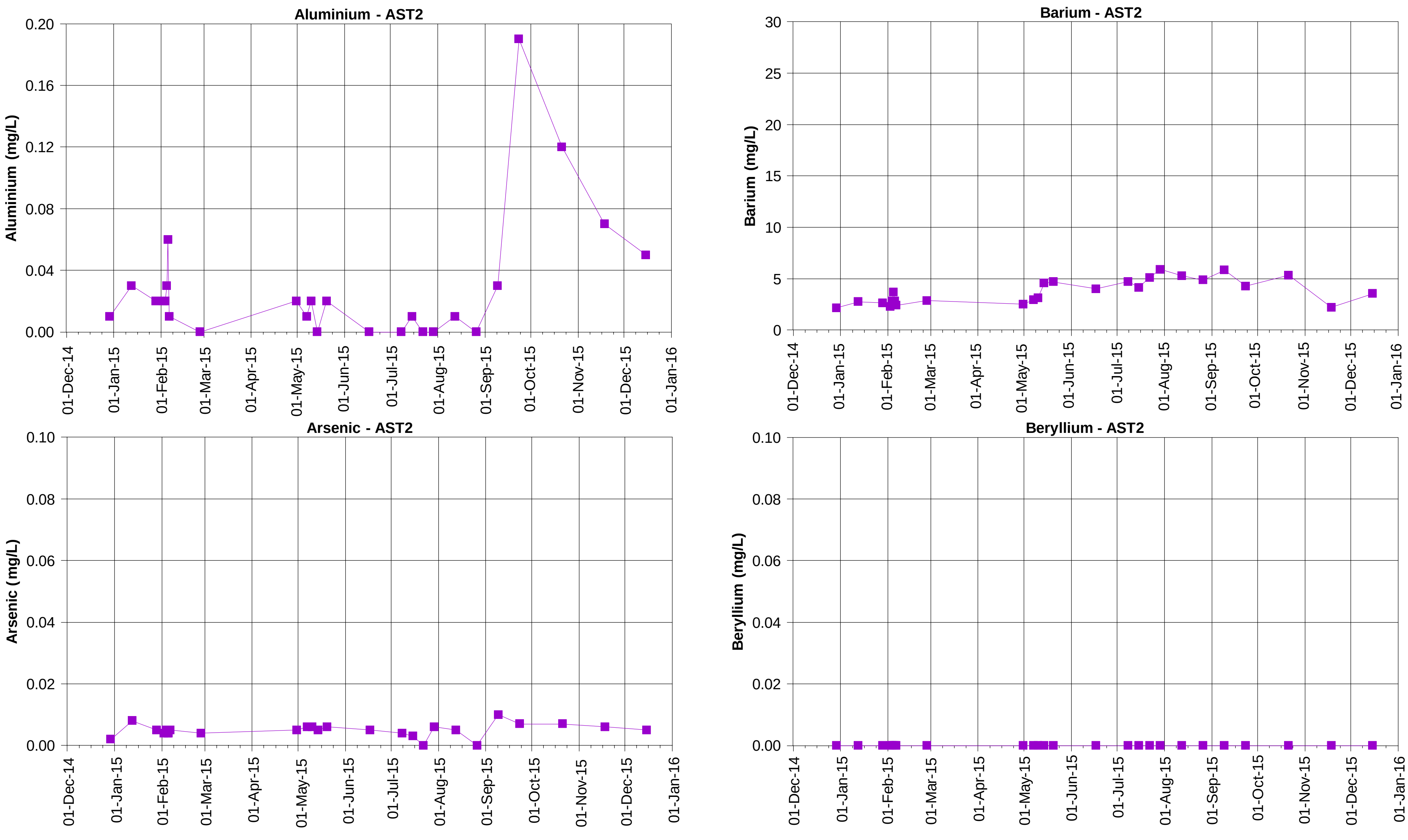

Figure F3.1: Aluminium, arsenic, barium and beryllium concentrations at AST2

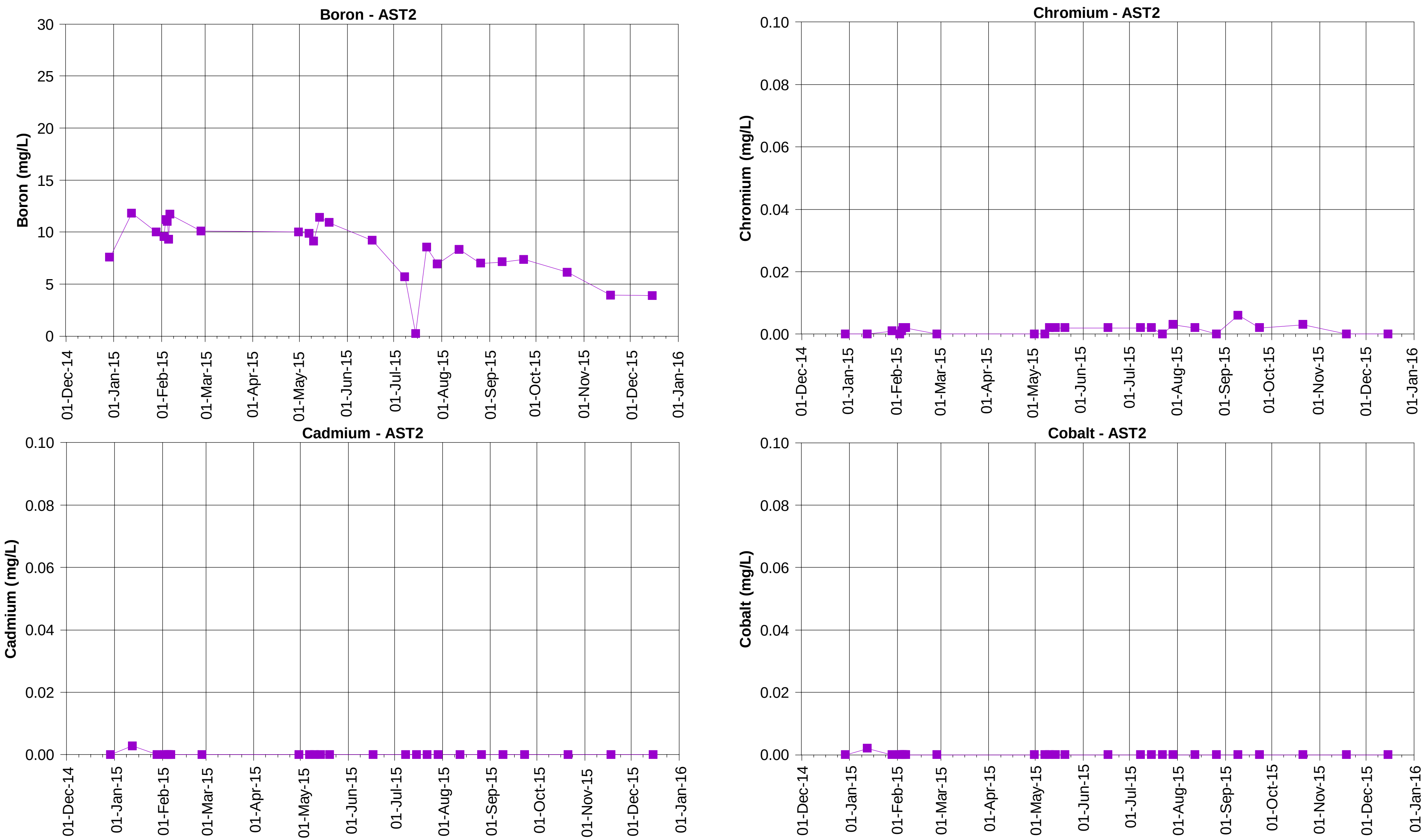

Figure F3.2: Boron, cadmium, chromium and cobalt concentrations at AST2

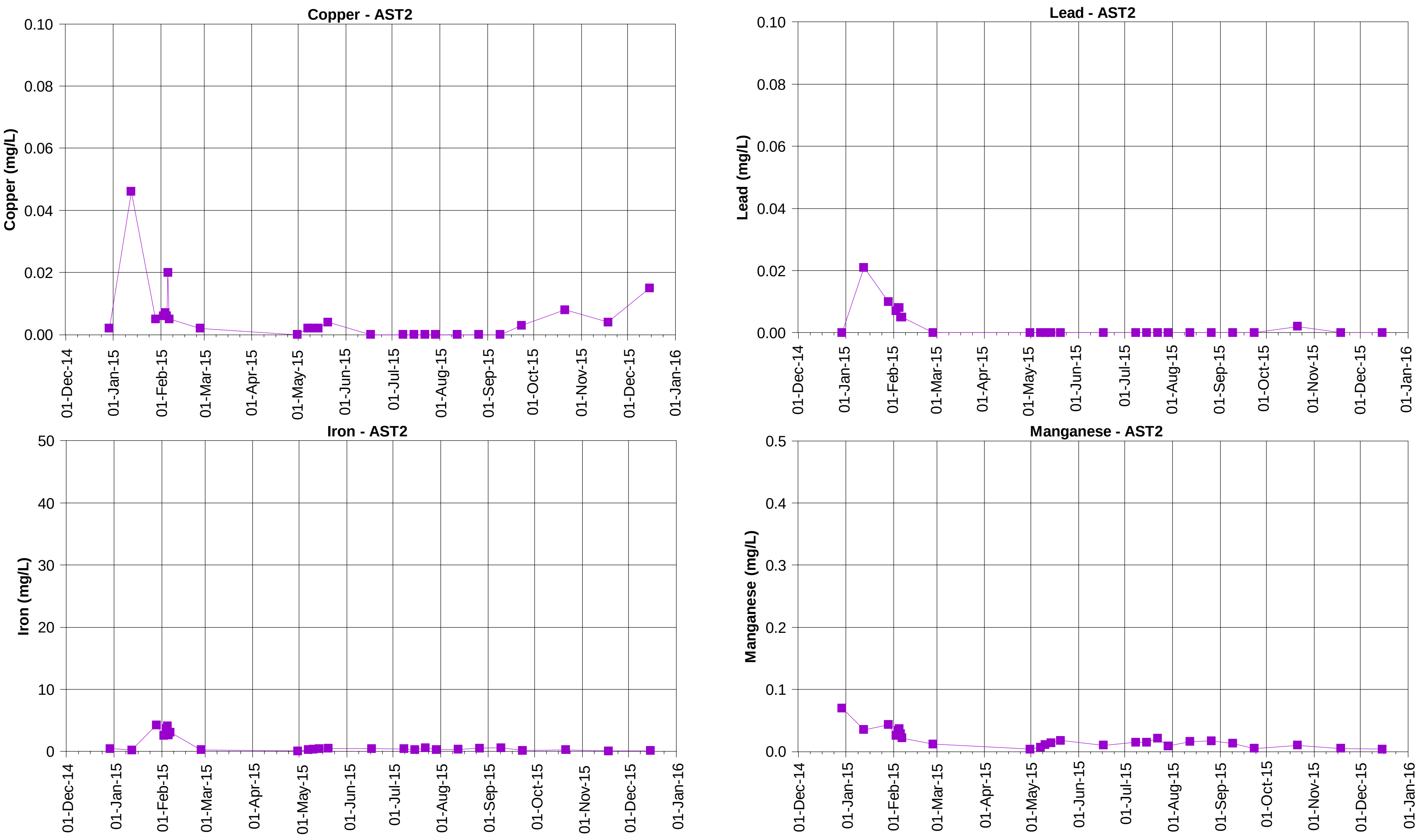

Figure F3.3: Copper, iron, lead and manganese concentrations at AST2

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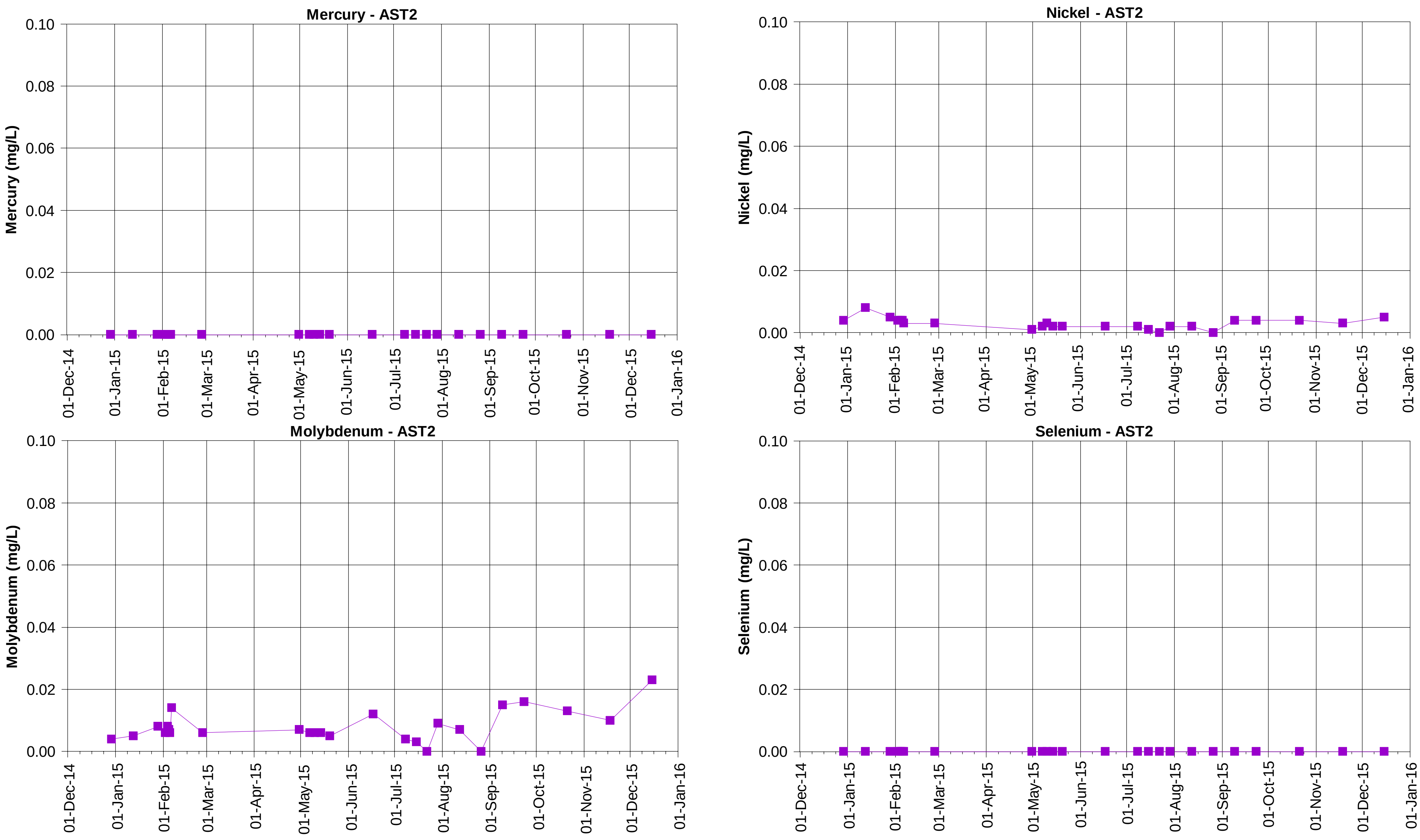

Figure F3.4: Mercury, molybdenum, nickel and selenium concentrations at AST2

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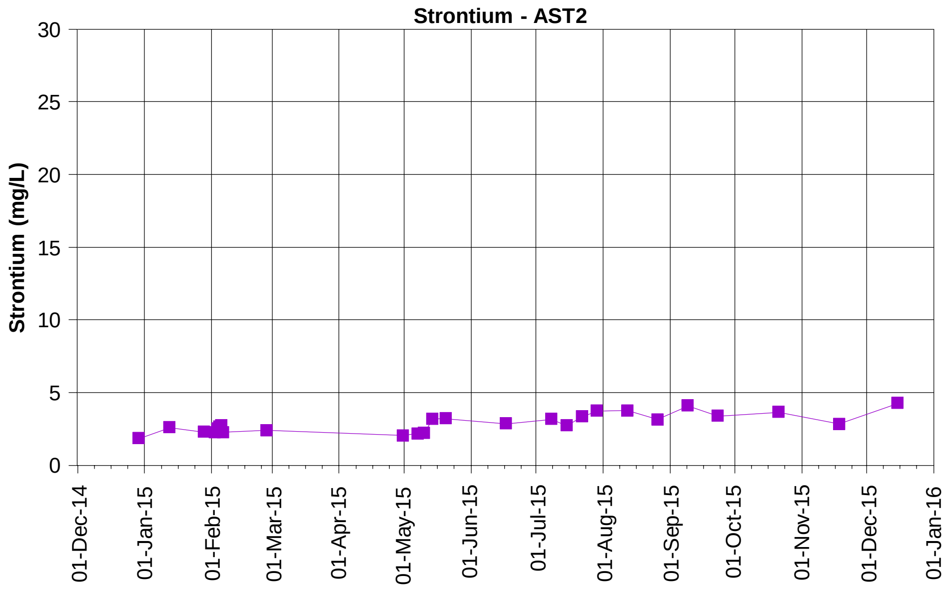

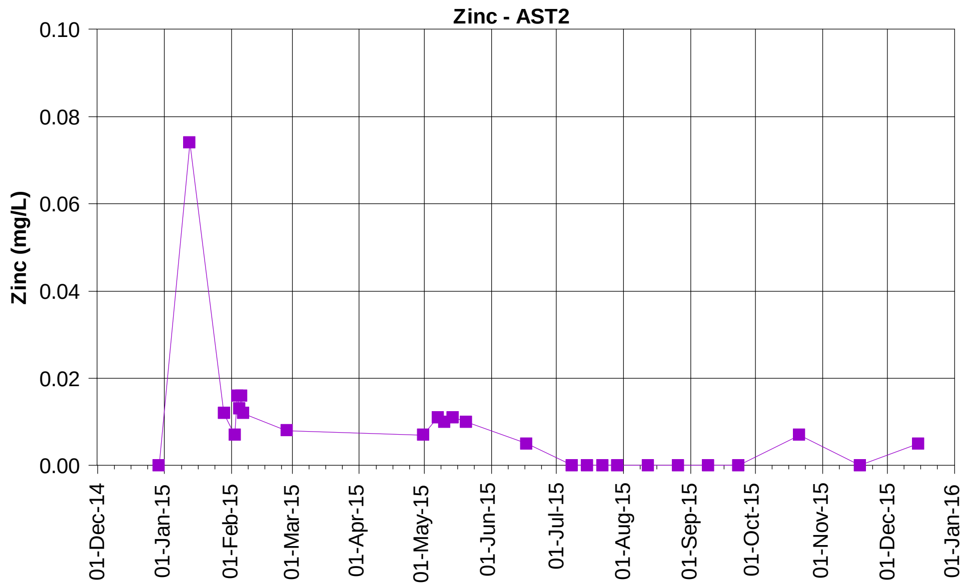

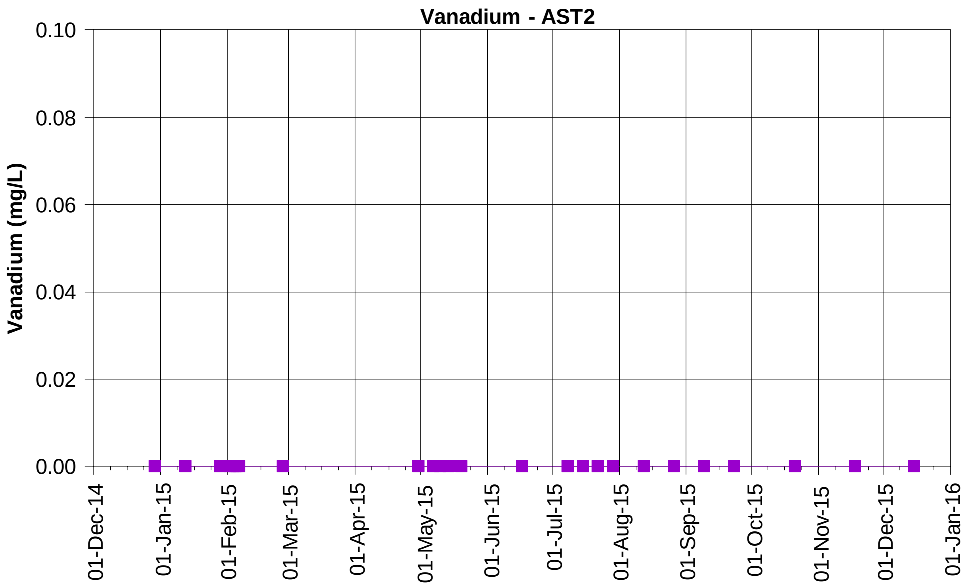

Figure F3.5: Strontium, vanadium and zinc concentrations at AST2

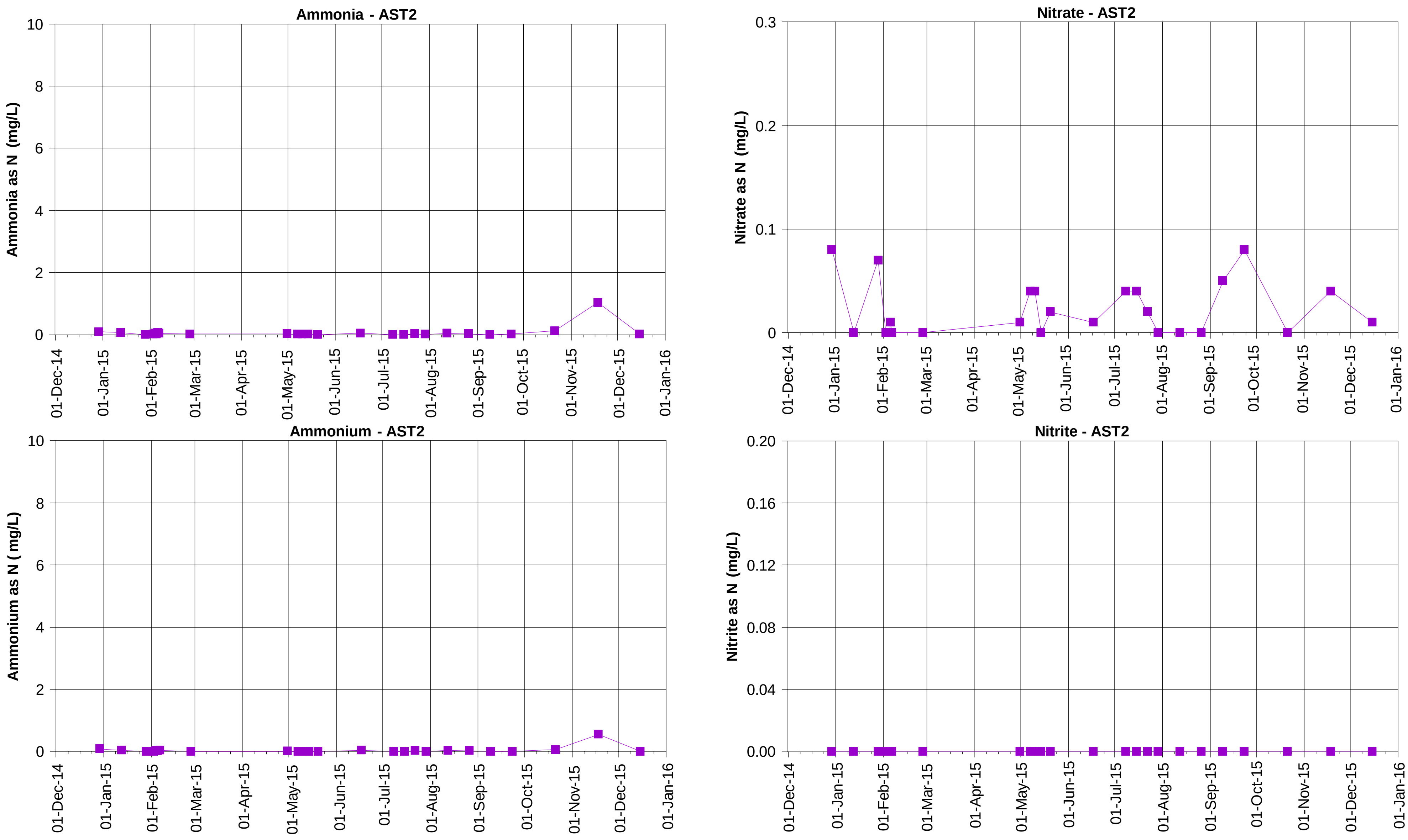

Figure F4.1: Ammonia, ammonium, nitrate and nitrite concentrations at AST2

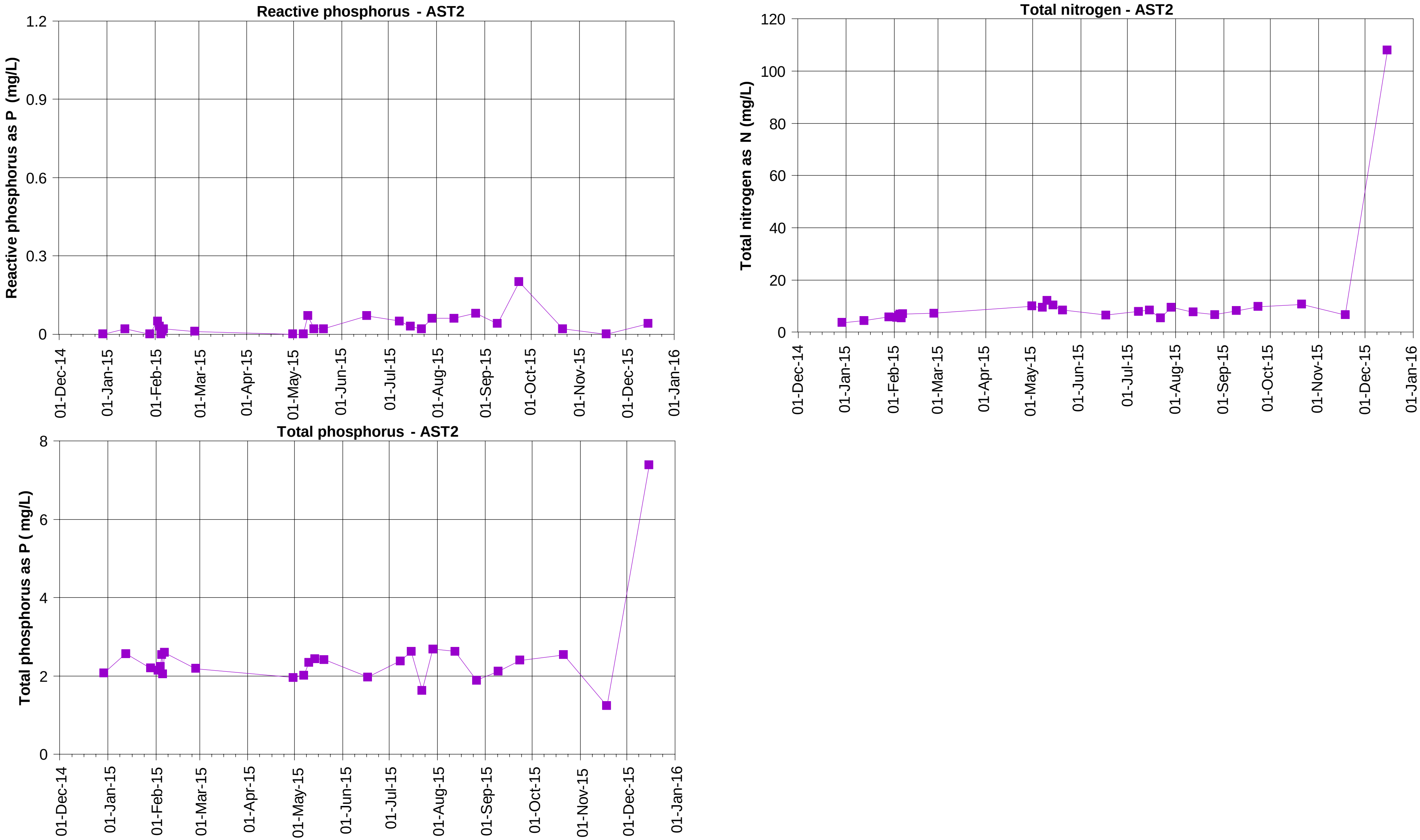

Figure F4.2: Reactive phosphorus, total phosphorus and total nitrogen concentrations at AST2

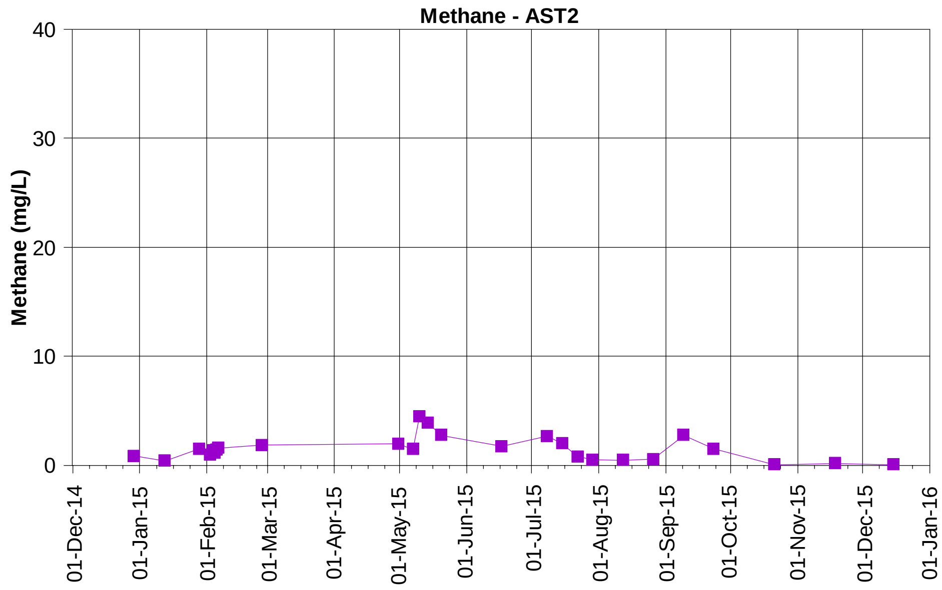

Figure G5.1: Concentration of methane at AST2.

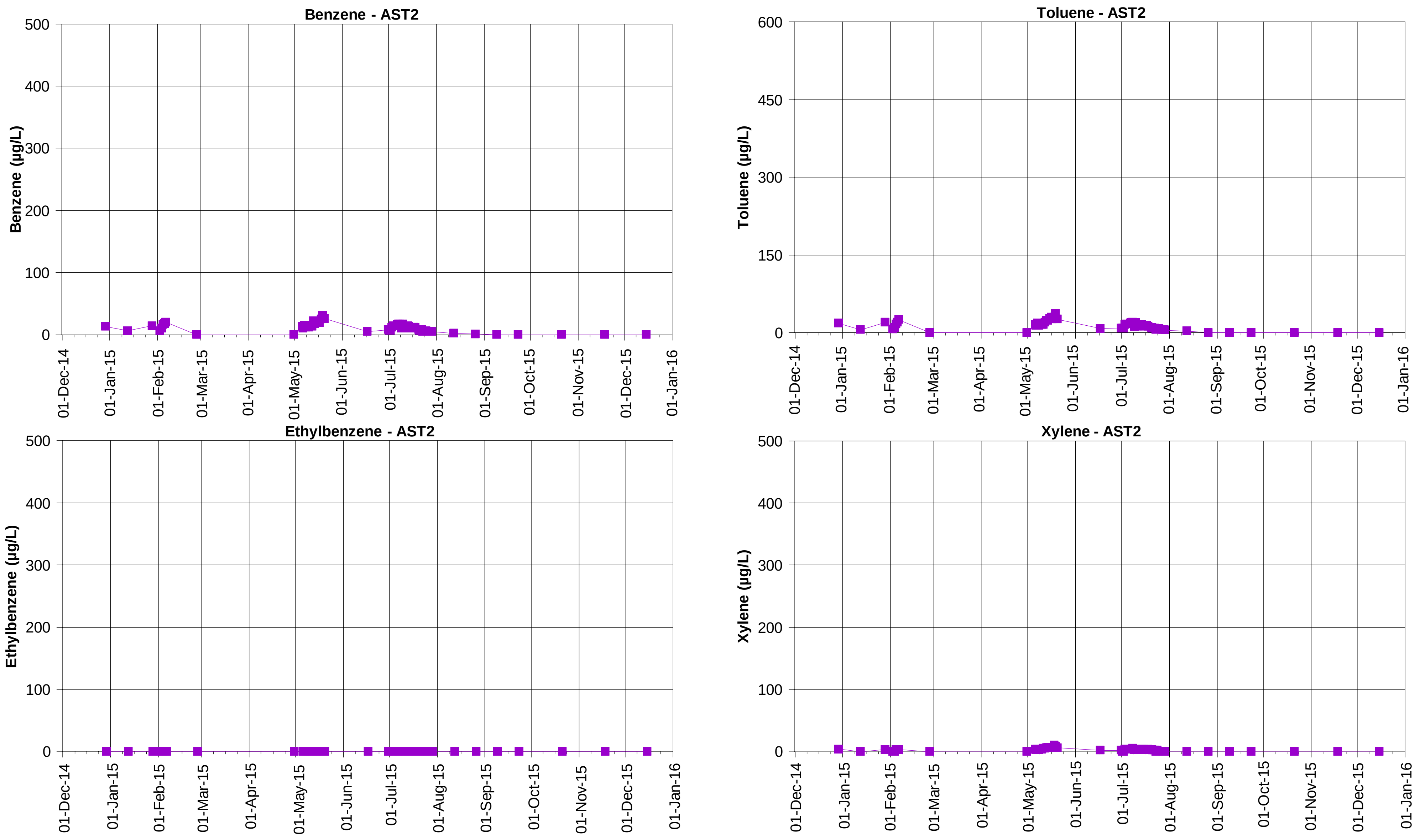

Figure F6.1: Benzene, Toulene Ethylbenzene and Xylene concentrations at AST2

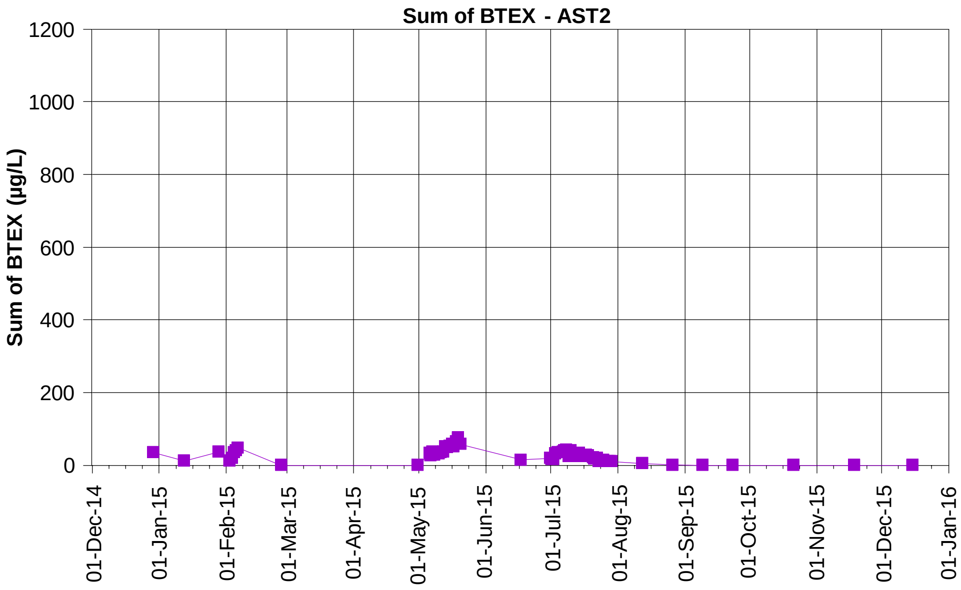

Figure F6.2: Sum of BTEX concentration at AST2.

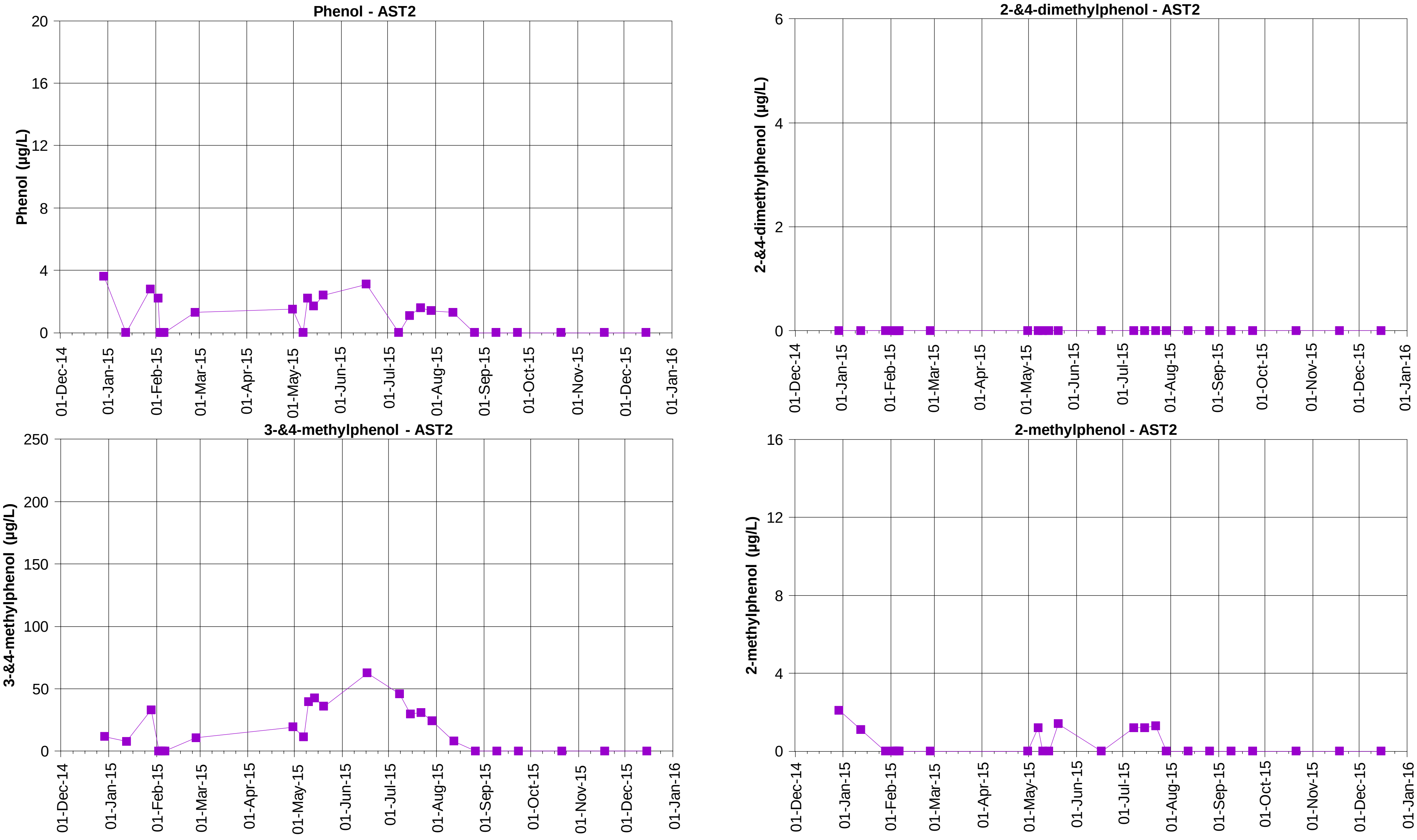

Figure F7.1: Phenol, 3-&4-methylphenol, 2-&4-dimethylphenol and 2-methylphenol concentrations at AST2.

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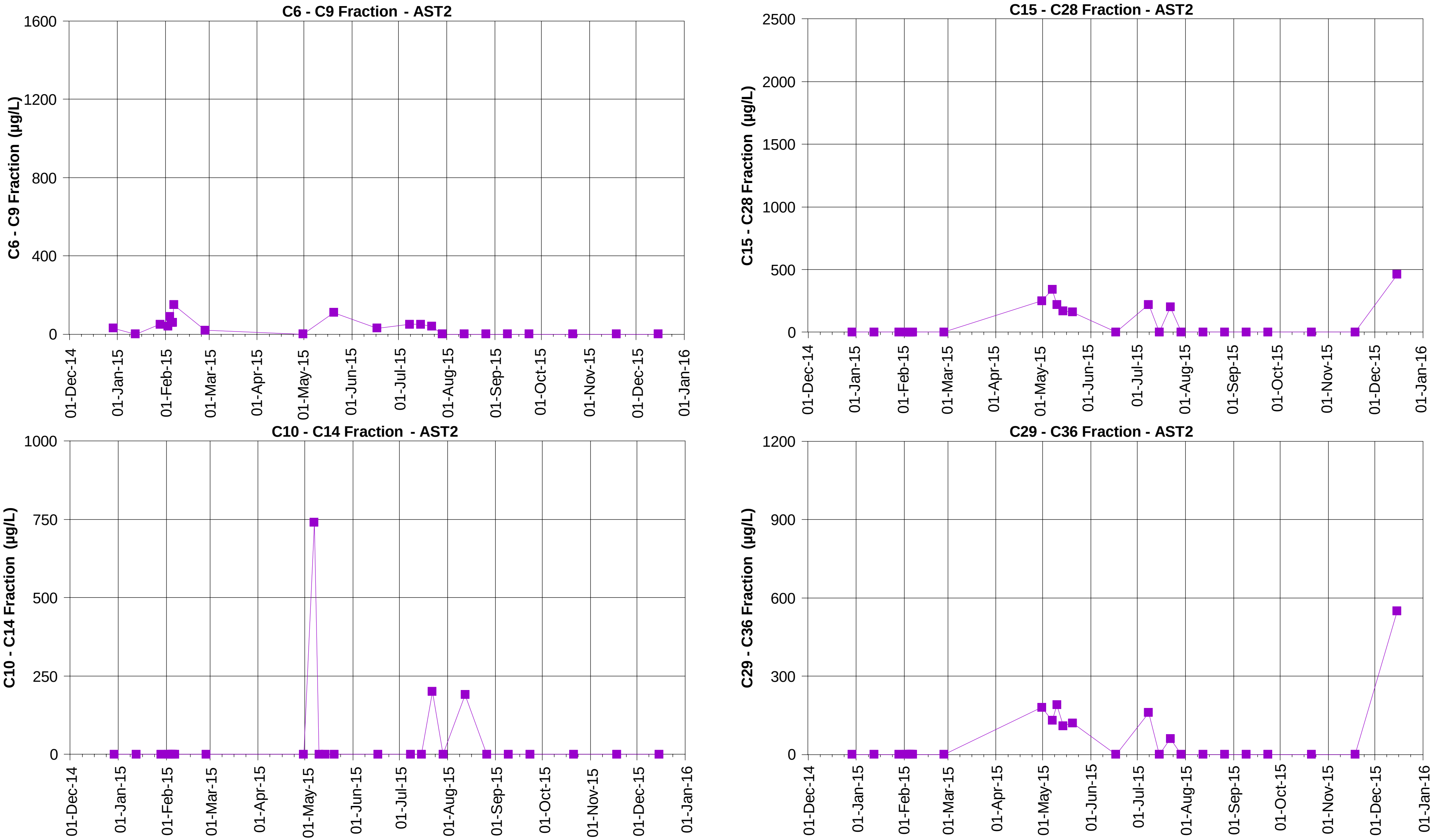

Figure F7.2: C6-C9 fraction, C10-C14 fraction, C15-C28 fraction and C29-C36 fraction concentrations at AST2.

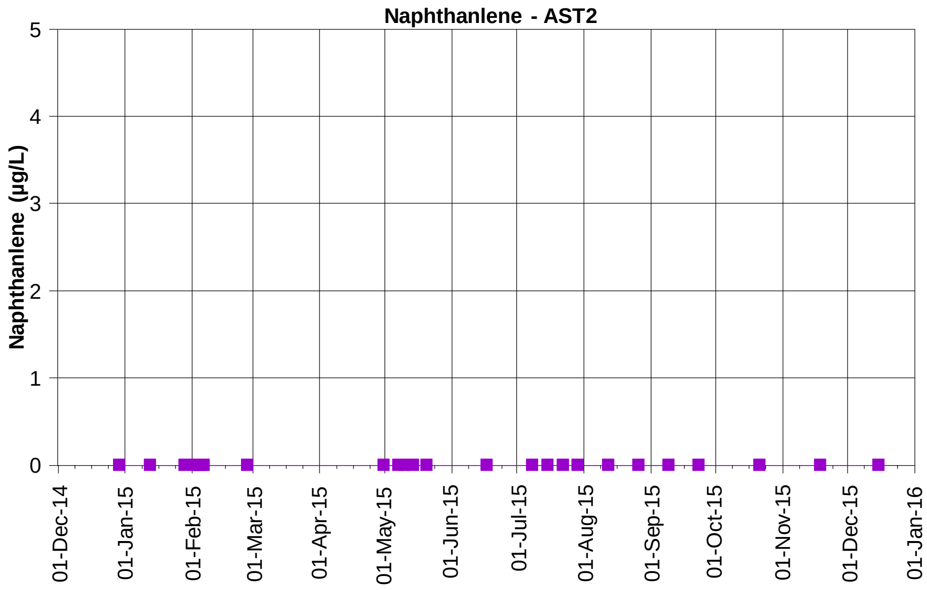

Figure F7.3: Naphthanlene concentration at AST2.

Naphthalene method analysis EP075(SIM)B

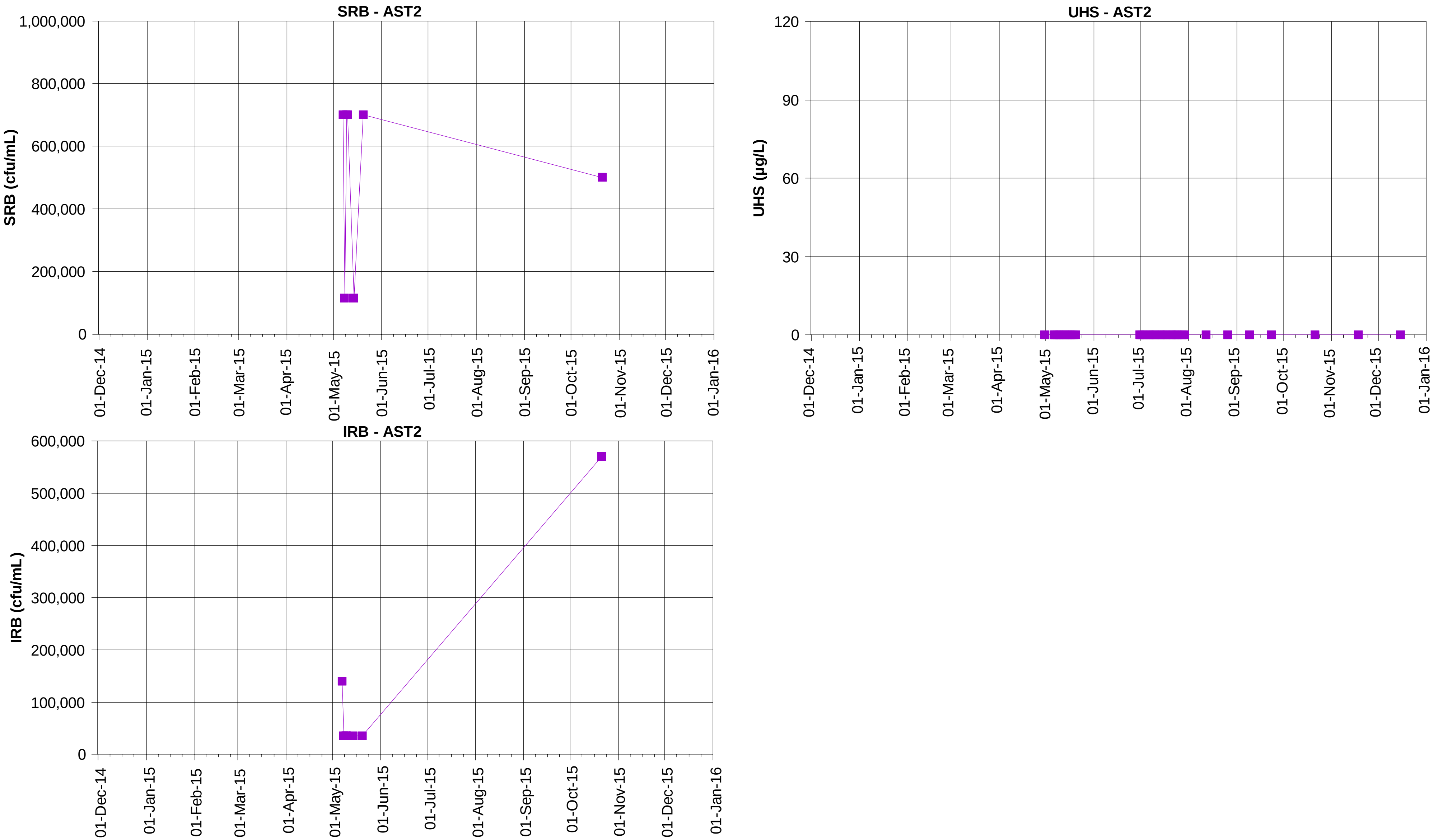

Figure F8.1 Sulphate Reducing Bacteria (SRB), Iron Related Bacteria (IRB) and Unionized Hydrogen Sulphide (UHS) concentrations at AST2.

Appendix G

Groundwater and surface water analyte time-series hydrographs

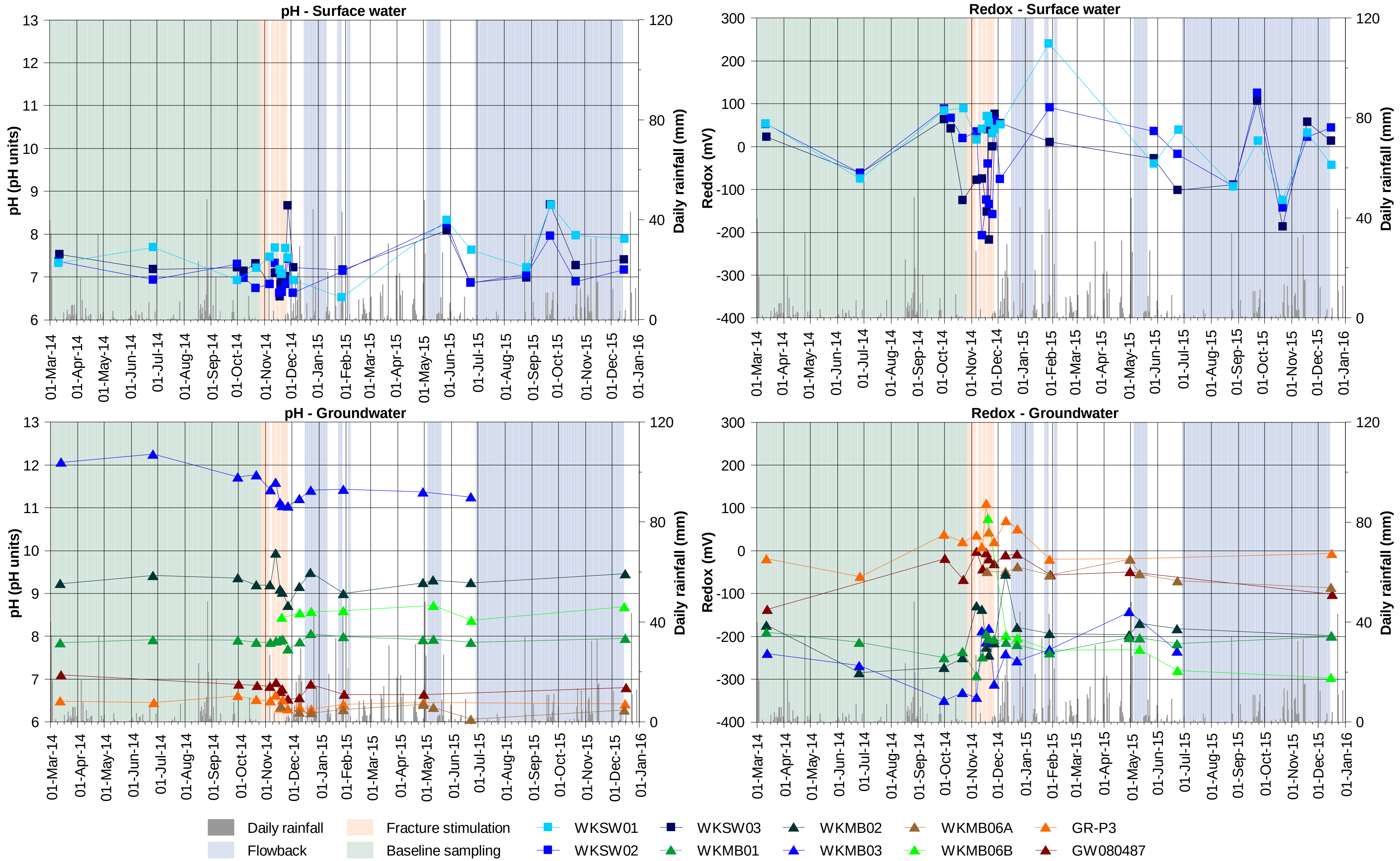

Figure G1.1: Field measurements of pH and redox at Waukivory surface water and groundwater monitoring locations.

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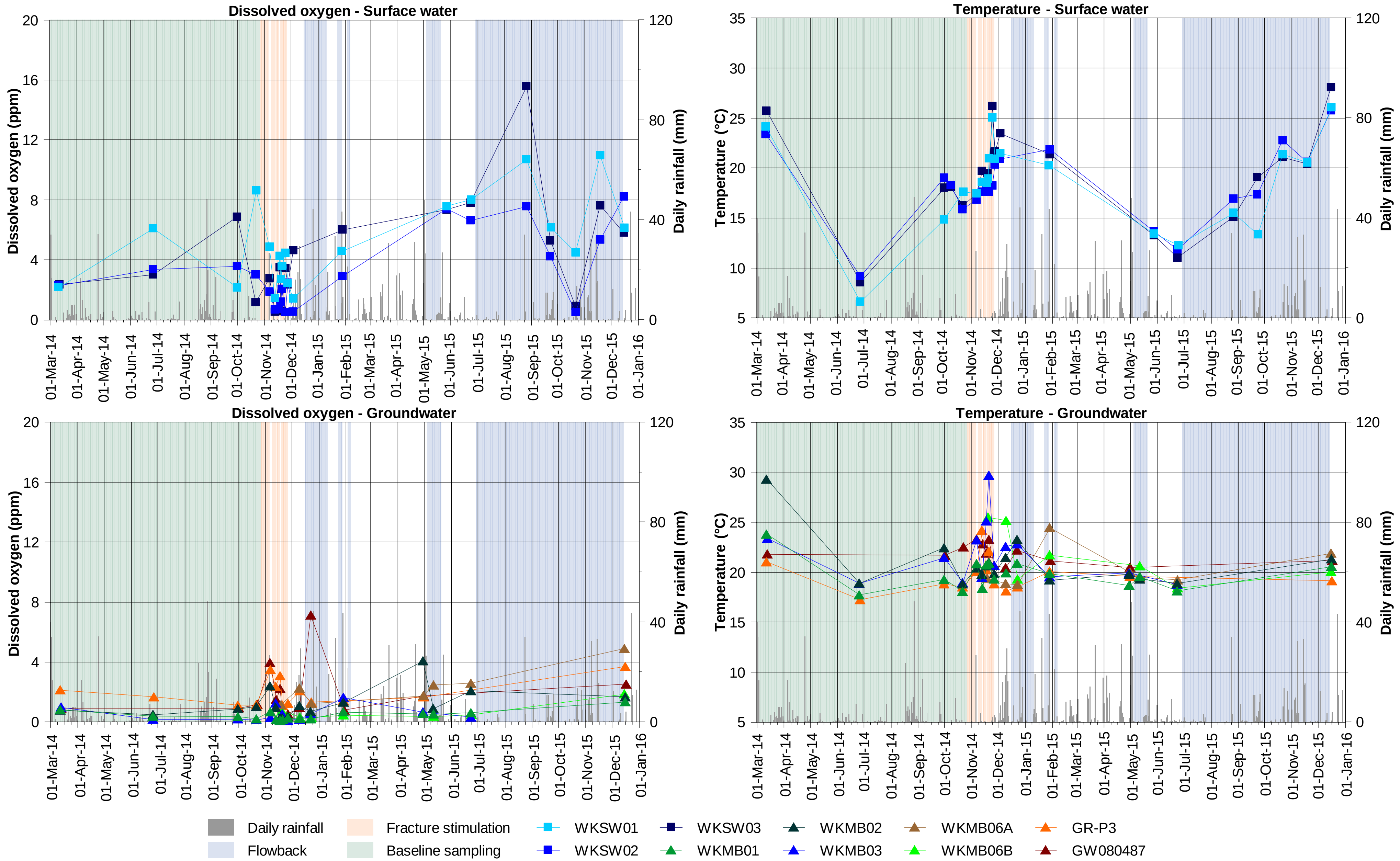

Figure G1.2: Field measurements of dissolved oxygen and temperature at Waukivory surface water and groundwater monitoring locations.

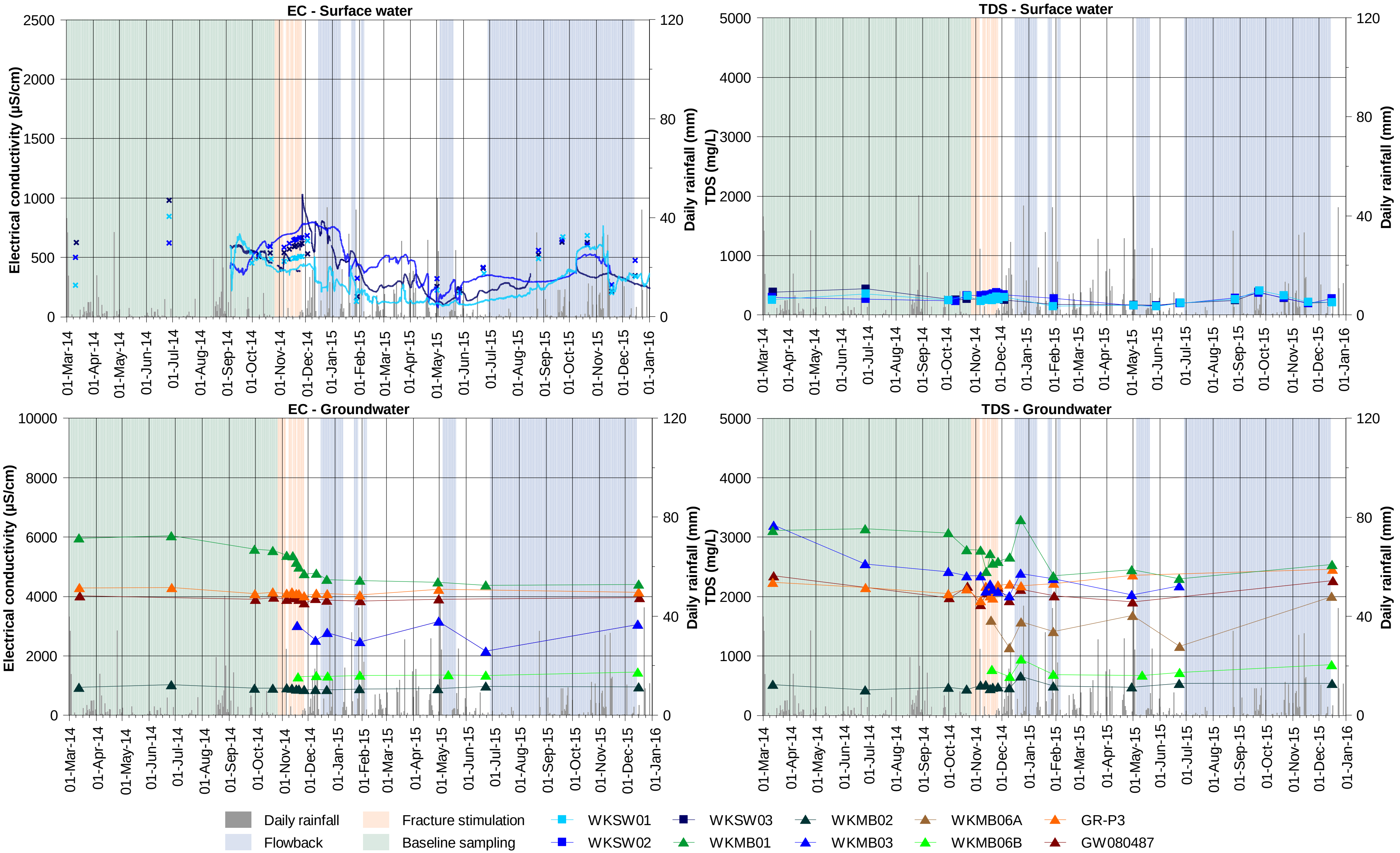

Figure G1.3: Laboratory measurements of EC and TDS at Waukivory surface water and groundwater monitoring locations.

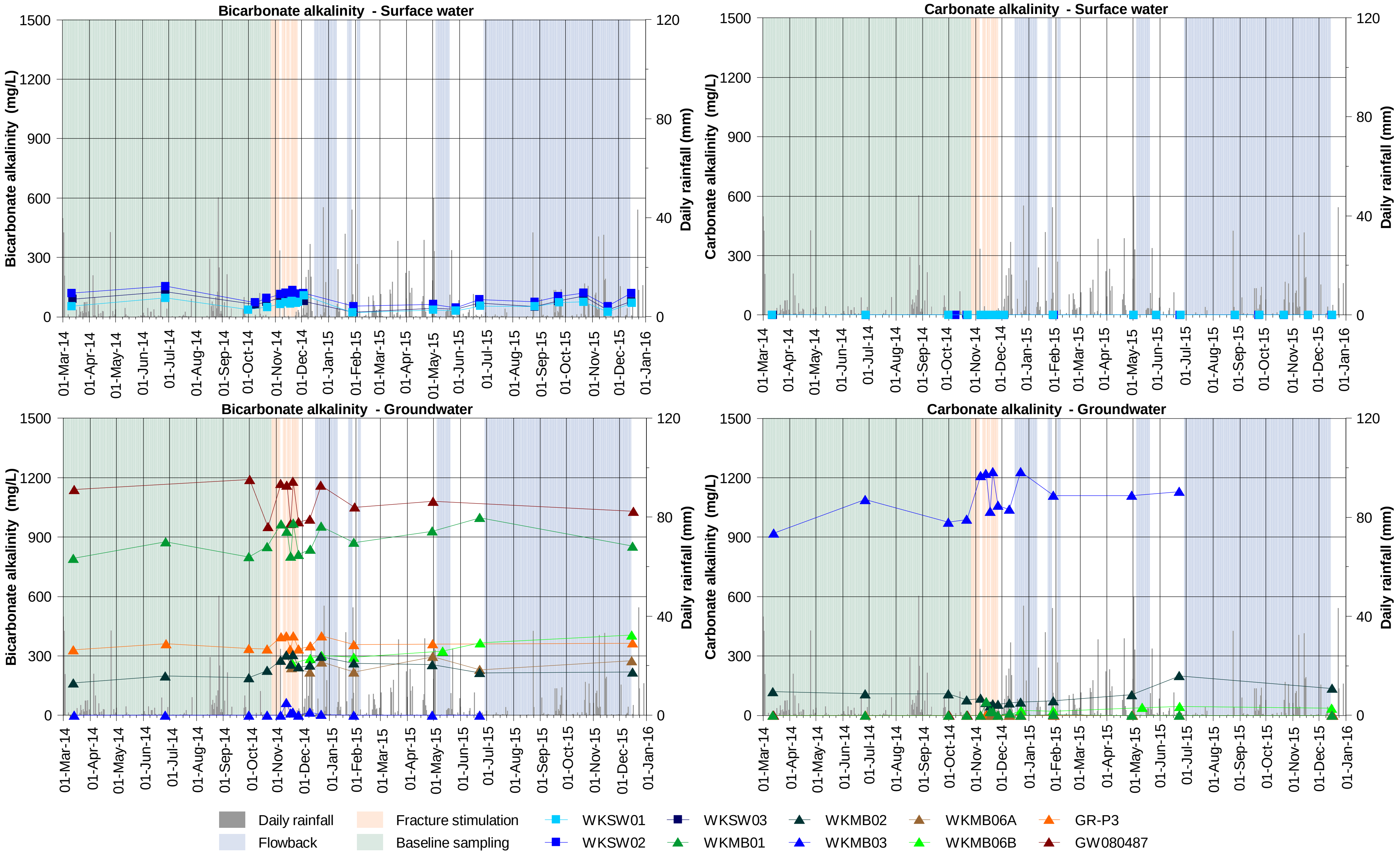

Figure G2.1: Bicarbonate alkalinity and carbonate alkalinity at Waukivory surface water and groundwater monitoring locations.

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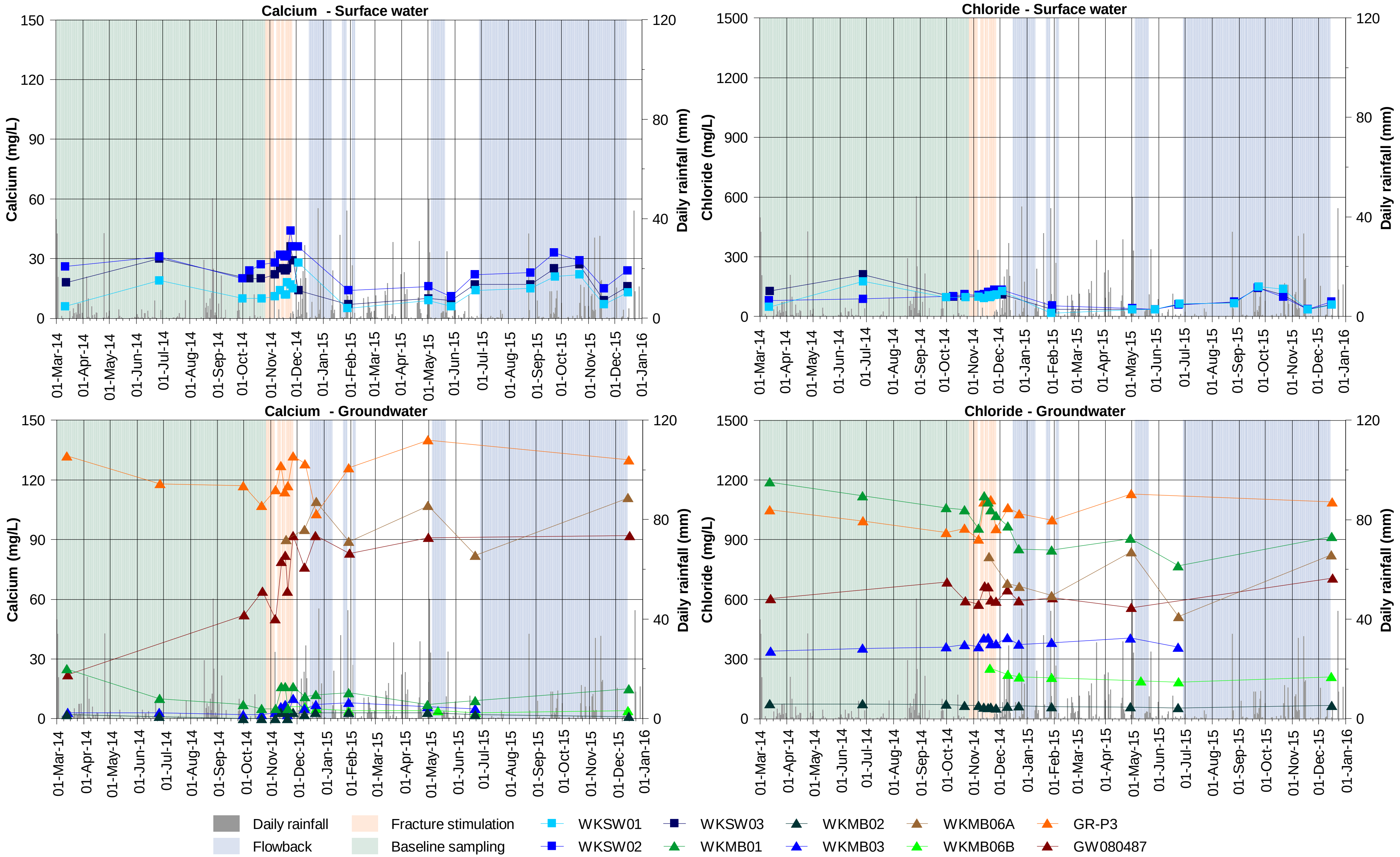

Figure G2.2: Calcium and chloride at Waukivory surface water and groundwater monitoring locations.

Note: Chloride method - ED0045

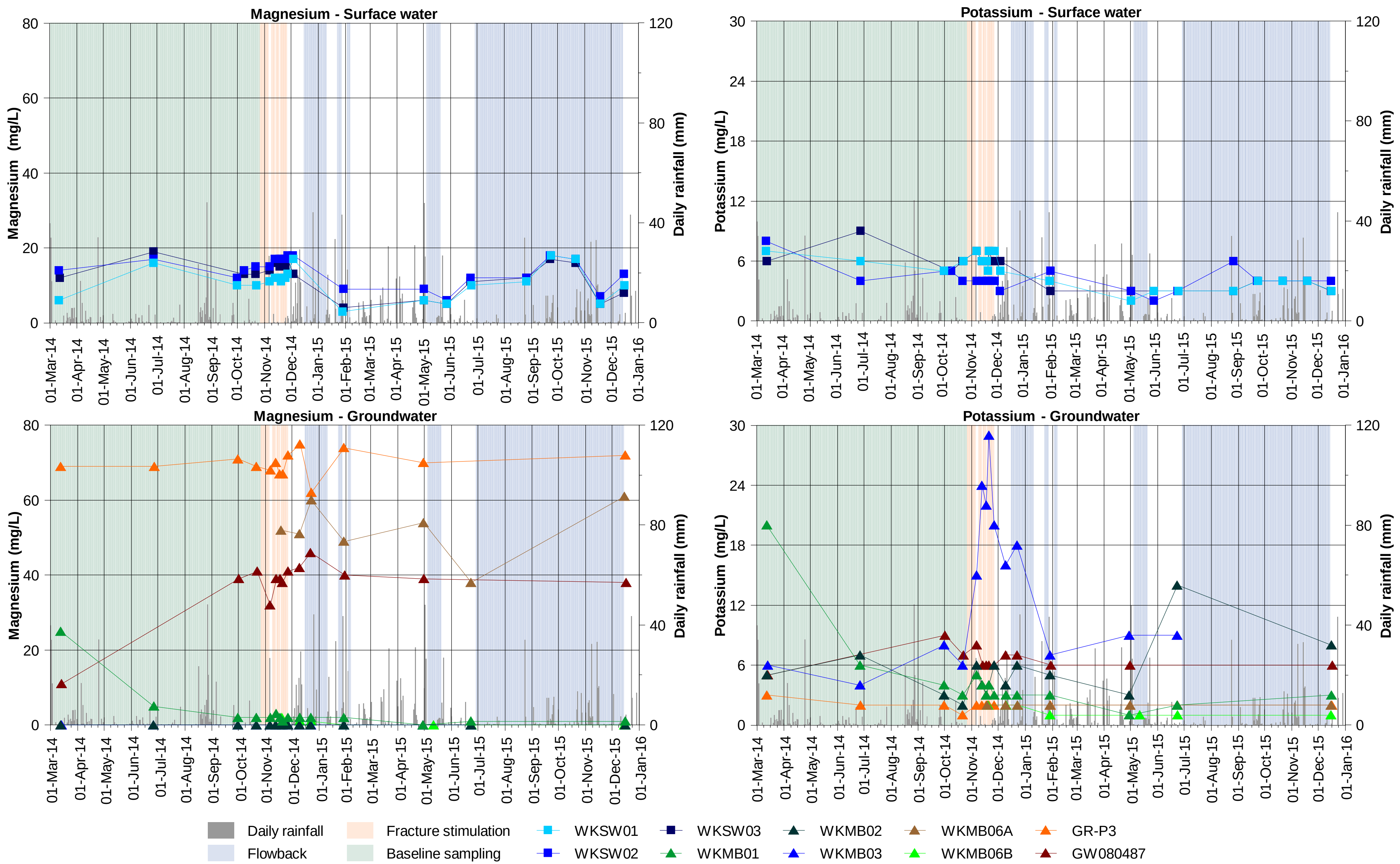

Figure G2.3: Magnesium and potassium at Waukivory surface water and groundwater monitoring locations.

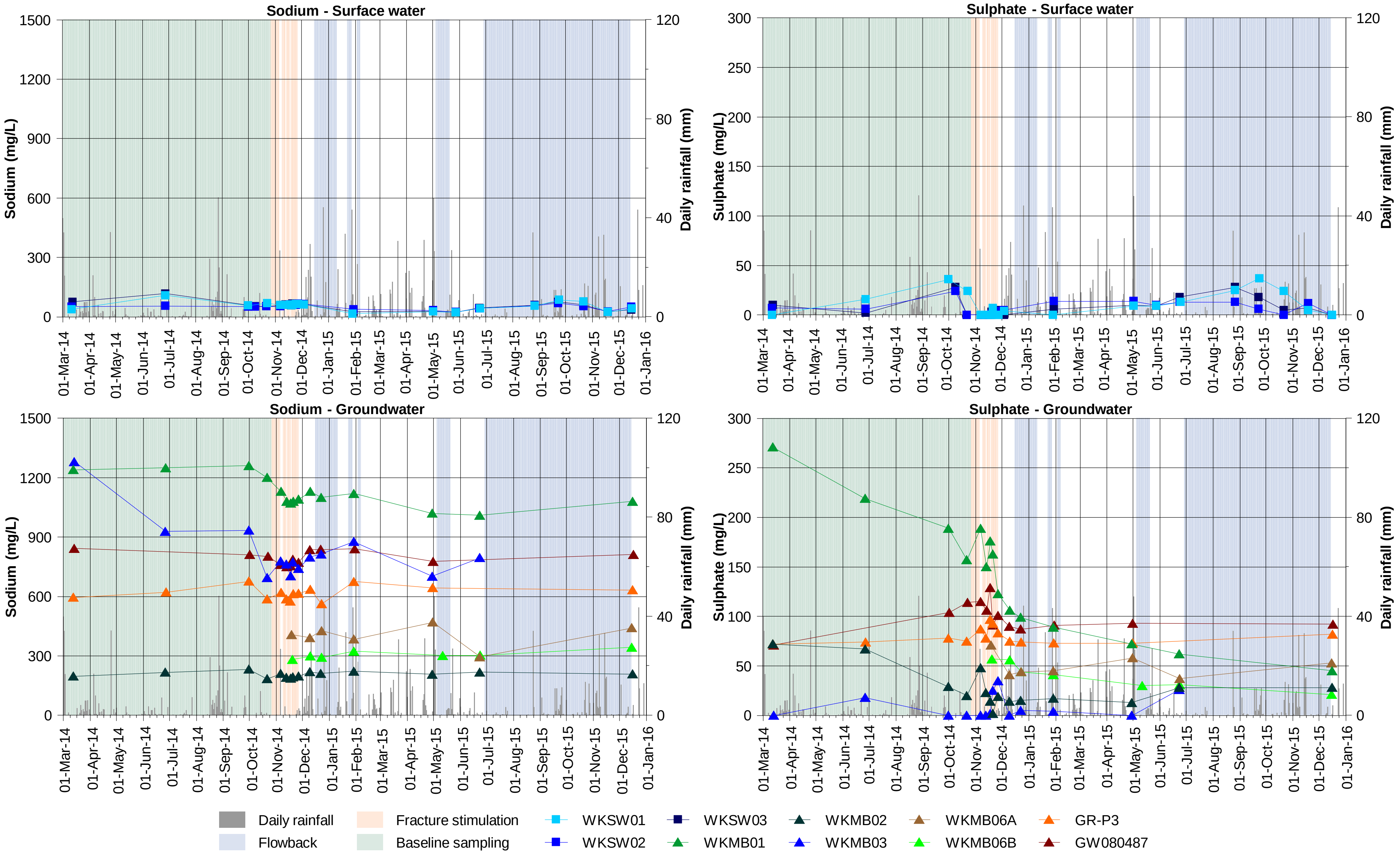

Figure G2.4: Sodium and sulphate at Waukivory surface water and groundwater monitoring locations.

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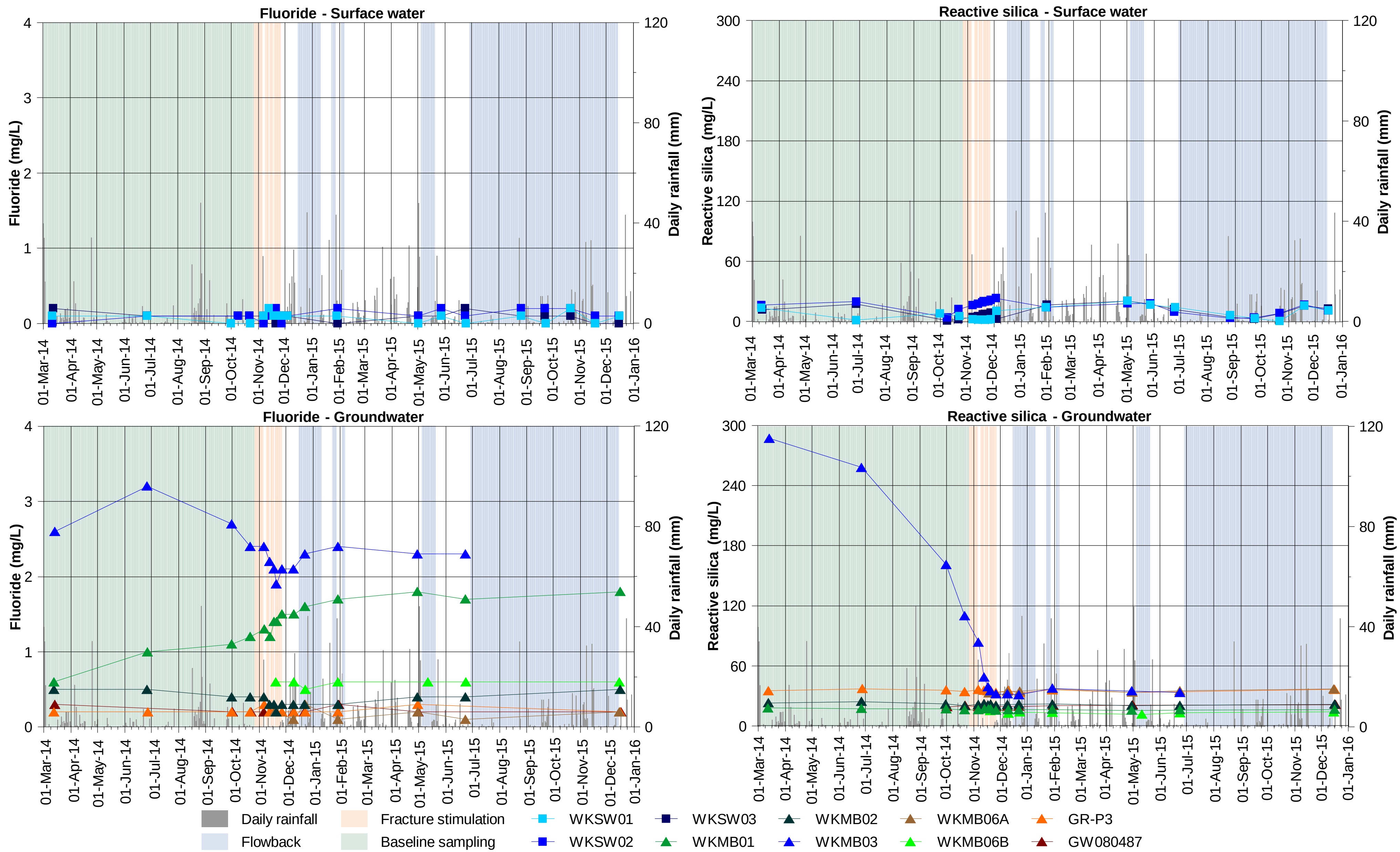

Note. Two groundwater sampling locations (WKMB01, WKMB03) contained dissolved fluoride concentrations greater than 1 mg/L. These concentrations were observed in baseline data and did not vary significantly during the fracture stimulation process. The localised and consistent nature of the fluoride concentrations in WKMB01 and WKMB03 suggest the most likely source is geological. As a result, the EPA intends to take no further action in relation to the issue of fluoride detections (EPA, 2015d).

Figure G2.5: Fluoride and reactive silica at Waukivory surface water and groundwater monitoring locations.

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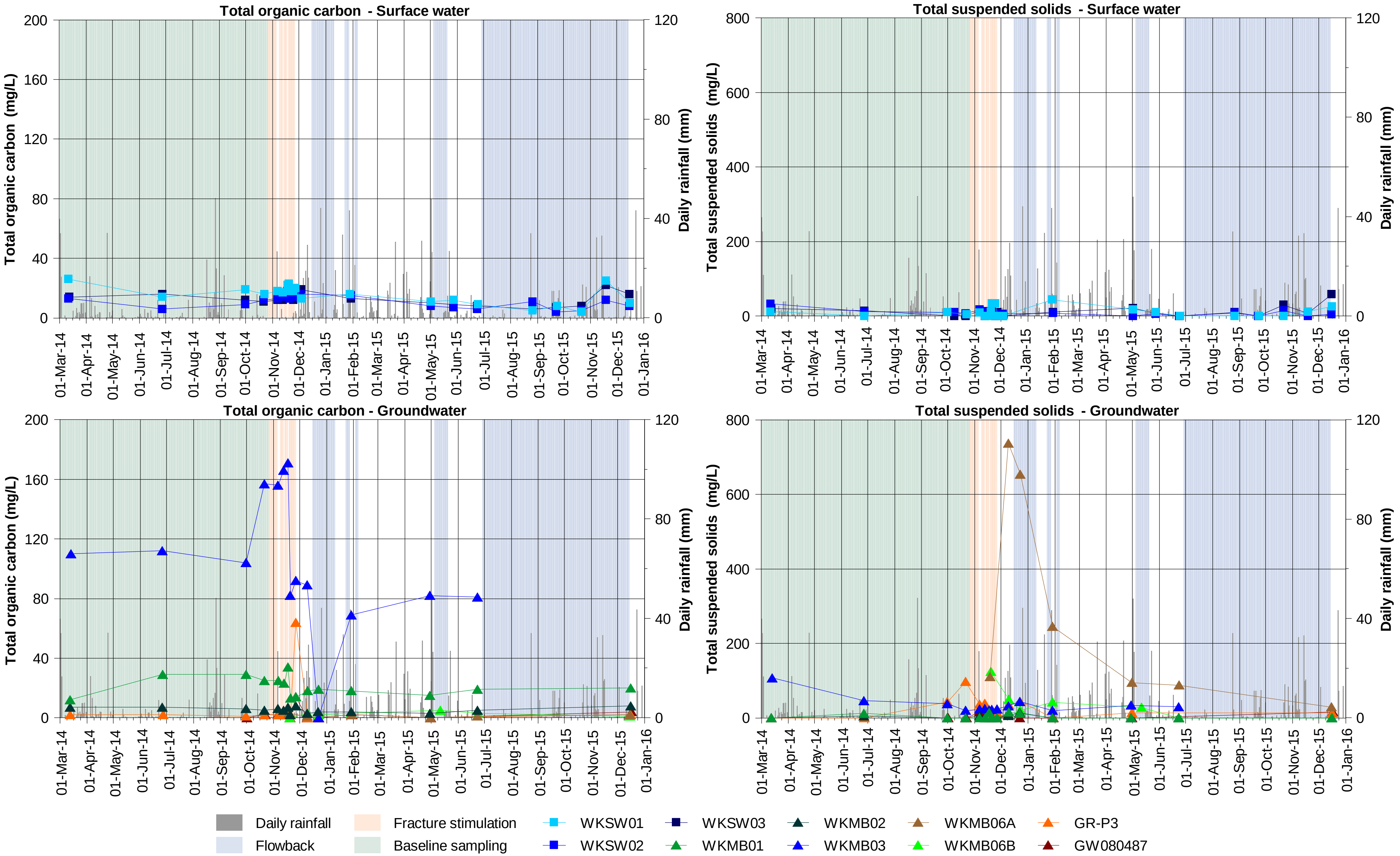

Figure G2.6: Total organic carbon (TOC) and total suspended solids (TSS) at Waukivory surface water and groundwater monitoring locations.

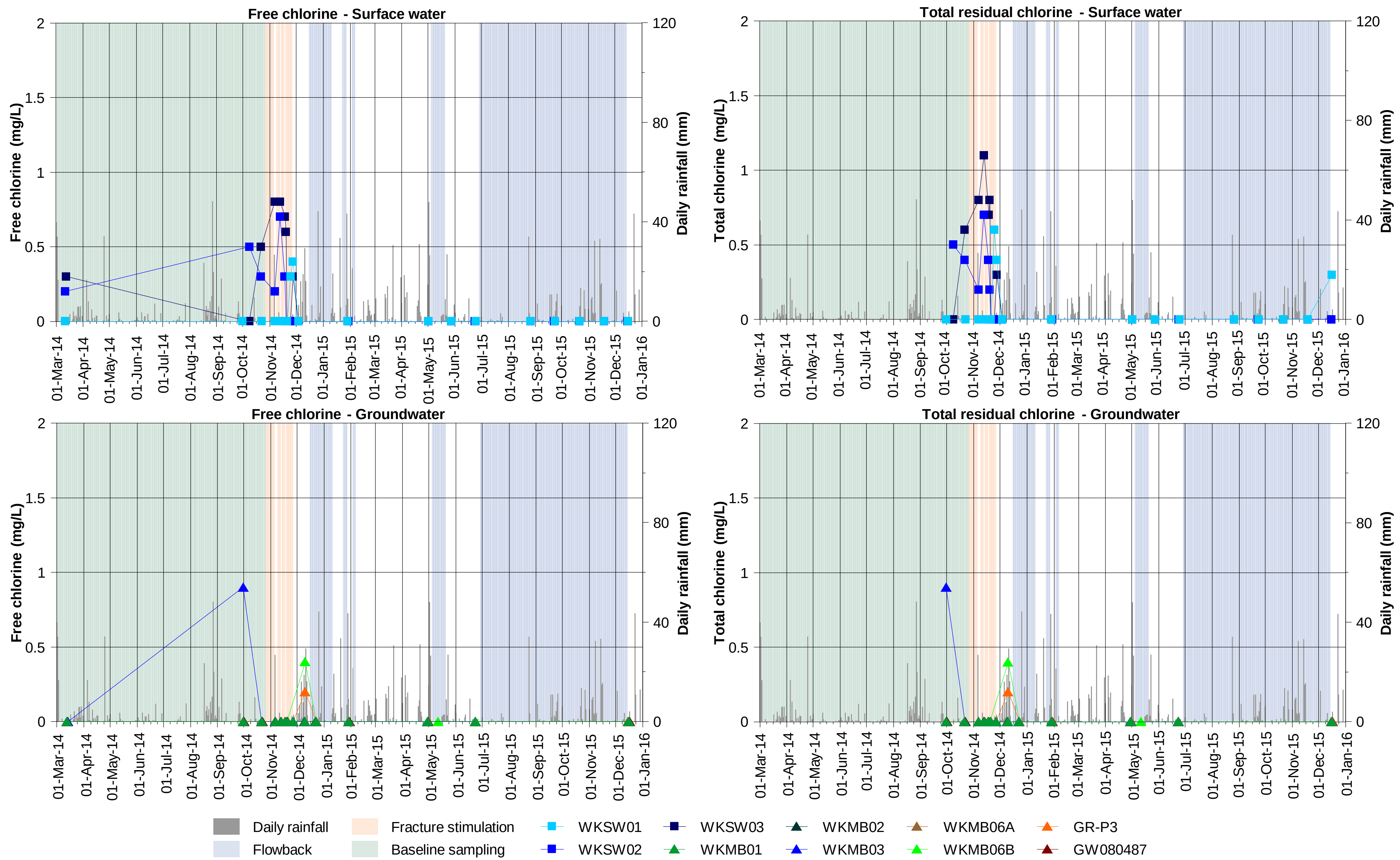

Figure G2.7: Laboratory measurements of free and total chlorine at Waukivory surface water and groundwater monitoring locations.

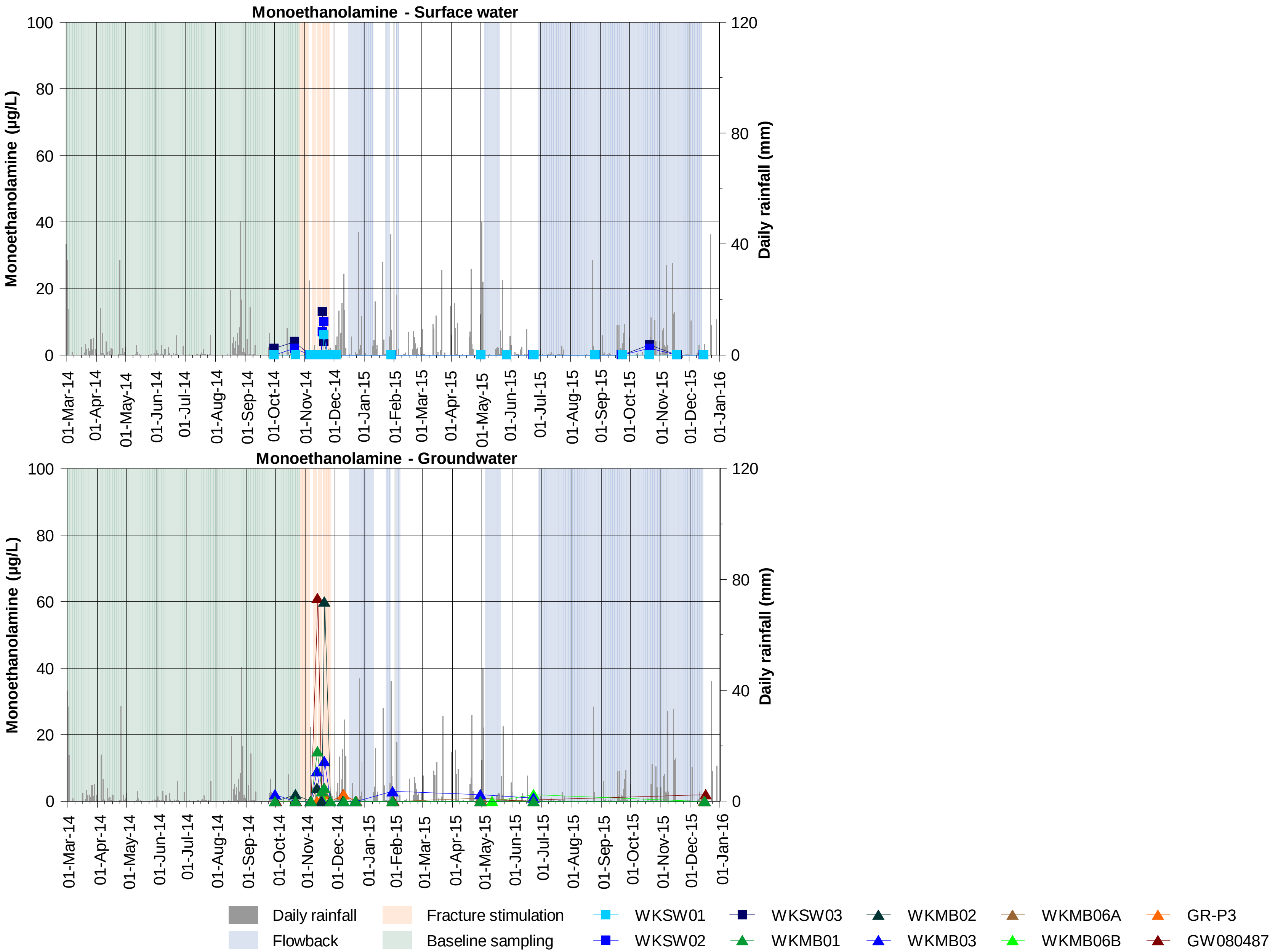

Figure G2.8: Monoethanolamine at Waukivory surface water and groundwater monitoring locations.

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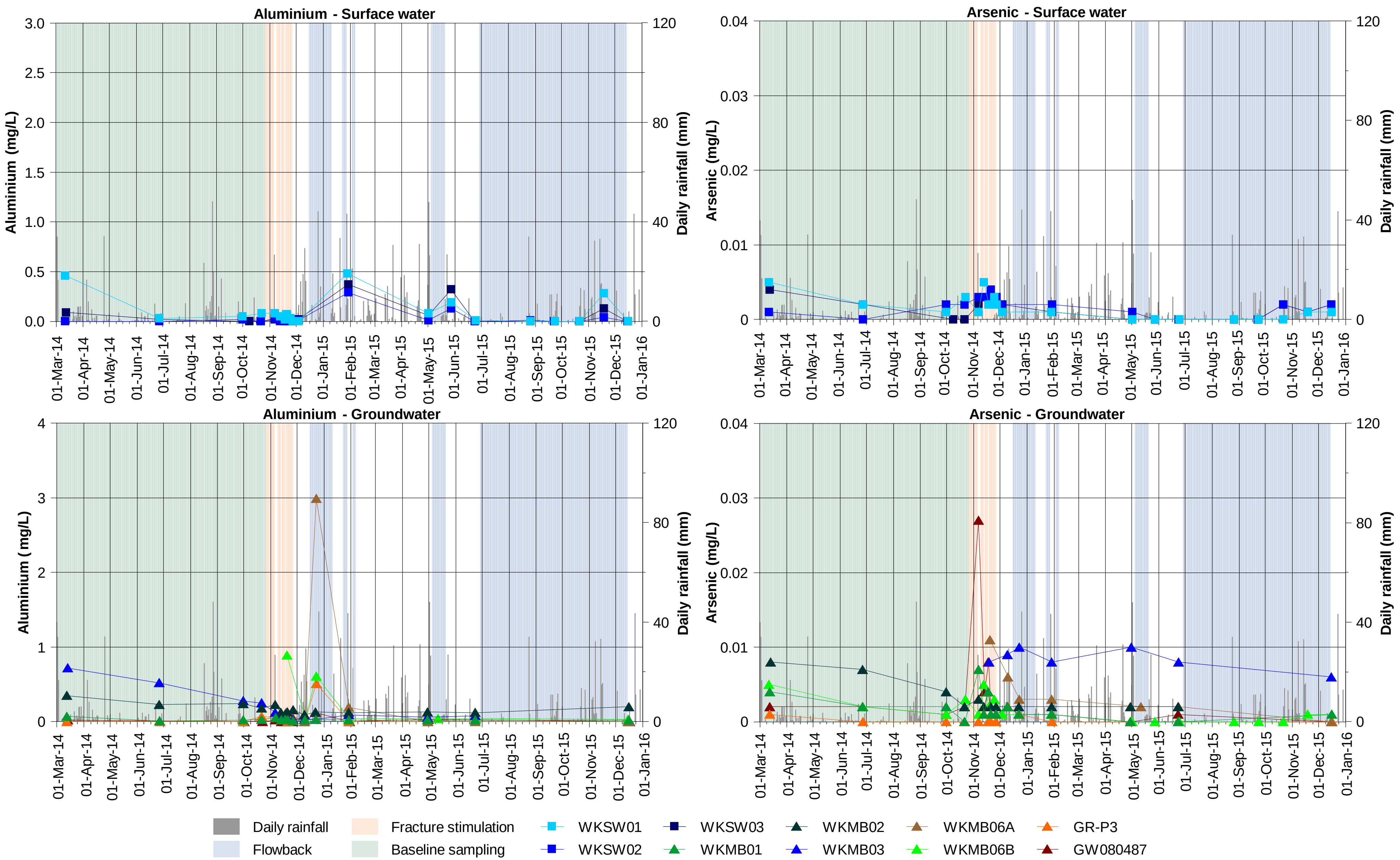

Figure G3.1: Aluminium and arsenic at Waukivory surface water and groundwater monitoring locations.

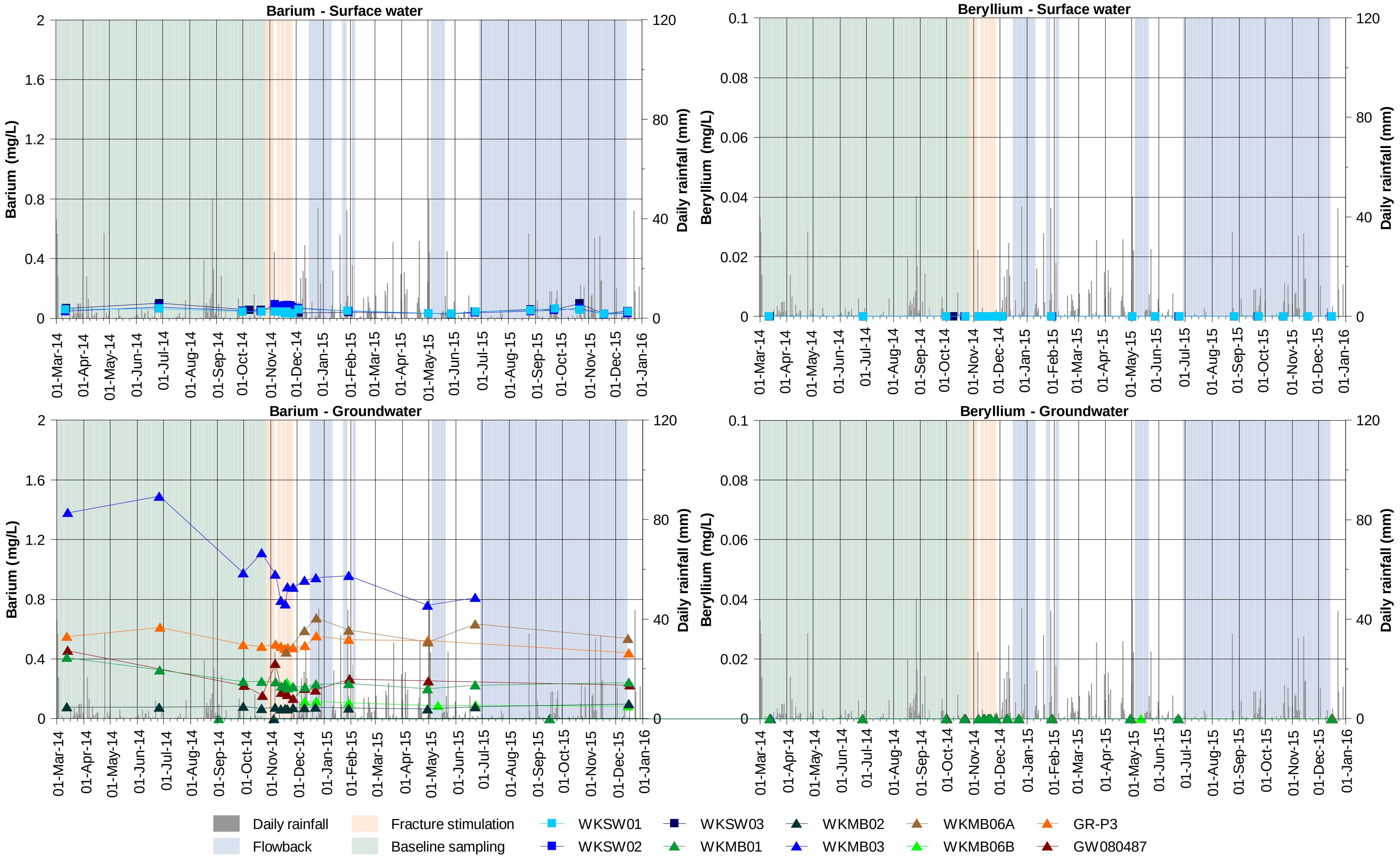

Figure G3.2: Barium and beryllium at Waukivory surface water and groundwater monitoring locations.

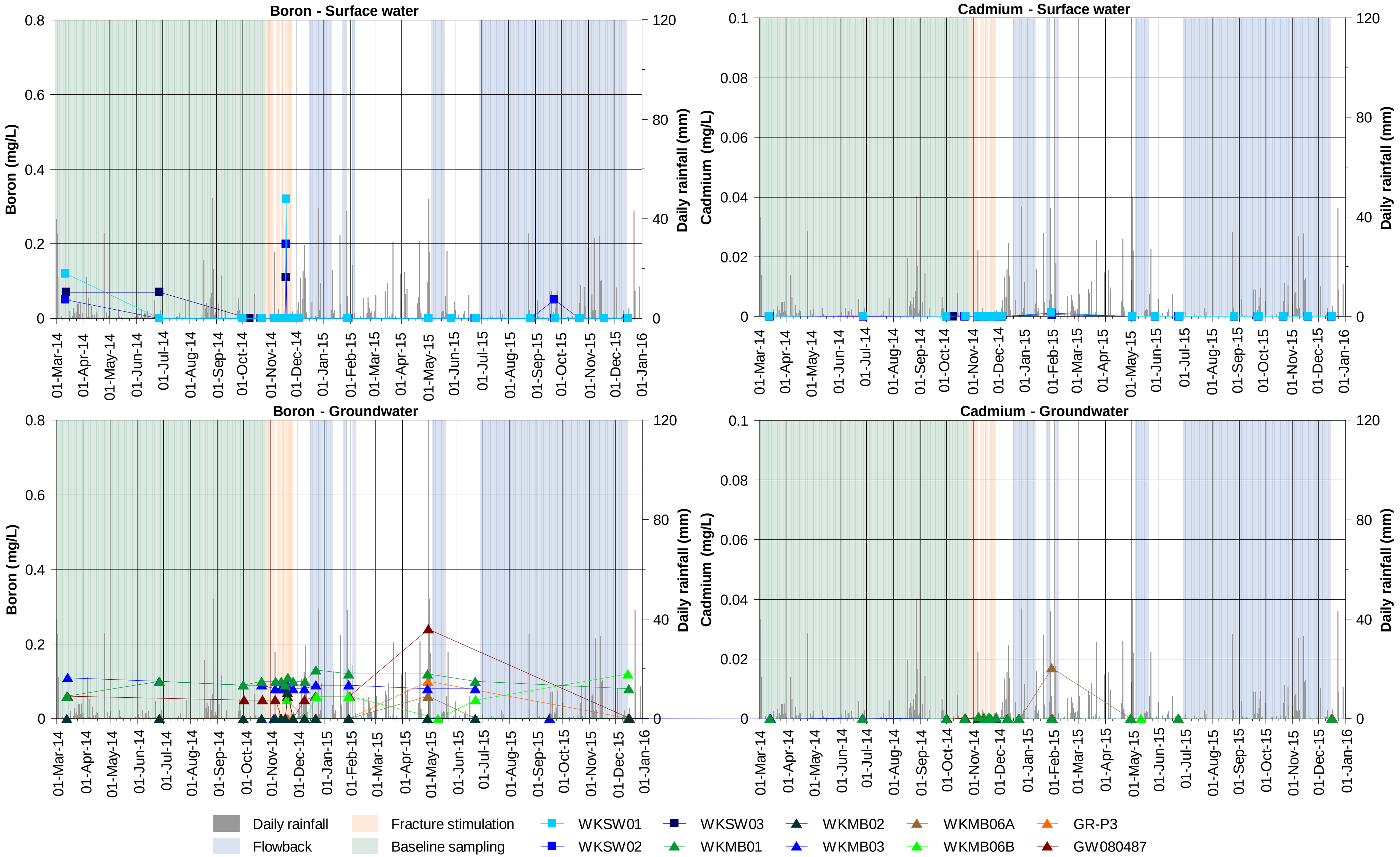

Figure G3.3: Boron and cadmium at Waukivory surface water and groundwater monitoring locations.

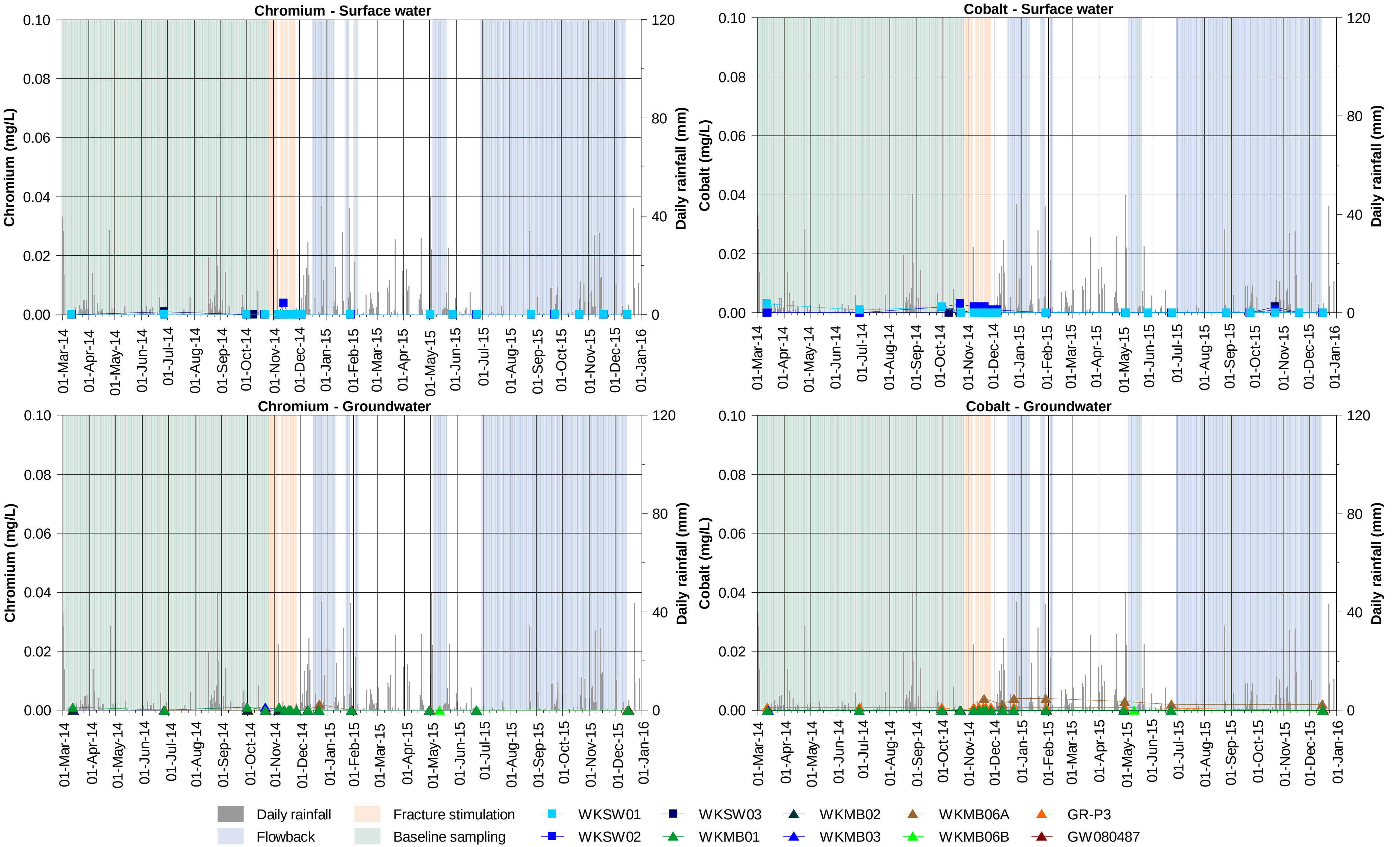

Figure G3.4: Chromium and cobalt at Waukivory surface water and groundwater monitoring locations.

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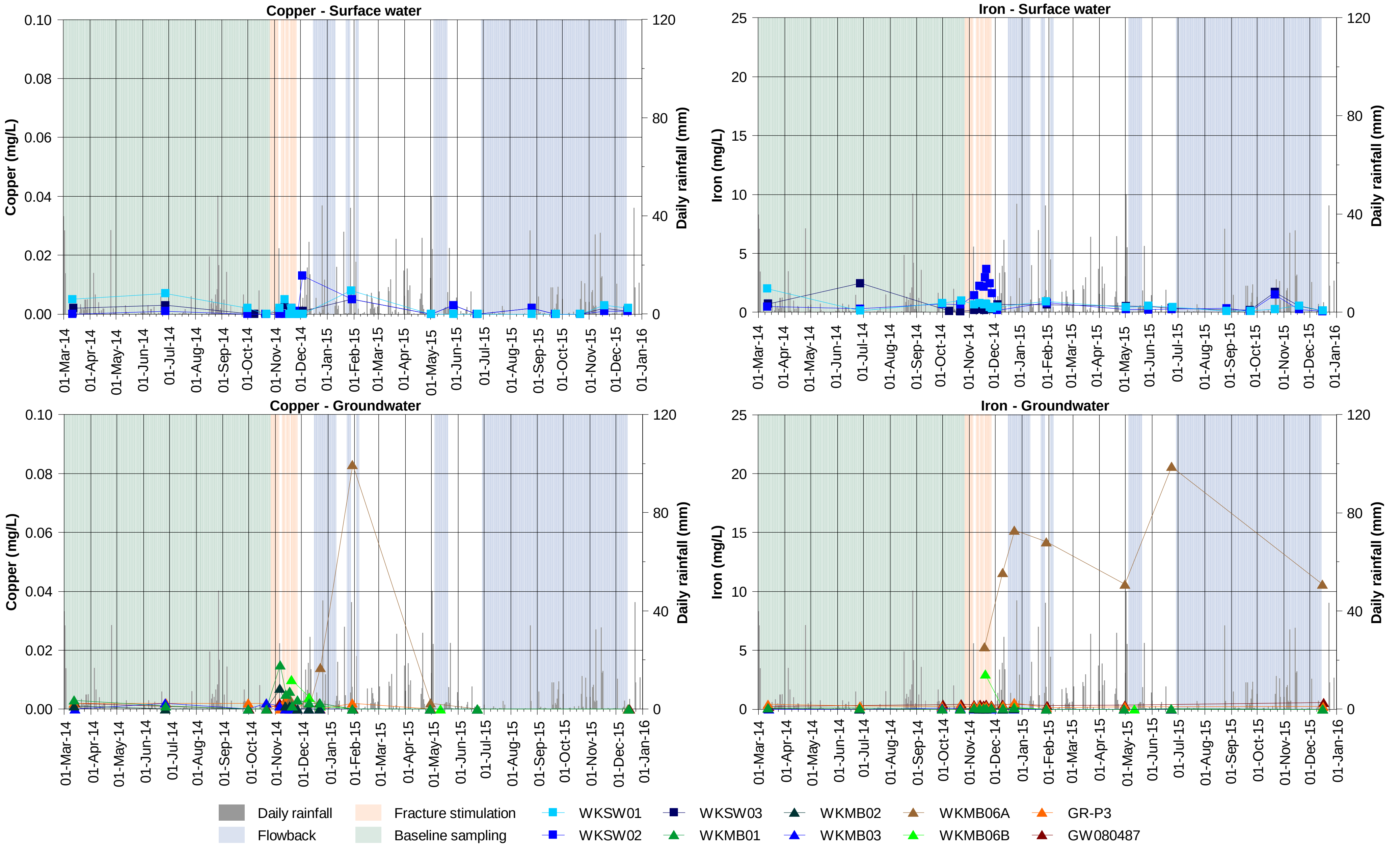

Figure G3.5: Copper and iron at Waukivory surface water and groundwater monitoring locations.

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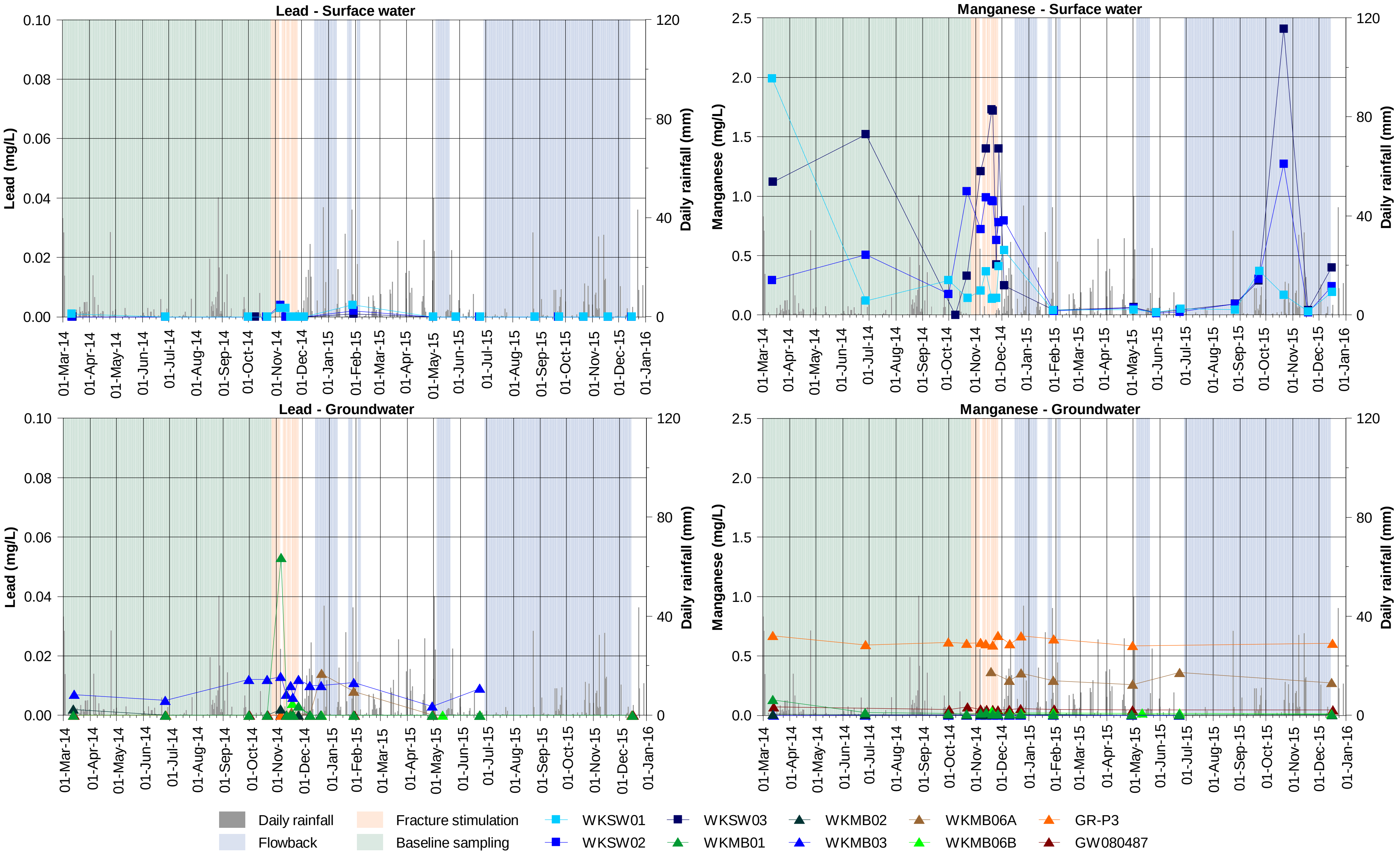

Figure G3.6: Lead and manganese at Waukivory surface water and groundwater monitoring locations.

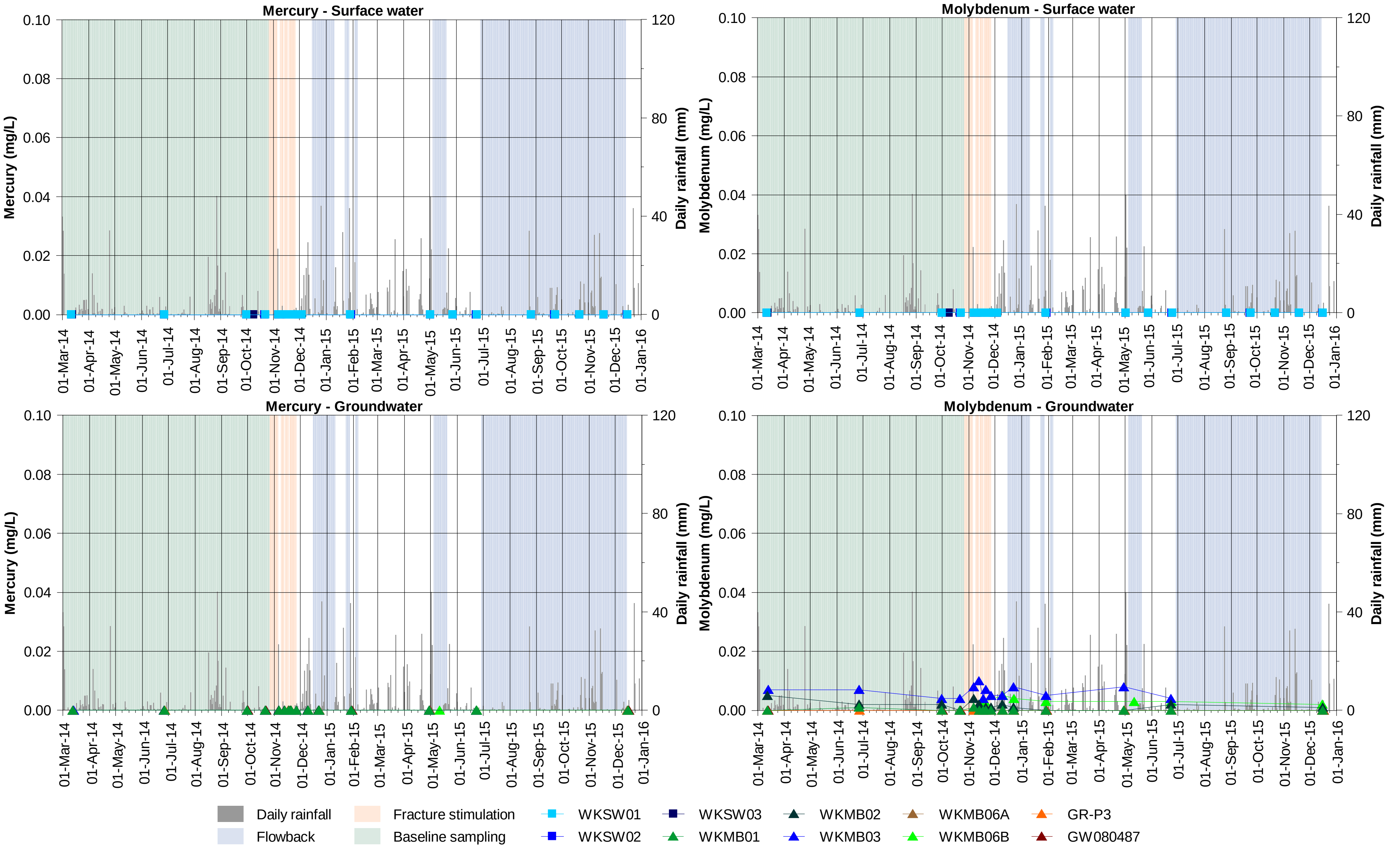

Figure G3.7: Mercury and molybdenum at Waukivory surface water and groundwater monitoring locations.

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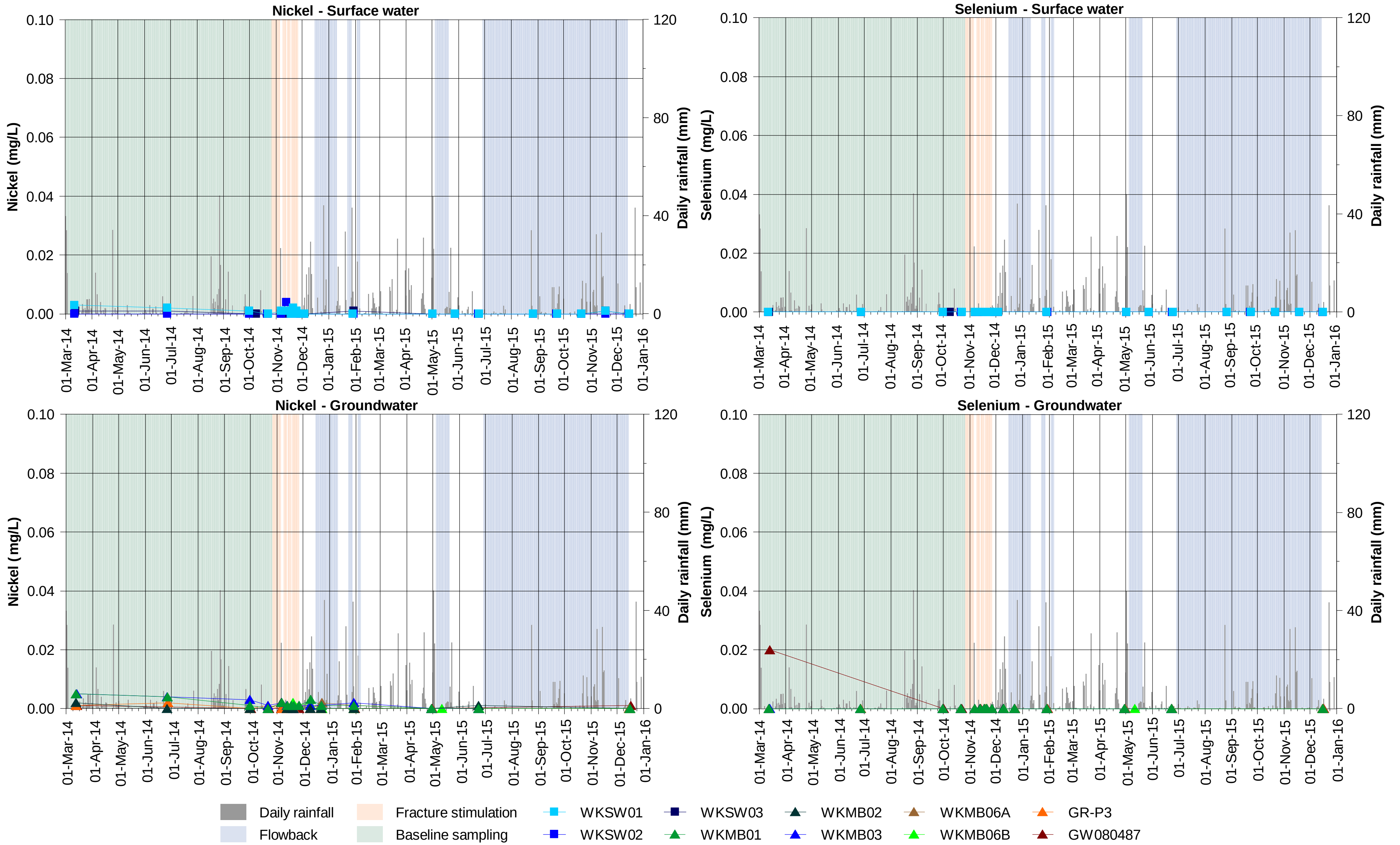

Figure G3.8: Nickel and selenium at Waukivory surface water and groundwater monitoring locations.

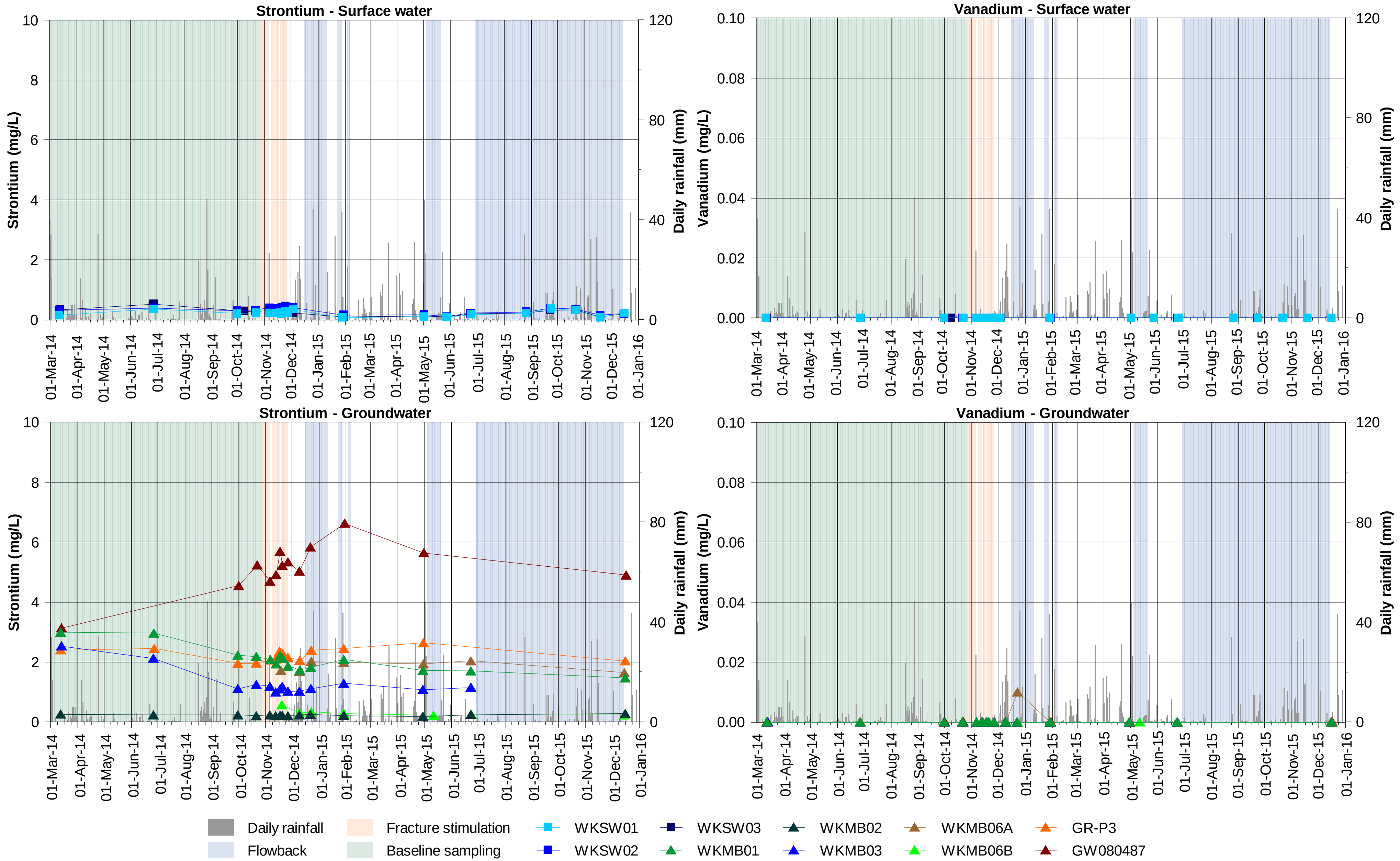

Figure G3.9: Strontium and vanadium at Waukivory surface water and groundwater monitoring locations.

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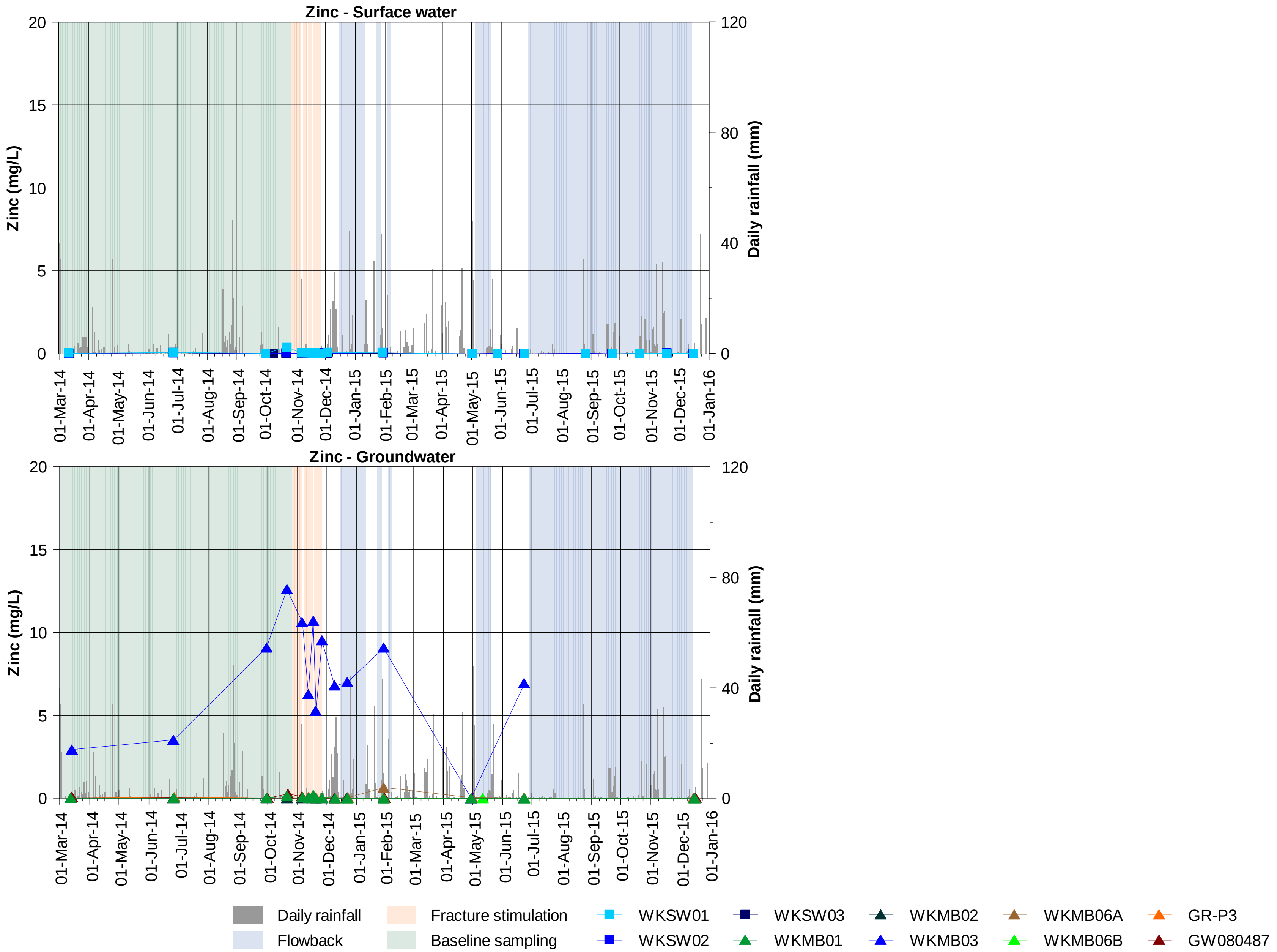

Figure G3.10: Zinc at Waukivory surface water and groundwater monitoring locations.

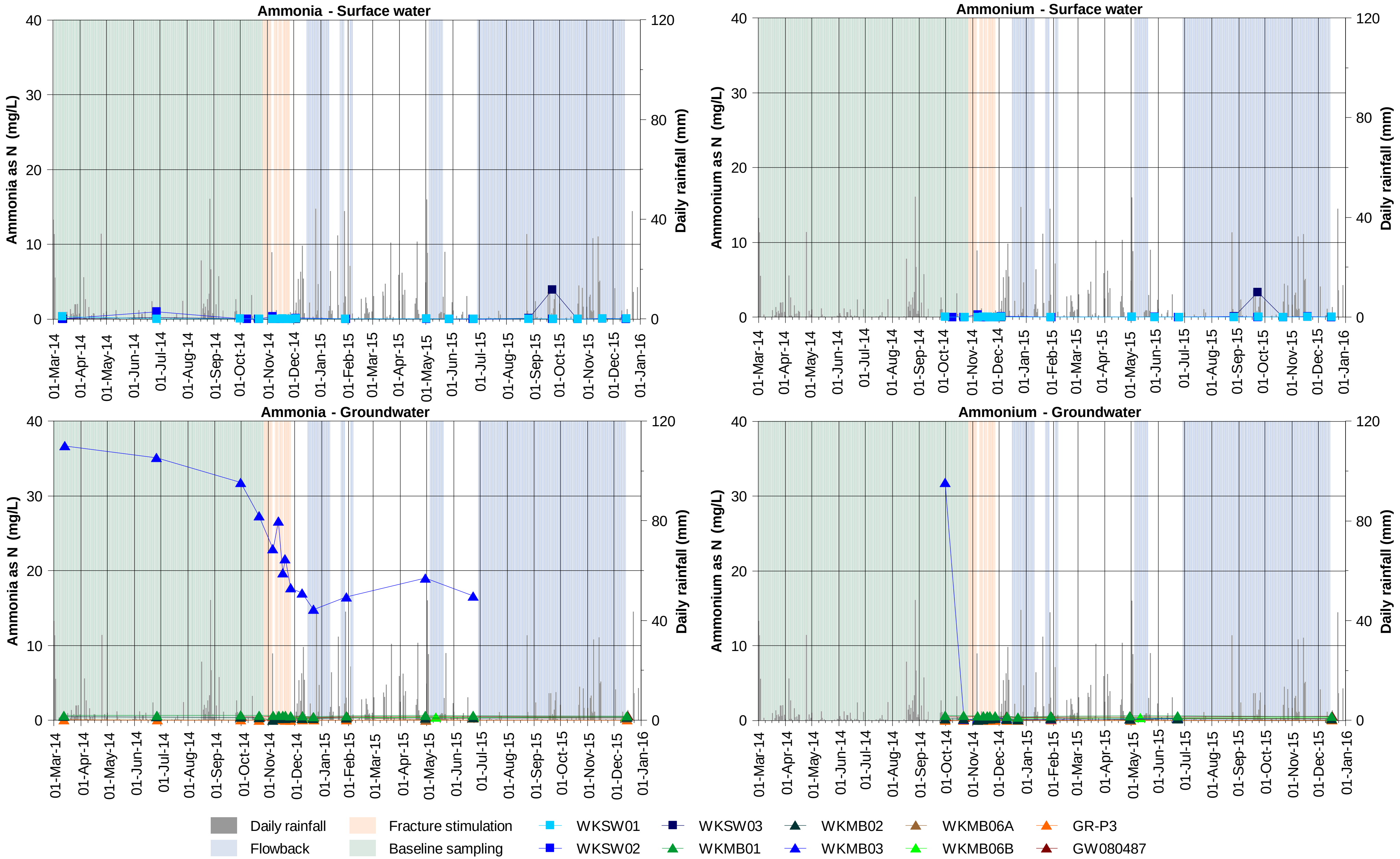

Figure G4.1: Ammonia and ammonium at Waukivory surface water and groundwater monitoring locations.

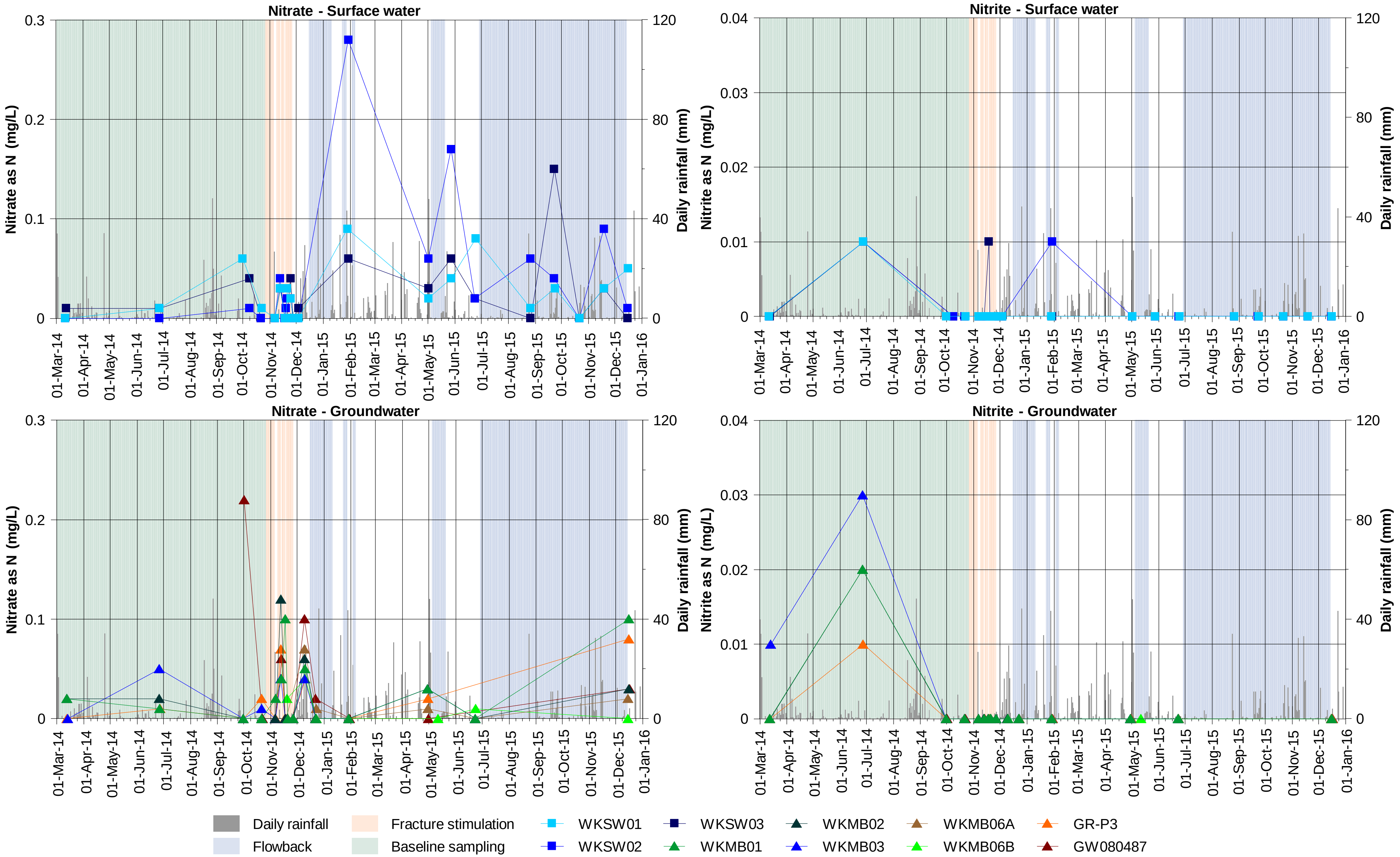

Figure G4.2: Nitrate and nitrite at Waukivory surface water and groundwater monitoring locations.

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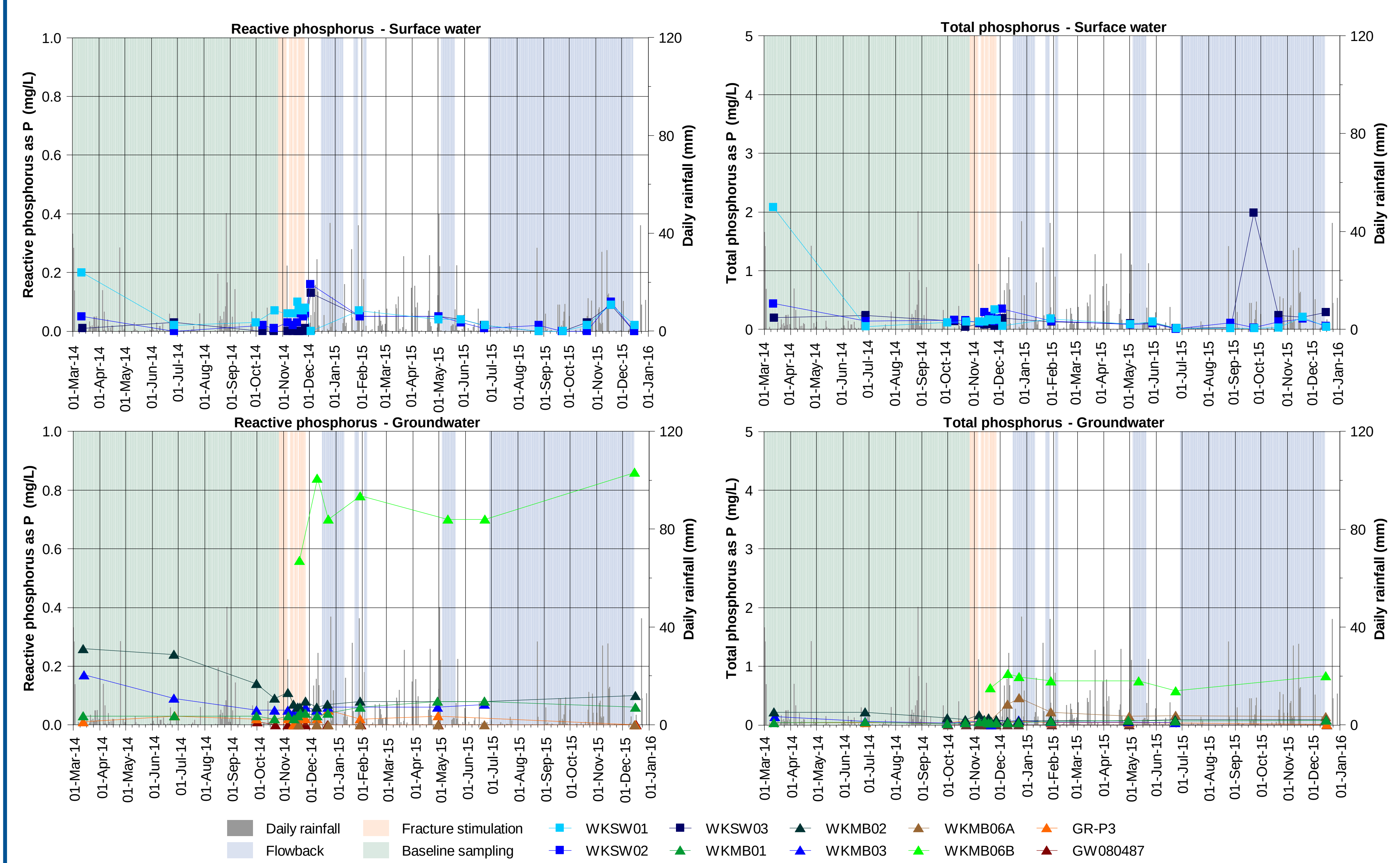

Figure G4.3: Reactive phosphorus and total phosphorus at Waukivory surface water and groundwater monitoring locations.

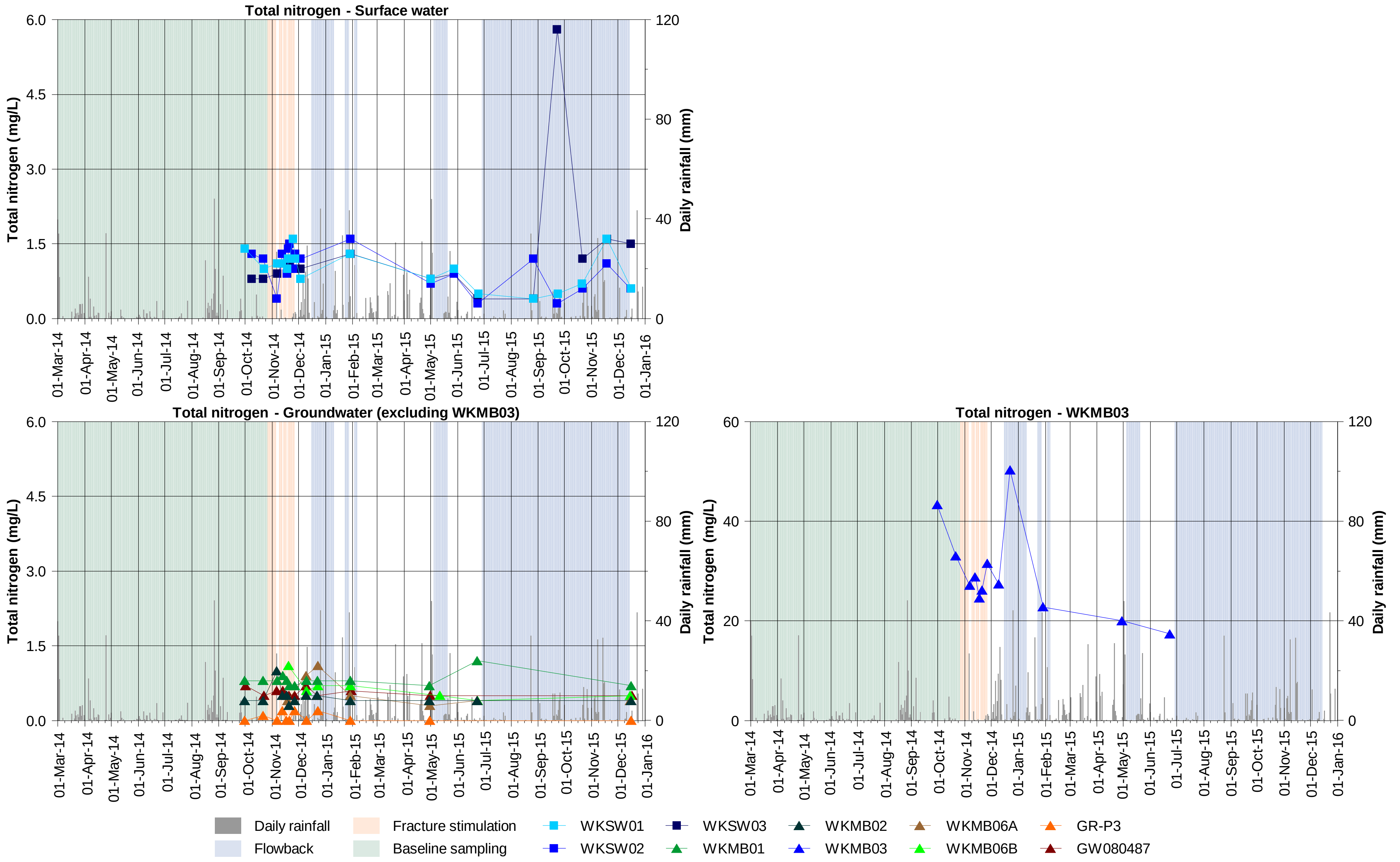

Figure G4.4: Total nitrogen at Waukivory surface water and groundwater monitoring locations.

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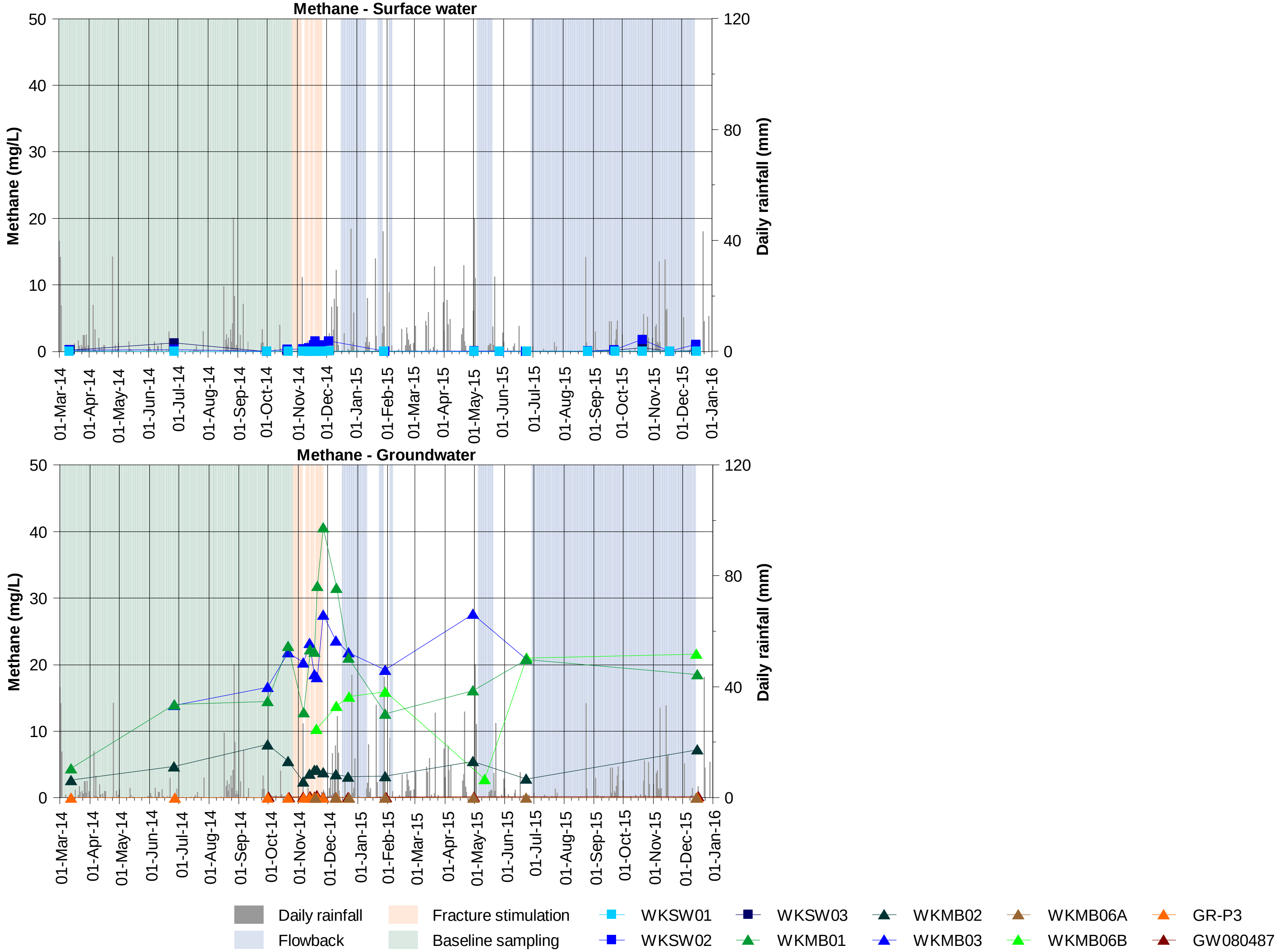

Figure G5.1: Methane at Waukivory surface water and groundwater monitoring locations.

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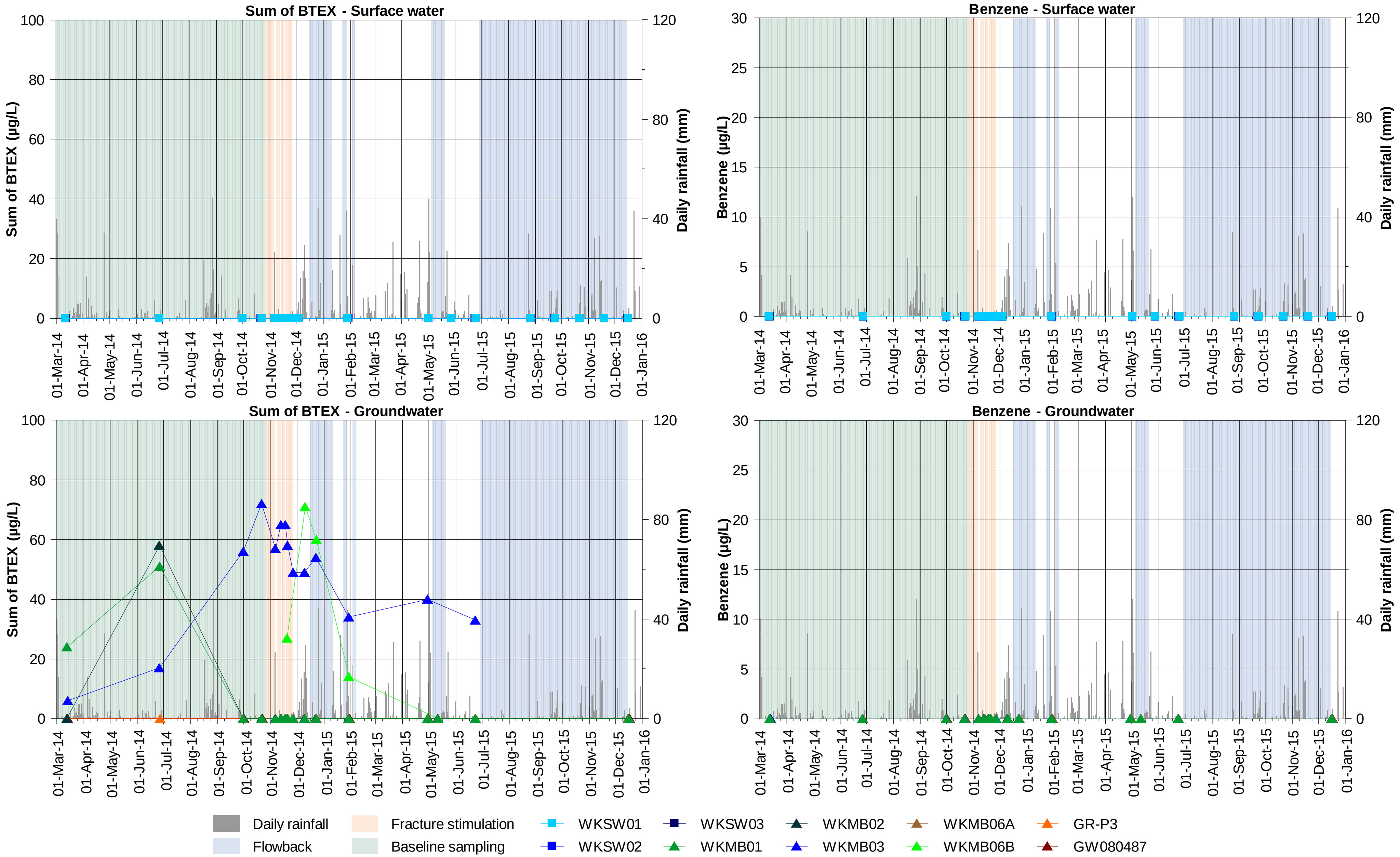

Figure F6.1: Sum of BTEX and benzene at Waukivory surface water and groundwater monitoring locations.

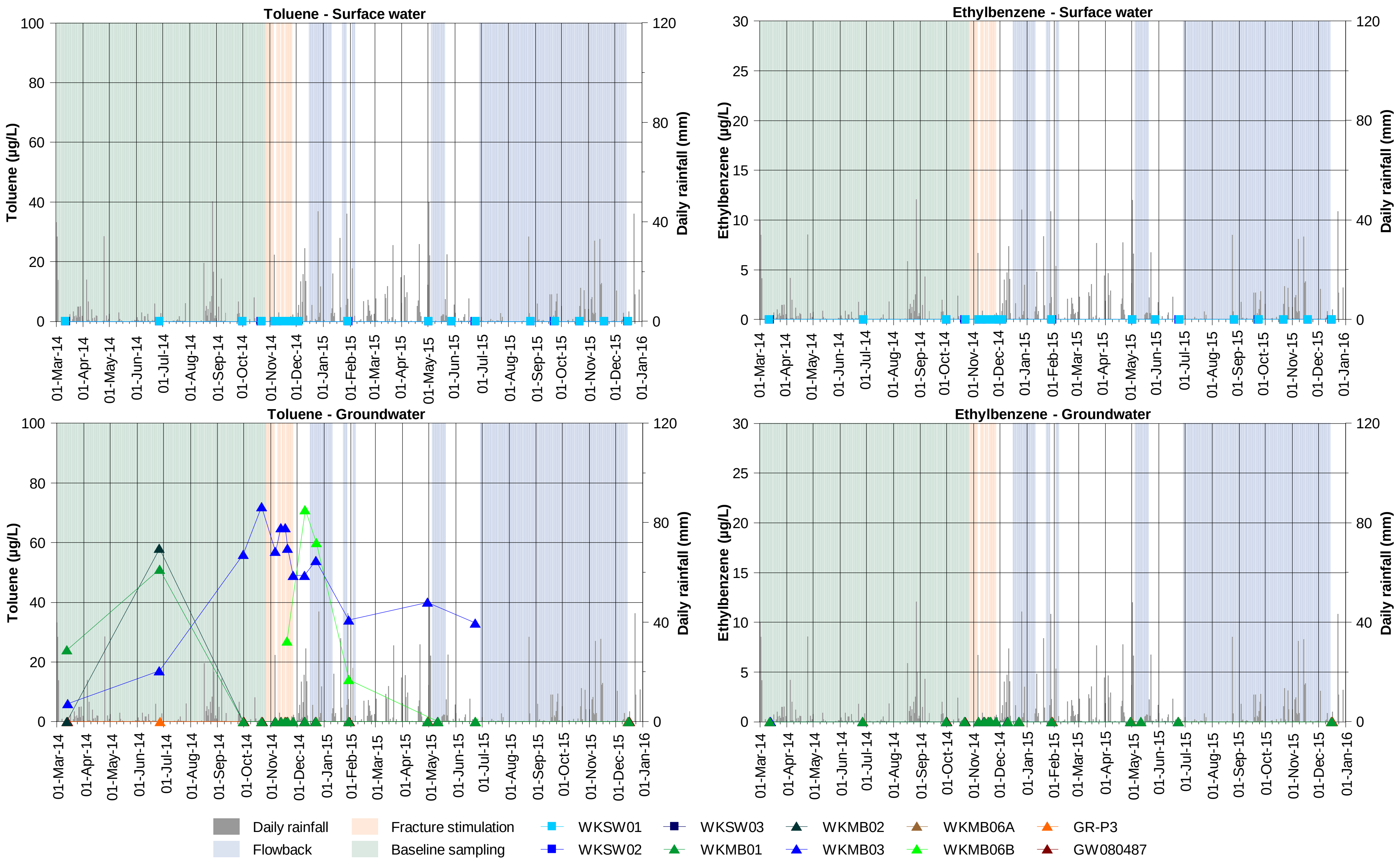

Figure F6.2: Toluene and ethylbenzene at Waukivory surface water and groundwater monitoring locations.

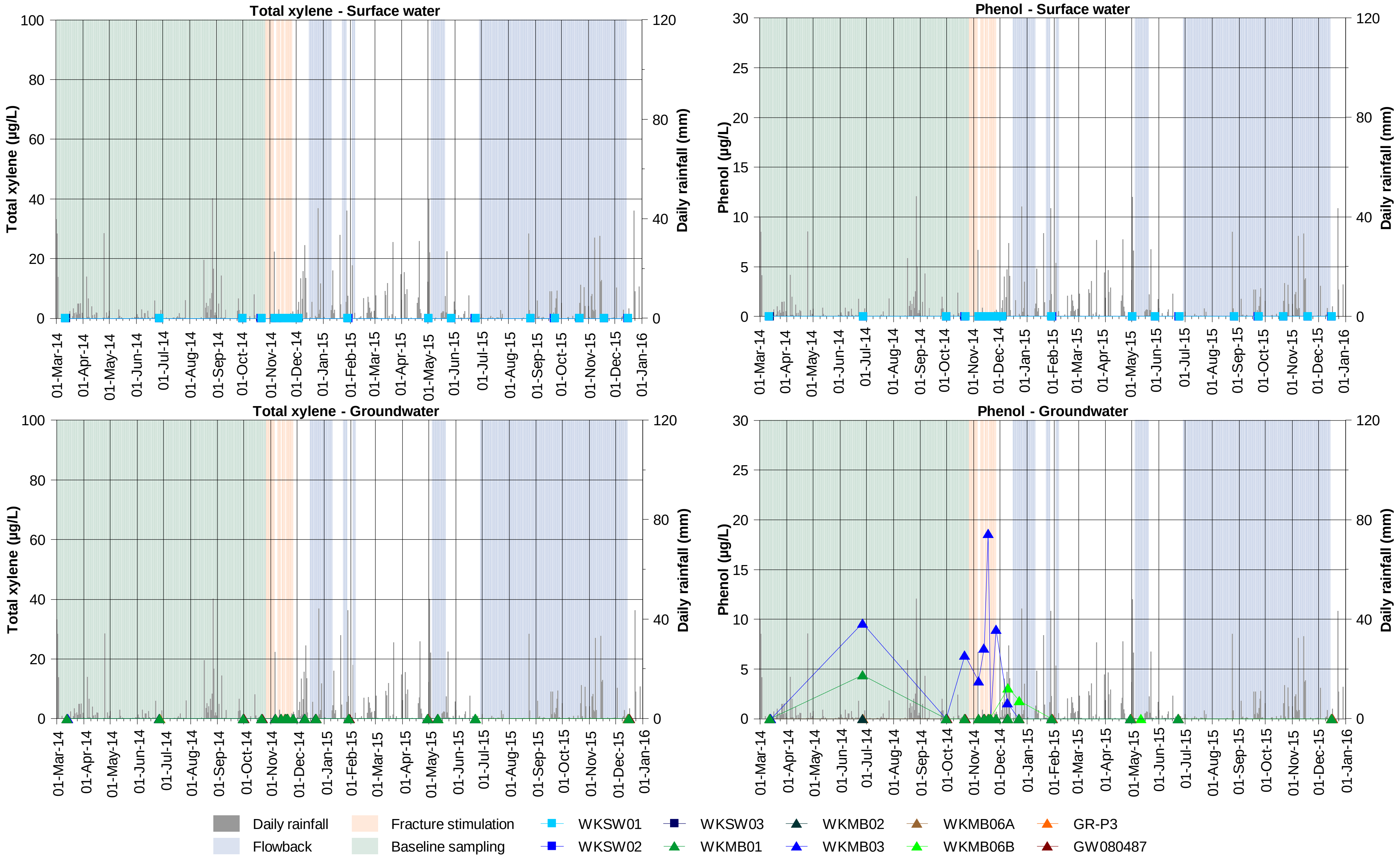

Figure G6.3: Total xylene and phenol at Waukivory surface water and groundwater monitoring locations.

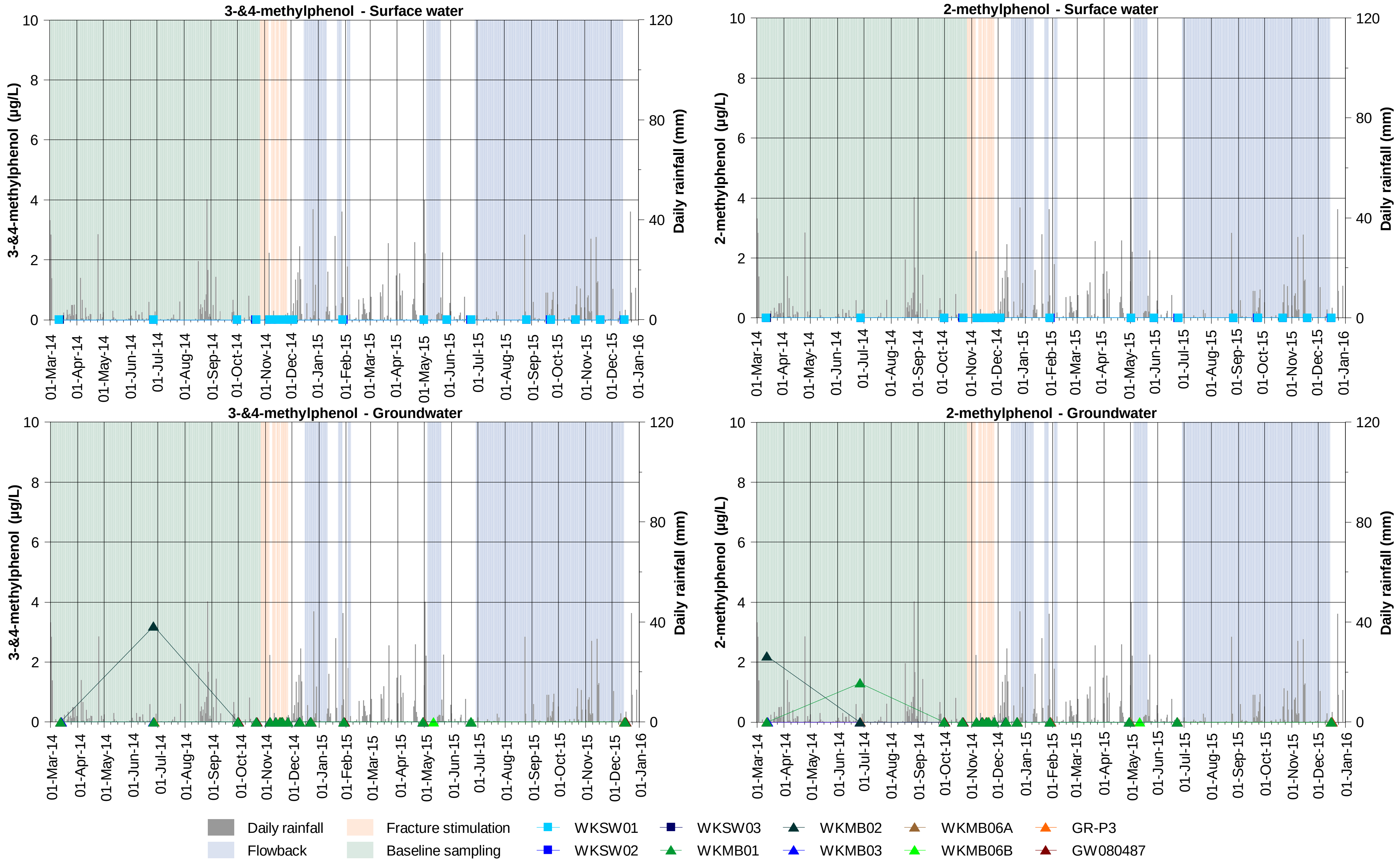

Figure G6.4: 3-&4-methylphenol and 2-methylphenol at Waukivory surface water and groundwater monitoring locations.

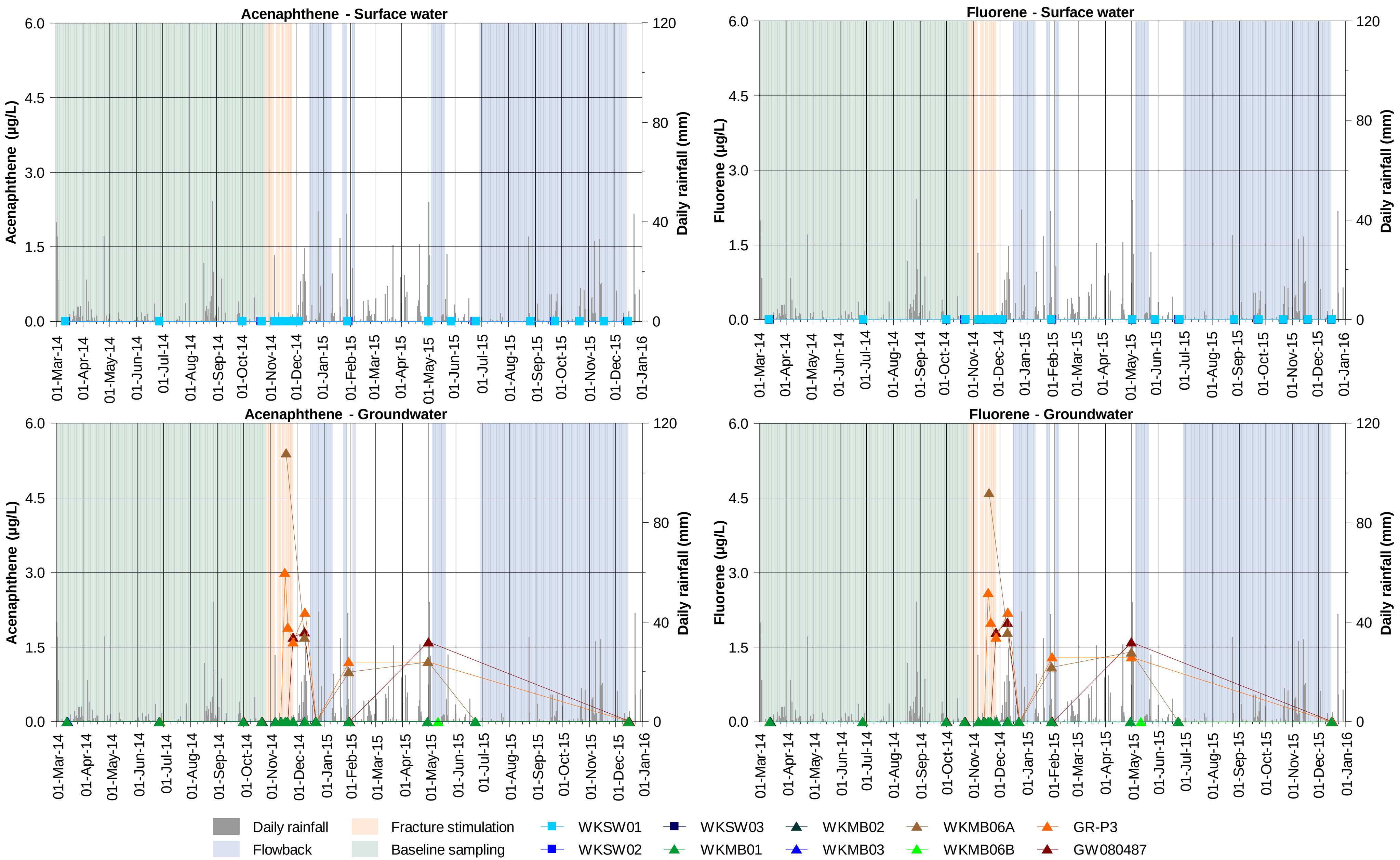

Figure G6.5: Acenaphthene and fluorene at Waukivory surface water and groundwater monitoring locations.

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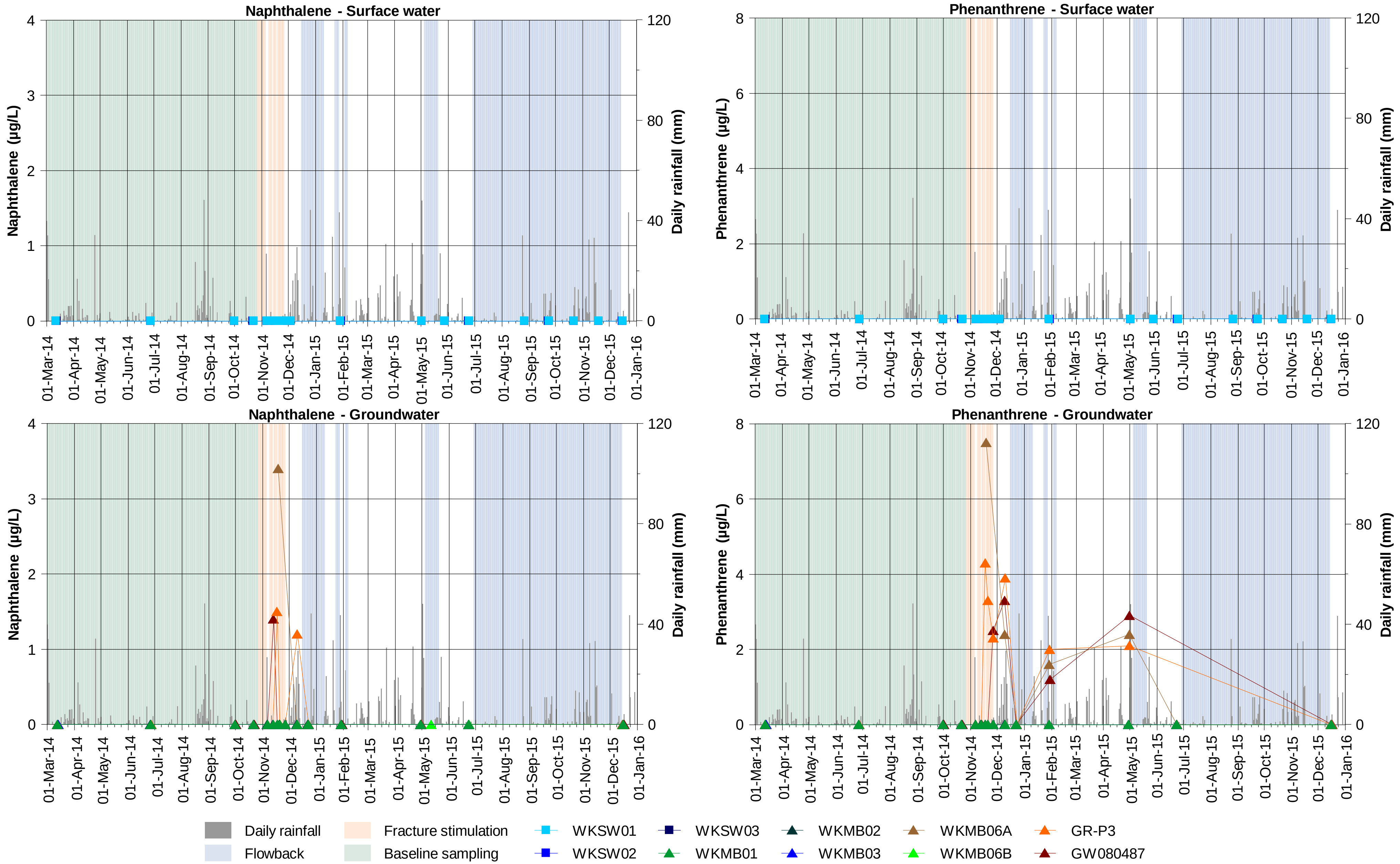

Figure G6.6: Naphthalene and phenanthrene at Waukivory surface water and groundwater monitoring locations.

Naphthalene method analysis EP075(SIM)B

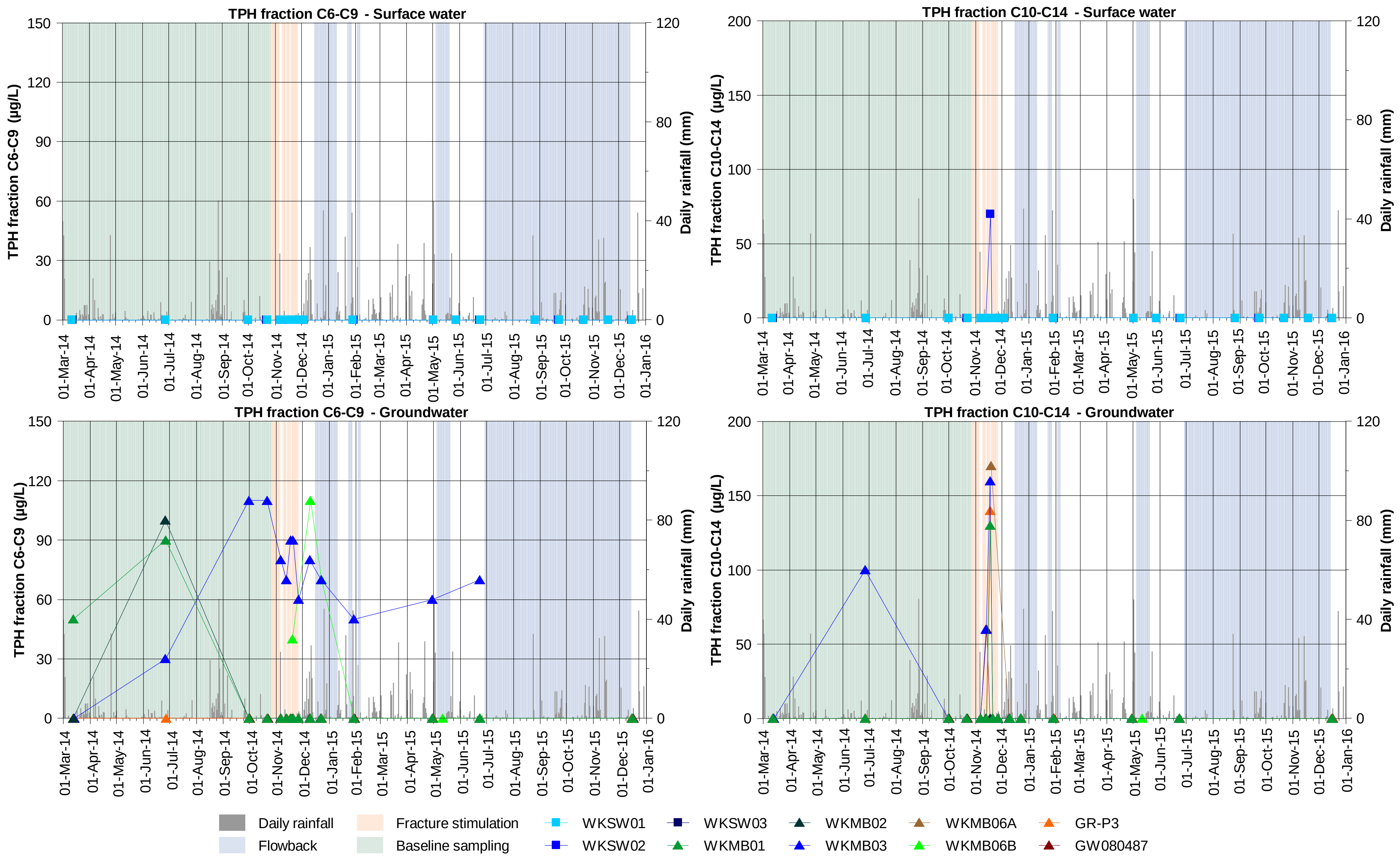

Figure G6.7: TPH fractions C6-C9 and C10-C14 at Waukivory surface water and groundwater monitoring locations.

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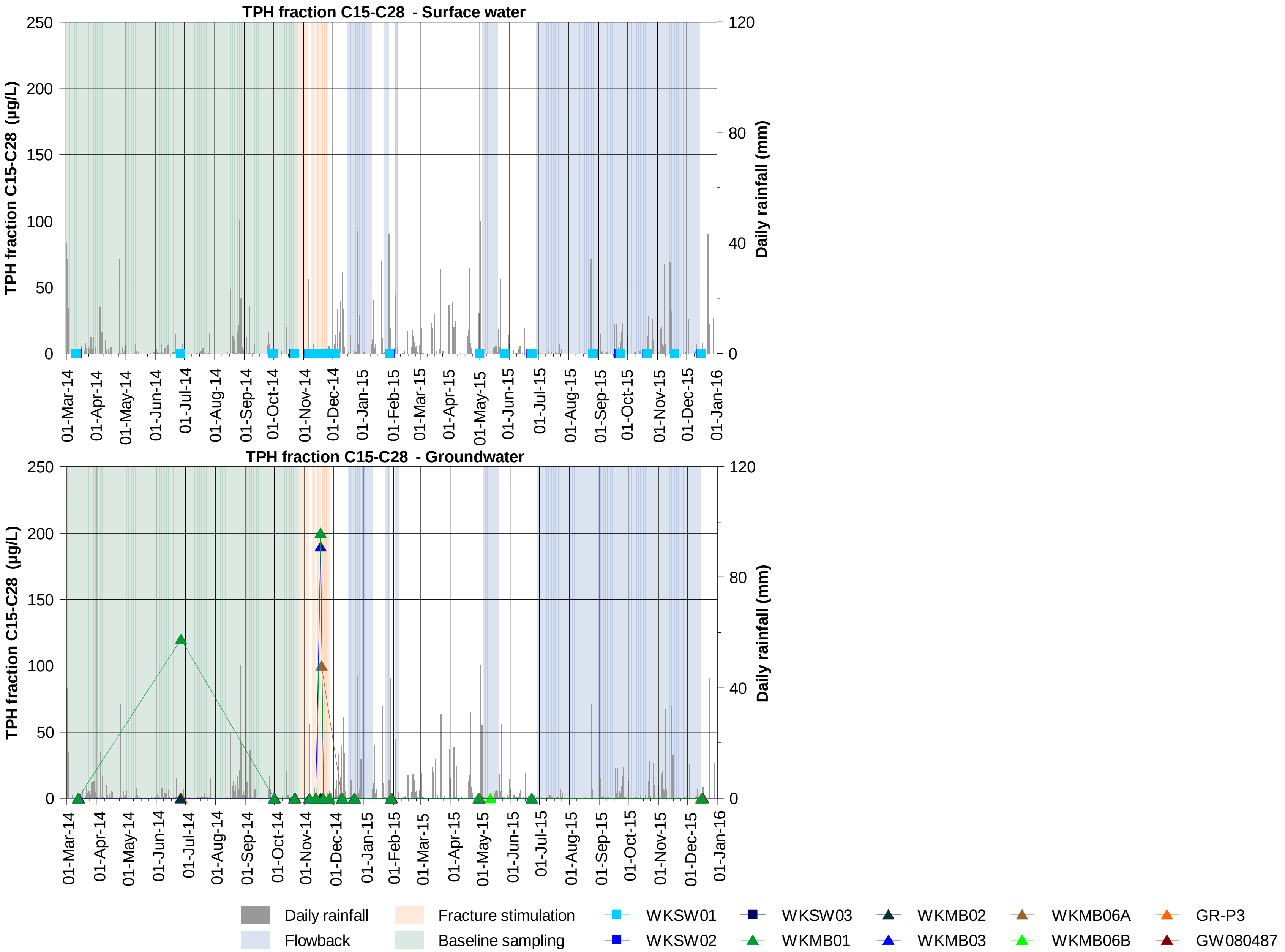

Figure G6.8: TPH fraction C15-C28 at Waukivory surface water and groundwater monitoring locations.

Appendix H

ALS laboratory reports

Appendix H

Laboratory results summary table

Report number	Date samples received	Lab Name
H1527198	21-October-2015	ALS
ES1534159	21-October-2015	ALS
ES1534161	21-October-2015	ALS
ES1534163	21-October-2015	ALS
ES1534210	21-October-2015	ALS
ES1534389	23-October-2015	ALS
ES1536590	19-November-2015	ALS
ES1536677	19-November-2015	ALS
ES1536678	19-November-2015	ALS
ES1538433	10-December-2015	ALS
ES1538987	16-December-2015	ALS
ES1538988	16-December-2015	ALS
ES1538990	16-December-2015	ALS
ES1539080	17-December-2015	ALS

ALS Water

ABN 84 009 936 029

5/585 Maitland Rd
MAYFIELD WEST NSW 2304
Tele: (02) 4014 2500

REPORT OF ANALYSIS

CUSTOMER: Parsons Brinckerhoff
GPO Box 5394, SYDNEY NSW 2000

CONTACT: Sean Daykin

SAMPLE DATE: 21 October 2015

DATE RECEIVED: 21 October 2015 at 3:30 pm – Sample temperature 5°C
1 sample/s sampled and submitted by customer, tested as received

TESTING COMMENCED: 21 October 2015 at 4:00 pm

REPORT NO.: HWA-15/08107

Sample No:	Sample Identification	Iron Related Bacteria (IRB) (Approximate IRB Population cfu/mL)	Sulphate Reducing Bacteria (SRB) (Approximate SRB Population cfu/mL)
H1527198	AST2	Present (570,000)	Present (500,000)

Test Methods:- HWC017 – (SRB-BART™ - for water and wastewater)
HWC020 – (IRB-BART™ - for water and wastewater)

RWoodward

R Woodward
Principal Microbiologist
30 October 2015

CERTIFICATE OF ANALYSIS

Work Order	: **ES1534159**	Page	: 1 of 10
Amendment	: **3**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523B	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 21-Oct-2015 15:30
C-O-C number	: ----	Date Analysis Commenced	: 21-Oct-2015
Sampler	: DAVID WATSON	Issue Date	: 04-Nov-2015 11:10
Site	: ----		
		No. of samples received	: 4
Quote number	: ----	No. of samples analysed	: 4

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

WORLD RECOGNISED ACCREDITATION

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Merrin Avery	Supervisor - Inorganic	Newcastle - Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Phalak Inthakesone	Laboratory Manager - Organics	Sydney Organics
Shobhna Chandra	Metals Coordinator	Sydney Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.

- EG020: Bromine quantification may be unreliable due to its low solubility in acid, leading to variable volatility during measurement by ICPMS.
- EG020: Results for EG020F metals (including iron) for samples ES1534159 #003 & #004 have been confirmed by re-analysis.
- This report has been amended and re-released to allow the reporting of additional analytical data.
- This report has been amended and re-released to allow additional pertinent comments to be added to the report. All analysis results are as per the previous report.
- This report has been amended to modify comment for EG020 analysis. All analysis results are as per the previous report
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WKSW01	WKSW02	WKSW03	QA14	----
			Client sampling date / time	21-Oct-2015 10:40	21-Oct-2015 11:30	21-Oct-2015 12:15	21-Oct-2015 12:15	----
Compound	CAS Number	LOR	Unit	ES1534159-001	ES1534159-002	ES1534159-003	ES1534159-004	--------
				Result	Result	Result	Result	Result
EA005: pH								
pH Value	----	0.01	pH Unit	**7.38**	**7.02**	**7.23**	**7.21**	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**681**	**607**	**623**	**623**	----
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	----	10	mg/L	**328**	**290**	**285**	**292**	----
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	5	mg/L	<5	**15**	**30**	**25**	----
ED009: Anions								
Chloride	16887-00-6	0.1	mg/L	**143**	**105**	**115**	**114**	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**75**	**121**	**105**	**105**	----
Total Alkalinity as CaCO3	----	1	mg/L	**75**	**121**	**105**	**105**	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**24**	<1	**5**	**6**	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**138**	**98**	**109**	**111**	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**22**	**29**	**27**	**28**	----
Magnesium	7439-95-4	1	mg/L	**17**	**17**	**16**	**16**	----
Sodium	7440-23-5	1	mg/L	**78**	**53**	**60**	**62**	----
Potassium	7440-09-7	1	mg/L	**4**	**4**	**4**	**4**	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	**0.002**	**0.002**	**0.003**	----
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	----
Strontium	7440-24-6	0.001	mg/L	**0.317**	**0.356**	**0.331**	**0.351**	----
Barium	7440-39-3	0.001	mg/L	**0.055**	**0.067**	**0.099**	**0.117**	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	**0.001**	**0.002**	**0.003**	----
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WKSW01	WKSW02	WKSW03	QA14	----
			Client sampling date / time	21-Oct-2015 10:40	21-Oct-2015 11:30	21-Oct-2015 12:15	21-Oct-2015 12:15	----
Compound	CAS Number	LOR	Unit	ES1534159-001	ES1534159-002	ES1534159-003	ES1534159-004	--------
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L	**0.169**	**1.27**	**2.41**	**2.88**	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
Zinc	7440-66-6	0.005	mg/L	**0.005**	<0.005	**0.010**	<0.005	----
Iron	7439-89-6	0.05	mg/L	**0.27**	**1.49**	**1.71**	**4.15**	----
Bromine	7726-95-6	0.1	mg/L	**0.3**	**0.3**	**0.3**	**0.3**	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
EG052G: Silica by Discrete Analyser								
Reactive Silica	----	0.05	mg/L	**0.24**	**8.17**	**7.72**	**7.68**	----
EK010/011: Chlorine								
Chlorine - Free	----	0.2	mg/L	<0.2	<0.2	<0.2	<0.2	----
Chlorine - Total Residual	----	0.2	mg/L	<0.2	<0.2	<0.2	<0.2	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.2**	**0.2**	**0.1**	**0.1**	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
EK055G-NH4: Ammonium as N by DA								
^ Ammonium as N	14798-03-9_N	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	<0.01	**0.01**	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	<0.01	**0.01**	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.7**	**0.6**	**1.2**	**1.0**	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WKSW01	WKSW02	WKSW03	QA14	----
			Client sampling date / time	21-Oct-2015 10:40	21-Oct-2015 11:30	21-Oct-2015 12:15	21-Oct-2015 12:15	----
Compound	CAS Number	LOR	Unit	ES1534159-001	ES1534159-002	ES1534159-003	ES1534159-004	--------
				Result	Result	Result	Result	Result
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.7**	**0.6**	**1.2**	**1.0**	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.03**	**0.13**	**0.24**	**0.28**	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	**0.02**	<0.01	**0.03**	**0.02**	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**5.89**	**5.18**	**5.28**	**5.35**	----
^ Total Cations	----	0.01	meq/L	**5.99**	**5.25**	**5.38**	**5.51**	----
^ Ionic Balance	----	0.01	%	**0.84**	**0.69**	**0.93**	**1.46**	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**4**	**5**	**8**	**8**	----
EP033: C1 - C4 Hydrocarbon Gases								
Methane	74-82-8	10	µg/L	**25**	**1770**	**568**	**665**	----
Ethene	74-85-1	10	µg/L	<10	<10	<10	<10	----
Ethane	74-84-0	10	µg/L	<10	<10	<10	<10	----
Propene	115-07-1	10	µg/L	<10	<10	<10	<10	----
Propane	74-98-6	10	µg/L	<10	<10	<10	<10	----
Butene	25167-67-3	10	µg/L	<10	<10	<10	<10	----
Butane	106-97-8	10	µg/L	<10	<10	<10	<10	----
EP074A: Monocyclic Aromatic Hydrocarbons								
Styrene	100-42-5	5	µg/L	<5	<5	<5	<5	----
Isopropylbenzene	98-82-8	5	µg/L	<5	<5	<5	<5	----
n-Propylbenzene	103-65-1	5	µg/L	<5	<5	<5	<5	----
1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	<5	<5	----
sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	<5	<5	----
1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	<5	<5	----
tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	<5	<5	----
p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	<5	<5	----
n-Butylbenzene	104-51-8	5	µg/L	<5	<5	<5	<5	----
EP074B: Oxygenated Compounds								
Vinyl Acetate	108-05-4	50	µg/L	<50	<50	<50	<50	----
2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	<50	<50	----
4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	<50	<50	----
2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	<50	<50	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WKSW01	WKSW02	WKSW03	QA14	----
			Client sampling date / time	21-Oct-2015 10:40	21-Oct-2015 11:30	21-Oct-2015 12:15	21-Oct-2015 12:15	----
Compound	CAS Number	LOR	Unit	ES1534159-001	ES1534159-002	ES1534159-003	ES1534159-004	--------
				Result	Result	Result	Result	Result
EP074C: Sulfonated Compounds								
Carbon disulfide	75-15-0	5	µg/L	<5	<5	<5	<5	----
EP074D: Fumigants								
2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	<5	<5	----
1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	<5	<5	----
cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	<5	<5	----
trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	<5	<5	----
1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	<5	<5	----
EP074E: Halogenated Aliphatic Compounds								
Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	<50	<50	----
Chloromethane	74-87-3	50	µg/L	<50	<50	<50	<50	----
Vinyl chloride	75-01-4	50	µg/L	<50	<50	<50	<50	----
Bromomethane	74-83-9	50	µg/L	<50	<50	<50	<50	----
Chloroethane	75-00-3	50	µg/L	<50	<50	<50	<50	----
Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	<50	<50	----
1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	<5	<5	----
Iodomethane	74-88-4	5	µg/L	<5	<5	<5	<5	----
trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	<5	<5	----
1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	<5	<5	----
cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	<5	<5	----
1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	<5	<5	----
1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	<5	<5	----
Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	<5	<5	----
1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	<5	<5	----
Trichloroethene	79-01-6	5	µg/L	<5	<5	<5	<5	----
Dibromomethane	74-95-3	5	µg/L	<5	<5	<5	<5	----
1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	<5	<5	----
1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	<5	<5	----
Tetrachloroethene	127-18-4	5	µg/L	<5	<5	<5	<5	----
1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	<5	<5	----
trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	<5	<5	----
cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	<5	<5	----
1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	<5	<5	----
1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	<5	<5	----
Pentachloroethane	76-01-7	5	µg/L	<5	<5	<5	<5	----

Analytical Results

Sub-Matrix: WATER
(Matrix: WATER)

Compound	CAS Number	LOR	Unit	WKSW01	WKSW02	WKSW03	QA14	----
			Client sampling date / time	21-Oct-2015 10:40	21-Oct-2015 11:30	21-Oct-2015 12:15	21-Oct-2015 12:15	----
				ES1534159-001	ES1534159-002	ES1534159-003	ES1534159-004	--------
				Result	Result	Result	Result	Result
EP074E: Halogenated Aliphatic Compounds - Continued								
1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	<5	<5	----
Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	<5	<5	----
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	5	µg/L	<5	<5	<5	<5	----
Bromobenzene	108-86-1	5	µg/L	<5	<5	<5	<5	----
2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	<5	<5	----
4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	<5	<5	----
1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	<5	<5	----
1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	<5	<5	----
1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	<5	<5	----
1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	<5	<5	----
1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	<5	<5	----
EP074G: Trihalomethanes								
Chloroform	67-66-3	5	µg/L	<5	<5	<5	<5	----
Bromodichloromethane	75-27-4	5	µg/L	<5	<5	<5	<5	----
Dibromochloromethane	124-48-1	5	µg/L	<5	<5	<5	<5	----
Bromoform	75-25-2	5	µg/L	<5	<5	<5	<5	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
2-Chlorophenol	95-57-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
2-Methylphenol	95-48-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	<2.0	<2.0	<2.0	----
2-Nitrophenol	88-75-5	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Pentachlorophenol	87-86-5	2	µg/L	<2.0	<2.0	<2.0	<2.0	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WKSW01	WKSW02	WKSW03	QA14	----
			Client sampling date / time	21-Oct-2015 10:40	21-Oct-2015 11:30	21-Oct-2015 12:15	21-Oct-2015 12:15	----
Compound	CAS Number	LOR	Unit	ES1534159-001	ES1534159-002	ES1534159-003	ES1534159-004	--------
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Fluorene	86-73-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Anthracene	120-12-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Pyrene	129-00-0	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Chrysene	218-01-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	----
>C10 - C16 Fraction	>C10_C16	100	µg/L	<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WKSW01	WKSW02	WKSW03	QA14	----
			Client sampling date / time	21-Oct-2015 10:40	21-Oct-2015 11:30	21-Oct-2015 12:15	21-Oct-2015 12:15	----
Compound	CAS Number	LOR	Unit	ES1534159-001	ES1534159-002	ES1534159-003	ES1534159-004	--------
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	----
^ Total Xylenes	1330-20-7	2	µg/L	<2	<2	<2	<2	----
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	<1	**2**	**3**	**3**	----
Diethanolamine	111-42-2	1	µg/L	<1	<1	<1	<1	----
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	<1	<1	<1	----
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	5	%	100	102	101	101	----
Toluene-D8	2037-26-5	5	%	106	106	100	98.6	----
4-Bromofluorobenzene	460-00-4	5	%	99.3	97.4	97.0	93.2	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1	%	27.9	20.7	20.6	23.2	----
2-Chlorophenol-D4	93951-73-6	1	%	56.8	42.6	43.5	47.1	----
2.4.6-Tribromophenol	118-79-6	1	%	48.8	42.7	38.7	40.6	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1	%	83.6	66.1	64.2	67.8	----
Anthracene-d10	1719-06-8	1	%	79.2	61.7	61.5	61.8	----
4-Terphenyl-d14	1718-51-0	1	%	89.5	69.8	68.7	69.8	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	112	114	114	113	----
Toluene-D8	2037-26-5	2	%	123	123	116	114	----
4-Bromofluorobenzene	460-00-4	2	%	116	114	113	109	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1534161**	Page	: 1 of 10
Amendment	: **1**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523B	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 21-Oct-2015 15:30
C-O-C number	: ----	Date Analysis Commenced	: 21-Oct-2015
Sampler	: DAVID WATSON	Issue Date	: 30-Oct-2015 17:17
Site	: ----		
		No. of samples received	: 1
Quote number	: ----	No. of samples analysed	: 1

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Dian Dao		Sydney Inorganics
Merrin Avery	Supervisor - Inorganic	Newcastle - Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Phalak Inthakesone	Laboratory Manager - Organics	Sydney Organics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.

- EG020: Bromine quantification may be unreliable due to its low solubility in acid, leading to variable volatility during measurement by ICPMS.
- Samples not received in a suitable time frame to conduct the analysis EA005 within the recommended holding time.
- This report has been amended and re-released to allow the reporting of additional analytical data.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	**AST2**	----	----	----	----
			Client sampling date / time	21-Oct-2015 09:10	----	----	----	----
				ES1534161-001	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EA005: pH								
pH Value	----	0.01	pH Unit	**9.51**	----	----	----	----
EA015: Total Dissolved Solids								
^ **Total Dissolved Solids @180°C**	----	10	mg/L	**5010**	----	----	----	----
EA025: Suspended Solids								
^ **Suspended Solids (SS)**	----	5	mg/L	**110**	----	----	----	----
ED009: Anions								
Chloride	16887-00-6	0.1	mg/L	**883**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	**1650**	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**2700**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**4350**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**852**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**10**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**3**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**2140**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**22**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.12**	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.007**	----	----	----	----
Boron	7440-42-8	0.05	mg/L	**6.12**	----	----	----	----
Strontium	7440-24-6	0.001	mg/L	**3.64**	----	----	----	----
Barium	7440-39-3	0.001	mg/L	**5.32**	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	----	----	----	----
Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	**0.003**	----	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.008**	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.010**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	AST2	----	----	----	----
			Client sampling date / time	21-Oct-2015 09:10	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1534161-001	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Molybdenum	7439-98-7	0.001	mg/L	**0.013**	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	**0.004**	----	----	----	----
Lead	7439-92-1	0.001	mg/L	**0.002**	----	----	----	----
Antimony	7440-36-0	0.001	mg/L	**0.002**	----	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	----	----	----	----
Tin	7440-31-5	0.001	mg/L	<0.001	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.007**	----	----	----	----
Iron	7439-89-6	0.05	mg/L	**0.26**	----	----	----	----
Bromine	7726-95-6	0.1	mg/L	**1.4**	----	----	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----
EG052G: Silica by Discrete Analyser								
Reactive Silica	----	0.05	mg/L	**1.26**	----	----	----	----
EK010/011: Chlorine								
Chlorine - Free	----	0.2	mg/L	<0.2	----	----	----	----
Chlorine - Total Residual	----	0.2	mg/L	<0.2	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**2.0**	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.12**	----	----	----	----
EK055G-NH4: Ammonium as N by DA								
^ Ammonium as N	14798-03-9_N	0.01	mg/L	**0.06**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	<0.01	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**10.7**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**10.7**	----	----	----	----

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	AST2	----	----	----	----
			Client sampling date / time	21-Oct-2015 09:10	----	----	----	----
				ES1534161-001	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**2.54**	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	**0.02**	----	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**111**	----	----	----	----
^ Total Cations	----	0.01	meq/L	**94.4**	----	----	----	----
^ Ionic Balance	----	0.01	%	**8.12**	----	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**61**	----	----	----	----
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	**7**	----	----	----	----
EP033: C1 - C4 Hydrocarbon Gases								
Methane	74-82-8	10	µg/L	**46**	----	----	----	----
Ethene	74-85-1	10	µg/L	<10	----	----	----	----
Ethane	74-84-0	10	µg/L	<10	----	----	----	----
Propene	115-07-1	10	µg/L	<10	----	----	----	----
Propane	74-98-6	10	µg/L	<10	----	----	----	----
Butene	25167-67-3	10	µg/L	<10	----	----	----	----
Butane	106-97-8	10	µg/L	<10	----	----	----	----
EP074A: Monocyclic Aromatic Hydrocarbons								
Styrene	100-42-5	5	µg/L	<5	----	----	----	----
Isopropylbenzene	98-82-8	5	µg/L	<5	----	----	----	----
n-Propylbenzene	103-65-1	5	µg/L	<5	----	----	----	----
1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	----	----	----	----
sec-Butylbenzene	135-98-8	5	µg/L	<5	----	----	----	----
1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	----	----	----	----
tert-Butylbenzene	98-06-6	5	µg/L	<5	----	----	----	----
p-Isopropyltoluene	99-87-6	5	µg/L	<5	----	----	----	----
n-Butylbenzene	104-51-8	5	µg/L	<5	----	----	----	----
EP074B: Oxygenated Compounds								
Vinyl Acetate	108-05-4	50	µg/L	<50	----	----	----	----
2-Butanone (MEK)	78-93-3	50	µg/L	<50	----	----	----	----
4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	----	----	----	----
2-Hexanone (MBK)	591-78-6	50	µg/L	<50	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	AST2	----	----	----	----
			Client sampling date / time	21-Oct-2015 09:10	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1534161-001	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EP074C: Sulfonated Compounds								
Carbon disulfide	75-15-0	5	µg/L	<5	----	----	----	----
EP074D: Fumigants								
2.2-Dichloropropane	594-20-7	5	µg/L	<5	----	----	----	----
1.2-Dichloropropane	78-87-5	5	µg/L	<5	----	----	----	----
cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	----	----	----	----
trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	----	----	----	----
1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	----	----	----	----
EP074E: Halogenated Aliphatic Compounds								
Dichlorodifluoromethane	75-71-8	50	µg/L	<50	----	----	----	----
Chloromethane	74-87-3	50	µg/L	<50	----	----	----	----
Vinyl chloride	75-01-4	50	µg/L	<50	----	----	----	----
Bromomethane	74-83-9	50	µg/L	<50	----	----	----	----
Chloroethane	75-00-3	50	µg/L	<50	----	----	----	----
Trichlorofluoromethane	75-69-4	50	µg/L	<50	----	----	----	----
1.1-Dichloroethene	75-35-4	5	µg/L	<5	----	----	----	----
Iodomethane	74-88-4	5	µg/L	<5	----	----	----	----
trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	----	----	----	----
1.1-Dichloroethane	75-34-3	5	µg/L	<5	----	----	----	----
cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	----	----	----	----
1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	----	----	----	----
1.1-Dichloropropylene	563-58-6	5	µg/L	<5	----	----	----	----
Carbon Tetrachloride	56-23-5	5	µg/L	<5	----	----	----	----
1.2-Dichloroethane	107-06-2	5	µg/L	<5	----	----	----	----
Trichloroethene	79-01-6	5	µg/L	<5	----	----	----	----
Dibromomethane	74-95-3	5	µg/L	<5	----	----	----	----
1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	----	----	----	----
1.3-Dichloropropane	142-28-9	5	µg/L	<5	----	----	----	----
Tetrachloroethene	127-18-4	5	µg/L	<5	----	----	----	----
1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	----	----	----	----
trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	----	----	----	----
cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	----	----	----	----
1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	----	----	----	----
1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	----	----	----	----
Pentachloroethane	76-01-7	5	µg/L	<5	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	AST2	----	----	----	----
			Client sampling date / time	21-Oct-2015 09:10	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1534161-001	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EP074E: Halogenated Aliphatic Compounds - Continued								
1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	----	----	----	----
Hexachlorobutadiene	87-68-3	5	µg/L	<5	----	----	----	----
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	5	µg/L	<5	----	----	----	----
Bromobenzene	108-86-1	5	µg/L	<5	----	----	----	----
2-Chlorotoluene	95-49-8	5	µg/L	<5	----	----	----	----
4-Chlorotoluene	106-43-4	5	µg/L	<5	----	----	----	----
1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	----	----	----	----
1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	----	----	----	----
1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	----	----	----	----
1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	----	----	----	----
1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	----	----	----	----
EP074G: Trihalomethanes								
Chloroform	67-66-3	5	µg/L	<5	----	----	----	----
Bromodichloromethane	75-27-4	5	µg/L	<5	----	----	----	----
Dibromochloromethane	124-48-1	5	µg/L	<5	----	----	----	----
Bromoform	75-25-2	5	µg/L	<5	----	----	----	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1	µg/L	<1.0	----	----	----	----
2-Chlorophenol	95-57-8	1	µg/L	<1.0	----	----	----	----
2-Methylphenol	95-48-7	1	µg/L	<1.0	----	----	----	----
3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	----	----	----	----
2-Nitrophenol	88-75-5	1	µg/L	<1.0	----	----	----	----
2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	----	----	----	----
2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	----	----	----	----
2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	----	----	----	----
4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	----	----	----	----
2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	----	----	----	----
2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	----	----	----	----
Pentachlorophenol	87-86-5	2	µg/L	<2.0	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1	µg/L	<1.0	----	----	----	----
Acenaphthylene	208-96-8	1	µg/L	<1.0	----	----	----	----
Acenaphthene	83-32-9	1	µg/L	<1.0	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	AST2	----	----	----	----
			Client sampling date / time	21-Oct-2015 09:10	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1534161-001	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Fluorene	86-73-7	1	µg/L	<1.0	----	----	----	----
Phenanthrene	85-01-8	1	µg/L	<1.0	----	----	----	----
Anthracene	120-12-7	1	µg/L	<1.0	----	----	----	----
Fluoranthene	206-44-0	1	µg/L	<1.0	----	----	----	----
Pyrene	129-00-0	1	µg/L	<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1	µg/L	<1.0	----	----	----	----
Chrysene	218-01-9	1	µg/L	<1.0	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	----	----	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	µg/L	<0.5	----	----	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
>C10 - C16 Fraction	>C10_C16	100	µg/L	<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L	<100	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L	<100	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	AST2	----	----	----	----
			Client sampling date / time	21-Oct-2015 09:10	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1534161-001	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----
^ Total Xylenes	1330-20-7	2	µg/L	<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	**32**	----	----	----	----
Diethanolamine	111-42-2	1	µg/L	<1	----	----	----	----
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	----	----	----	----
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	5	%	**92.2**	----	----	----	----
Toluene-D8	2037-26-5	5	%	**106**	----	----	----	----
4-Bromofluorobenzene	460-00-4	5	%	**102**	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1	%	**20.6**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1	%	**36.1**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1	%	**36.5**	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1	%	**76.9**	----	----	----	----
Anthracene-d10	1719-06-8	1	%	**46.1**	----	----	----	----
4-Terphenyl-d14	1718-51-0	1	%	**65.4**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**91.5**	----	----	----	----
Toluene-D8	2037-26-5	2	%	**104**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	**104**	----	----	----	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1534163**	Page	: 1 of 2
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523B	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 21-Oct-2015 15:30
C-O-C number	: ----	Date Analysis Commenced	: 22-Oct-2015
Sampler	: ----	Issue Date	: 27-Oct-2015 12:51
Site	: ----		
		No. of samples received	: 1
Quote number	: ----	No. of samples analysed	: 1

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA

WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ashesh Patel	Inorganic Chemist	Sydney Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**AST2**	**----**	**----**	**----**	**----**
			Client sampling date / time	21-Oct-2015 09:10	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1534163-001**	**--------**	**--------**	**--------**	**--------**
				Result	Result	Result	Result	Result
EG051G: Ferrous Iron by Discrete Analyser								
Ferrous Iron	----	0.05	mg/L	**0.39**	----	----	----	----
EK085M: Sulfide as S2-								
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	----	----	----	----
EP006D: Dissolved Inorganic Carbon (DIC)								
Dissolved Inorganic Carbon	----	1	mg/L	**844**	----	----	----	----
EP030: Biochemical Oxygen Demand (BOD)								
Biochemical Oxygen Demand	----	2	mg/L	**24**	----	----	----	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1534210**	Page	: 1 of 2
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523A	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 21-Oct-2015 16:15
C-O-C number	: ----	Date Analysis Commenced	: 21-Oct-2015
Sampler	: DAVID WATSON	Issue Date	: 23-Oct-2015 16:17
Site	: ----		
		No. of samples received	: 1
Quote number	: ----	No. of samples analysed	: 1

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA

WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics

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Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**AST2**	----	----	----	----
			Client sampling date / time	21-Oct-2015 09:10	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1534210-001**	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**9560**	----	----	----	----
EK084: Un-ionized Hydrogen Sulfide								
Unionized Hydrogen Sulfide	----	0.1	mg/L	<0.1	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----
^ **Total Xylenes**	1330-20-7	2	µg/L	<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L	<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**93.5**	----	----	----	----
Toluene-D8	2037-26-5	2	%	**114**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	**87.2**	----	----	----	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1534389**		
Amendment	: **2**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523A	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: ----	Date Samples Received	: 23-Oct-2015 12:00
C-O-C number	: ----	Date Analysis Commenced	: 23-Oct-2015
Sampler	: B EASTWOOD	Issue Date	: 05-Jan-2016 11:57
Site	: ----		
		No. of samples received	: 4
Quote number	: ----	No. of samples analysed	: 1

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

WORLD RECOGNISED ACCREDITATION

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Phalak Inthakesone	Laboratory Manager - Organics	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

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- This report has been amended following a request to generate an individual report for sample WK12. All other analytical results are as per the previous report.

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**WK12**	----	----	----	----
			Client sampling date / time	22-Oct-2015 15:30	----	----	----	----
Compound	CAS Number	LOR	Unit	**ES1534389-004**	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	**2**	----	----	----	----
Toluene	108-88-3	2	µg/L	**3**	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----
^ **Total Xylenes**	1330-20-7	2	µg/L	<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L	**5**	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**106**	----	----	----	----
Toluene-D8	2037-26-5	2	%	**126**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	**109**	----	----	----	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1536590**	Page	: 1 of 9
Amendment	: **3**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523A	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: ----	Date Samples Received	: 19-Nov-2015 12:15
C-O-C number	: ----	Date Analysis Commenced	: 20-Nov-2015
Sampler	: DAVID WATSON	Issue Date	: 05-Jan-2016 12:05
Site	: ----		
		No. of samples received	: 6
Quote number	: ----	No. of samples analysed	: 5

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

WORLD RECOGNISED ACCREDITATION

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW
Pabi Subba	Senior Organic Chemist	Sydney Organics, Smithfield, NSW
Phalak Inthakesone	Laboratory Manager - Organics	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

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- ED041G: LOR raised for Sulfate analysis on sample no: 2, due to matrix interferences.
- EG020: LOR's for some samples have been raised due to matrix interference (High Total Dissolved Solids)
- EG020: Bromine quantification may be unreliable due to its low solubility in acid, leading to variable volatility during measurement by ICPMS.
- This report has been amended and re-released to allow the reporting of additional analytical data.
- This report has been amended and re-released to allow the removal of analytical data for sample WK11 FRAC TANK 1.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	AST2	WK12	WK13	WK14	QA18
			Client sampling date / time	18-Nov-2015 07:00	18-Nov-2015 09:45	18-Nov-2015 09:10	18-Nov-2015 08:20	18-Nov-2015 07:00
Compound	CAS Number	LOR	Unit	ES1536590-001	ES1536590-002	ES1536590-003	ES1536590-004	ES1536590-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**9.28**	**7.82**	**8.87**	**8.69**	**9.28**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	----	**19400**	**7340**	**12600**	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**6320**	**11700**	**4410**	**8340**	**6470**
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	**124**	<5	<5	<5
ED009: Anions								
Chloride	16887-00-6	0.1	mg/L	**2000**	**6110**	**675**	**1980**	**2010**
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	**869**	<1	**500**	**350**	**875**
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**1560**	**1150**	**2720**	**4120**	**1570**
Total Alkalinity as CaCO3	----	1	mg/L	**2420**	**1150**	**3220**	**4480**	**2440**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**1**	<10	<1	<1	<1
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**1900**	**5900**	**662**	**1890**	**1880**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**14**	**213**	**6**	**21**	**16**
Magnesium	7439-95-4	1	mg/L	**12**	**38**	**2**	**11**	**13**
Sodium	7440-23-5	1	mg/L	**2370**	**3500**	**1950**	**3300**	**2480**
Potassium	7440-09-7	1	mg/L	**284**	**927**	**11**	**15**	**284**
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.07**	<0.01	**0.02**	<0.01	**0.05**
Arsenic	7440-38-2	0.001	mg/L	**0.006**	**0.002**	**0.008**	**0.003**	**0.006**
Boron	7440-42-8	0.05	mg/L	**3.93**	**1.11**	**2.06**	**2.42**	**4.18**
Strontium	7440-24-6	0.001	mg/L	**2.82**	**25.0**	**1.78**	**6.02**	**2.98**
Barium	7440-39-3	0.001	mg/L	**2.20**	**33.4**	**2.24**	**7.24**	**2.26**
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L	<0.001	**0.003**	<0.001	**0.004**	<0.001

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	AST2	WK12	WK13	WK14	QA18
			Client sampling date / time	18-Nov-2015 07:00	18-Nov-2015 09:45	18-Nov-2015 09:10	18-Nov-2015 08:20	18-Nov-2015 07:00
Compound	CAS Number	LOR	Unit	ES1536590-001	ES1536590-002	ES1536590-003	ES1536590-004	ES1536590-005
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Copper	7440-50-8	0.001	mg/L	**0.004**	<0.001	**0.003**	<0.001	**0.006**
Manganese	7439-96-5	0.001	mg/L	**0.005**	**0.236**	**0.003**	**0.012**	**0.004**
Molybdenum	7439-98-7	0.001	mg/L	**0.010**	**0.024**	**0.013**	**0.010**	**0.011**
Nickel	7440-02-0	0.001	mg/L	**0.003**	**0.002**	**0.002**	**0.002**	**0.004**
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Antimony	7440-36-0	0.001	mg/L	**0.001**	<0.001	<0.001	<0.001	**0.001**
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	<0.005	**0.015**	<0.005	<0.005	**0.006**
Iron	7439-89-6	0.05	mg/L	**0.06**	**21.8**	**0.11**	**0.09**	**0.08**
Bromine	7726-95-6	0.1	mg/L	**2.9**	**12.0**	**1.6**	**1.2**	**3.0**
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG052G: Silica by Discrete Analyser								
Reactive Silica	----	0.05	mg/L	**3.23**	**32.5**	**25.2**	**34.9**	**2.87**
EK010/011: Chlorine								
Chlorine - Free	----	0.2	mg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorine - Total Residual	----	0.2	mg/L	<0.2	<0.2	<0.2	<0.2	<0.2
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**1.6**	**1.6**	**2.4**	**1.2**	**1.6**
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**1.03**	**7.90**	**4.50**	**4.85**	**0.95**
EK055G-NH4: Ammonium as N by DA								
Ammonium as N	14798-03-9_N	0.01	mg/L	**0.55**	**7.78**	**3.94**	**4.71**	**0.51**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	**0.02**	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.04**	**0.02**	**0.03**	<0.01	**0.04**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.04**	**0.02**	**0.03**	**0.02**	**0.04**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**6.6**	**9.8**	**6.4**	**7.0**	**6.5**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	AST2	WK12	WK13	WK14	QA18
			Client sampling date / time	18-Nov-2015 07:00	18-Nov-2015 09:45	18-Nov-2015 09:10	18-Nov-2015 08:20	18-Nov-2015 07:00
Compound	CAS Number	LOR	Unit	ES1536590-001	ES1536590-002	ES1536590-003	ES1536590-004	ES1536590-005
				Result	Result	Result	Result	Result
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**6.6**	**9.8**	**6.4**	**7.0**	**6.5**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**1.24**	**0.79**	**1.73**	**1.48**	**1.23**
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	**0.07**	**0.54**	**0.21**	<0.01
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	**102**	**189**	**83.0**	**143**	**102**
Total Cations	----	0.01	meq/L	**112**	**190**	**85.6**	**146**	**117**
Ionic Balance	----	0.01	%	**4.67**	**0.08**	**1.46**	**1.00**	**6.92**
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**33**	**8**	**3**	<1	**33**
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	<5	**7**	<5	<5	<5
EP033: C1 - C4 Hydrocarbon Gases								
Methane	74-82-8	10	µg/L	**161**	**17200**	**18100**	**13400**	**105**
Ethene	74-85-1	10	µg/L	<10	<10	<10	<10	<10
Ethane	74-84-0	10	µg/L	<10	**106**	**2740**	**1020**	<10
Propene	115-07-1	10	µg/L	<10	<10	<10	<10	<10
Propane	74-98-6	10	µg/L	<10	**21**	**389**	**106**	<10
Butene	25167-67-3	10	µg/L	<10	<10	<10	<10	<10
Butane	106-97-8	10	µg/L	<10	<10	**12**	<10	<10
EP074A: Monocyclic Aromatic Hydrocarbons								
Styrene	100-42-5	5	µg/L	<5	<5	<5	<5	<5
Isopropylbenzene	98-82-8	5	µg/L	<5	<5	<5	<5	<5
n-Propylbenzene	103-65-1	5	µg/L	<5	<5	<5	<5	<5
1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	<5	<5	<5
sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	<5	<5	<5
1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	<5	<5	<5
tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	<5	<5	<5
p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	<5	<5	<5
n-Butylbenzene	104-51-8	5	µg/L	<5	<5	<5	<5	<5
EP074B: Oxygenated Compounds								
Vinyl Acetate	108-05-4	50	µg/L	<50	<50	<50	<50	<50
2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER
(Matrix: WATER)

			Client sample ID	AST2	WK12	WK13	WK14	QA18
			Client sampling date / time	18-Nov-2015 07:00	18-Nov-2015 09:45	18-Nov-2015 09:10	18-Nov-2015 08:20	18-Nov-2015 07:00
Compound	CAS Number	LOR	Unit	ES1536590-001	ES1536590-002	ES1536590-003	ES1536590-004	ES1536590-005
				Result	Result	Result	Result	Result
EP074B: Oxygenated Compounds - Continued								
4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	<50	<50	<50
2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	<50	<50	<50
EP074C: Sulfonated Compounds								
Carbon disulfide	75-15-0	5	µg/L	<5	<5	<5	<5	<5
EP074D: Fumigants								
2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	<5	<5	<5
1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	<5	<5	<5
cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	<5	<5	<5
trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	<5	<5	<5
1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	<5	<5	<5
EP074E: Halogenated Aliphatic Compounds								
Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	<50	<50	<50
Chloromethane	74-87-3	50	µg/L	<50	<50	<50	<50	<50
Vinyl chloride	75-01-4	50	µg/L	<50	<50	<50	<50	<50
Bromomethane	74-83-9	50	µg/L	<50	<50	<50	<50	<50
Chloroethane	75-00-3	50	µg/L	<50	<50	<50	<50	<50
Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	<50	<50	<50
1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	<5	<5	<5
Iodomethane	74-88-4	5	µg/L	<5	<5	<5	<5	<5
trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	<5	<5	<5
1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	<5	<5	<5
cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	<5	<5	<5
1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	<5	<5	<5
1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	<5	<5	<5
Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	<5	<5	<5
1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	<5	<5	<5
Trichloroethene	79-01-6	5	µg/L	<5	<5	<5	<5	<5
Dibromomethane	74-95-3	5	µg/L	<5	<5	<5	<5	<5
1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	<5	<5	<5
1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	<5	<5	<5
Tetrachloroethene	127-18-4	5	µg/L	<5	<5	<5	<5	<5
1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	<5	<5	<5
trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	<5	<5	<5
cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	<5	<5	<5

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	AST2	WK12	WK13	WK14	QA18
			Client sampling date / time	18-Nov-2015 07:00	18-Nov-2015 09:45	18-Nov-2015 09:10	18-Nov-2015 08:20	18-Nov-2015 07:00
Compound	CAS Number	LOR	Unit	ES1536590-001	ES1536590-002	ES1536590-003	ES1536590-004	ES1536590-005
				Result	Result	Result	Result	Result
EP074E: Halogenated Aliphatic Compounds - Continued								
1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	<5	<5	<5
1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	<5	<5	<5
Pentachloroethane	76-01-7	5	µg/L	<5	<5	<5	<5	<5
1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	<5	<5	<5
Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	<5	<5	<5
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	5	µg/L	<5	<5	<5	<5	<5
Bromobenzene	108-86-1	5	µg/L	<5	<5	<5	<5	<5
2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	<5	<5	<5
4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	<5	<5	<5
1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	<5	<5	<5
1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	<5	<5	<5
1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	<5	<5	<5
1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	<5	<5	<5
1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	<5	<5	<5
EP074G: Trihalomethanes								
Chloroform	67-66-3	5	µg/L	<5	<5	<5	<5	<5
Bromodichloromethane	75-27-4	5	µg/L	<5	<5	<5	<5	<5
Dibromochloromethane	124-48-1	5	µg/L	<5	<5	<5	<5	<5
Bromoform	75-25-2	5	µg/L	<5	<5	<5	<5	<5
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chlorophenol	95-57-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2-Methylphenol	95-48-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
2-Nitrophenol	88-75-5	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pentachlorophenol	87-86-5	2	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	AST2	WK12	WK13	WK14	QA18
			Client sampling date / time	18-Nov-2015 07:00	18-Nov-2015 09:45	18-Nov-2015 09:10	18-Nov-2015 08:20	18-Nov-2015 07:00
Compound	CAS Number	LOR	Unit	ES1536590-001	ES1536590-002	ES1536590-003	ES1536590-004	ES1536590-005
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	**120**	**60**	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	**120**	**60**	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	**50**	**20**	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	<100
EP262: Ethanolamines								

Analytical Results

Sub-Matrix: WATER
(Matrix: WATER)

Compound	CAS Number	LOR	Unit	AST2	WK12	WK13	WK14	QA18
Client sampling date / time				18-Nov-2015 07:00	18-Nov-2015 09:45	18-Nov-2015 09:10	18-Nov-2015 08:20	18-Nov-2015 07:00
				ES1536590-001	ES1536590-002	ES1536590-003	ES1536590-004	ES1536590-005
				Result	Result	Result	Result	Result
EP262: Ethanolamines - Continued								
Ethanolamine	141-43-5	1	µg/L	<1	25	23	28	<1
Diethanolamine	111-42-2	1	µg/L	36	6	13	9	38
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	2	2	8	<1
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	5	%	99.1	95.6	108	101	98.8
Toluene-D8	2037-26-5	5	%	113	111	113	114	110
4-Bromofluorobenzene	460-00-4	5	%	108	105	109	108	104
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1	%	28.1	29.2	34.5	34.9	27.1
2-Chlorophenol-D4	93951-73-6	1	%	35.0	52.2	58.2	62.9	33.2
2.4.6-Tribromophenol	118-79-6	1	%	32.0	69.0	66.2	75.6	30.9
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1	%	76.4	65.6	75.4	76.5	66.2
Anthracene-d10	1719-06-8	1	%	83.4	75.0	86.6	94.6	75.3
4-Terphenyl-d14	1718-51-0	1	%	61.3	60.1	67.6	74.0	58.5

CERTIFICATE OF ANALYSIS

Work Order	: **ES1536677**	Page	: 1 of 16
Amendment	: **1**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523B	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: ----	Date Samples Received	: 19-Nov-2015 12:15
C-O-C number	: ----	Date Analysis Commenced	: 20-Nov-2015
Sampler	: DAVID WATSON	Issue Date	: 10-Dec-2015 15:58
Site	: ----		
		No. of samples received	: 6
Quote number	: ----	No. of samples analysed	: 6

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Phalak Inthakesone	Laboratory Manager - Organics	Sydney Organics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.

- EG020: Bromine quantification may be unreliable due to its low solubility in acid, leading to variable volatility during measurement by ICPMS.
- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Ionic Balance out of acceptable limits due to analytes not quantified in this report.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WKSW01	WKSW02	WKSW03	QA15	QA16
			Client sampling date / time	18-Nov-2015 11:45	18-Nov-2015 12:15	18-Nov-2015 13:00	[18-Nov-2015]	[18-Nov-2015]
Compound	CAS Number	LOR	Unit	ES1536677-001	ES1536677-002	ES1536677-003	ES1536677-004	ES1536677-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.24	7.60	7.33	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	202	267	214	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	218	194	202	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	12	<5	8	----	----
ED009: Anions								
Chloride	16887-00-6	0.1	mg/L	33.3	36.8	33.9	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	25	54	35	----	----
Total Alkalinity as CaCO3	----	1	mg/L	25	54	35	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5	12	7	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	34	37	35	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	7	15	9	----	----
Magnesium	7439-95-4	1	mg/L	5	7	5	----	----
Sodium	7440-23-5	1	mg/L	24	27	25	----	----
Potassium	7440-09-7	1	mg/L	4	4	4	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.28	0.04	0.13	0.16	0.09
Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.001	<0.001	0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Strontium	7440-24-6	0.001	mg/L	0.082	0.149	0.102	0.084	0.142
Barium	7440-39-3	0.001	mg/L	0.030	0.027	0.030	0.030	0.027
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WKSW01	WKSW02	WKSW03	QA15	QA16
			Client sampling date / time	18-Nov-2015 11:45	18-Nov-2015 12:15	18-Nov-2015 13:00	[18-Nov-2015]	[18-Nov-2015]
Compound	CAS Number	LOR	Unit	ES1536677-001	ES1536677-002	ES1536677-003	ES1536677-004	ES1536677-005
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Copper	7440-50-8	0.001	mg/L	**0.003**	**0.001**	**0.002**	**0.003**	**0.002**
Manganese	7439-96-5	0.001	mg/L	**0.030**	**0.020**	**0.040**	**0.030**	**0.021**
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	**0.001**	<0.001	**0.001**	**0.002**	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	**0.016**	**0.019**	**0.008**	**0.009**	**0.006**
Iron	7439-89-6	0.05	mg/L	**0.56**	**0.24**	**0.51**	**0.54**	**0.31**
Bromine	7726-95-6	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG052G: Silica by Discrete Analyser								
Reactive Silica	----	0.05	mg/L	**15.6**	**16.7**	**15.7**	----	----
EK010/011: Chlorine								
Chlorine - Free	----	0.2	mg/L	<0.2	<0.2	<0.2	----	----
Chlorine - Total Residual	----	0.2	mg/L	<0.2	<0.2	<0.2	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	**0.1**	<0.1	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.04**	**0.09**	**0.04**	----	----
EK055G-NH4: Ammonium as N by DA								
Ammonium as N	14798-03-9_N	0.01	mg/L	**0.04**	**0.09**	**0.04**	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.03**	**0.09**	**0.03**	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.03**	**0.09**	**0.03**	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**1.6**	**1.0**	**1.6**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WKSW01	WKSW02	WKSW03	QA15	QA16
			Client sampling date / time	18-Nov-2015 11:45	18-Nov-2015 12:15	18-Nov-2015 13:00	[18-Nov-2015]	[18-Nov-2015]
Compound	CAS Number	LOR	Unit	ES1536677-001	ES1536677-002	ES1536677-003	ES1536677-004	ES1536677-005
				Result	Result	Result	Result	Result
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ **Total Nitrogen as N**	----	0.1	mg/L	**1.6**	**1.1**	**1.6**	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.21**	**0.18**	**0.21**	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	**0.09**	**0.10**	**0.09**	----	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	**1.56**	**2.37**	**1.83**	----	----
Total Cations	----	0.01	meq/L	**1.91**	**2.60**	**2.05**	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**25**	**12**	**22**	----	----
EP033: C1 - C4 Hydrocarbon Gases								
Methane	74-82-8	10	µg/L	**11**	**26**	**15**	----	----
Ethene	74-85-1	10	µg/L	<10	<10	<10	----	----
Ethane	74-84-0	10	µg/L	<10	<10	<10	----	----
Propene	115-07-1	10	µg/L	<10	<10	<10	----	----
Propane	74-98-6	10	µg/L	<10	<10	<10	----	----
Butene	25167-67-3	10	µg/L	<10	<10	<10	----	----
Butane	106-97-8	10	µg/L	<10	<10	<10	----	----
EP074A: Monocyclic Aromatic Hydrocarbons								
Styrene	100-42-5	5	µg/L	<5	<5	<5	----	----
Isopropylbenzene	98-82-8	5	µg/L	<5	<5	<5	----	----
n-Propylbenzene	103-65-1	5	µg/L	<5	<5	<5	----	----
1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	<5	----	----
sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	<5	----	----
1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	<5	----	----
tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	<5	----	----
p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	<5	----	----
n-Butylbenzene	104-51-8	5	µg/L	<5	<5	<5	----	----
EP074B: Oxygenated Compounds								
Vinyl Acetate	108-05-4	50	µg/L	<50	<50	<50	----	----
2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	<50	----	----
4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	<50	----	----
2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	<50	----	----
EP074C: Sulfonated Compounds								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WKSW01	WKSW02	WKSW03	QA15	QA16
			Client sampling date / time	18-Nov-2015 11:45	18-Nov-2015 12:15	18-Nov-2015 13:00	[18-Nov-2015]	[18-Nov-2015]
Compound	CAS Number	LOR	Unit	ES1536677-001	ES1536677-002	ES1536677-003	ES1536677-004	ES1536677-005
				Result	Result	Result	Result	Result
EP074C: Sulfonated Compounds - Continued								
Carbon disulfide	75-15-0	5	µg/L	<5	<5	<5	----	----
EP074D: Fumigants								
2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	<5	----	----
1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	<5	----	----
cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	<5	----	----
trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	<5	----	----
1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	<5	----	----
EP074E: Halogenated Aliphatic Compounds								
Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	<50	----	----
Chloromethane	74-87-3	50	µg/L	<50	<50	<50	----	----
Vinyl chloride	75-01-4	50	µg/L	<50	<50	<50	----	----
Bromomethane	74-83-9	50	µg/L	<50	<50	<50	----	----
Chloroethane	75-00-3	50	µg/L	<50	<50	<50	----	----
Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	<50	----	----
1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	<5	----	----
Iodomethane	74-88-4	5	µg/L	<5	<5	<5	----	----
trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	<5	----	----
1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	<5	----	----
cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	<5	----	----
1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	<5	----	----
1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	<5	----	----
Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	<5	----	----
1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	<5	----	----
Trichloroethene	79-01-6	5	µg/L	<5	<5	<5	----	----
Dibromomethane	74-95-3	5	µg/L	<5	<5	<5	----	----
1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	<5	----	----
1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	<5	----	----
Tetrachloroethene	127-18-4	5	µg/L	<5	<5	<5	----	----
1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	<5	----	----
trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	<5	----	----
cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	<5	----	----
1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	<5	----	----
1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	<5	----	----
Pentachloroethane	76-01-7	5	µg/L	<5	<5	<5	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WKSW01	WKSW02	WKSW03	QA15	QA16
			Client sampling date / time	18-Nov-2015 11:45	18-Nov-2015 12:15	18-Nov-2015 13:00	[18-Nov-2015]	[18-Nov-2015]
Compound	CAS Number	LOR	Unit	ES1536677-001	ES1536677-002	ES1536677-003	ES1536677-004	ES1536677-005
				Result	Result	Result	Result	Result
EP074E: Halogenated Aliphatic Compounds - Continued								
1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	<5	----	----
Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	<5	----	----
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	5	µg/L	<5	<5	<5	----	----
Bromobenzene	108-86-1	5	µg/L	<5	<5	<5	----	----
2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	<5	----	----
4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	<5	----	----
1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	<5	----	----
1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	<5	----	----
1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	<5	----	----
1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	<5	----	----
1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	<5	----	----
EP074G: Trihalomethanes								
Chloroform	67-66-3	5	µg/L	<5	<5	<5	----	----
Bromodichloromethane	75-27-4	5	µg/L	<5	<5	<5	----	----
Dibromochloromethane	124-48-1	5	µg/L	<5	<5	<5	----	----
Bromoform	75-25-2	5	µg/L	<5	<5	<5	----	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1	µg/L	<1.0	<1.0	<1.0	----	----
2-Chlorophenol	95-57-8	1	µg/L	<1.0	<1.0	<1.0	----	----
2-Methylphenol	95-48-7	1	µg/L	<1.0	<1.0	<1.0	----	----
3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	<2.0	<2.0	----	----
2-Nitrophenol	88-75-5	1	µg/L	<1.0	<1.0	<1.0	----	----
2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	<1.0	<1.0	----	----
2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	<1.0	<1.0	----	----
2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	<1.0	<1.0	----	----
4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	<1.0	<1.0	----	----
2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	<1.0	<1.0	----	----
2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	<1.0	<1.0	----	----
Pentachlorophenol	87-86-5	2	µg/L	<2.0	<2.0	<2.0	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	<1.0	----	----
Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	<1.0	----	----
Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	<1.0	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WKSW01	WKSW02	WKSW03	QA15	QA16
			Client sampling date / time	18-Nov-2015 11:45	18-Nov-2015 12:15	18-Nov-2015 13:00	[18-Nov-2015]	[18-Nov-2015]
Compound	CAS Number	LOR	Unit	ES1536677-001	ES1536677-002	ES1536677-003	ES1536677-004	ES1536677-005
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Fluorene	86-73-7	1	µg/L	<1.0	<1.0	<1.0	----	----
Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	<1.0	----	----
Anthracene	120-12-7	1	µg/L	<1.0	<1.0	<1.0	----	----
Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	<1.0	----	----
Pyrene	129-00-0	1	µg/L	<1.0	<1.0	<1.0	----	----
Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	<1.0	----	----
Chrysene	218-01-9	1	µg/L	<1.0	<1.0	<1.0	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	<1.0	----	----
Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	<1.0	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	<1.0	----	----
Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	<1.0	----	----
Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	<1.0	<1.0	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L	<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WKSW01	WKSW02	WKSW03	QA15	QA16
			Client sampling date / time	18-Nov-2015 11:45	18-Nov-2015 12:15	18-Nov-2015 13:00	[18-Nov-2015]	[18-Nov-2015]
Compound	CAS Number	LOR	Unit	ES1536677-001	ES1536677-002	ES1536677-003	ES1536677-004	ES1536677-005
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	----	----
^ Total Xylenes	1330-20-7	2	µg/L	<2	<2	<2	----	----
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	----	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	<1	<1	<1	----	----
Diethanolamine	111-42-2	1	µg/L	<1	<1	<1	----	----
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	<1	<1	----	----
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	5	%	**101**	**102**	**100**	----	----
Toluene-D8	2037-26-5	5	%	**112**	**111**	**108**	----	----
4-Bromofluorobenzene	460-00-4	5	%	**108**	**106**	**103**	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1	%	**36.4**	**33.9**	**30.3**	----	----
2-Chlorophenol-D4	93951-73-6	1	%	**69.4**	**62.8**	**55.4**	----	----
2.4.6-Tribromophenol	118-79-6	1	%	**90.3**	**77.1**	**76.2**	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1	%	**81.6**	**75.0**	**68.1**	----	----
Anthracene-d10	1719-06-8	1	%	**93.3**	**84.8**	**80.5**	----	----
4-Terphenyl-d14	1718-51-0	1	%	**71.2**	**66.6**	**63.6**	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**108**	**109**	**107**	----	----
Toluene-D8	2037-26-5	2	%	**105**	**105**	**102**	----	----
4-Bromofluorobenzene	460-00-4	2	%	**96.1**	**95.1**	**93.1**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	QA17	----	----	----	----
			Client sampling date / time	[18-Nov-2015]	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1536677-006	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	----	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	----	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	----	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	----	----	----	----	----
ED009: Anions								
Chloride	16887-00-6	0.1	mg/L	----	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	----	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	----	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	----	----	----	----
Magnesium	7439-95-4	1	mg/L	----	----	----	----	----
Sodium	7440-23-5	1	mg/L	----	----	----	----	----
Potassium	7440-09-7	1	mg/L	----	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.27**	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.001**	----	----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	----	----	----	----
Strontium	7440-24-6	0.001	mg/L	**0.094**	----	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.030**	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	----	----	----	----
Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	QA17	----	----	----	----
			Client sampling date / time	[18-Nov-2015]	----	----	----	----
				ES1536677-006	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Copper	7440-50-8	0.001	mg/L	**0.002**	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.039**	----	----	----	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	**0.001**	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	----	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	----	----	----	----
Tin	7440-31-5	0.001	mg/L	<0.001	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.011**	----	----	----	----
Iron	7439-89-6	0.05	mg/L	**0.59**	----	----	----	----
Bromine	7726-95-6	0.1	mg/L	<0.1	----	----	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----
EG052G: Silica by Discrete Analyser								
Reactive Silica	----	0.05	mg/L	----	----	----	----	----
EK010/011: Chlorine								
Chlorine - Free	----	0.2	mg/L	----	----	----	----	----
Chlorine - Total Residual	----	0.2	mg/L	----	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	----	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	----	----	----	----	----
EK055G-NH4: Ammonium as N by DA								
Ammonium as N	14798-03-9_N	0.01	mg/L	----	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	----	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	----	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	----	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	QA17	----	----	----	----
			Client sampling date / time	[18-Nov-2015]	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1536677-006	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	----	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	----	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	----	----	----	----	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	----	----	----	----	----
Total Cations	----	0.01	meq/L	----	----	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	----	----	----	----	----
EP033: C1 - C4 Hydrocarbon Gases								
Methane	74-82-8	10	µg/L	----	----	----	----	----
Ethene	74-85-1	10	µg/L	----	----	----	----	----
Ethane	74-84-0	10	µg/L	----	----	----	----	----
Propene	115-07-1	10	µg/L	----	----	----	----	----
Propane	74-98-6	10	µg/L	----	----	----	----	----
Butene	25167-67-3	10	µg/L	----	----	----	----	----
Butane	106-97-8	10	µg/L	----	----	----	----	----
EP074A: Monocyclic Aromatic Hydrocarbons								
Styrene	100-42-5	5	µg/L	----	----	----	----	----
Isopropylbenzene	98-82-8	5	µg/L	----	----	----	----	----
n-Propylbenzene	103-65-1	5	µg/L	----	----	----	----	----
1.3.5-Trimethylbenzene	108-67-8	5	µg/L	----	----	----	----	----
sec-Butylbenzene	135-98-8	5	µg/L	----	----	----	----	----
1.2.4-Trimethylbenzene	95-63-6	5	µg/L	----	----	----	----	----
tert-Butylbenzene	98-06-6	5	µg/L	----	----	----	----	----
p-Isopropyltoluene	99-87-6	5	µg/L	----	----	----	----	----
n-Butylbenzene	104-51-8	5	µg/L	----	----	----	----	----
EP074B: Oxygenated Compounds								
Vinyl Acetate	108-05-4	50	µg/L	----	----	----	----	----
2-Butanone (MEK)	78-93-3	50	µg/L	----	----	----	----	----
4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	----	----	----	----	----
2-Hexanone (MBK)	591-78-6	50	µg/L	----	----	----	----	----
EP074C: Sulfonated Compounds								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	QA17	----	----	----	----
			Client sampling date / time	[18-Nov-2015]	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1536677-006	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EP074C: Sulfonated Compounds - Continued								
Carbon disulfide	75-15-0	5	µg/L	----	----	----	----	----
EP074D: Fumigants								
2.2-Dichloropropane	594-20-7	5	µg/L	----	----	----	----	----
1.2-Dichloropropane	78-87-5	5	µg/L	----	----	----	----	----
cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	----	----	----	----	----
trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	----	----	----	----	----
1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	----	----	----	----	----
EP074E: Halogenated Aliphatic Compounds								
Dichlorodifluoromethane	75-71-8	50	µg/L	----	----	----	----	----
Chloromethane	74-87-3	50	µg/L	----	----	----	----	----
Vinyl chloride	75-01-4	50	µg/L	----	----	----	----	----
Bromomethane	74-83-9	50	µg/L	----	----	----	----	----
Chloroethane	75-00-3	50	µg/L	----	----	----	----	----
Trichlorofluoromethane	75-69-4	50	µg/L	----	----	----	----	----
1.1-Dichloroethene	75-35-4	5	µg/L	----	----	----	----	----
Iodomethane	74-88-4	5	µg/L	----	----	----	----	----
trans-1.2-Dichloroethene	156-60-5	5	µg/L	----	----	----	----	----
1.1-Dichloroethane	75-34-3	5	µg/L	----	----	----	----	----
cis-1.2-Dichloroethene	156-59-2	5	µg/L	----	----	----	----	----
1.1.1-Trichloroethane	71-55-6	5	µg/L	----	----	----	----	----
1.1-Dichloropropylene	563-58-6	5	µg/L	----	----	----	----	----
Carbon Tetrachloride	56-23-5	5	µg/L	----	----	----	----	----
1.2-Dichloroethane	107-06-2	5	µg/L	----	----	----	----	----
Trichloroethene	79-01-6	5	µg/L	----	----	----	----	----
Dibromomethane	74-95-3	5	µg/L	----	----	----	----	----
1.1.2-Trichloroethane	79-00-5	5	µg/L	----	----	----	----	----
1.3-Dichloropropane	142-28-9	5	µg/L	----	----	----	----	----
Tetrachloroethene	127-18-4	5	µg/L	----	----	----	----	----
1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	----	----	----	----	----
trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	----	----	----	----	----
cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	----	----	----	----	----
1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	----	----	----	----	----
1.2.3-Trichloropropane	96-18-4	5	µg/L	----	----	----	----	----
Pentachloroethane	76-01-7	5	µg/L	----	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	QA17	----	----	----	----
			Client sampling date / time	[18-Nov-2015]	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1536677-006	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EP074E: Halogenated Aliphatic Compounds - Continued								
1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	----	----	----	----	----
Hexachlorobutadiene	87-68-3	5	µg/L	----	----	----	----	----
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	5	µg/L	----	----	----	----	----
Bromobenzene	108-86-1	5	µg/L	----	----	----	----	----
2-Chlorotoluene	95-49-8	5	µg/L	----	----	----	----	----
4-Chlorotoluene	106-43-4	5	µg/L	----	----	----	----	----
1.3-Dichlorobenzene	541-73-1	5	µg/L	----	----	----	----	----
1.4-Dichlorobenzene	106-46-7	5	µg/L	----	----	----	----	----
1.2-Dichlorobenzene	95-50-1	5	µg/L	----	----	----	----	----
1.2.4-Trichlorobenzene	120-82-1	5	µg/L	----	----	----	----	----
1.2.3-Trichlorobenzene	87-61-6	5	µg/L	----	----	----	----	----
EP074G: Trihalomethanes								
Chloroform	67-66-3	5	µg/L	----	----	----	----	----
Bromodichloromethane	75-27-4	5	µg/L	----	----	----	----	----
Dibromochloromethane	124-48-1	5	µg/L	----	----	----	----	----
Bromoform	75-25-2	5	µg/L	----	----	----	----	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1	µg/L	----	----	----	----	----
2-Chlorophenol	95-57-8	1	µg/L	----	----	----	----	----
2-Methylphenol	95-48-7	1	µg/L	----	----	----	----	----
3- & 4-Methylphenol	1319-77-3	2	µg/L	----	----	----	----	----
2-Nitrophenol	88-75-5	1	µg/L	----	----	----	----	----
2.4-Dimethylphenol	105-67-9	1	µg/L	----	----	----	----	----
2.4-Dichlorophenol	120-83-2	1	µg/L	----	----	----	----	----
2.6-Dichlorophenol	87-65-0	1	µg/L	----	----	----	----	----
4-Chloro-3-methylphenol	59-50-7	1	µg/L	----	----	----	----	----
2.4.6-Trichlorophenol	88-06-2	1	µg/L	----	----	----	----	----
2.4.5-Trichlorophenol	95-95-4	1	µg/L	----	----	----	----	----
Pentachlorophenol	87-86-5	2	µg/L	----	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1	µg/L	----	----	----	----	----
Acenaphthylene	208-96-8	1	µg/L	----	----	----	----	----
Acenaphthene	83-32-9	1	µg/L	----	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	QA17	----	----	----	----
			Client sampling date / time	[18-Nov-2015]	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1536677-006	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Fluorene	86-73-7	1	µg/L	----	----	----	----	----
Phenanthrene	85-01-8	1	µg/L	----	----	----	----	----
Anthracene	120-12-7	1	µg/L	----	----	----	----	----
Fluoranthene	206-44-0	1	µg/L	----	----	----	----	----
Pyrene	129-00-0	1	µg/L	----	----	----	----	----
Benz(a)anthracene	56-55-3	1	µg/L	----	----	----	----	----
Chrysene	218-01-9	1	µg/L	----	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	----	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1	µg/L	----	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	----	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	----	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1	µg/L	----	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1	µg/L	----	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	----	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	----	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	----	----	----	----	----
C10 - C14 Fraction	----	50	µg/L	----	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	----	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	----	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	----	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L	----	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	----	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	----	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	----	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	----	----	----	----	----
Toluene	108-88-3	2	µg/L	----	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	----	----	----	----	----

Analytical Results

Sub-Matrix: WATER
(Matrix: WATER)

Compound	CAS Number	LOR	Unit	QA17	----	----	----	----
			Client sampling date / time	[18-Nov-2015]	----	----	----	----
				ES1536677-006	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	----	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	----	----	----	----	----
^ Total Xylenes	1330-20-7	2	µg/L	----	----	----	----	----
^ Sum of BTEX	----	1	µg/L	----	----	----	----	----
Naphthalene	91-20-3	5	µg/L	----	----	----	----	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	----	----	----	----	----
Diethanolamine	111-42-2	1	µg/L	----	----	----	----	----
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	----	----	----	----	----
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	5	%	----	----	----	----	----
Toluene-D8	2037-26-5	5	%	----	----	----	----	----
4-Bromofluorobenzene	460-00-4	5	%	----	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1	%	----	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1	%	----	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1	%	----	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1	%	----	----	----	----	----
Anthracene-d10	1719-06-8	1	%	----	----	----	----	----
4-Terphenyl-d14	1718-51-0	1	%	----	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	----	----	----	----	----
Toluene-D8	2037-26-5	2	%	----	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	----	----	----	----	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1536678**	Page	: 1 of 2
Amendment	: **2**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523A	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: ----	Date Samples Received	: 19-Nov-2015 12:15
C-O-C number	: ----	Date Analysis Commenced	: 20-Nov-2015
Sampler	: ANDREW FARINA, DAVID WATSON	Issue Date	: 06-Jan-2016 14:28
Site	: ----		
		No. of samples received	: 6
Quote number	: ----	No. of samples analysed	: 5

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.

- This report has been amended and re-released to allow the removal of analytical data for sample WK11 FRAC TANK 1.

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**AST2**	**WK12**	**WK13**	**WK14**	**QA18**
			Client sampling date / time	18-Nov-2015 07:00	18-Nov-2015 09:45	18-Nov-2015 09:10	18-Nov-2015 08:20	18-Nov-2015 07:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1536678-001**	**ES1536678-002**	**ES1536678-003**	**ES1536678-004**	**ES1536678-005**
				Result	Result	Result	Result	Result
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**10300**	----	----	----	**10400**
EK084: Un-ionized Hydrogen Sulfide								
Unionized Hydrogen Sulfide	----	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	**2**	**42**	**21**	<1
Toluene	108-88-3	2	µg/L	<2	<2	**32**	**18**	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	**5**	**3**	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ **Total Xylenes**	1330-20-7	2	µg/L	<2	<2	**5**	**3**	<2
^ **Sum of BTEX**	----	1	µg/L	<1	**2**	**79**	**42**	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**105**	**120**	**111**	**112**	**122**
Toluene-D8	2037-26-5	2	%	**104**	**116**	**114**	**110**	**120**
4-Bromofluorobenzene	460-00-4	2	%	**107**	**117**	**119**	**110**	**124**

CERTIFICATE OF ANALYSIS

Work Order	: **ES1538433**	Page	: 1 of 10
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523A	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: ----	Date Samples Received	: 10-Dec-2015 12:50
C-O-C number	: ----	Date Analysis Commenced	: 10-Dec-2015
Sampler	: DAVID WATSON	Issue Date	: 16-Dec-2015 17:22
Site	: ----		
		No. of samples received	: 4
Quote number	: ----	No. of samples analysed	: 4

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Barbara Coupland	Quality Officer	Newcastle - Inorganics, Mayfield West, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Pabi Subba	Senior Organic Chemist	Sydney Organics, Smithfield, NSW
Phalak Inthakesone	Laboratory Manager - Organics	Sydney Organics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW
Shobhna Chandra	Metals Coordinator	Sydney Inorganics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW

General Comments

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LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- EP005 : NPOC analysis was carried out for various samples due to high inorganic carbon content.
- Metals analysis: Sample ES1538433 # 004 was diluted and rerun due to matrix interference and LOR's have been raised accordingly.
- EG020: 'Bromine' quantification may be unreliable due to its low solubility in acid, leading to variable volatility during measurement by ICPMS
- ED041G: LOR raised for Sulfate analysis on a few samples due to matrix interferences.
- It has been noted that Ammonia is greater than TKN for sample 1, however this difference is within the limits of experimental variation.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WK11	WK12	WK13	WK14	----
			Client sampling date / time	10-Dec-2015 08:20	10-Dec-2015 09:50	10-Dec-2015 09:00	10-Dec-2015 09:25	----
Compound	CAS Number	LOR	Unit	ES1538433-001	ES1538433-002	ES1538433-003	ES1538433-004	--------
				Result	Result	Result	Result	Result
EA005: pH								
pH Value	----	0.01	pH Unit	8.31	7.46	8.74	7.98	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	14900	15400	7240	12600	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	9700	9810	5710	9400	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	78	16	<5	----
ED009: Anions								
Chloride	16887-00-6	0.1	mg/L	3980	4320	686	1890	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	93	<1	300	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1890	1830	2820	4720	----
Total Alkalinity as CaCO3	----	1	mg/L	1980	1830	3120	4720	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10	<10	<10	<10	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	4180	4490	690	1780	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	27	122	7	48	----
Magnesium	7439-95-4	1	mg/L	12	24	2	13	----
Sodium	7440-23-5	1	mg/L	3360	2960	1860	3190	----
Potassium	7440-09-7	1	mg/L	375	622	12	15	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.01	<0.01	0.02	<0.10	----
Arsenic	7440-38-2	0.001	mg/L	0.004	0.004	0.005	<0.010	----
Boron	7440-42-8	0.05	mg/L	3.43	1.38	2.88	2.67	----
Strontium	7440-24-6	0.001	mg/L	8.64	19.0	2.71	6.64	----
Barium	7440-39-3	0.001	mg/L	14.5	25.2	3.20	8.36	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.010	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0010	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.010	----
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.010	----
Chromium	7440-47-3	0.001	mg/L	0.002	0.002	<0.001	<0.010	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WK11	WK12	WK13	WK14	----
			Client sampling date / time	10-Dec-2015 08:20	10-Dec-2015 09:50	10-Dec-2015 09:00	10-Dec-2015 09:25	----
Compound	CAS Number	LOR	Unit	ES1538433-001	ES1538433-002	ES1538433-003	ES1538433-004	--------
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Copper	7440-50-8	0.001	mg/L	<0.001	**0.003**	<0.001	<0.010	----
Manganese	7439-96-5	0.001	mg/L	**0.013**	**0.340**	**0.006**	**0.014**	----
Molybdenum	7439-98-7	0.001	mg/L	**0.033**	**0.021**	**0.014**	<0.010	----
Nickel	7440-02-0	0.001	mg/L	**0.003**	**0.002**	**0.002**	<0.010	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.010	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.010	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.10	----
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.010	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.10	----
Zinc	7440-66-6	0.005	mg/L	**0.082**	**0.017**	<0.005	<0.050	----
Iron	7439-89-6	0.05	mg/L	**0.57**	**32.6**	**0.49**	**0.20**	----
Bromine	7726-95-6	0.1	mg/L	**1.7**	**8.4**	**1.5**	<1.0	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
EG052G: Silica by Discrete Analyser								
Reactive Silica	----	0.05	mg/L	**54.4**	**36.3**	**25.4**	**37.8**	----
EK010/011: Chlorine								
Chlorine - Free	----	0.2	mg/L	<0.2	<0.2	<0.2	<0.2	----
Chlorine - Total Residual	----	0.2	mg/L	<0.2	<0.2	<0.2	<0.2	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**1.6**	**1.8**	**2.5**	**1.0**	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**8.41**	**5.81**	**4.63**	**5.10**	----
EK055G-NH4: Ammonium as N by DA								
Ammonium as N	14798-03-9_N	0.01	mg/L	**7.97**	**5.77**	**3.86**	**4.94**	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	**0.06**	**0.01**	<0.01	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	**0.06**	**0.01**	<0.01	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**8.0**	**6.0**	**5.1**	**5.4**	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WK11	WK12	WK13	WK14	----
			Client sampling date / time	10-Dec-2015 08:20	10-Dec-2015 09:50	10-Dec-2015 09:00	10-Dec-2015 09:25	----
Compound	CAS Number	LOR	Unit	ES1538433-001	ES1538433-002	ES1538433-003	ES1538433-004	--------
				Result	Result	Result	Result	Result
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**8.0**	**6.1**	**5.1**	**5.4**	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**1.22**	**1.19**	**1.59**	**1.22**	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	**0.13**	**0.06**	**0.11**	**0.40**	----
EK084: Un-ionized Hydrogen Sulfide								
Unionized Hydrogen Sulfide	----	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	**157**	**163**	**81.8**	**144**	----
Total Cations	----	0.01	meq/L	**158**	**153**	**81.7**	**143**	----
Ionic Balance	----	0.01	%	**0.17**	**3.33**	**0.10**	**0.72**	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	----	**13**	----	----	----
Nonpurgeable Organic Carbon	----	1	mg/L	**28**	----	**19**	**6**	----
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	<5	**10**	**9**	**7**	----
EP033: C1 - C4 Hydrocarbon Gases								
Methane	74-82-8	10	µg/L	**21500**	**25800**	**22900**	**24000**	----
Ethene	74-85-1	10	µg/L	<10	<10	<10	<10	----
Ethane	74-84-0	10	µg/L	**2260**	**61**	**3000**	**1990**	----
Propene	115-07-1	10	µg/L	<10	<10	<10	<10	----
Propane	74-98-6	10	µg/L	**452**	<10	**535**	**279**	----
Butene	25167-67-3	10	µg/L	<10	<10	<10	<10	----
Butane	106-97-8	10	µg/L	**43**	<10	**41**	**14**	----
EP074A: Monocyclic Aromatic Hydrocarbons								
Styrene	100-42-5	5	µg/L	<5	<5	<5	<5	----
Isopropylbenzene	98-82-8	5	µg/L	<5	<5	<5	<5	----
n-Propylbenzene	103-65-1	5	µg/L	<5	<5	<5	<5	----
1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	<5	<5	----
sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	<5	<5	----
1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	<5	<5	----
tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	<5	<5	----
p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	<5	<5	----
n-Butylbenzene	104-51-8	5	µg/L	<5	<5	<5	<5	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WK11	WK12	WK13	WK14	----
			Client sampling date / time	10-Dec-2015 08:20	10-Dec-2015 09:50	10-Dec-2015 09:00	10-Dec-2015 09:25	----
Compound	CAS Number	LOR	Unit	ES1538433-001	ES1538433-002	ES1538433-003	ES1538433-004	--------
				Result	Result	Result	Result	Result
EP074B: Oxygenated Compounds								
Vinyl Acetate	108-05-4	50	µg/L	<50	<50	<50	<50	----
2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	<50	<50	----
4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	<50	<50	----
2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	<50	<50	----
EP074C: Sulfonated Compounds								
Carbon disulfide	75-15-0	5	µg/L	<5	<5	<5	<5	----
EP074D: Fumigants								
2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	<5	<5	----
1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	<5	<5	----
cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	<5	<5	----
trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	<5	<5	----
1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	<5	<5	----
EP074E: Halogenated Aliphatic Compounds								
Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	<50	<50	----
Chloromethane	74-87-3	50	µg/L	<50	<50	<50	<50	----
Vinyl chloride	75-01-4	50	µg/L	<50	<50	<50	<50	----
Bromomethane	74-83-9	50	µg/L	<50	<50	<50	<50	----
Chloroethane	75-00-3	50	µg/L	<50	<50	<50	<50	----
Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	<50	<50	----
1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	<5	<5	----
Iodomethane	74-88-4	5	µg/L	<5	<5	<5	<5	----
trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	<5	<5	----
1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	<5	<5	----
cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	<5	<5	----
1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	<5	<5	----
1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	<5	<5	----
Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	<5	<5	----
1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	<5	<5	----
Trichloroethene	79-01-6	5	µg/L	<5	<5	<5	<5	----
Dibromomethane	74-95-3	5	µg/L	<5	<5	<5	<5	----
1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	<5	<5	----
1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	<5	<5	----
Tetrachloroethene	127-18-4	5	µg/L	<5	<5	<5	<5	----
1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	<5	<5	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WK11	WK12	WK13	WK14	----
			Client sampling date / time	10-Dec-2015 08:20	10-Dec-2015 09:50	10-Dec-2015 09:00	10-Dec-2015 09:25	----
Compound	CAS Number	LOR	Unit	ES1538433-001	ES1538433-002	ES1538433-003	ES1538433-004	--------
				Result	Result	Result	Result	Result
EP074E: Halogenated Aliphatic Compounds - Continued								
trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	<5	<5	----
cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	<5	<5	----
1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	<5	<5	----
1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	<5	<5	----
Pentachloroethane	76-01-7	5	µg/L	<5	<5	<5	<5	----
1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	<5	<5	----
Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	<5	<5	----
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	5	µg/L	<5	<5	<5	<5	----
Bromobenzene	108-86-1	5	µg/L	<5	<5	<5	<5	----
2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	<5	<5	----
4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	<5	<5	----
1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	<5	<5	----
1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	<5	<5	----
1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	<5	<5	----
1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	<5	<5	----
1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	<5	<5	----
EP074G: Trihalomethanes								
Chloroform	67-66-3	5	µg/L	<5	<5	<5	<5	----
Bromodichloromethane	75-27-4	5	µg/L	<5	<5	<5	<5	----
Dibromochloromethane	124-48-1	5	µg/L	<5	<5	<5	<5	----
Bromoform	75-25-2	5	µg/L	<5	<5	<5	<5	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1	µg/L	**1.5**	<1.0	<1.0	<1.0	----
2-Chlorophenol	95-57-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
2-Methylphenol	95-48-7	1	µg/L	<1.0	<1.0	**3.2**	<1.0	----
3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	<2.0	**6.8**	<2.0	----
2-Nitrophenol	88-75-5	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	<1.0	<1.0	<1.0	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WK11	WK12	WK13	WK14	----
			Client sampling date / time	10-Dec-2015 08:20	10-Dec-2015 09:50	10-Dec-2015 09:00	10-Dec-2015 09:25	----
Compound	CAS Number	LOR	Unit	ES1538433-001	ES1538433-002	ES1538433-003	ES1538433-004	--------
				Result	Result	Result	Result	Result
EP075(SIM)A: Phenolic Compounds - Continued								
Pentachlorophenol	87-86-5	2	µg/L	<2.0	<2.0	<2.0	<2.0	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Fluorene	86-73-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Anthracene	120-12-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Pyrene	129-00-0	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Chrysene	218-01-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	**120**	<20	**110**	**80**	----
C10 - C14 Fraction	----	50	µg/L	**150**	<50	**60**	<50	----
C15 - C28 Fraction	----	100	µg/L	<100	**140**	<100	<100	----
C29 - C36 Fraction	----	50	µg/L	<50	**80**	<50	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	**150**	**220**	**60**	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	**130**	<20	**120**	**80**	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	**70**	<20	**60**	**30**	----
>C10 - C16 Fraction	----	100	µg/L	**150**	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L	**100**	**200**	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	**250**	**200**	<100	<100	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WK11	WK12	WK13	WK14	----
			Client sampling date / time	10-Dec-2015 08:20	10-Dec-2015 09:50	10-Dec-2015 09:00	10-Dec-2015 09:25	----
Compound	CAS Number	LOR	Unit	ES1538433-001	ES1538433-002	ES1538433-003	ES1538433-004	--------
				Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	**150**	<100	<100	<100	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	**28**	<1	**30**	**25**	----
Toluene	108-88-3	2	µg/L	**27**	<2	**26**	**20**	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	**7**	<2	**5**	**3**	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	----
^ Total Xylenes	1330-20-7	2	µg/L	**7**	<2	**5**	**3**	----
^ Sum of BTEX	----	1	µg/L	**62**	<1	**61**	**48**	----
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	**31**	**23**	**6**	**23**	----
Diethanolamine	111-42-2	1	µg/L	**8**	**2**	<1	**2**	----
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	**6**	<1	<1	<1	----
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	5	%	**112**	**109**	**111**	**114**	----
Toluene-D8	2037-26-5	5	%	**119**	**123**	**124**	**118**	----
4-Bromofluorobenzene	460-00-4	5	%	**106**	**101**	**104**	**107**	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1	%	**25.7**	**30.4**	**29.1**	**27.4**	----
2-Chlorophenol-D4	93951-73-6	1	%	**48.8**	**56.1**	**50.4**	**52.0**	----
2.4.6-Tribromophenol	118-79-6	1	%	**46.5**	**62.6**	**41.8**	**53.5**	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1	%	**64.7**	**65.2**	**70.3**	**65.9**	----
Anthracene-d10	1719-06-8	1	%	**87.8**	**119**	**119**	**98.4**	----
4-Terphenyl-d14	1718-51-0	1	%	**73.8**	**84.4**	**86.4**	**81.8**	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**112**	**109**	**110**	**114**	----
Toluene-D8	2037-26-5	2	%	**120**	**123**	**124**	**118**	----
4-Bromofluorobenzene	460-00-4	2	%	**107**	**102**	**104**	**106**	----

CERTIFICATE OF ANALYSIS

Work Order	: **ES1538987**	Page	: 1 of 2
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523A	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: ----	Date Samples Received	: 16-Dec-2015 14:55
C-O-C number	: ----	Date Analysis Commenced	: 16-Dec-2015
Sampler	: CAROLINA SARDELLA, REBECCA ROLLINS	Issue Date	: 17-Dec-2015 16:31
Site	: ----		
		No. of samples received	: 1
Quote number	: ----	No. of samples analysed	: 1

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

WORLD RECOGNISED ACCREDITATION

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Phalak Inthakesone	Laboratory Manager - Organics	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**AST2**	----	----	----	----
			Client sampling date / time	15-Dec-2015 10:30	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1538987-001**	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**15200**	----	----	----	----
EK084: Un-ionized Hydrogen Sulfide								
Unionized Hydrogen Sulfide	----	0.1	mg/L	<0.1	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----
^ **Total Xylenes**	1330-20-7	2	µg/L	<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L	<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**89.1**	----	----	----	----
Toluene-D8	2037-26-5	2	%	**114**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	**106**	----	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **ES1538988**	Page	: 1 of 9
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523A	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: ----	Date Samples Received	: 16-Dec-2015 14:55
C-O-C number	: ----	Date Analysis Commenced	: 17-Dec-2015
Sampler	: BECKY ROLLINS, CAROLINA SARDELLA	Issue Date	: 29-Dec-2015 16:59
Site	: ----		
		No. of samples received	: 1
Quote number	: ----	No. of samples analysed	: 1

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

WORLD RECOGNISED ACCREDITATION

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Pabi Subba	Senior Organic Chemist	Sydney Organics, Smithfield, NSW
Phalak Inthakesone	Laboratory Manager - Organics	Sydney Organics, Smithfield, NSW
Shobhna Chandra	Metals Coordinator	Sydney Inorganics, Smithfield, NSW

General Comments

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LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.

- EG020: Bromine quantification may be unreliable due to its low solubility in acid, leading to variable volatility during measurement by ICPMS.
- EP005 : NPOC analysis was carried out due to high inorganic carbon content.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Analytical Results

Sub-Matrix: WATER
(Matrix: WATER)

Compound	CAS Number	LOR	Unit	AST2	----	----	----	----
			Client sampling date / time	15-Dec-2015 10:30	----	----	----	----
				ES1538988-001	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**9.40**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**9700**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**2770**	----	----	----	----
ED009: Anions								
Chloride	16887-00-6	0.1	mg/L	**3990**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	**1290**	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**1360**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**2650**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**3970**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**16**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**16**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**3040**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**599**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.05**	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.005**	----	----	----	----
Boron	7440-42-8	0.05	mg/L	**3.89**	----	----	----	----
Strontium	7440-24-6	0.001	mg/L	**4.26**	----	----	----	----
Barium	7440-39-3	0.001	mg/L	**3.54**	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	----	----	----	----
Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.015**	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.004**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	AST2	----	----	----	----
			Client sampling date / time	15-Dec-2015 10:30	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1538988-001	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Molybdenum	7439-98-7	0.001	mg/L	**0.023**	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	**0.005**	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Antimony	7440-36-0	0.001	mg/L	**0.002**	----	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	----	----	----	----
Tin	7440-31-5	0.001	mg/L	<0.001	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.005**	----	----	----	----
Iron	7439-89-6	0.05	mg/L	**0.10**	----	----	----	----
Bromine	7726-95-6	0.1	mg/L	**5.0**	----	----	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----
EG052G: Silica by Discrete Analyser								
Reactive Silica	----	0.05	mg/L	**5.63**	----	----	----	----
EK010/011: Chlorine								
Chlorine - Free	----	0.2	mg/L	<0.2	----	----	----	----
Chlorine - Total Residual	----	0.2	mg/L	<0.2	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**1.9**	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.02**	----	----	----	----
EK055G-NH4: Ammonium as N by DA								
Ammonium as N	14798-03-9_N	0.01	mg/L	<0.01	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.01**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.01**	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**108**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**108**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	AST2	----	----	----	----
			Client sampling date / time	15-Dec-2015 10:30	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1538988-001	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**7.39**	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	**0.04**	----	----	----	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	**165**	----	----	----	----
Total Cations	----	0.01	meq/L	**150**	----	----	----	----
Ionic Balance	----	0.01	%	**4.88**	----	----	----	----
EP005: Total Organic Carbon (TOC)								
Nonpurgeable Organic Carbon	----	1	mg/L	**92**	----	----	----	----
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	**7**	----	----	----	----
EP033: C1 - C4 Hydrocarbon Gases								
Methane	74-82-8	10	µg/L	**53**	----	----	----	----
Ethene	74-85-1	10	µg/L	<10	----	----	----	----
Ethane	74-84-0	10	µg/L	<10	----	----	----	----
Propene	115-07-1	10	µg/L	<10	----	----	----	----
Propane	74-98-6	10	µg/L	<10	----	----	----	----
Butene	25167-67-3	10	µg/L	<10	----	----	----	----
Butane	106-97-8	10	µg/L	<10	----	----	----	----
EP074A: Monocyclic Aromatic Hydrocarbons								
Styrene	100-42-5	5	µg/L	<5	----	----	----	----
Isopropylbenzene	98-82-8	5	µg/L	<5	----	----	----	----
n-Propylbenzene	103-65-1	5	µg/L	<5	----	----	----	----
1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	----	----	----	----
sec-Butylbenzene	135-98-8	5	µg/L	<5	----	----	----	----
1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	----	----	----	----
tert-Butylbenzene	98-06-6	5	µg/L	<5	----	----	----	----
p-Isopropyltoluene	99-87-6	5	µg/L	<5	----	----	----	----
n-Butylbenzene	104-51-8	5	µg/L	<5	----	----	----	----
EP074B: Oxygenated Compounds								
Vinyl Acetate	108-05-4	50	µg/L	<50	----	----	----	----
2-Butanone (MEK)	78-93-3	50	µg/L	<50	----	----	----	----
4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	----	----	----	----
2-Hexanone (MBK)	591-78-6	50	µg/L	<50	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	AST2	----	----	----	----
			Client sampling date / time	15-Dec-2015 10:30	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1538988-001	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EP074C: Sulfonated Compounds								
Carbon disulfide	75-15-0	5	µg/L	<5	----	----	----	----
EP074D: Fumigants								
2.2-Dichloropropane	594-20-7	5	µg/L	<5	----	----	----	----
1.2-Dichloropropane	78-87-5	5	µg/L	<5	----	----	----	----
cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	----	----	----	----
trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	----	----	----	----
1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	----	----	----	----
EP074E: Halogenated Aliphatic Compounds								
Dichlorodifluoromethane	75-71-8	50	µg/L	<50	----	----	----	----
Chloromethane	74-87-3	50	µg/L	<50	----	----	----	----
Vinyl chloride	75-01-4	50	µg/L	<50	----	----	----	----
Bromomethane	74-83-9	50	µg/L	<50	----	----	----	----
Chloroethane	75-00-3	50	µg/L	<50	----	----	----	----
Trichlorofluoromethane	75-69-4	50	µg/L	<50	----	----	----	----
1.1-Dichloroethene	75-35-4	5	µg/L	<5	----	----	----	----
Iodomethane	74-88-4	5	µg/L	<5	----	----	----	----
trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	----	----	----	----
1.1-Dichloroethane	75-34-3	5	µg/L	<5	----	----	----	----
cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	----	----	----	----
1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	----	----	----	----
1.1-Dichloropropylene	563-58-6	5	µg/L	<5	----	----	----	----
Carbon Tetrachloride	56-23-5	5	µg/L	<5	----	----	----	----
1.2-Dichloroethane	107-06-2	5	µg/L	<5	----	----	----	----
Trichloroethene	79-01-6	5	µg/L	<5	----	----	----	----
Dibromomethane	74-95-3	5	µg/L	<5	----	----	----	----
1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	----	----	----	----
1.3-Dichloropropane	142-28-9	5	µg/L	<5	----	----	----	----
Tetrachloroethene	127-18-4	5	µg/L	<5	----	----	----	----
1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	----	----	----	----
trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	----	----	----	----
cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	----	----	----	----
1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	----	----	----	----
1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	----	----	----	----
Pentachloroethane	76-01-7	5	µg/L	<5	----	----	----	----

Analytical Results

Sub-Matrix: WATER
(Matrix: WATER)

Compound	CAS Number	LOR	Unit	AST2	----	----	----	----
			Client sampling date / time	15-Dec-2015 10:30	----	----	----	----
				ES1538988-001	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EP074E: Halogenated Aliphatic Compounds - Continued								
1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	----	----	----	----
Hexachlorobutadiene	87-68-3	5	µg/L	<5	----	----	----	----
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	5	µg/L	<5	----	----	----	----
Bromobenzene	108-86-1	5	µg/L	<5	----	----	----	----
2-Chlorotoluene	95-49-8	5	µg/L	<5	----	----	----	----
4-Chlorotoluene	106-43-4	5	µg/L	<5	----	----	----	----
1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	----	----	----	----
1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	----	----	----	----
1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	----	----	----	----
1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	----	----	----	----
1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	----	----	----	----
EP074G: Trihalomethanes								
Chloroform	67-66-3	5	µg/L	<5	----	----	----	----
Bromodichloromethane	75-27-4	5	µg/L	<5	----	----	----	----
Dibromochloromethane	124-48-1	5	µg/L	<5	----	----	----	----
Bromoform	75-25-2	5	µg/L	<5	----	----	----	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1	µg/L	<1.0	----	----	----	----
2-Chlorophenol	95-57-8	1	µg/L	<1.0	----	----	----	----
2-Methylphenol	95-48-7	1	µg/L	<1.0	----	----	----	----
3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	----	----	----	----
2-Nitrophenol	88-75-5	1	µg/L	<1.0	----	----	----	----
2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	----	----	----	----
2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	----	----	----	----
2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	----	----	----	----
4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	----	----	----	----
2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	----	----	----	----
2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	----	----	----	----
Pentachlorophenol	87-86-5	2	µg/L	<2.0	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1	µg/L	<1.0	----	----	----	----
Acenaphthylene	208-96-8	1	µg/L	<1.0	----	----	----	----
Acenaphthene	83-32-9	1	µg/L	<1.0	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	AST2	----	----	----	----
			Client sampling date / time	15-Dec-2015 10:30	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1538988-001	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Fluorene	86-73-7	1	µg/L	<1.0	----	----	----	----
Phenanthrene	85-01-8	1	µg/L	<1.0	----	----	----	----
Anthracene	120-12-7	1	µg/L	<1.0	----	----	----	----
Fluoranthene	206-44-0	1	µg/L	<1.0	----	----	----	----
Pyrene	129-00-0	1	µg/L	<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1	µg/L	<1.0	----	----	----	----
Chrysene	218-01-9	1	µg/L	<1.0	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	**460**	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	**550**	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	**1010**	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	**800**	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	**280**	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	**1080**	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

			Client sample ID	AST2	----	----	----	----
			Client sampling date / time	15-Dec-2015 10:30	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1538988-001	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----
^ Total Xylenes	1330-20-7	2	µg/L	<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	**19**	----	----	----	----
Diethanolamine	111-42-2	1	µg/L	<1	----	----	----	----
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	----	----	----	----
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	5	%	**117**	----	----	----	----
Toluene-D8	2037-26-5	5	%	**111**	----	----	----	----
4-Bromofluorobenzene	460-00-4	5	%	**100**	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1	%	**25.9**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1	%	**49.9**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1	%	**55.4**	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1	%	**65.1**	----	----	----	----
Anthracene-d10	1719-06-8	1	%	**67.6**	----	----	----	----
4-Terphenyl-d14	1718-51-0	1	%	**75.2**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**117**	----	----	----	----
Toluene-D8	2037-26-5	2	%	**120**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	**101**	----	----	----	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1538990**	Page	: 1 of 9
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523B	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: ----	Date Samples Received	: 16-Dec-2015 14:55
C-O-C number	: ----	Date Analysis Commenced	: 16-Dec-2015
Sampler	: CAROLINA SARDELLA, REBECCA ROLLINS	Issue Date	: 29-Dec-2015 17:00
Site	: ----		
		No. of samples received	: 4
Quote number	: ----	No. of samples analysed	: 4

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

NATA WORLD RECOGNISED ACCREDITATION

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Phalak Inthakesone	Laboratory Manager - Organics	Sydney Organics, Smithfield, NSW
Shobhna Chandra	Metals Coordinator	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.

- EG020: Bromine quantification may be unreliable due to its low solubility in acid, leading to variable volatility during measurement by ICPMS.
- ED041G: LOR raised for Sulfate analysis on sample no: 4 due matrix interferences.
- TDS by method EA-015 may bias high for sample 1 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- EK071G: It has been noted that Reactive P is greater than Total P for sample no 2, however this difference is within the limits of experimental variation.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WKMB06A	WKMB06B	WKSW02	WKSW03	----
			Client sampling date / time	15-Dec-2015 14:30	15-Dec-2015 14:00	15-Dec-2015 17:00	15-Dec-2015 16:30	----
Compound	CAS Number	LOR	Unit	ES1538990-001	ES1538990-002	ES1538990-003	ES1538990-004	--------
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.91	8.63	7.38	7.34	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	3060	1450	472	346	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	2000	853	275	217	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	29	<5	5	58	----
ED009: Anions								
Chloride	16887-00-6	0.1	mg/L	803	196	75.4	59.9	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	36	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	275	405	120	78	----
Total Alkalinity as CaCO3	----	1	mg/L	275	441	120	78	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	53	21	<1	<10	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	823	211	74	60	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	111	4	24	16	----
Magnesium	7439-95-4	1	mg/L	61	<1	13	8	----
Sodium	7440-23-5	1	mg/L	441	343	50	36	----
Potassium	7440-09-7	1	mg/L	2	1	4	3	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	0.03	<0.01	<0.01	----
Arsenic	7440-38-2	0.001	mg/L	0.006	<0.001	0.002	0.002	----
Boron	7440-42-8	0.05	mg/L	<0.05	0.12	<0.05	<0.05	----
Strontium	7440-24-6	0.001	mg/L	1.64	0.238	0.207	0.192	----
Barium	7440-39-3	0.001	mg/L	0.537	0.083	0.034	0.048	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
Cobalt	7440-48-4	0.001	mg/L	0.002	<0.001	<0.001	<0.001	----
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WKMB06A	WKMB06B	WKSW02	WKSW03	----
			Client sampling date / time	15-Dec-2015 14:30	15-Dec-2015 14:00	15-Dec-2015 17:00	15-Dec-2015 16:30	----
Compound	CAS Number	LOR	Unit	ES1538990-001	ES1538990-002	ES1538990-003	ES1538990-004	--------
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	**0.001**	**0.001**	----
Manganese	7439-96-5	0.001	mg/L	**0.274**	**0.012**	**0.241**	**0.400**	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	**0.002**	<0.001	<0.001	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
Zinc	7440-66-6	0.005	mg/L	**0.009**	<0.005	**0.010**	**0.006**	----
Iron	7439-89-6	0.05	mg/L	**10.6**	<0.05	**0.07**	**0.14**	----
Bromine	7726-95-6	0.1	mg/L	**1.5**	**0.4**	**0.2**	**0.2**	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
EG052G: Silica by Discrete Analyser								
Reactive Silica	----	0.05	mg/L	**36.9**	**14.0**	**11.0**	**12.7**	----
EK010/011: Chlorine								
Chlorine - Free	----	0.2	mg/L	<0.2	<0.2	<0.2	<0.2	----
Chlorine - Total Residual	----	0.2	mg/L	<0.2	<0.2	<0.2	<0.2	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.2**	**0.6**	**0.1**	<0.1	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.29**	**0.44**	**0.02**	**0.02**	----
EK055G-NH4: Ammonium as N by DA								
Ammonium as N	14798-03-9_N	0.01	mg/L	**0.29**	**0.37**	**0.02**	**0.02**	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.02**	<0.01	**0.01**	<0.01	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.02**	<0.01	**0.01**	<0.01	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.4**	**0.5**	**0.6**	**1.5**	----

Analytical Results

Sub-Matrix: WATER
(Matrix: WATER)

Compound	CAS Number	LOR	Unit	WKMB06A	WKMB06B	WKSW02	WKSW03	----
Client sampling date / time				15-Dec-2015 14:30	15-Dec-2015 14:00	15-Dec-2015 17:00	15-Dec-2015 16:30	----
				ES1538990-001	ES1538990-002	ES1538990-003	ES1538990-004	--------
				Result	Result	Result	Result	Result
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.4**	**0.5**	**0.6**	**1.5**	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.14**	**0.84**	**0.06**	**0.29**	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	**0.86**	<0.01	<0.01	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	**29.8**	**15.2**	**4.48**	**3.25**	----
Total Cations	----	0.01	meq/L	**29.8**	**15.1**	**4.54**	**3.10**	----
Ionic Balance	----	0.01	%	**0.04**	**0.23**	**0.65**	**2.39**	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**2**	**1**	**8**	**16**	----
EP033: C1 - C4 Hydrocarbon Gases								
Methane	74-82-8	10	µg/L	**13**	**21600**	**1060**	**101**	----
Ethene	74-85-1	10	µg/L	<10	<10	<10	<10	----
Ethane	74-84-0	10	µg/L	<10	<10	<10	<10	----
Propene	115-07-1	10	µg/L	<10	<10	<10	<10	----
Propane	74-98-6	10	µg/L	<10	<10	<10	<10	----
Butene	25167-67-3	10	µg/L	<10	<10	<10	<10	----
Butane	106-97-8	10	µg/L	<10	<10	<10	<10	----
EP074A: Monocyclic Aromatic Hydrocarbons								
Styrene	100-42-5	5	µg/L	<5	<5	<5	<5	----
Isopropylbenzene	98-82-8	5	µg/L	<5	<5	<5	<5	----
n-Propylbenzene	103-65-1	5	µg/L	<5	<5	<5	<5	----
1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	<5	<5	----
sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	<5	<5	----
1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	<5	<5	----
tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	<5	<5	----
p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	<5	<5	----
n-Butylbenzene	104-51-8	5	µg/L	<5	<5	<5	<5	----
EP074B: Oxygenated Compounds								
Vinyl Acetate	108-05-4	50	µg/L	<50	<50	<50	<50	----
2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	<50	<50	----
4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	<50	<50	----
2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	<50	<50	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WKMB06A	WKMB06B	WKSW02	WKSW03	----
			Client sampling date / time	15-Dec-2015 14:30	15-Dec-2015 14:00	15-Dec-2015 17:00	15-Dec-2015 16:30	----
Compound	CAS Number	LOR	Unit	ES1538990-001	ES1538990-002	ES1538990-003	ES1538990-004	--------
				Result	Result	Result	Result	Result
EP074C: Sulfonated Compounds								
Carbon disulfide	75-15-0	5	µg/L	<5	<5	<5	<5	----
EP074D: Fumigants								
2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	<5	<5	----
1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	<5	<5	----
cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	<5	<5	----
trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	<5	<5	----
1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	<5	<5	----
EP074E: Halogenated Aliphatic Compounds								
Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	<50	<50	----
Chloromethane	74-87-3	50	µg/L	<50	<50	<50	<50	----
Vinyl chloride	75-01-4	50	µg/L	<50	<50	<50	<50	----
Bromomethane	74-83-9	50	µg/L	<50	<50	<50	<50	----
Chloroethane	75-00-3	50	µg/L	<50	<50	<50	<50	----
Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	<50	<50	----
1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	<5	<5	----
Iodomethane	74-88-4	5	µg/L	<5	<5	<5	<5	----
trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	<5	<5	----
1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	<5	<5	----
cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	<5	<5	----
1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	<5	<5	----
1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	<5	<5	----
Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	<5	<5	----
1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	<5	<5	----
Trichloroethene	79-01-6	5	µg/L	<5	<5	<5	<5	----
Dibromomethane	74-95-3	5	µg/L	<5	<5	<5	<5	----
1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	<5	<5	----
1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	<5	<5	----
Tetrachloroethene	127-18-4	5	µg/L	<5	<5	<5	<5	----
1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	<5	<5	----
trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	<5	<5	----
cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	<5	<5	----
1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	<5	<5	----
1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	<5	<5	----
Pentachloroethane	76-01-7	5	µg/L	<5	<5	<5	<5	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WKMB06A	WKMB06B	WKSW02	WKSW03	----
			Client sampling date / time	15-Dec-2015 14:30	15-Dec-2015 14:00	15-Dec-2015 17:00	15-Dec-2015 16:30	----
Compound	CAS Number	LOR	Unit	ES1538990-001	ES1538990-002	ES1538990-003	ES1538990-004	--------
				Result	Result	Result	Result	Result
EP074E: Halogenated Aliphatic Compounds - Continued								
1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	<5	<5	----
Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	<5	<5	----
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	5	µg/L	<5	<5	<5	<5	----
Bromobenzene	108-86-1	5	µg/L	<5	<5	<5	<5	----
2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	<5	<5	----
4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	<5	<5	----
1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	<5	<5	----
1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	<5	<5	----
1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	<5	<5	----
1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	<5	<5	----
1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	<5	<5	----
EP074G: Trihalomethanes								
Chloroform	67-66-3	5	µg/L	<5	<5	<5	<5	----
Bromodichloromethane	75-27-4	5	µg/L	<5	<5	<5	<5	----
Dibromochloromethane	124-48-1	5	µg/L	<5	<5	<5	<5	----
Bromoform	75-25-2	5	µg/L	<5	<5	<5	<5	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
2-Chlorophenol	95-57-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
2-Methylphenol	95-48-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	<2.0	<2.0	<2.0	----
2-Nitrophenol	88-75-5	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Pentachlorophenol	87-86-5	2	µg/L	<2.0	<2.0	<2.0	<2.0	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WKMB06A	WKMB06B	WKSW02	WKSW03	----
			Client sampling date / time	15-Dec-2015 14:30	15-Dec-2015 14:00	15-Dec-2015 17:00	15-Dec-2015 16:30	----
Compound	CAS Number	LOR	Unit	ES1538990-001	ES1538990-002	ES1538990-003	ES1538990-004	--------
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Fluorene	86-73-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Anthracene	120-12-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Pyrene	129-00-0	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Chrysene	218-01-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	----
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WKMB06A	WKMB06B	WKSW02	WKSW03	----
			Client sampling date / time	15-Dec-2015 14:30	15-Dec-2015 14:00	15-Dec-2015 17:00	15-Dec-2015 16:30	----
Compound	CAS Number	LOR	Unit	ES1538990-001	ES1538990-002	ES1538990-003	ES1538990-004	--------
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	----
^ Total Xylenes	1330-20-7	2	µg/L	<2	<2	<2	<2	----
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	<1	<1	<1	<1	----
Diethanolamine	111-42-2	1	µg/L	<1	<1	<1	<1	----
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	<1	<1	<1	----
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	5	%	99.8	98.6	99.6	95.7	----
Toluene-D8	2037-26-5	5	%	102	103	99.3	97.5	----
4-Bromofluorobenzene	460-00-4	5	%	88.7	86.7	88.0	85.1	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1	%	33.6	31.7	29.7	25.6	----
2-Chlorophenol-D4	93951-73-6	1	%	62.9	52.0	55.4	55.3	----
2.4.6-Tribromophenol	118-79-6	1	%	43.8	33.5	47.4	69.0	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1	%	67.4	73.5	67.3	72.2	----
Anthracene-d10	1719-06-8	1	%	116	106	113	111	----
4-Terphenyl-d14	1718-51-0	1	%	83.0	87.6	83.7	81.7	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	99.6	98.4	99.5	95.5	----
Toluene-D8	2037-26-5	2	%	111	112	107	105	----
4-Bromofluorobenzene	460-00-4	2	%	87.6	86.3	87.6	84.7	----

CERTIFICATE OF ANALYSIS

Work Order	: **ES1539080**	Page	: 1 of 9
Amendment	: **2**		
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: SEAN DAYKIN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: SDaykin@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 92725100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2268523B	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: ----	Date Samples Received	: 17-Dec-2015 13:24
C-O-C number	: ----	Date Analysis Commenced	: 17-Dec-2015
Sampler	: BECKY ROLLINS, CAROLINA SARDELLA	Issue Date	: 08-Jan-2016 13:51
Site	: ----		
		No. of samples received	: 5
Quote number	: ----	No. of samples analysed	: 5

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Barbara Coupland	Quality Officer	Newcastle - Inorganics, Mayfield West, NSW
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Phalak Inthakesone	Laboratory Manager - Organics	Sydney Organics, Smithfield, NSW
Shobhna Chandra	Metals Coordinator	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.

- EA005: Samples #2-5 have been analysed outside recommended holding times and this must be taken into consideration when interpreting results.
- EK055G: It has been noted that Ammonia is greater than TKN for sample No 1 & 5, however this difference is within the limits of experimental variation.
- EK071G: It has been noted that Reactive P is greater than Total P for sample No 5, however this difference is within the limits of experimental variation.
- This report has been amended and re-released to allow the reporting of additional analytical data, specifically EN055. ED093F results may have been affected inorder to process through EN055.
- This report has been amended as a result of a request to change sample identification numbers (IDs) received by ALS from Kelly-Jane on 8/1/2016. All analysis results are as per the previous report.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	GW080487	GR-P3	WKSW01	WKMB01	WKMB02
			Client sampling date / time	17-Dec-2015 10:30	16-Dec-2015 14:30	16-Dec-2015 12:00	16-Dec-2015 11:00	16-Dec-2015 09:15
Compound	CAS Number	LOR	Unit	ES1539080-001	ES1539080-002	ES1539080-003	ES1539080-004	ES1539080-005
				Result	Result	Result	Result	Result
EA005: pH								
pH Value	----	0.01	pH Unit	7.00	6.53	7.27	8.03	9.54
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	3960	4140	337	4410	956
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	2270	2460	214	2540	538
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	16	13	26	<5	<5
ED009: Anions								
Chloride	16887-00-6	0.1	mg/L	696	1150	61.0	962	66.6
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	136
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1030	364	70	853	218
Total Alkalinity as CaCO3	----	1	mg/L	1030	364	70	853	354
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	92	82	<1	45	28
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	707	1090	59	916	67
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	92	130	13	15	1
Magnesium	7439-95-4	1	mg/L	38	72	10	1	<1
Sodium	7440-23-5	1	mg/L	812	632	41	1080	208
Potassium	7440-09-7	1	mg/L	6	2	3	3	8
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	0.02	0.20
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.001	<0.001	0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	0.08	<0.05
Strontium	7440-24-6	0.001	mg/L	4.90	2.03	0.221	1.47	0.280
Barium	7440-39-3	0.001	mg/L	0.224	0.440	0.044	0.242	0.098
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Uranium	7440-61-1	0.001	mg/L	<0.001	0.002	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	GW080487	GR-P3	WKSW01	WKMB01	WKMB02
			Client sampling date / time	17-Dec-2015 10:30	16-Dec-2015 14:30	16-Dec-2015 12:00	16-Dec-2015 11:00	16-Dec-2015 09:15
Compound	CAS Number	LOR	Unit	ES1539080-001	ES1539080-002	ES1539080-003	ES1539080-004	ES1539080-005
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	**0.002**	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	**0.046**	**0.607**	**0.195**	**0.009**	**0.005**
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	**0.001**
Nickel	7440-02-0	0.001	mg/L	**0.001**	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	**0.009**	**0.017**	**0.007**	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L	**0.57**	**0.24**	**0.14**	<0.05	<0.05
Bromine	7726-95-6	0.1	mg/L	**1.5**	**1.8**	**0.2**	**2.0**	**0.2**
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG052G: Silica by Discrete Analyser								
Reactive Silica	----	0.05	mg/L	**21.2**	**36.5**	**10.8**	**16.4**	**21.7**
EK010/011: Chlorine								
Chlorine - Free	----	0.2	mg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorine - Total Residual	----	0.2	mg/L	<0.2	<0.2	**0.3**	<0.2	<0.2
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.2**	**0.2**	**0.1**	**1.8**	**0.5**
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.55**	**0.04**	**0.04**	**0.55**	**0.42**
EK055G-NH4: Ammonium as N by DA								
Ammonium as N	14798-03-9_N	0.01	mg/L	**0.55**	**0.04**	**0.04**	**0.53**	**0.19**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.03**	**0.08**	**0.05**	**0.10**	**0.03**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.03**	**0.08**	**0.05**	**0.10**	**0.03**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.5**	<0.1	**0.6**	**0.6**	**0.4**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	GW080487	GR-P3	WKSW01	WKMB01	WKMB02
			Client sampling date / time	17-Dec-2015 10:30	16-Dec-2015 14:30	16-Dec-2015 12:00	16-Dec-2015 11:00	16-Dec-2015 09:15
Compound	CAS Number	LOR	Unit	ES1539080-001	ES1539080-002	ES1539080-003	ES1539080-004	ES1539080-005
				Result	Result	Result	Result	Result
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.5**	<0.1	**0.6**	**0.7**	**0.4**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	<0.01	**0.01**	**0.04**	**0.08**	**0.09**
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	**0.02**	**0.06**	**0.10**
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	**42.4**	**39.7**	**3.06**	**43.8**	**9.54**
Total Cations	----	0.01	meq/L	**43.2**	**40.0**	**3.33**	**47.9**	**9.30**
Ionic Balance	----	0.01	%	**0.85**	**0.28**	**4.19**	**4.39**	**1.35**
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**4**	**2**	**10**	**20**	**8**
EP033: C1 - C4 Hydrocarbon Gases								
Methane	74-82-8	10	µg/L	**190**	<10	**17**	**18500**	**7240**
Ethene	74-85-1	10	µg/L	<10	<10	<10	<10	<10
Ethane	74-84-0	10	µg/L	<10	<10	<10	<10	<10
Propene	115-07-1	10	µg/L	<10	<10	<10	<10	<10
Propane	74-98-6	10	µg/L	<10	<10	<10	<10	<10
Butene	25167-67-3	10	µg/L	<10	<10	<10	<10	<10
Butane	106-97-8	10	µg/L	<10	<10	<10	<10	<10
EP074A: Monocyclic Aromatic Hydrocarbons								
Styrene	100-42-5	5	µg/L	<5	<5	<5	<5	<5
Isopropylbenzene	98-82-8	5	µg/L	<5	<5	<5	<5	<5
n-Propylbenzene	103-65-1	5	µg/L	<5	<5	<5	<5	<5
1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	<5	<5	<5
sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	<5	<5	<5
1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	<5	<5	<5
tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	<5	<5	<5
p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	<5	<5	<5
n-Butylbenzene	104-51-8	5	µg/L	<5	<5	<5	<5	<5
EP074B: Oxygenated Compounds								
Vinyl Acetate	108-05-4	50	µg/L	<50	<50	<50	<50	<50
2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	<50	<50	<50
4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	<50	<50	<50
2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	GW080487	GR-P3	WKSW01	WKMB01	WKMB02
			Client sampling date / time	17-Dec-2015 10:30	16-Dec-2015 14:30	16-Dec-2015 12:00	16-Dec-2015 11:00	16-Dec-2015 09:15
Compound	CAS Number	LOR	Unit	ES1539080-001	ES1539080-002	ES1539080-003	ES1539080-004	ES1539080-005
				Result	Result	Result	Result	Result
EP074C: Sulfonated Compounds								
Carbon disulfide	75-15-0	5	µg/L	<5	<5	<5	<5	<5
EP074D: Fumigants								
2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	<5	<5	<5
1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	<5	<5	<5
cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	<5	<5	<5
trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	<5	<5	<5
1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	<5	<5	<5
EP074E: Halogenated Aliphatic Compounds								
Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	<50	<50	<50
Chloromethane	74-87-3	50	µg/L	<50	<50	<50	<50	<50
Vinyl chloride	75-01-4	50	µg/L	<50	<50	<50	<50	<50
Bromomethane	74-83-9	50	µg/L	<50	<50	<50	<50	<50
Chloroethane	75-00-3	50	µg/L	<50	<50	<50	<50	<50
Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	<50	<50	<50
1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	<5	<5	<5
Iodomethane	74-88-4	5	µg/L	<5	<5	<5	<5	<5
trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	<5	<5	<5
1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	<5	<5	<5
cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	<5	<5	<5
1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	<5	<5	<5
1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	<5	<5	<5
Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	<5	<5	<5
1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	<5	<5	<5
Trichloroethene	79-01-6	5	µg/L	<5	<5	<5	<5	<5
Dibromomethane	74-95-3	5	µg/L	<5	<5	<5	<5	<5
1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	<5	<5	<5
1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	<5	<5	<5
Tetrachloroethene	127-18-4	5	µg/L	<5	<5	<5	<5	<5
1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	<5	<5	<5
trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	<5	<5	<5
cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	<5	<5	<5
1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	<5	<5	<5
1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	<5	<5	<5
Pentachloroethane	76-01-7	5	µg/L	<5	<5	<5	<5	<5

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	GW080487	GR-P3	WKSW01	WKMB01	WKMB02
			Client sampling date / time	17-Dec-2015 10:30	16-Dec-2015 14:30	16-Dec-2015 12:00	16-Dec-2015 11:00	16-Dec-2015 09:15
Compound	CAS Number	LOR	Unit	ES1539080-001	ES1539080-002	ES1539080-003	ES1539080-004	ES1539080-005
				Result	Result	Result	Result	Result
EP074E: Halogenated Aliphatic Compounds - Continued								
1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	<5	<5	<5
Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	<5	<5	<5
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	5	µg/L	<5	<5	<5	<5	<5
Bromobenzene	108-86-1	5	µg/L	<5	<5	<5	<5	<5
2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	<5	<5	<5
4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	<5	<5	<5
1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	<5	<5	<5
1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	<5	<5	<5
1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	<5	<5	<5
1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	<5	<5	<5
1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	<5	<5	<5
EP074G: Trihalomethanes								
Chloroform	67-66-3	5	µg/L	<5	<5	<5	<5	<5
Bromodichloromethane	75-27-4	5	µg/L	<5	<5	<5	<5	<5
Dibromochloromethane	124-48-1	5	µg/L	<5	<5	<5	<5	<5
Bromoform	75-25-2	5	µg/L	<5	<5	<5	<5	<5
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chlorophenol	95-57-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2-Methylphenol	95-48-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
2-Nitrophenol	88-75-5	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pentachlorophenol	87-86-5	2	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0

Analytical Results

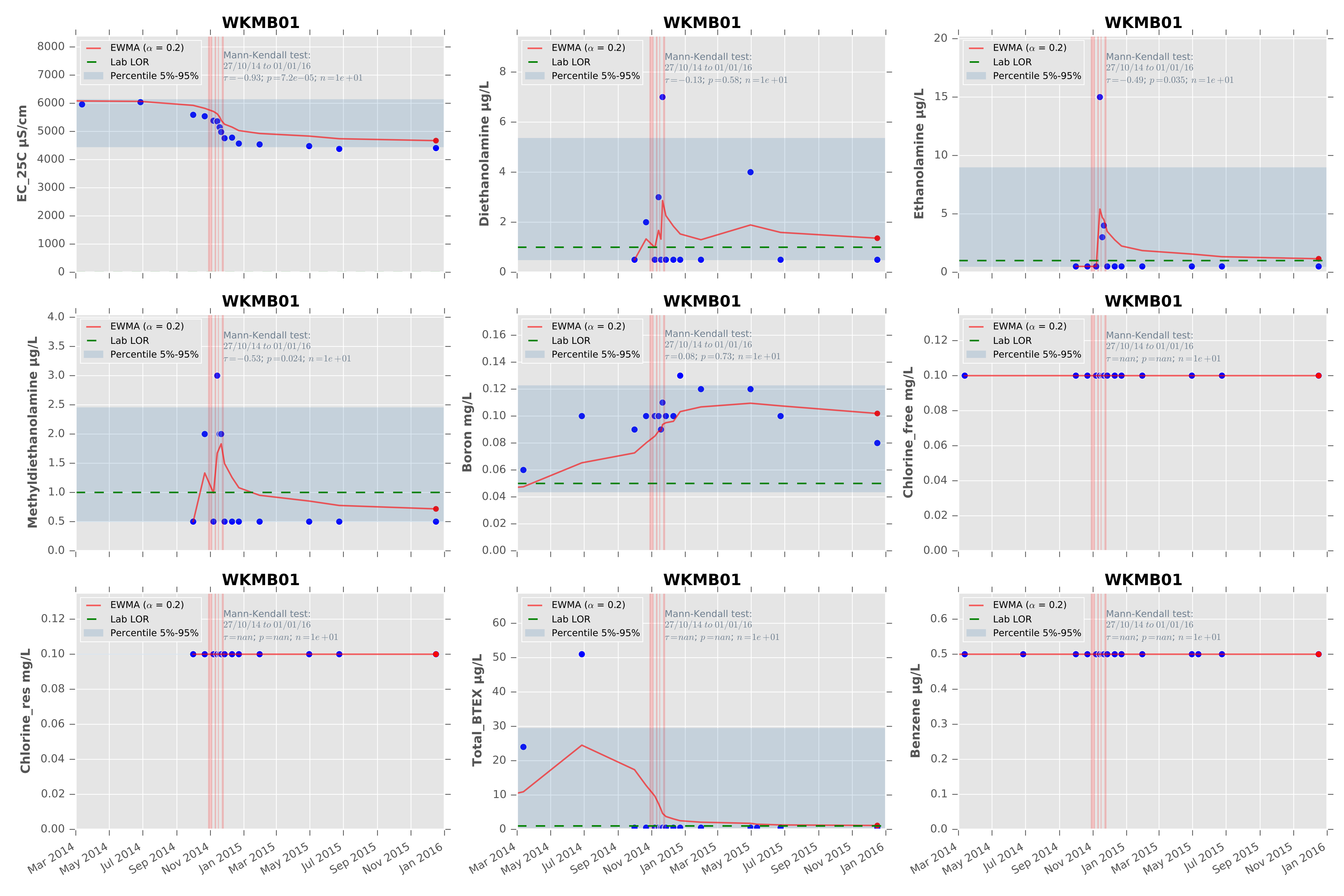
Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	GW080487	GR-P3	WKSW01	WKMB01	WKMB02
			Client sampling date / time	17-Dec-2015 10:30	16-Dec-2015 14:30	16-Dec-2015 12:00	16-Dec-2015 11:00	16-Dec-2015 09:15
Compound	CAS Number	LOR	Unit	ES1539080-001	ES1539080-002	ES1539080-003	ES1539080-004	ES1539080-005
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Fluorene	86-73-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2

Analytical Results

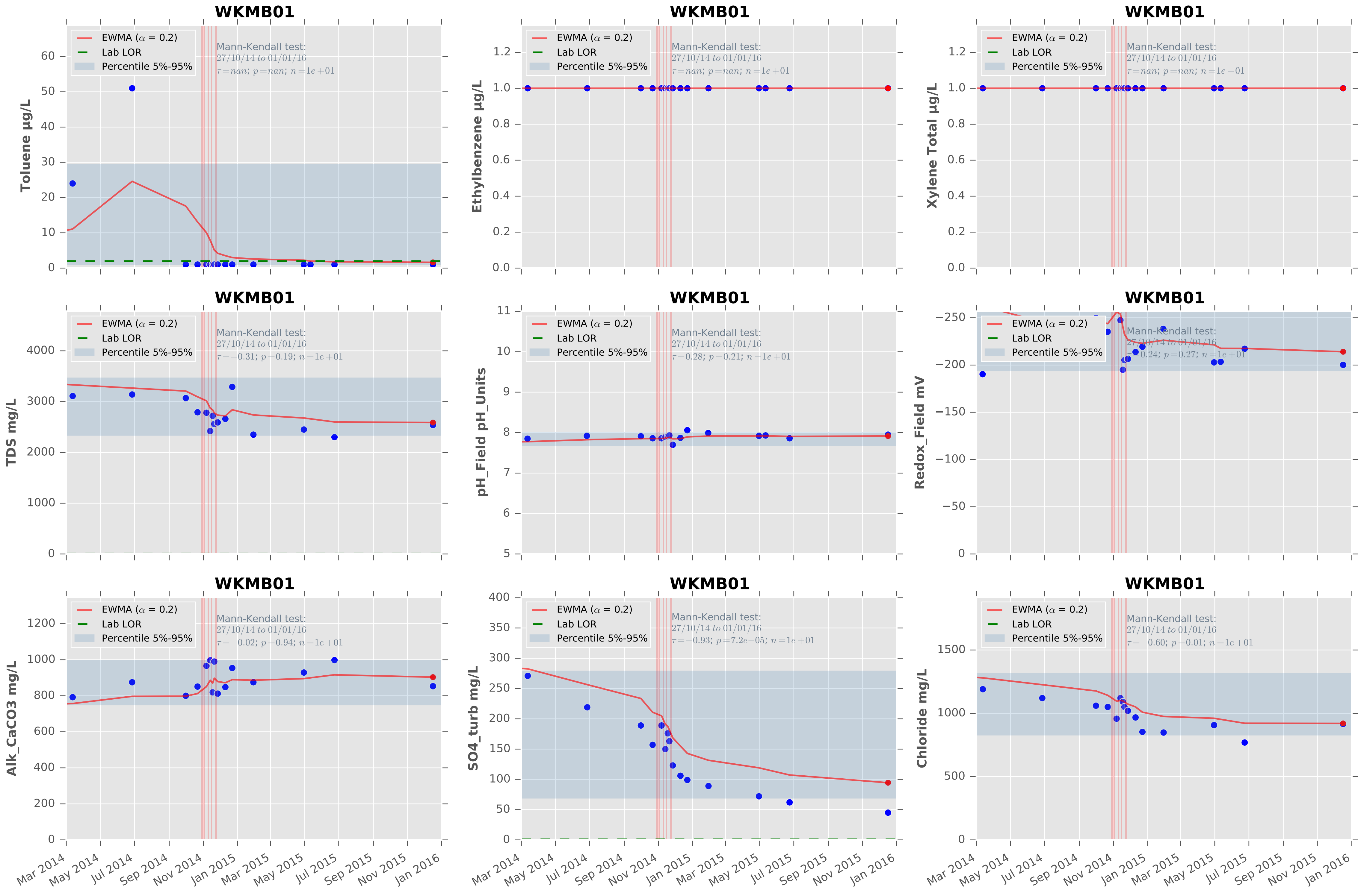
Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	GW080487	GR-P3	WKSW01	WKMB01	WKMB02
			Client sampling date / time	17-Dec-2015 10:30	16-Dec-2015 14:30	16-Dec-2015 12:00	16-Dec-2015 11:00	16-Dec-2015 09:15
Compound	CAS Number	LOR	Unit	ES1539080-001	ES1539080-002	ES1539080-003	ES1539080-004	ES1539080-005
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	**2**	<1	<1	<1	<1
Diethanolamine	111-42-2	1	µg/L	<1	<1	<1	<1	<1
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	<1	<1	<1	<1
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	5	%	88.2	87.5	91.8	87.5	87.4
Toluene-D8	2037-26-5	5	%	95.5	97.0	96.1	98.9	99.4
4-Bromofluorobenzene	460-00-4	5	%	94.3	94.5	95.3	95.6	94.9
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1	%	35.3	29.6	29.4	28.3	30.9
2-Chlorophenol-D4	93951-73-6	1	%	64.4	55.0	51.5	50.8	38.9
2.4.6-Tribromophenol	118-79-6	1	%	66.6	44.8	32.6	35.8	22.0
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1	%	78.7	68.3	65.4	62.3	73.6
Anthracene-d10	1719-06-8	1	%	115	105	113	102	106
4-Terphenyl-d14	1718-51-0	1	%	95.9	82.7	80.4	80.1	89.6
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	82.2	81.0	85.6	80.7	81.6
Toluene-D8	2037-26-5	2	%	91.8	93.1	92.2	95.1	95.6
4-Bromofluorobenzene	460-00-4	2	%	89.9	91.5	91.5	93.2	91.1

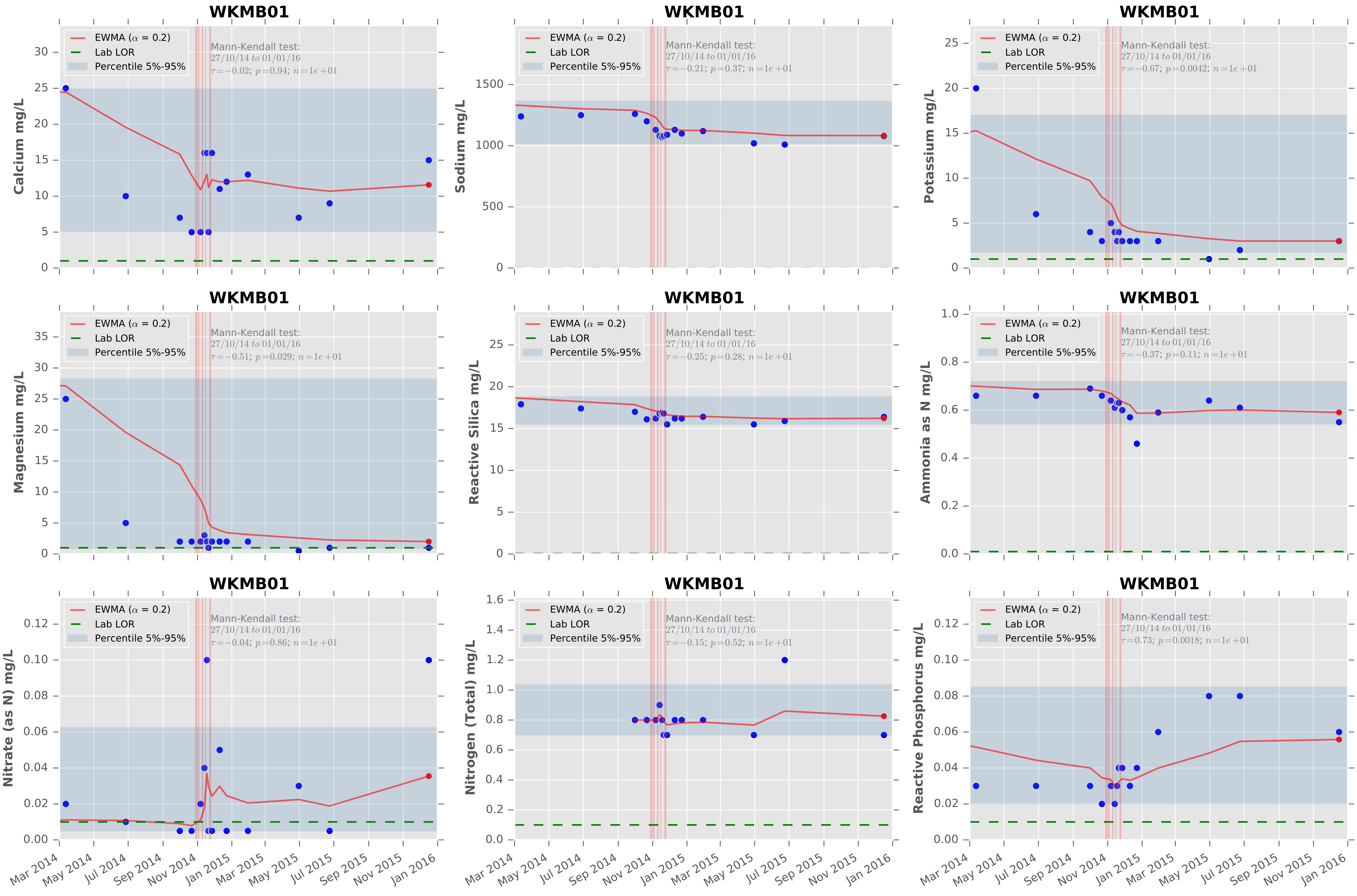
Appendix I

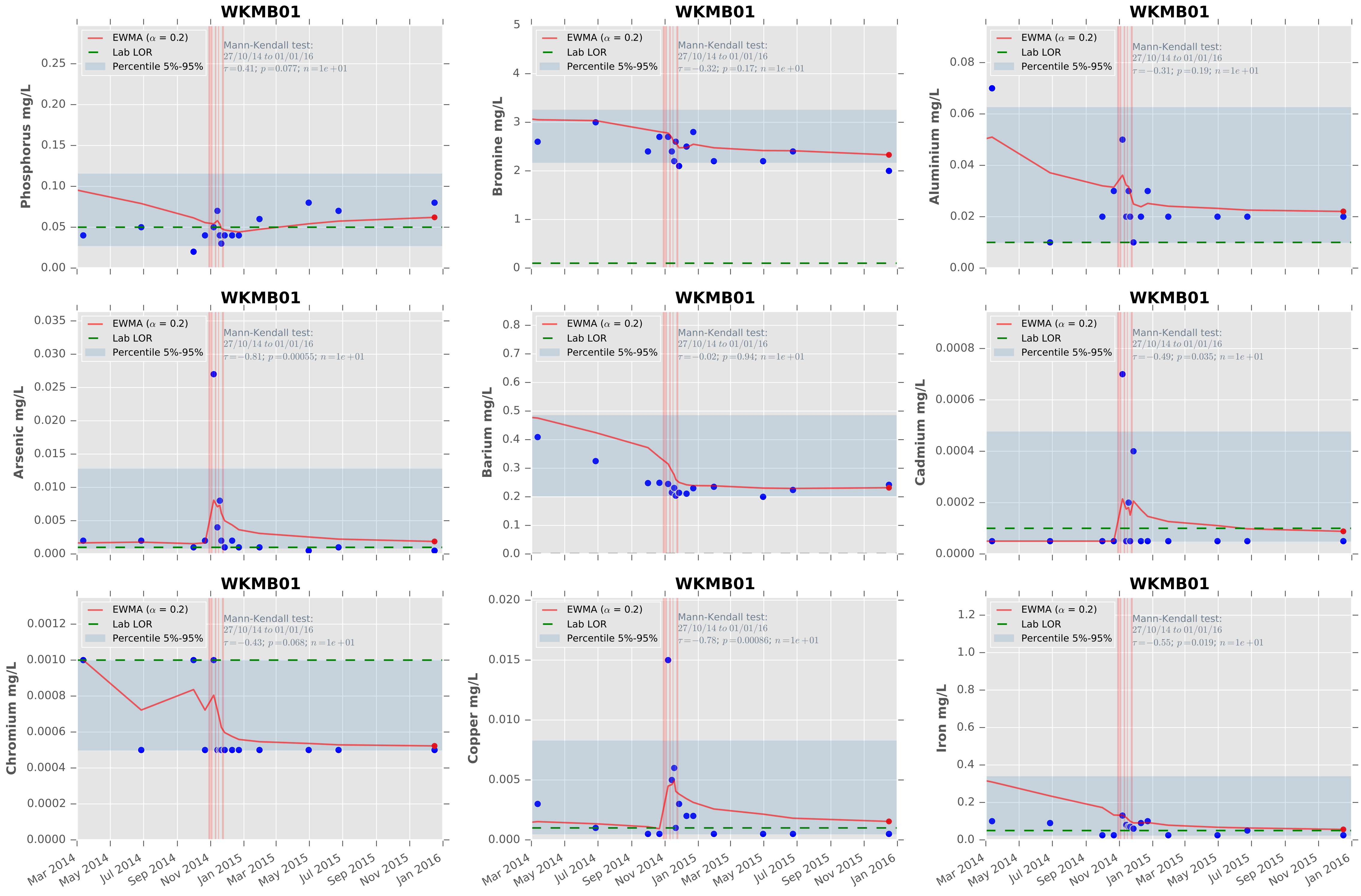
Groundwater and surface water trend analysis

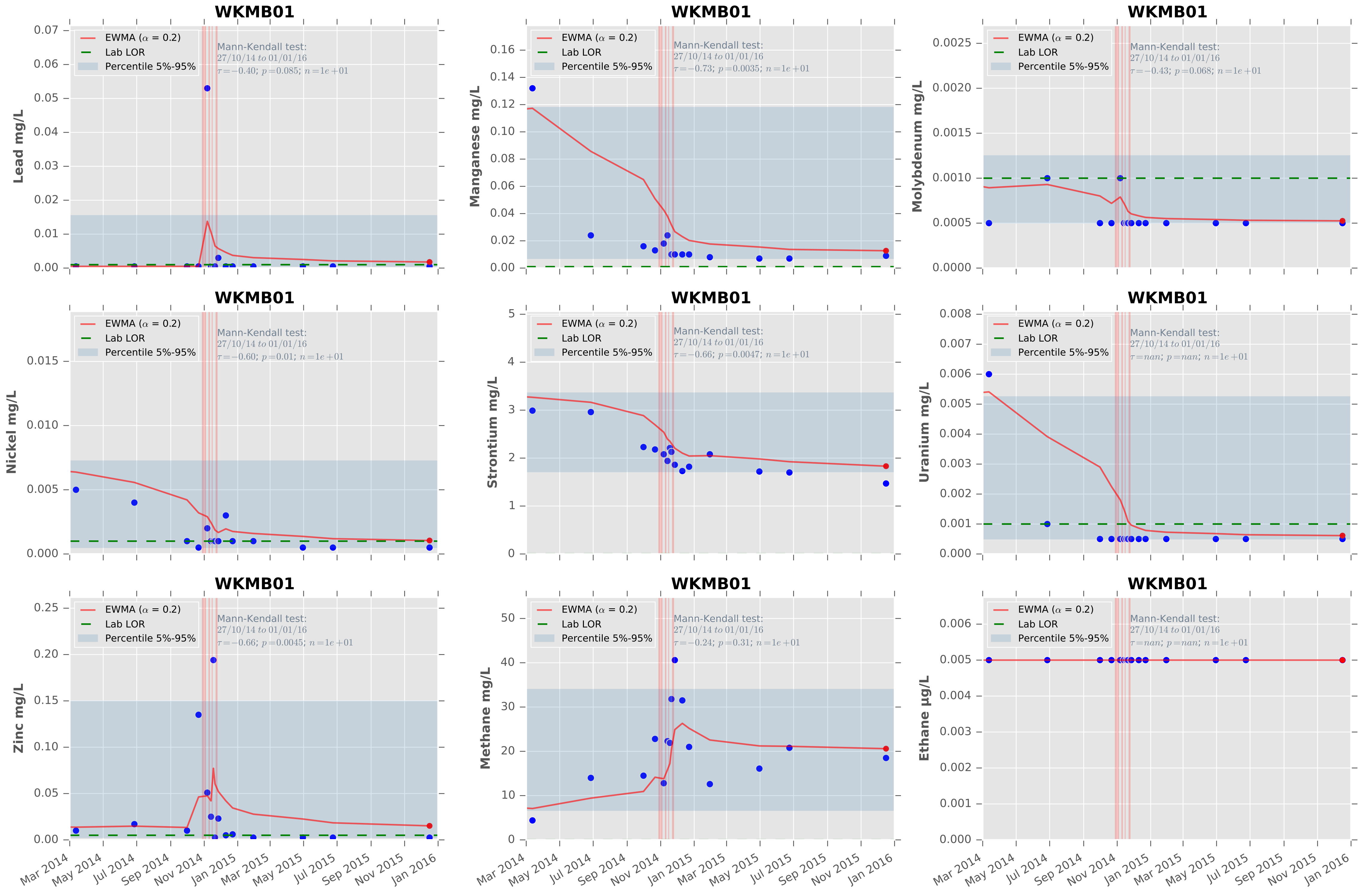


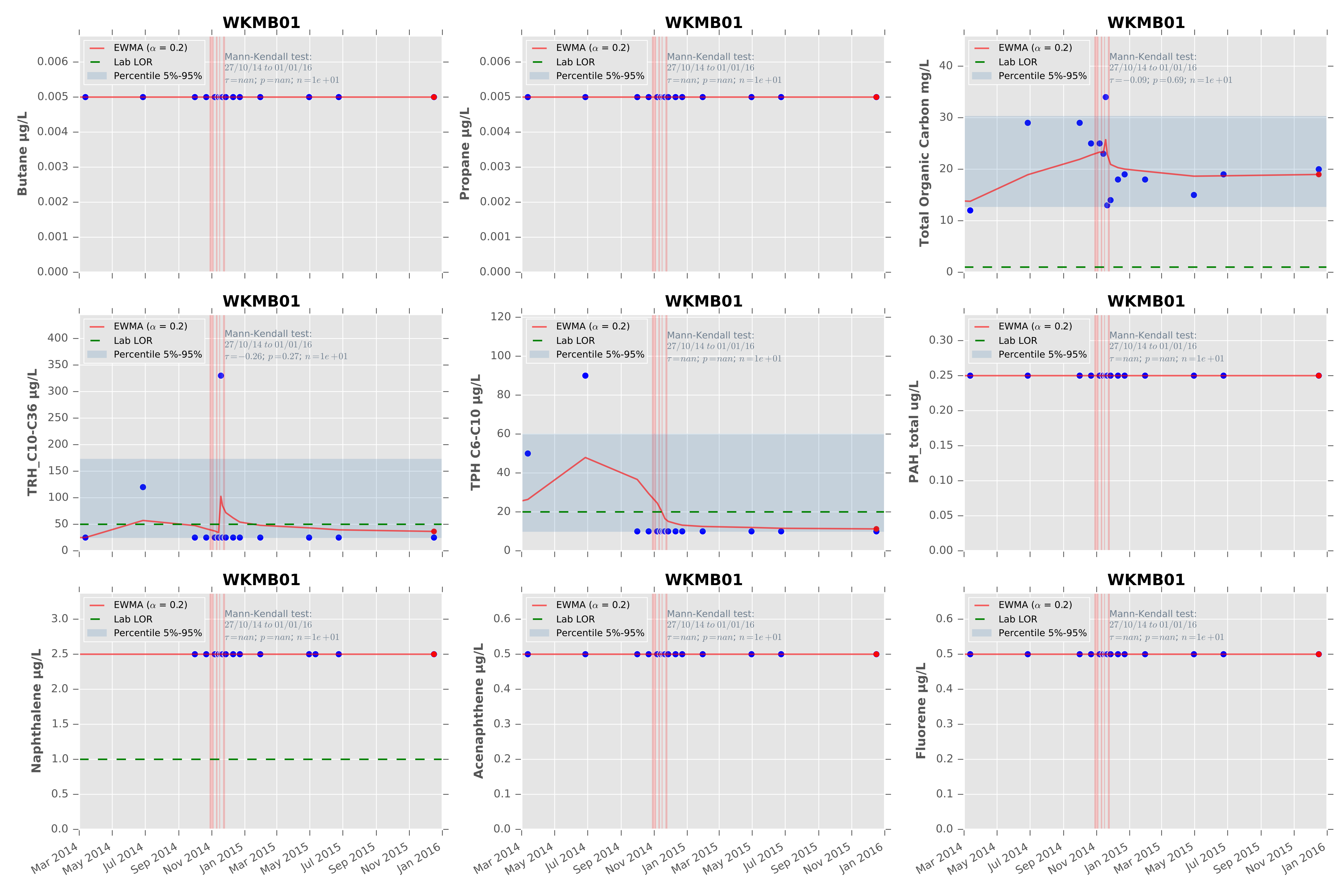
WKMB01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.93; p=7.2e−05; n=1e+01
EC_25C µS/cm
WKMB01
Diethanolamine µg/L
τ=−0.13; p=0.58; n=1e+01
WKMB01
Ethanolamine µg/L
τ=−0.49; p=0.035; n=1e+01
WKMB01
Methyldiethanolamine µg/L
τ=−0.53; p=0.024; n=1e+01
WKMB01
Boron mg/L
τ=0.08; p=0.73; n=1e+01
WKMB01
Chlorine_free mg/L
τ=nan; p=nan; n=1e+01
WKMB01
Chlorine_res mg/L
τ=nan; p=nan; n=1e+01
WKMB01
Total_BTEX µg/L
τ=nan; p=nan; n=1e+01
WKMB01
Benzene µg/L
τ=nan; p=nan; n=1e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016


WKMB01
Toluene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
WKMB01
Ethylbenzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
WKMB01
Xylene Total µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
WKMB01
TDS mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.31; p=0.19; n=1e+01
WKMB01
pH_Field pH_Units
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.28; p=0.21; n=1e+01
WKMB01
Redox_Field mV
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.24; p=0.27; n=1e+01
WKMB01
Alk_CaCO3 mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.02; p=0.94; n=1e+01
WKMB01
SO4_turb mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.93; p=7.2e−05; n=1e+01
WKMB01
Chloride mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.60; p=0.01; n=1e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

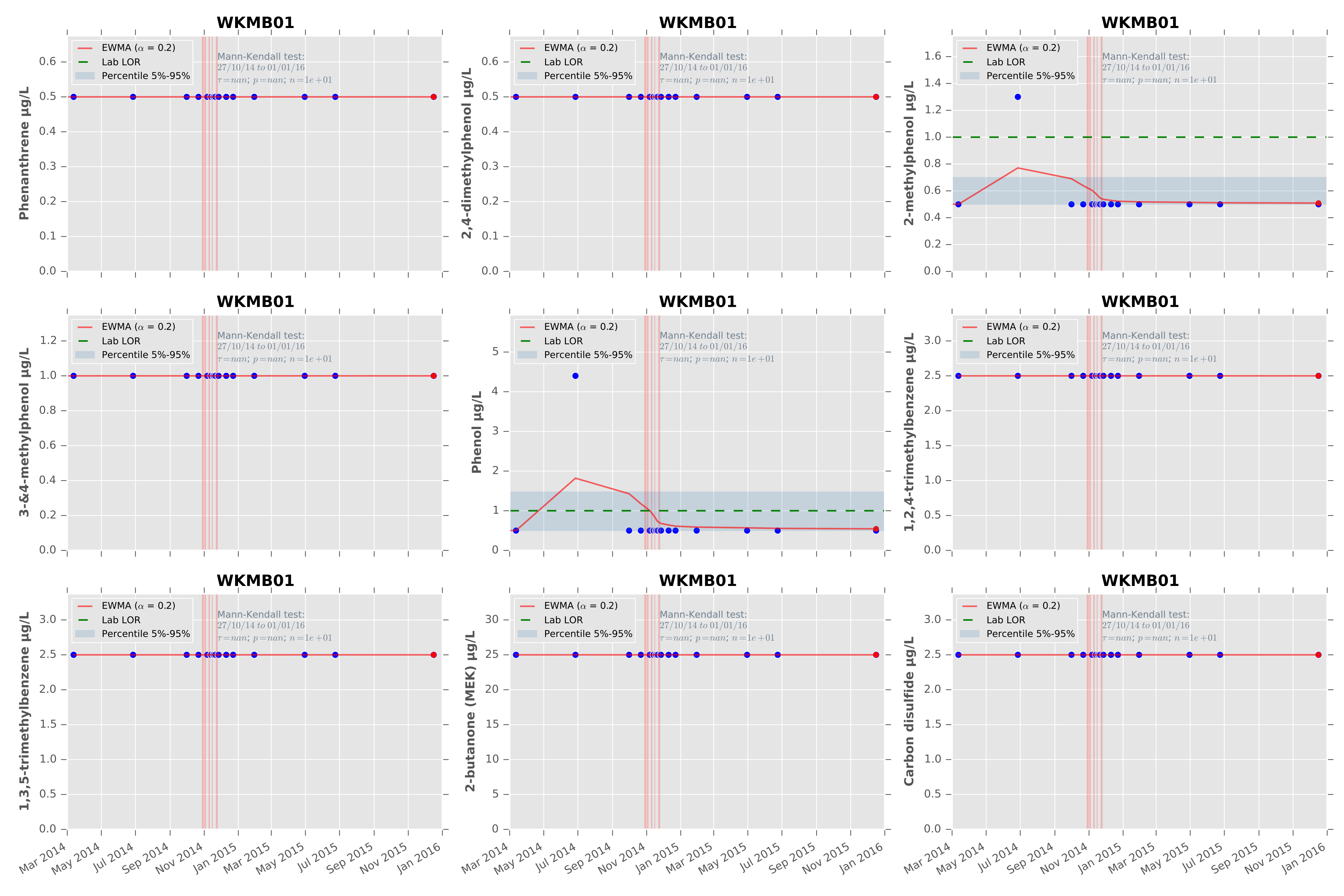

WKMB01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.02; p=0.94; n=1e+01
Calcium mg/L
WKMB01
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.21; p=0.37; n=1e+01
Sodium mg/L
WKMB01
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.67; p=0.0042; n=1e+01
Potassium mg/L
WKMB01
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.51; p=0.029; n=1e+01
Magnesium mg/L
WKMB01
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.25; p=0.28; n=1e+01
Reactive Silica mg/L
WKMB01
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.37; p=0.11; n=1e+01
Ammonia as N mg/L
WKMB01
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.04; p=0.86; n=1e+01
Nitrate (as N) mg/L
WKMB01
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.15; p=0.52; n=1e+01
Nitrogen (Total) mg/L
WKMB01
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.73; p=0.0018; n=1e+01
Reactive Phosphorus mg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016


WKMB01
Phosphorus mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.41; p=0.077; n=1e+01
WKMB01
Bromine mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.32; p=0.17; n=1e+01
WKMB01
Aluminium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.31; p=0.19; n=1e+01
WKMB01
Arsenic mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.81; p=0.00055; n=1e+01
WKMB01
Barium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.02; p=0.94; n=1e+01
WKMB01
Cadmium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.49; p=0.035; n=1e+01
WKMB01
Chromium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.43; p=0.068; n=1e+01
WKMB01
Copper mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.78; p=0.00086; n=1e+01
WKMB01
Iron mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.55; p=0.019; n=1e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

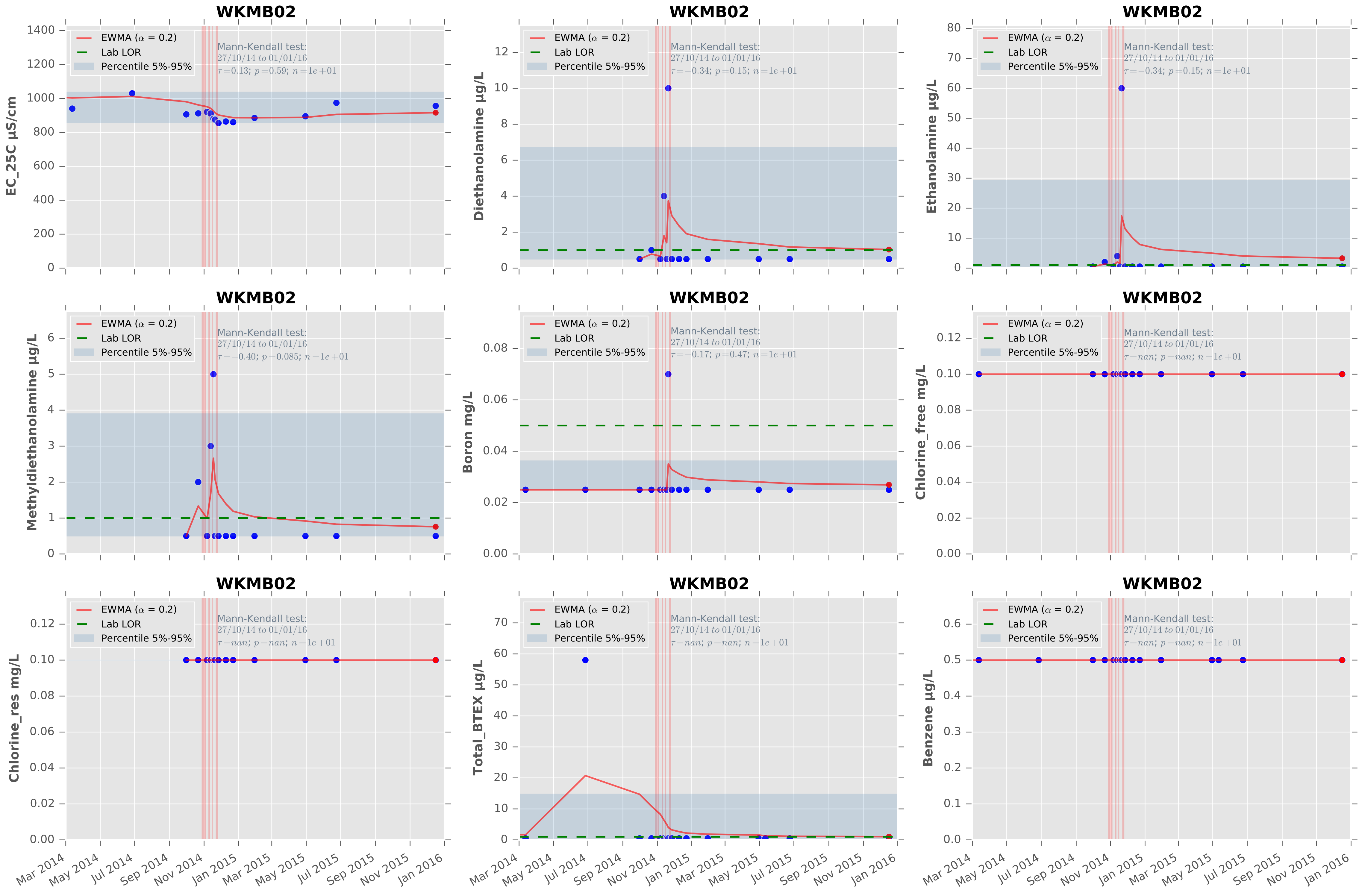

WKMB01
Lead mg/L
Manganese mg/L
Molybdenum mg/L
Nickel mg/L
Strontium mg/L
Uranium mg/L
Zinc mg/L
Methane mg/L
Ethane µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.40; p=0.085; n=1e+01
τ=−0.73; p=0.0035; n=1e+01
τ=−0.43; p=0.068; n=1e+01
τ=−0.60; p=0.01; n=1e+01
τ=−0.66; p=0.0047; n=1e+01
τ=nan; p=nan; n=1e+01
τ=−0.66; p=0.0045; n=1e+01
τ=−0.24; p=0.31; n=1e+01
τ=nan; p=nan; n=1e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

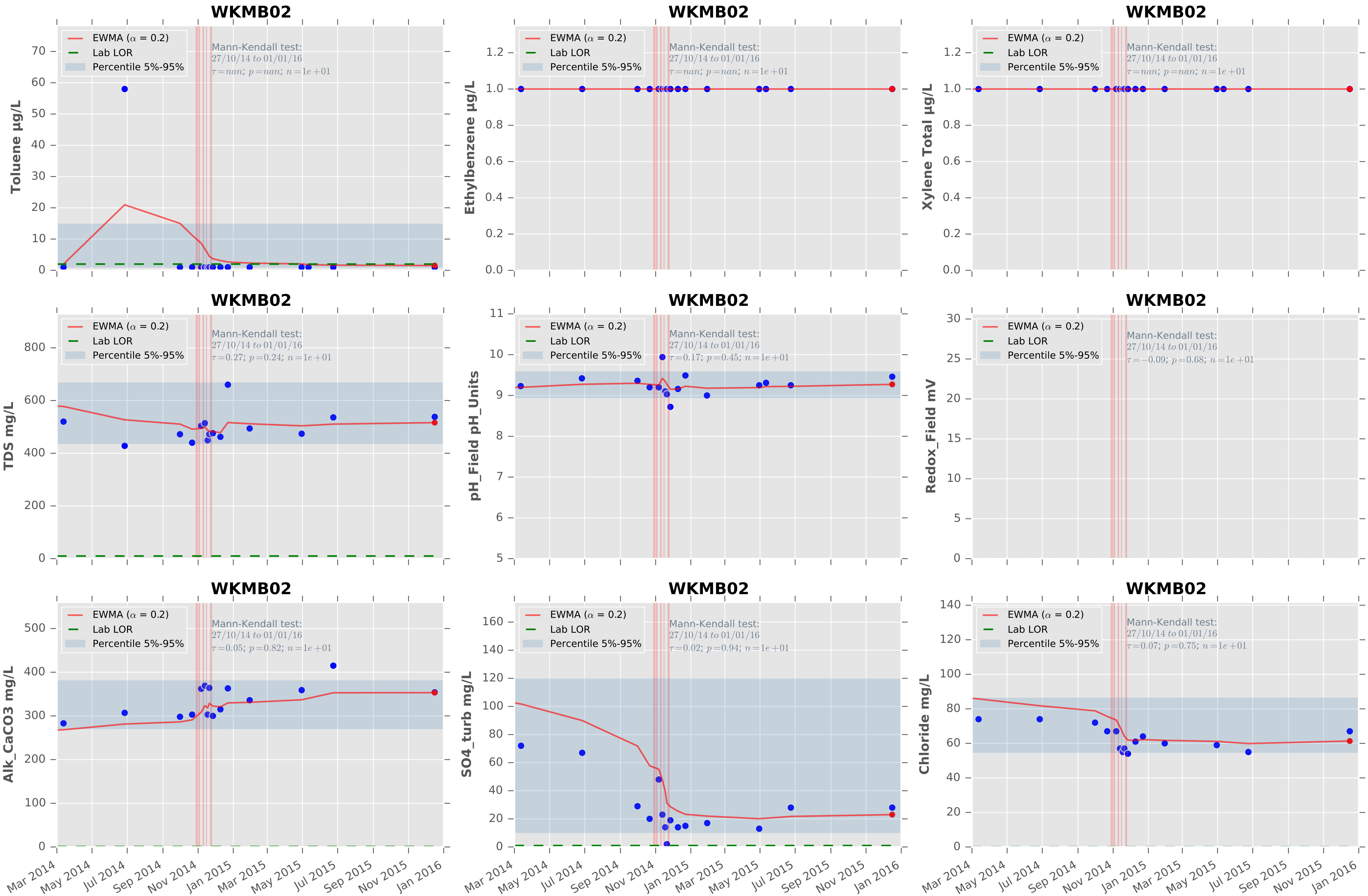


WKMB01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Butane µg/L
WKMB01
Propane µg/L
τ=nan; p=nan; n=1e+01
WKMB01
Total Organic Carbon mg/L
τ=−0.09; p=0.69; n=1e+01
WKMB01
TRH_C10-C36 µg/L
τ=−0.26; p=0.27; n=1e+01
WKMB01
TPH C6-C10 µg/L
τ=nan; p=nan; n=1e+01
WKMB01
PAH_total ug/L
τ=nan; p=nan; n=1e+01
WKMB01
Naphthalene µg/L
τ=nan; p=nan; n=1e+01
WKMB01
Acenaphthene µg/L
τ=nan; p=nan; n=1e+01
WKMB01
Fluorene µg/L
τ=nan; p=nan; n=1e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

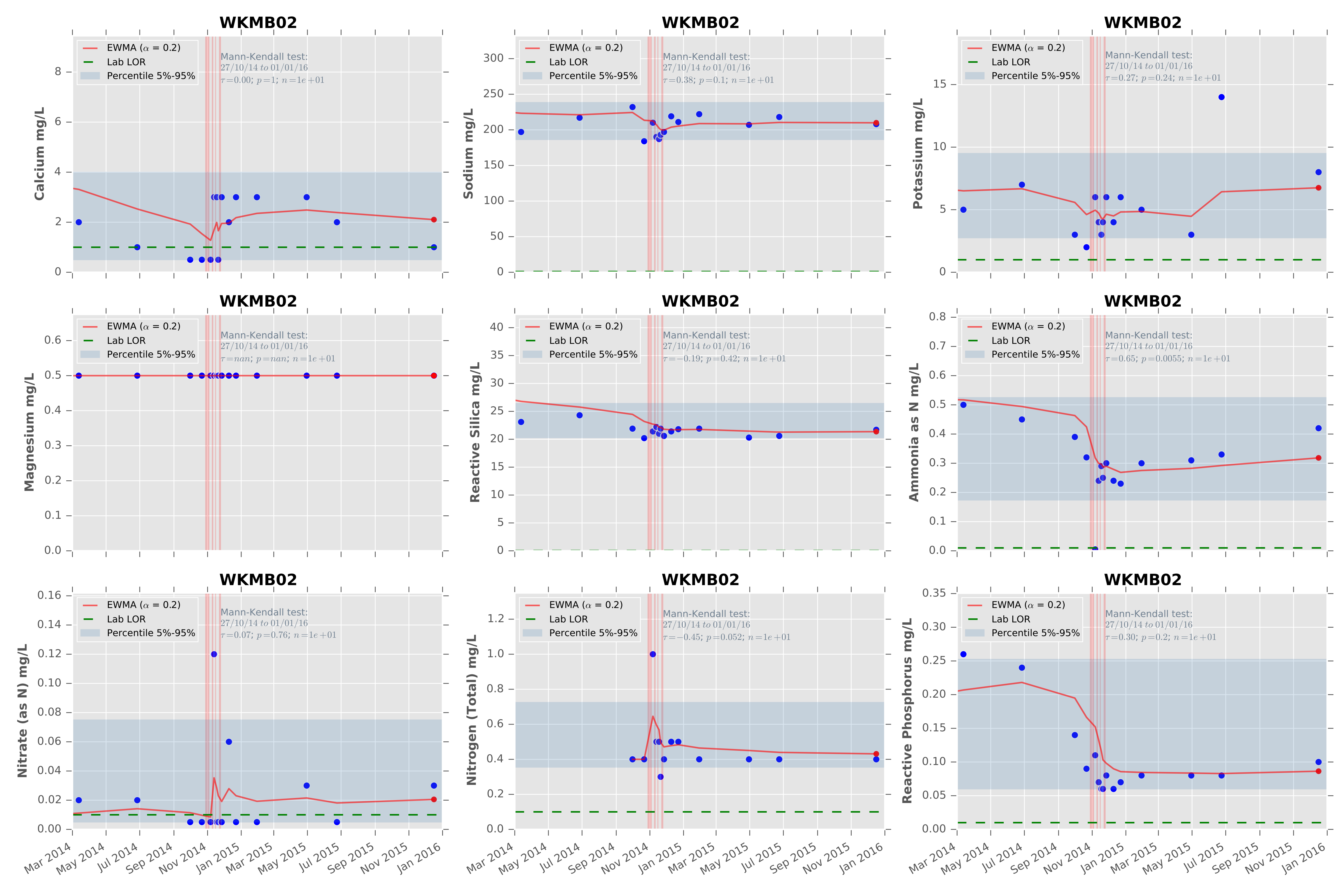


WKMB01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Phenanthrene µg/L
2,4-dimethylphenol µg/L
2-methylphenol µg/L
3-&4-methylphenol µg/L
Phenol µg/L
1,2,4-trimethylbenzene µg/L
1,3,5-trimethylbenzene µg/L
2-butanone (MEK) µg/L
Carbon disulfide µg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

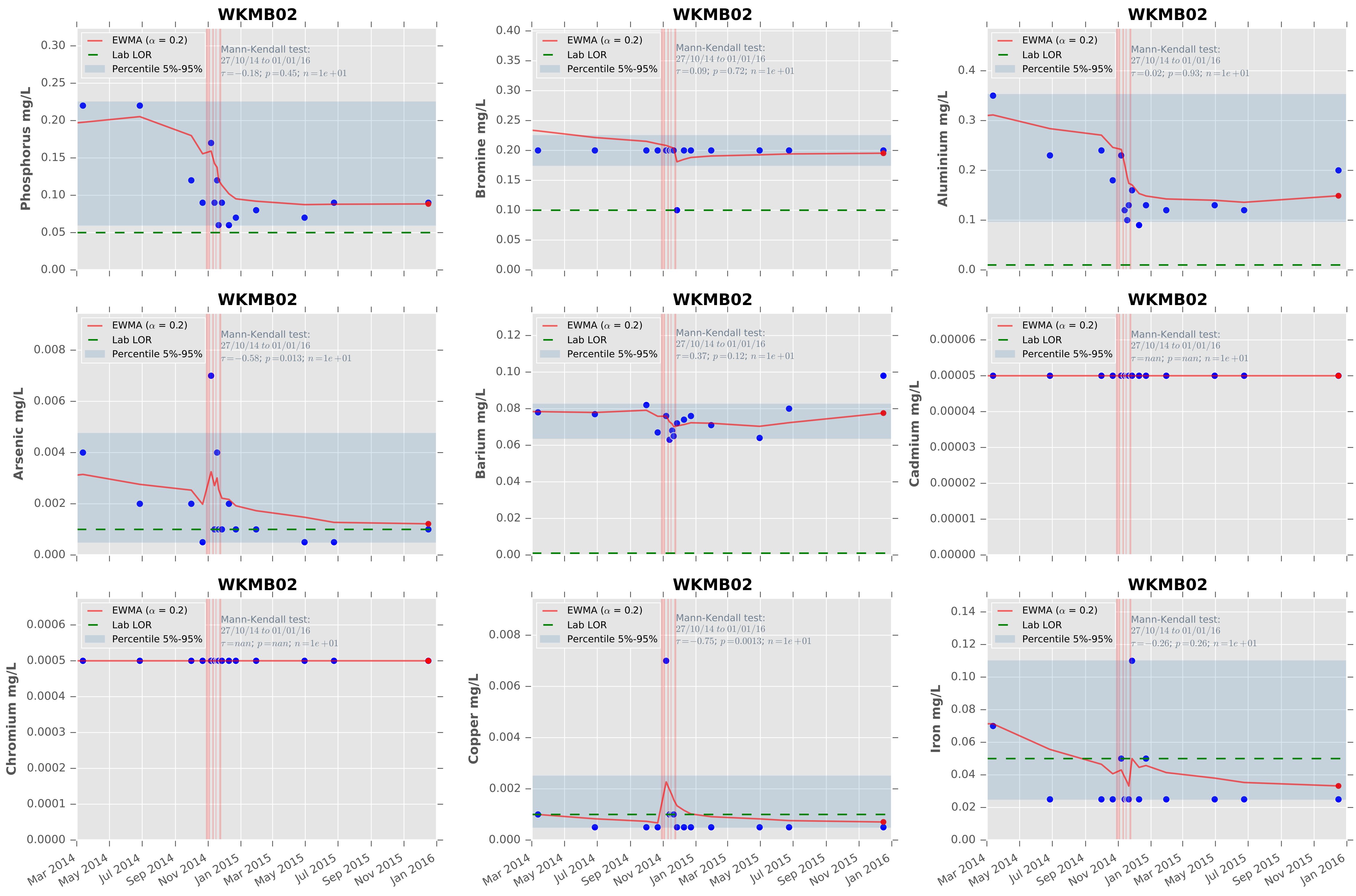

WKMB02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.13; p=0.59; n=1e+01
EC_25C µS/cm
WKMB02
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.34; p=0.15; n=1e+01
Diethanolamine µg/L
WKMB02
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.34; p=0.15; n=1e+01
Ethanolamine µg/L
WKMB02
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.40; p=0.085; n=1e+01
Methyldiethanolamine µg/L
WKMB02
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.17; p=0.47; n=1e+01
Boron mg/L
WKMB02
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Chlorine_free mg/L
WKMB02
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Chlorine_res mg/L
WKMB02
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Total_BTEX µg/L
WKMB02
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Benzene µg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

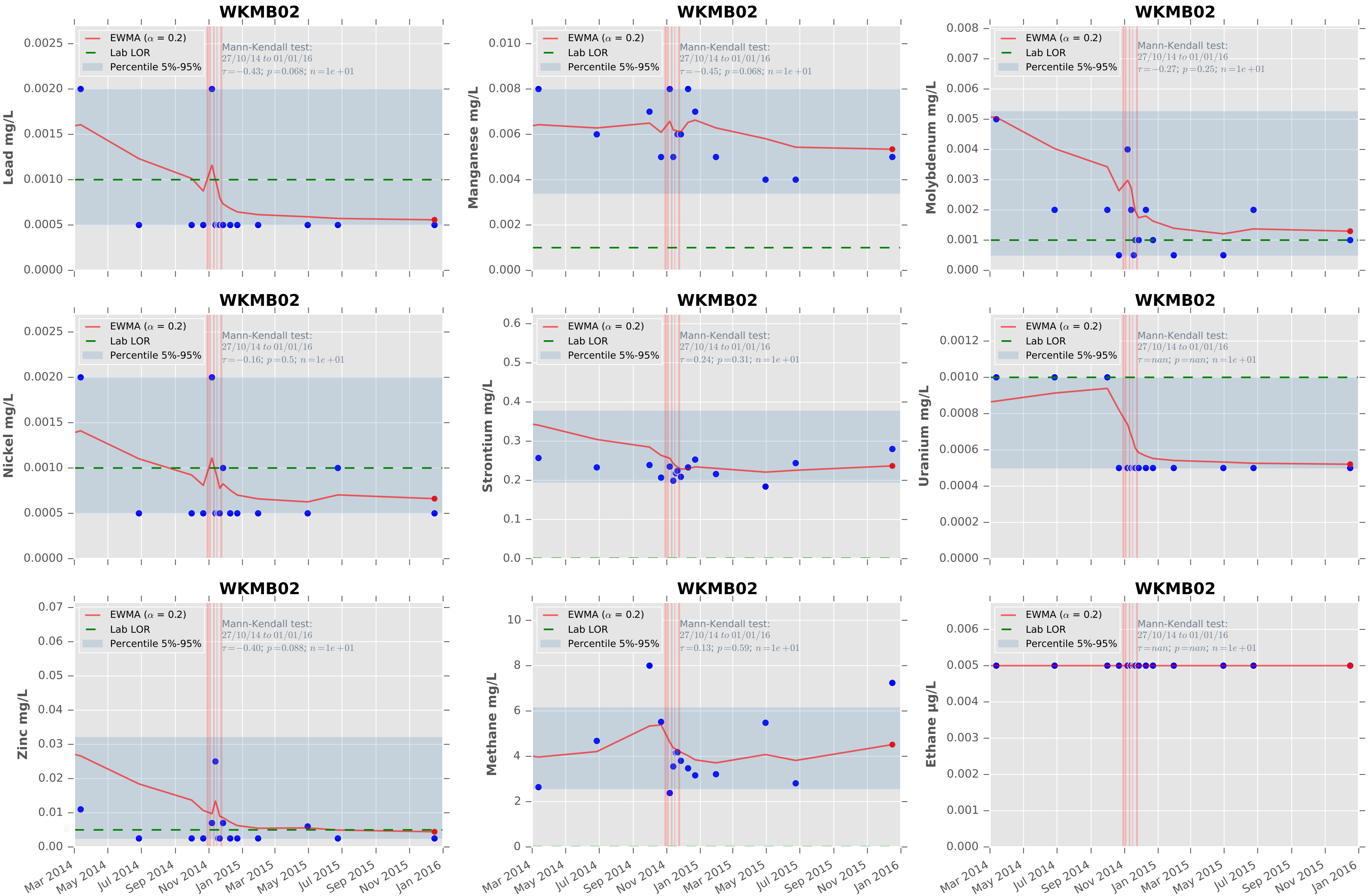


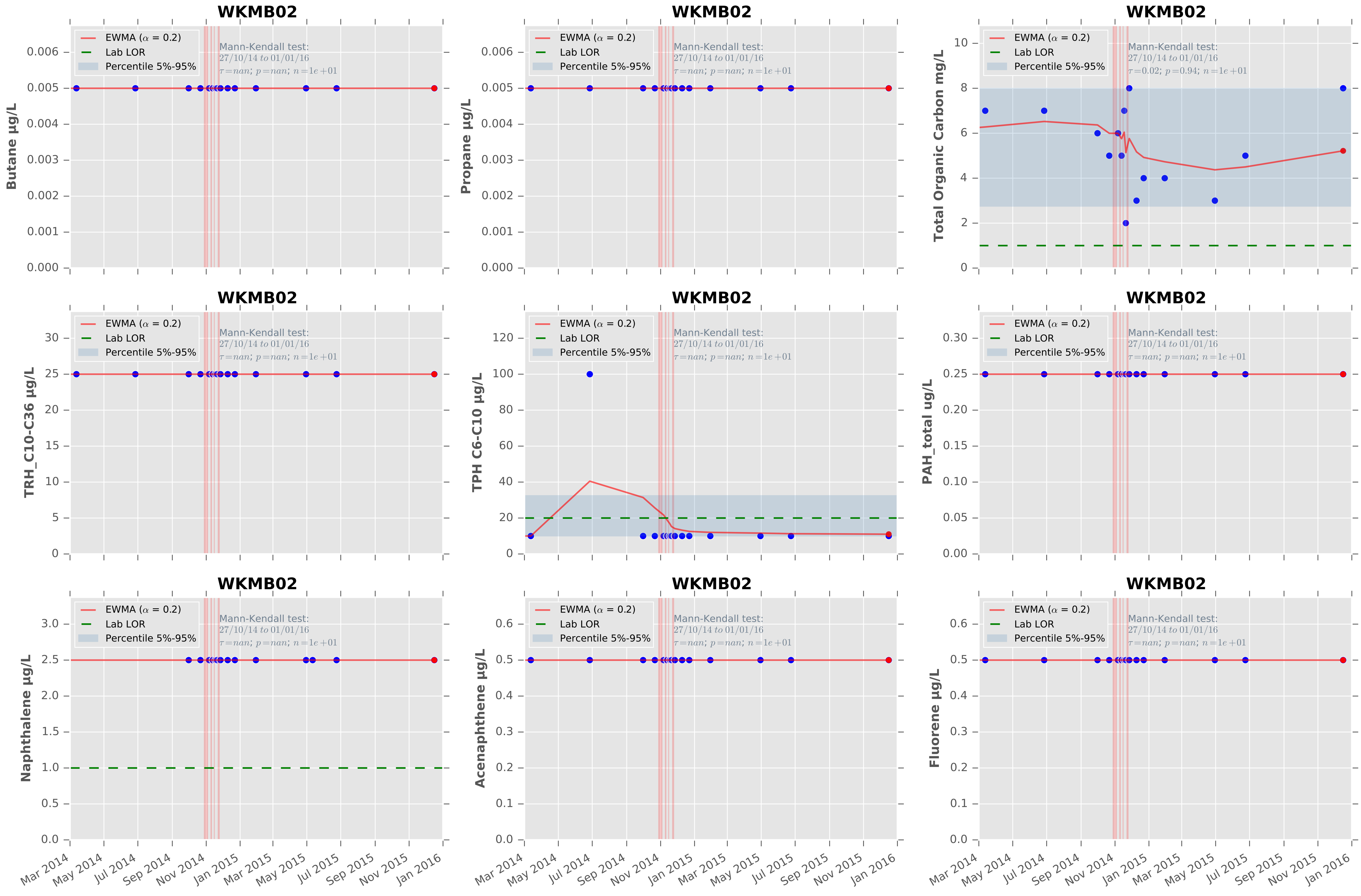
WKMB02
Toluene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
WKMB02
Ethylbenzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
WKMB02
Xylene Total µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
WKMB02
TDS mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.27; p=0.24; n=1e+01
WKMB02
pH_Field pH_Units
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.17; p=0.45; n=1e+01
WKMB02
Redox_Field mV
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.09; p=0.68; n=1e+01
WKMB02
Alk_CaCO3 mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.05; p=0.82; n=1e+01
WKMB02
SO4_turb mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.02; p=0.94; n=1e+01
WKMB02
Chloride mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.07; p=0.75; n=1e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016



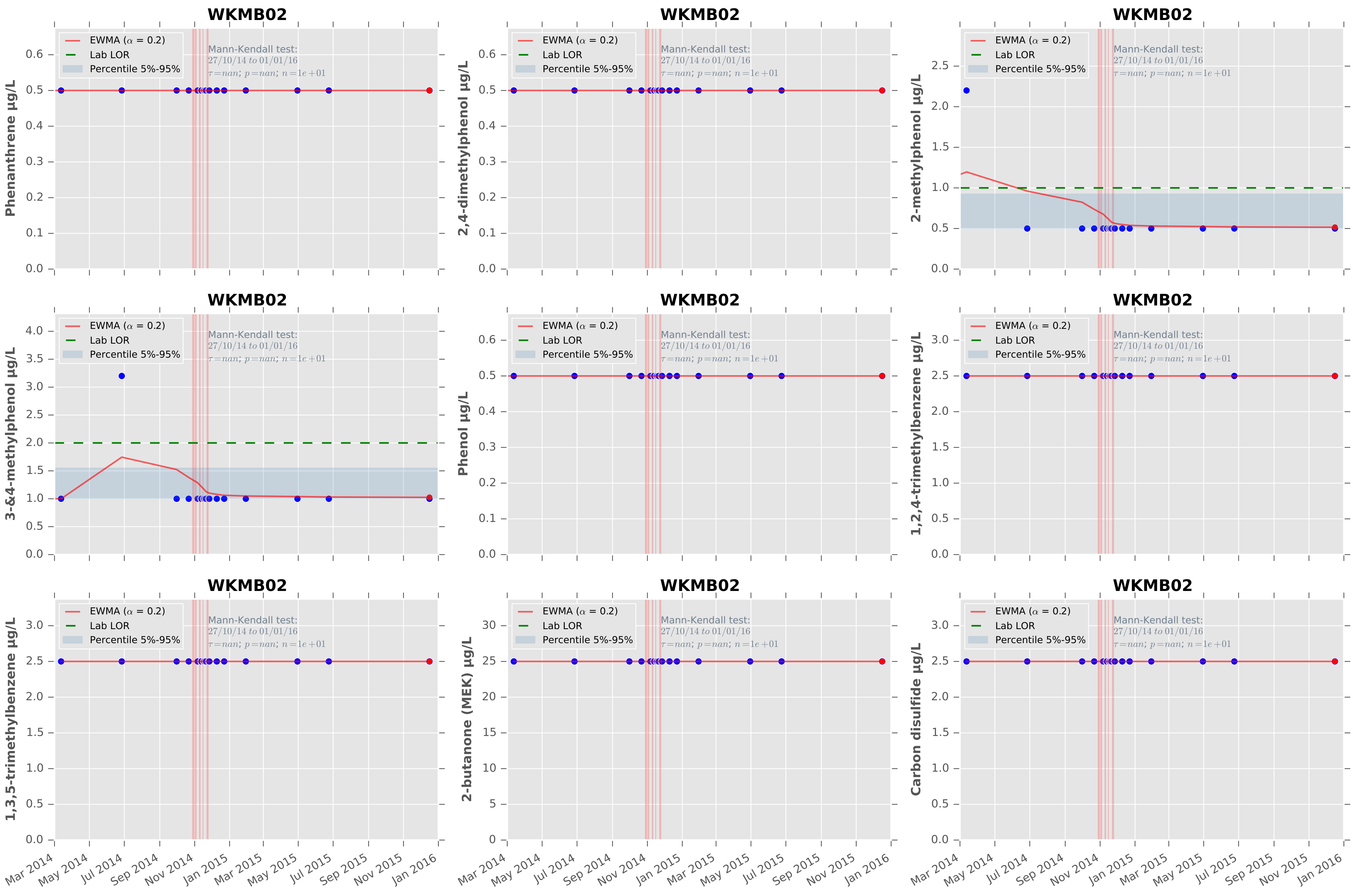
WKMB02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.00; p=1; n=1e+01
Calcium mg/L
WKMB02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.38; p=0.1; n=1e+01
Sodium mg/L
WKMB02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.27; p=0.24; n=1e+01
Potassium mg/L
WKMB02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Magnesium mg/L
WKMB02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.19; p=0.42; n=1e+01
Reactive Silica mg/L
WKMB02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.65; p=0.0055; n=1e+01
Ammonia as N mg/L
WKMB02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.07; p=0.76; n=1e+01
Nitrate (as N) mg/L
WKMB02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.45; p=0.052; n=1e+01
Nitrogen (Total) mg/L
WKMB02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.30; p=0.2; n=1e+01
Reactive Phosphorus mg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

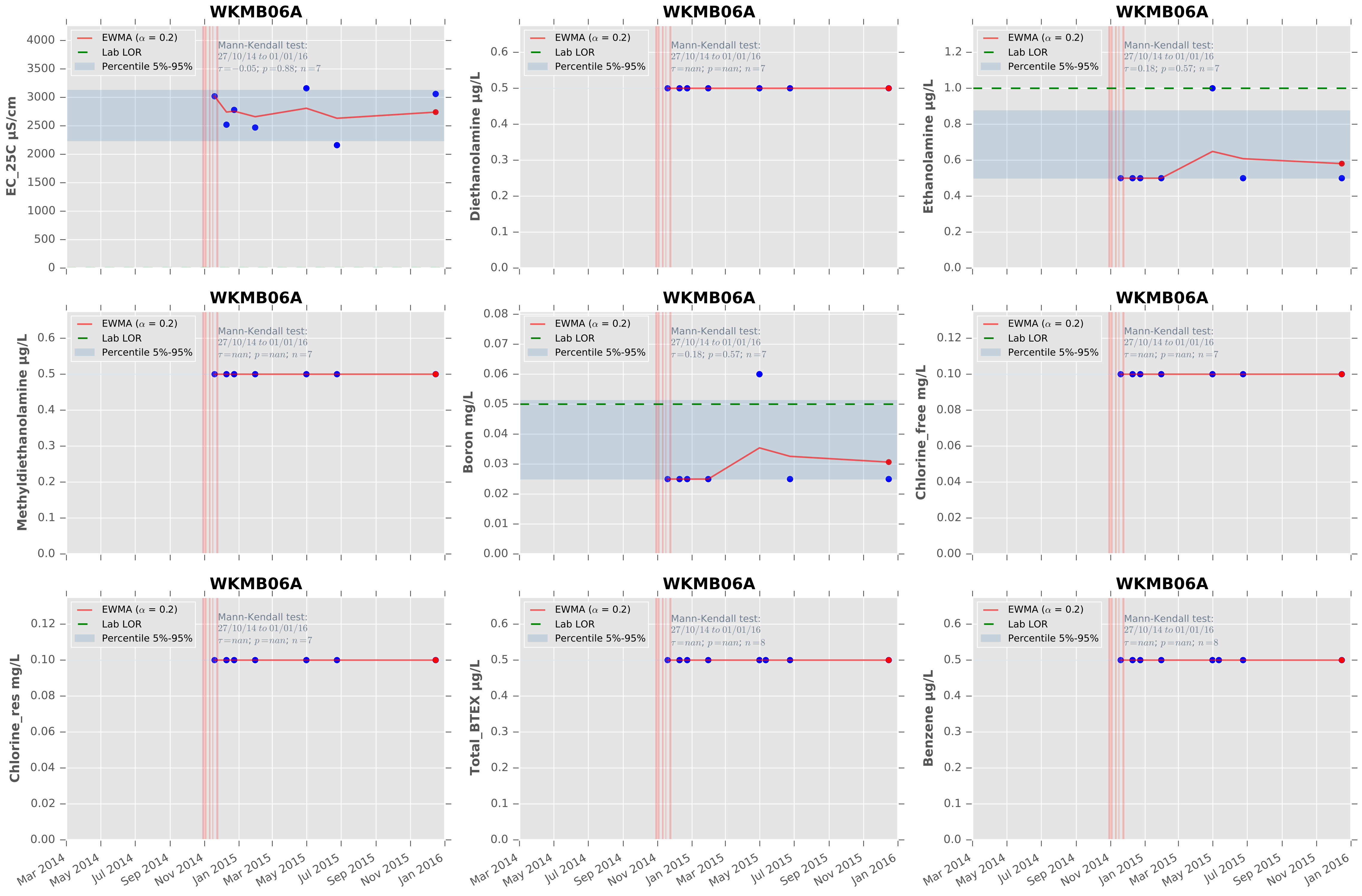

WKMB02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = -0.18$; $p = 0.45$; $n = 1e+01$
Phosphorus mg/L
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = 0.09$; $p = 0.72$; $n = 1e+01$
Bromine mg/L
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = 0.02$; $p = 0.93$; $n = 1e+01$
Aluminium mg/L
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = -0.58$; $p = 0.013$; $n = 1e+01$
Arsenic mg/L
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = 0.37$; $p = 0.12$; $n = 1e+01$
Barium mg/L
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = nan$; $p = nan$; $n = 1e+01$
Cadmium mg/L
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = nan$; $p = nan$; $n = 1e+01$
Chromium mg/L
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = -0.75$; $p = 0.0013$; $n = 1e+01$
Copper mg/L
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = -0.26$; $p = 0.26$; $n = 1e+01$
Iron mg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

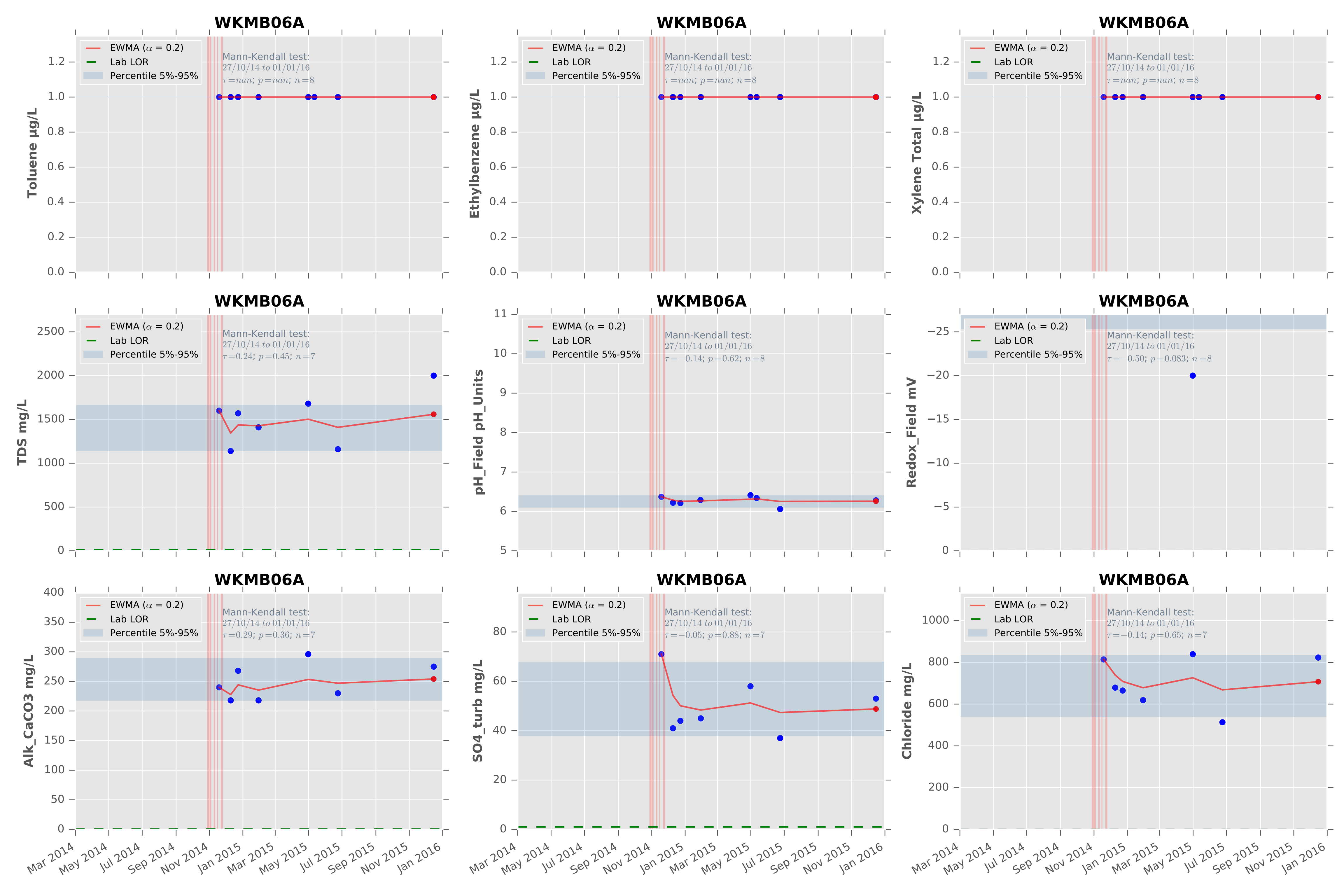

WKMB02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.43; p=0.068; n=1e+01
Lead mg/L
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
WKMB02
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.45; p=0.068; n=1e+01
Manganese mg/L
0.000
0.002
0.004
0.006
0.008
0.010
WKMB02
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.27; p=0.25; n=1e+01
Molybdenum mg/L
0.000
0.001
0.002
0.003
0.004
0.005
0.006
0.007
0.008
WKMB02
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.16; p=0.5; n=1e+01
Nickel mg/L
WKMB02
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.24; p=0.31; n=1e+01
Strontium mg/L
0.0
0.1
0.2
0.3
0.4
0.5
0.6
WKMB02
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Uranium mg/L
0.0000
0.0002
0.0004
0.0006
0.0008
0.0010
0.0012
WKMB02
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.40; p=0.088; n=1e+01
Zinc mg/L
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
WKMB02
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.13; p=0.59; n=1e+01
Methane mg/L
0
2
4
6
8
10
WKMB02
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Ethane µg/L
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

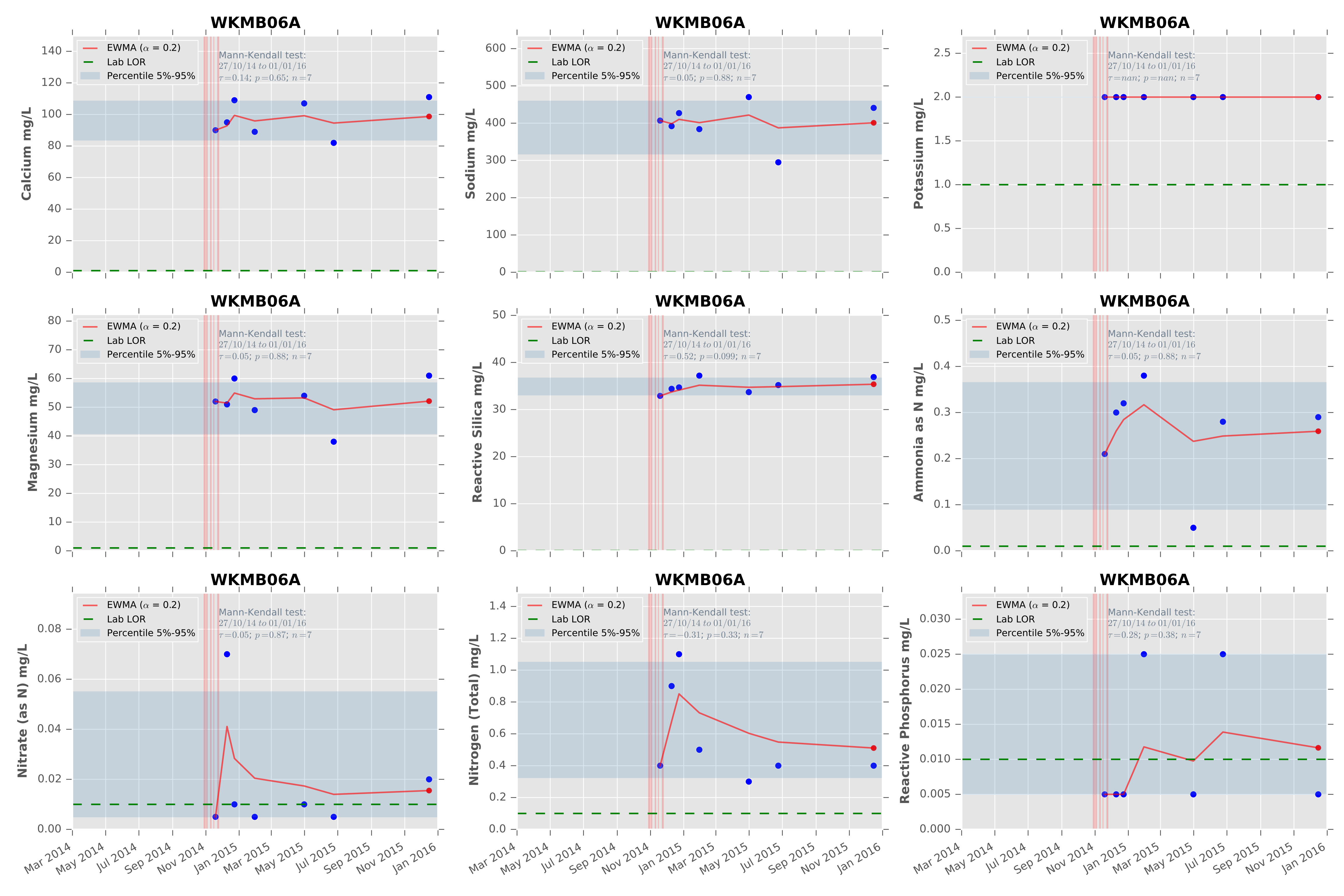


WKMB02
Butane µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
WKMB02
Propane µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
WKMB02
Total Organic Carbon mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.02; p=0.94; n=1e+01
WKMB02
TRH_C10-C36 µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
WKMB02
TPH C6-C10 µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
WKMB02
PAH_total ug/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
WKMB02
Naphthalene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
WKMB02
Acenaphthene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
WKMB02
Fluorene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

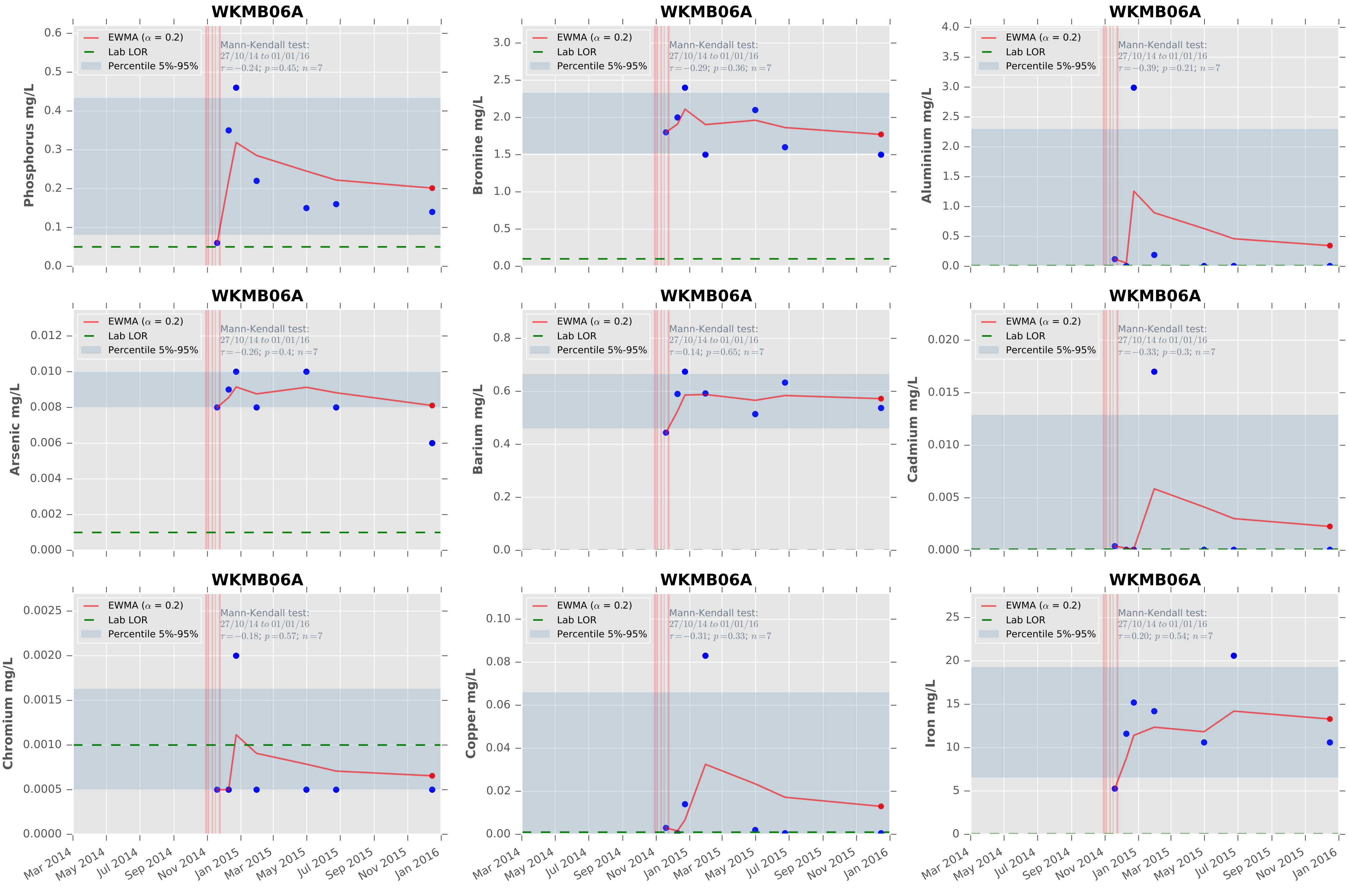

WKMB02
Phenanthrene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
WKMB02
2,4-dimethylphenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
WKMB02
2-methylphenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
WKMB02
3-&4-methylphenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
WKMB02
Phenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
WKMB02
1,2,4-trimethylbenzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
WKMB02
1,3,5-trimethylbenzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
WKMB02
2-butanone (MEK) µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
WKMB02
Carbon disulfide µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016


WKMB06A
EC_25C µS/cm
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.05; p=0.88; n=7
WKMB06A
Diethanolamine µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
WKMB06A
Ethanolamine µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.18; p=0.57; n=7
WKMB06A
Methyldiethanolamine µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
WKMB06A
Boron mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.18; p=0.57; n=7
WKMB06A
Chlorine_free mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
WKMB06A
Chlorine_res mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
WKMB06A
Total_BTEX µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=8
WKMB06A
Benzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=8
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

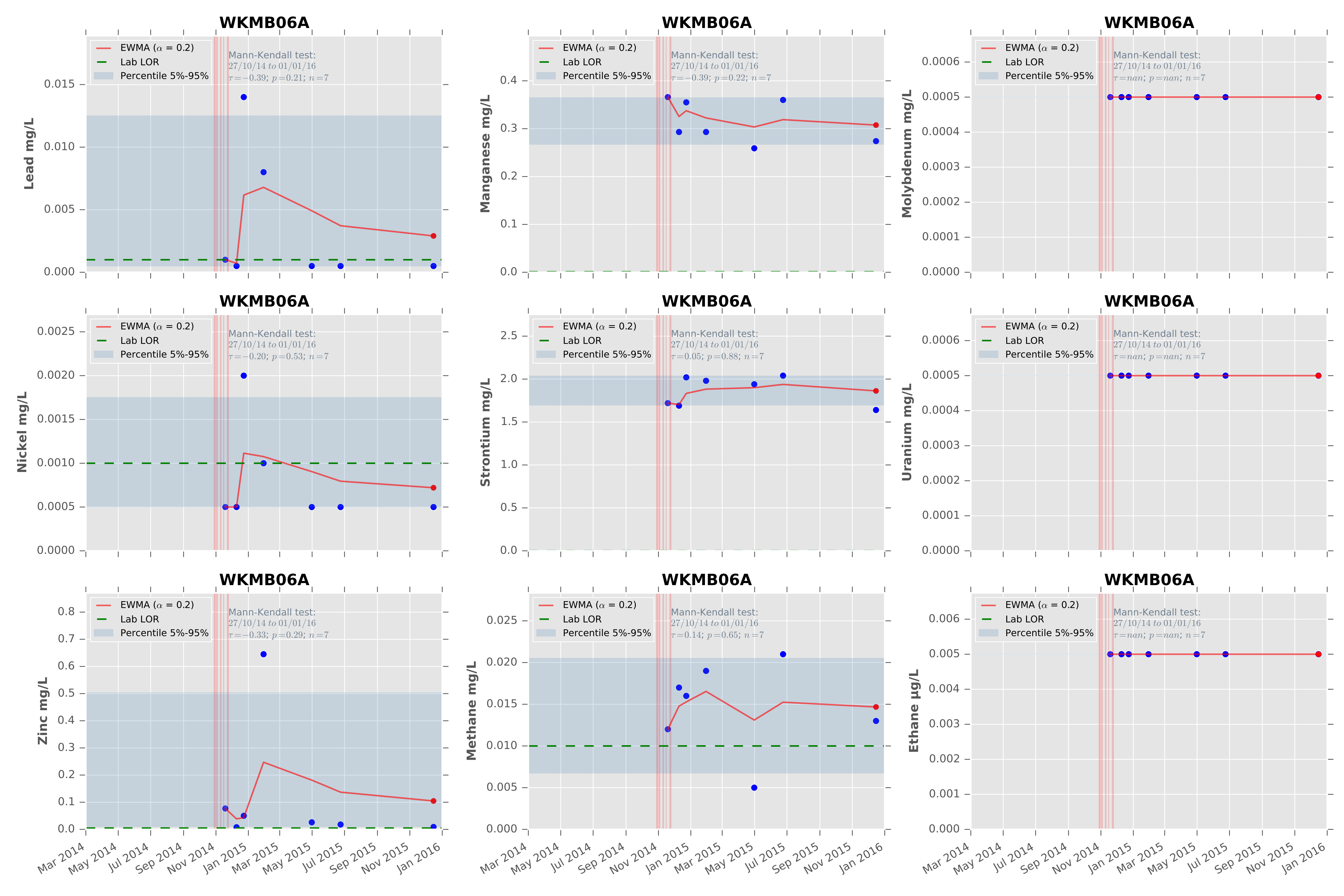

WKMB06A
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = nan$; $p = nan$; $n = 8$
Toluene µg/L
Ethylbenzene µg/L
Xylene Total µg/L
$\tau = 0.24$; $p = 0.45$; $n = 7$
TDS mg/L
$\tau = -0.14$; $p = 0.62$; $n = 8$
pH_Field pH_Units
$\tau = -0.50$; $p = 0.083$; $n = 8$
Redox_Field mV
$\tau = 0.29$; $p = 0.36$; $n = 7$
Alk_CaCO3 mg/L
$\tau = -0.05$; $p = 0.88$; $n = 7$
SO4_turb mg/L
$\tau = -0.14$; $p = 0.65$; $n = 7$
Chloride mg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

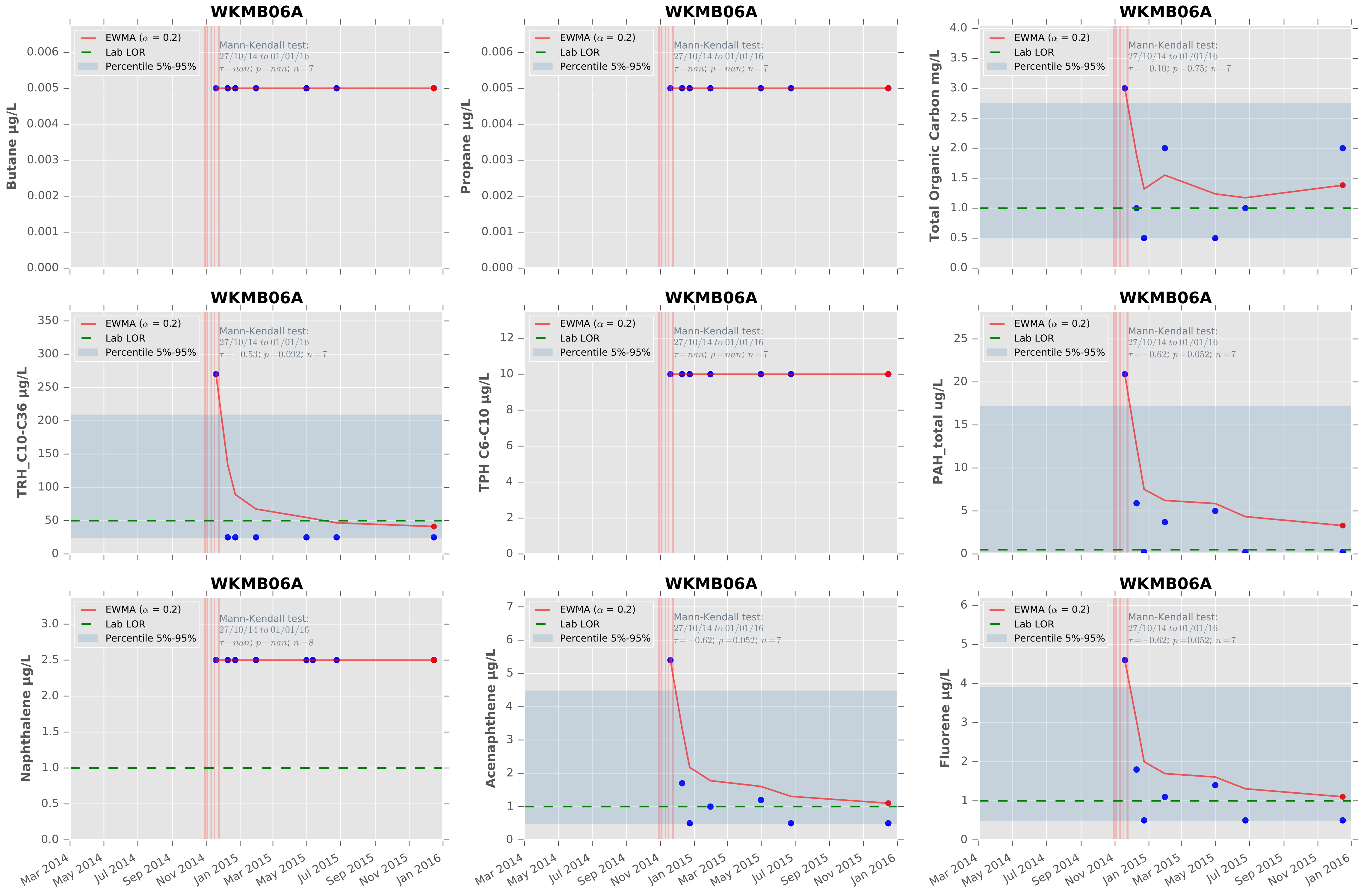


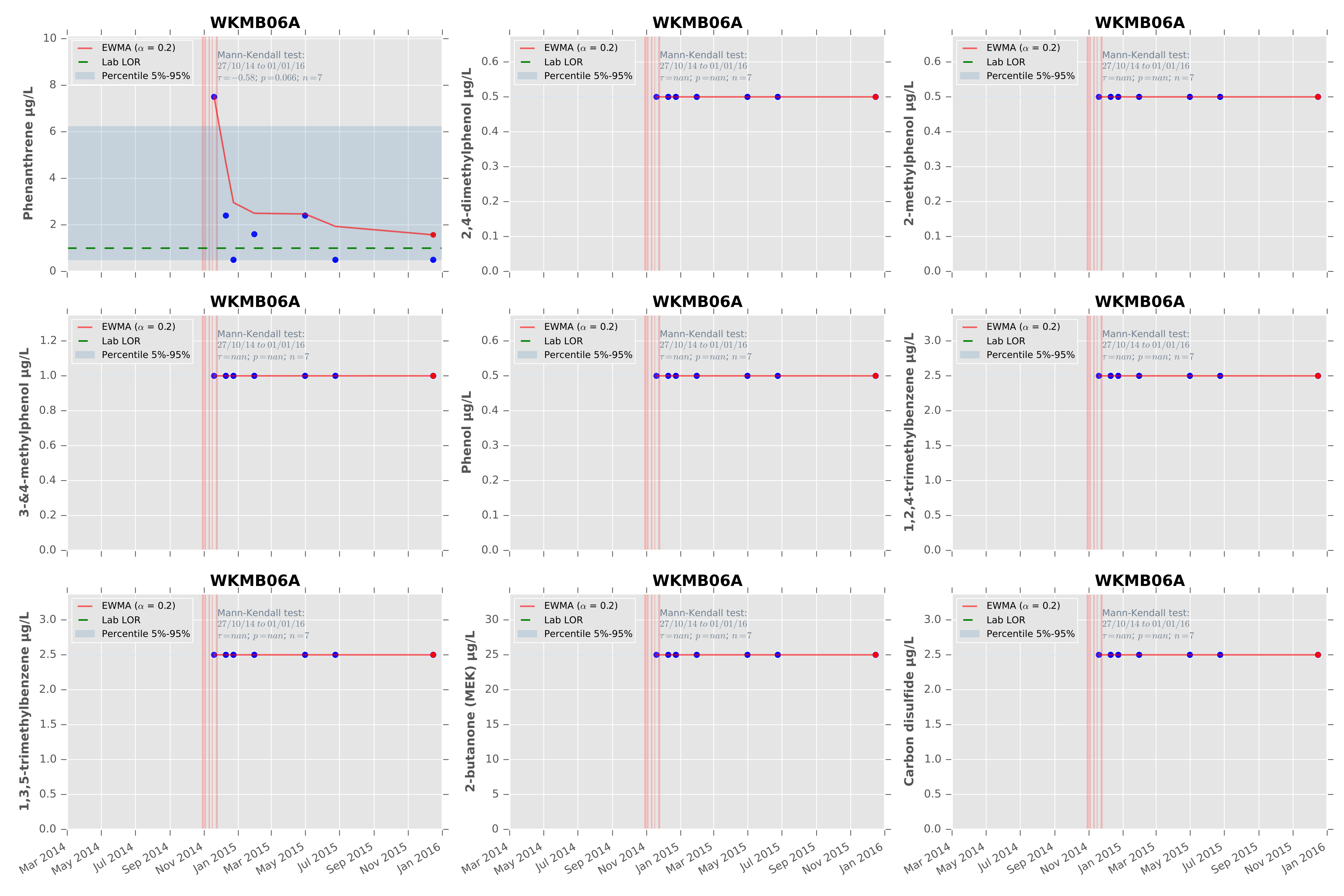
WKMB06A
Calcium mg/L
Sodium mg/L
Potassium mg/L
Magnesium mg/L
Reactive Silica mg/L
Ammonia as N mg/L
Nitrate (as N) mg/L
Nitrogen (Total) mg/L
Reactive Phosphorus mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.14; p=0.65; n=7
τ=0.05; p=0.88; n=7
τ=nan; p=nan; n=7
τ=0.05; p=0.88; n=7
τ=0.52; p=0.099; n=7
τ=0.05; p=0.88; n=7
τ=0.05; p=0.87; n=7
τ=−0.31; p=0.33; n=7
τ=0.28; p=0.38; n=7
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016



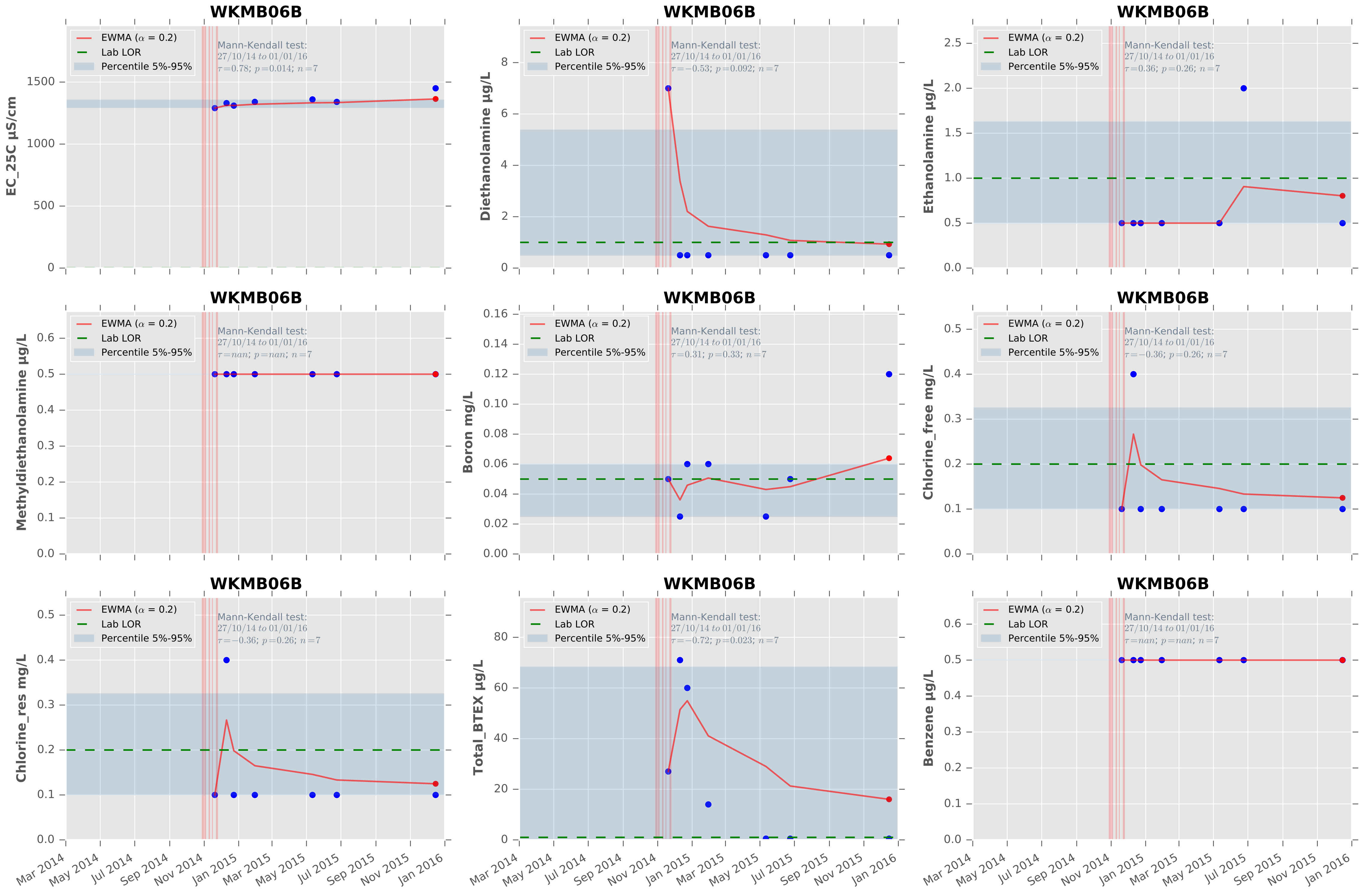
WKMB06A
Phosphorus mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.24; p=0.45; n=7
WKMB06A
Bromine mg/L
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.29; p=0.36; n=7
WKMB06A
Aluminium mg/L
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.39; p=0.21; n=7
WKMB06A
Arsenic mg/L
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.26; p=0.4; n=7
WKMB06A
Barium mg/L
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.14; p=0.65; n=7
WKMB06A
Cadmium mg/L
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.33; p=0.3; n=7
WKMB06A
Chromium mg/L
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.18; p=0.57; n=7
WKMB06A
Copper mg/L
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.31; p=0.33; n=7
WKMB06A
Iron mg/L
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.20; p=0.54; n=7
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016


WKMB06A
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.39; p=0.21; n=7
Lead mg/L
0.000
0.005
0.010
0.015
WKMB06A
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.39; p=0.22; n=7
Manganese mg/L
0.0
0.1
0.2
0.3
0.4
WKMB06A
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
Molybdenum mg/L
0.0000
0.0001
0.0002
0.0003
0.0004
0.0005
0.0006
WKMB06A
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.20; p=0.53; n=7
Nickel mg/L
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
WKMB06A
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.05; p=0.88; n=7
Strontium mg/L
0.0
0.5
1.0
1.5
2.0
2.5
WKMB06A
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
Uranium mg/L
0.0000
0.0001
0.0002
0.0003
0.0004
0.0005
0.0006
WKMB06A
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.33; p=0.29; n=7
Zinc mg/L
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
WKMB06A
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.14; p=0.65; n=7
Methane mg/L
0.000
0.005
0.010
0.015
0.020
0.025
WKMB06A
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
Ethane µg/L
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

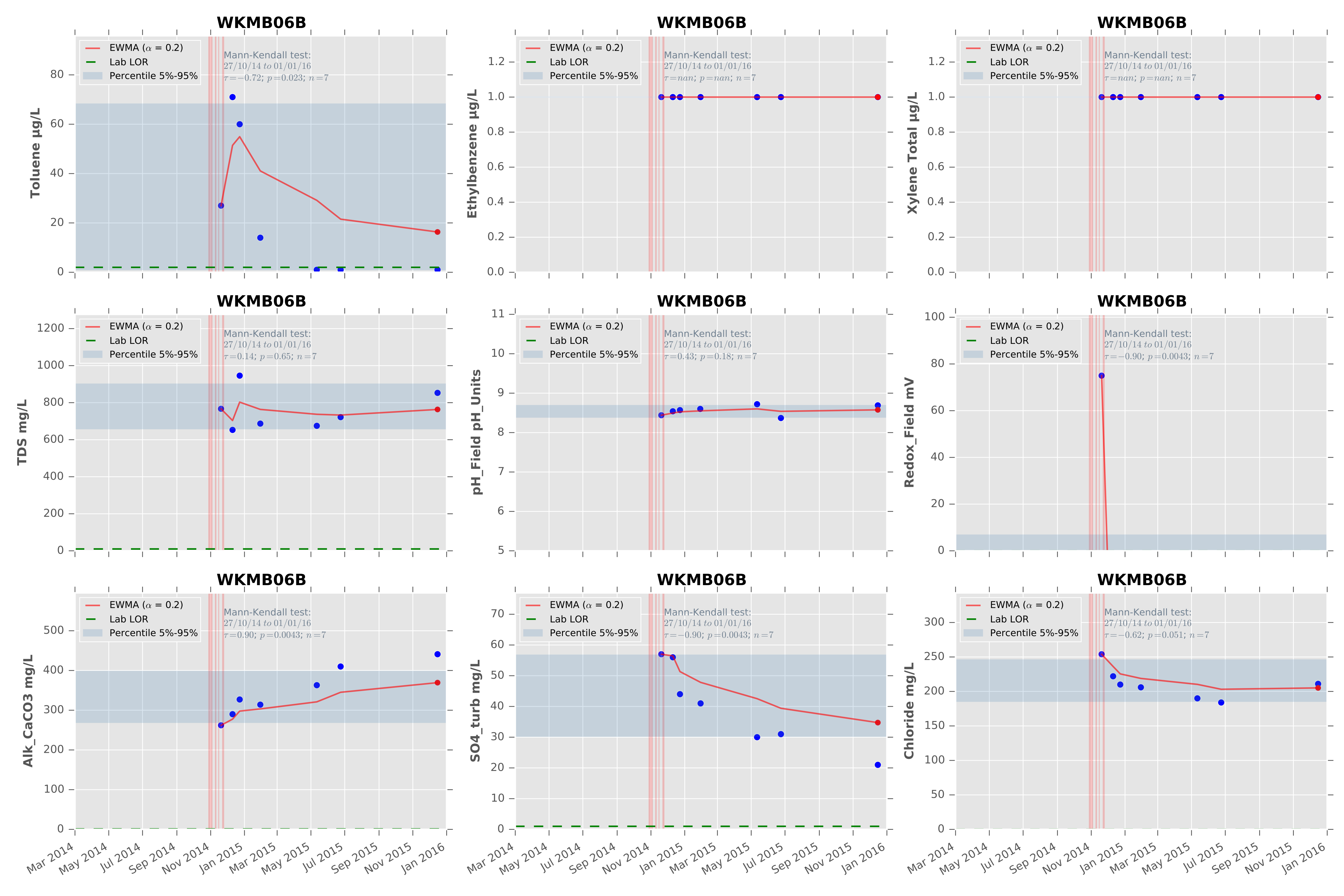

WKMB06A
Butane µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
WKMB06A
Propane µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
WKMB06A
Total Organic Carbon mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.10; p=0.75; n=7
WKMB06A
TRH_C10-C36 µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.53; p=0.092; n=7
WKMB06A
TPH C6-C10 µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
WKMB06A
PAH_total ug/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.62; p=0.052; n=7
WKMB06A
Naphthalene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=8
WKMB06A
Acenaphthene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.62; p=0.052; n=7
WKMB06A
Fluorene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.62; p=0.052; n=7
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

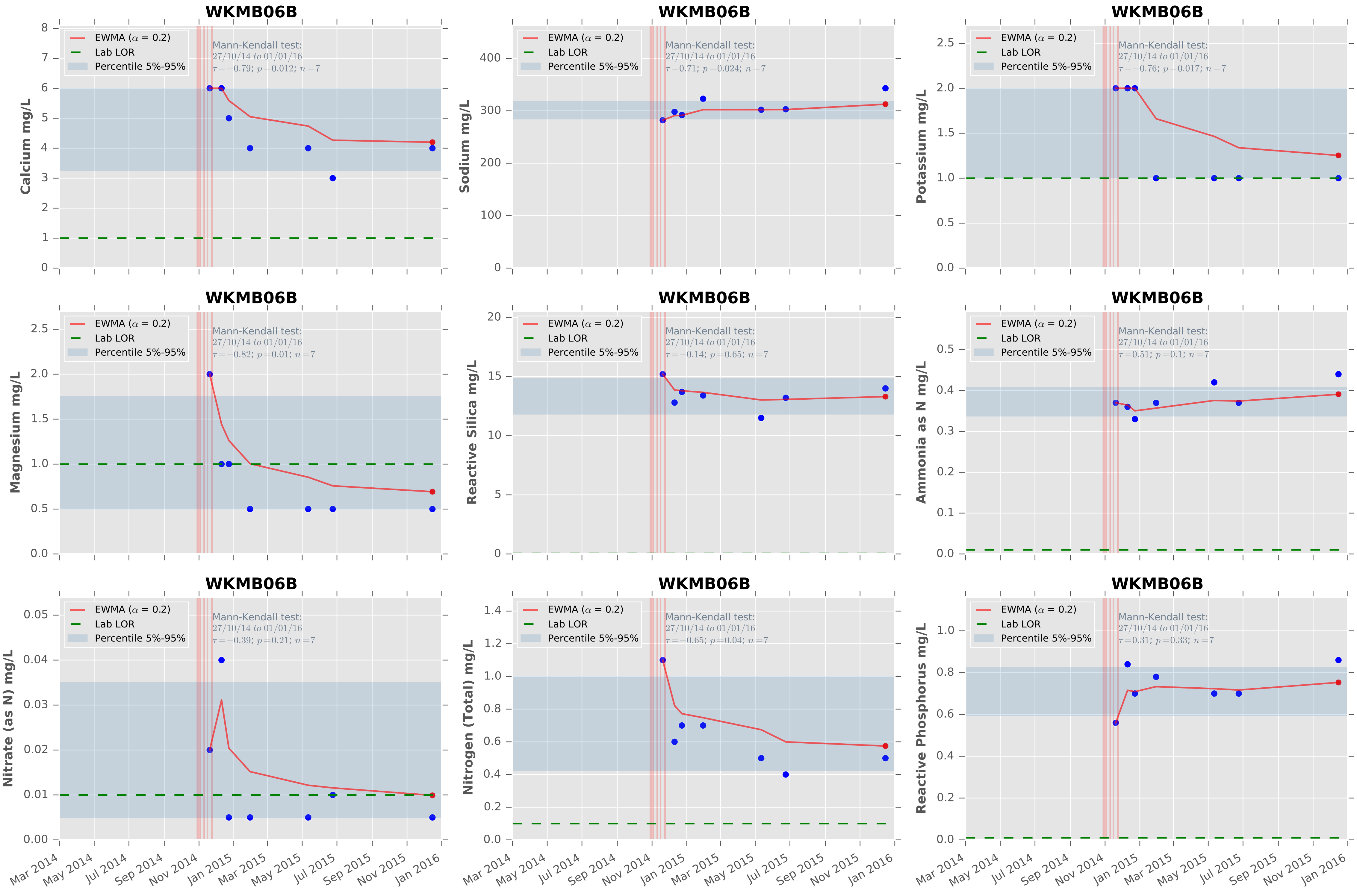


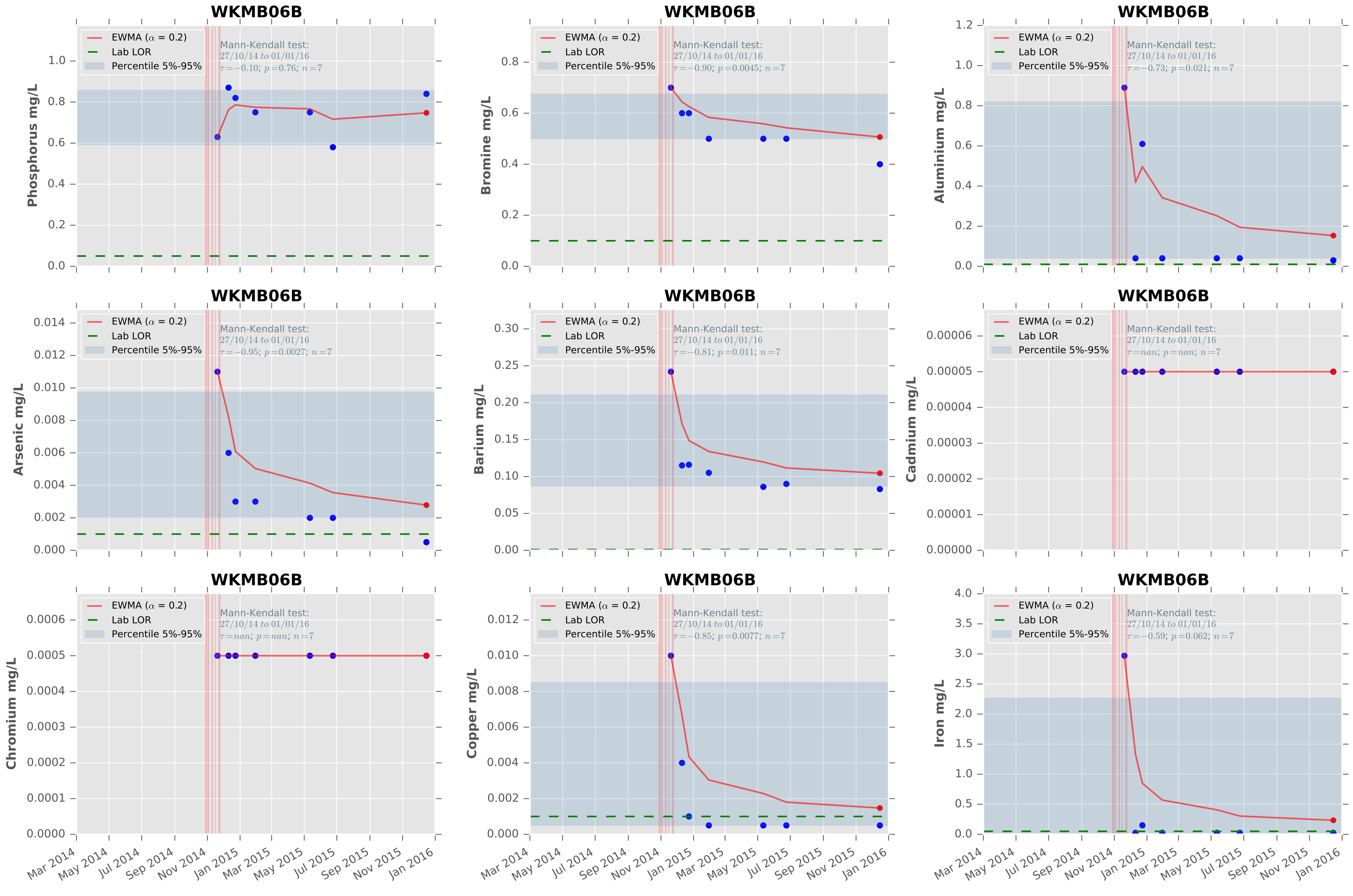
WKMB06A
Phenanthrene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.58; p=0.066; n=7
WKMB06A
2,4-dimethylphenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
WKMB06A
2-methylphenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
WKMB06A
3-&4-methylphenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
WKMB06A
Phenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
WKMB06A
1,2,4-trimethylbenzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
WKMB06A
1,3,5-trimethylbenzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
WKMB06A
2-butanone (MEK) µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
WKMB06A
Carbon disulfide µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

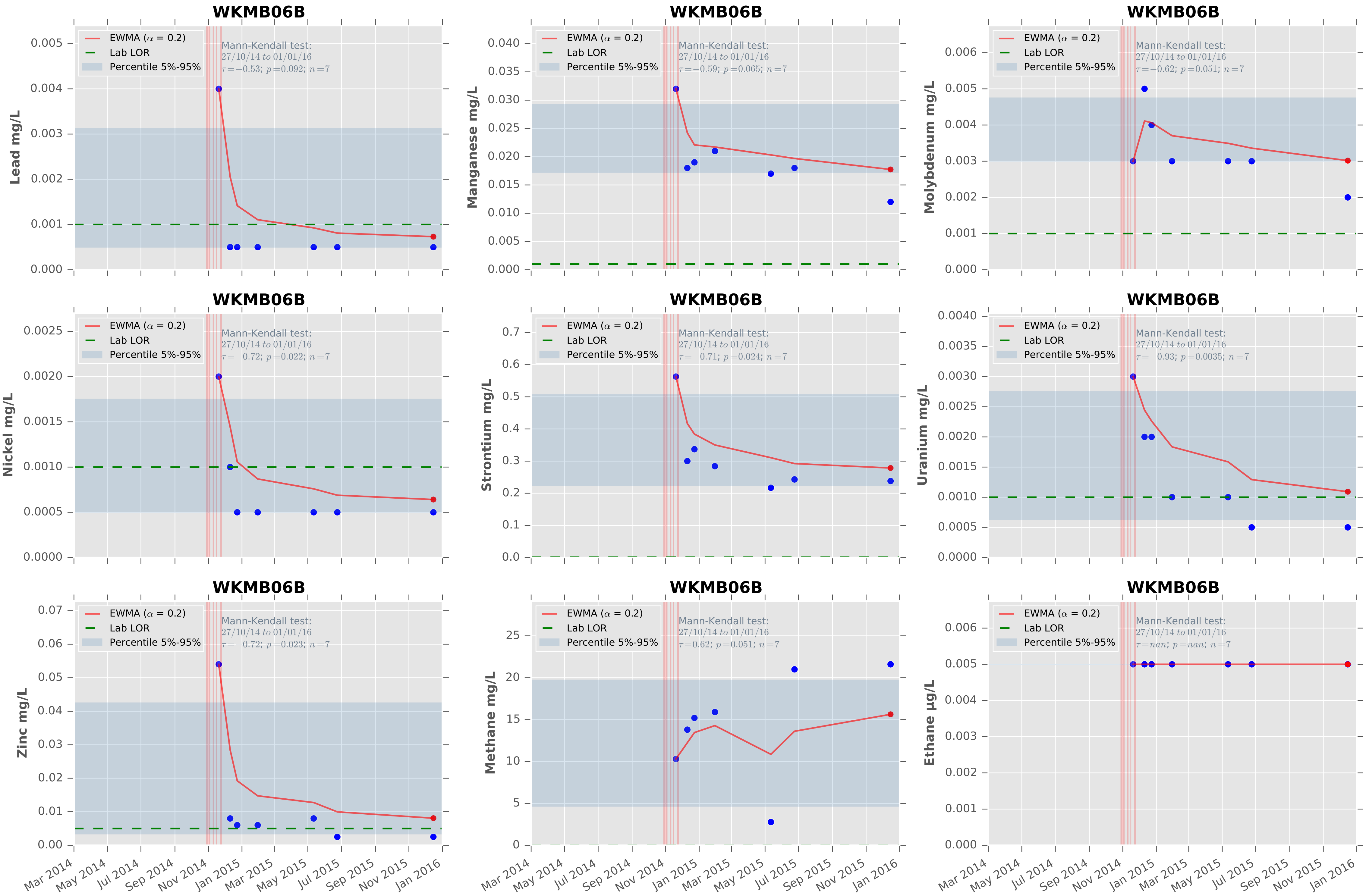


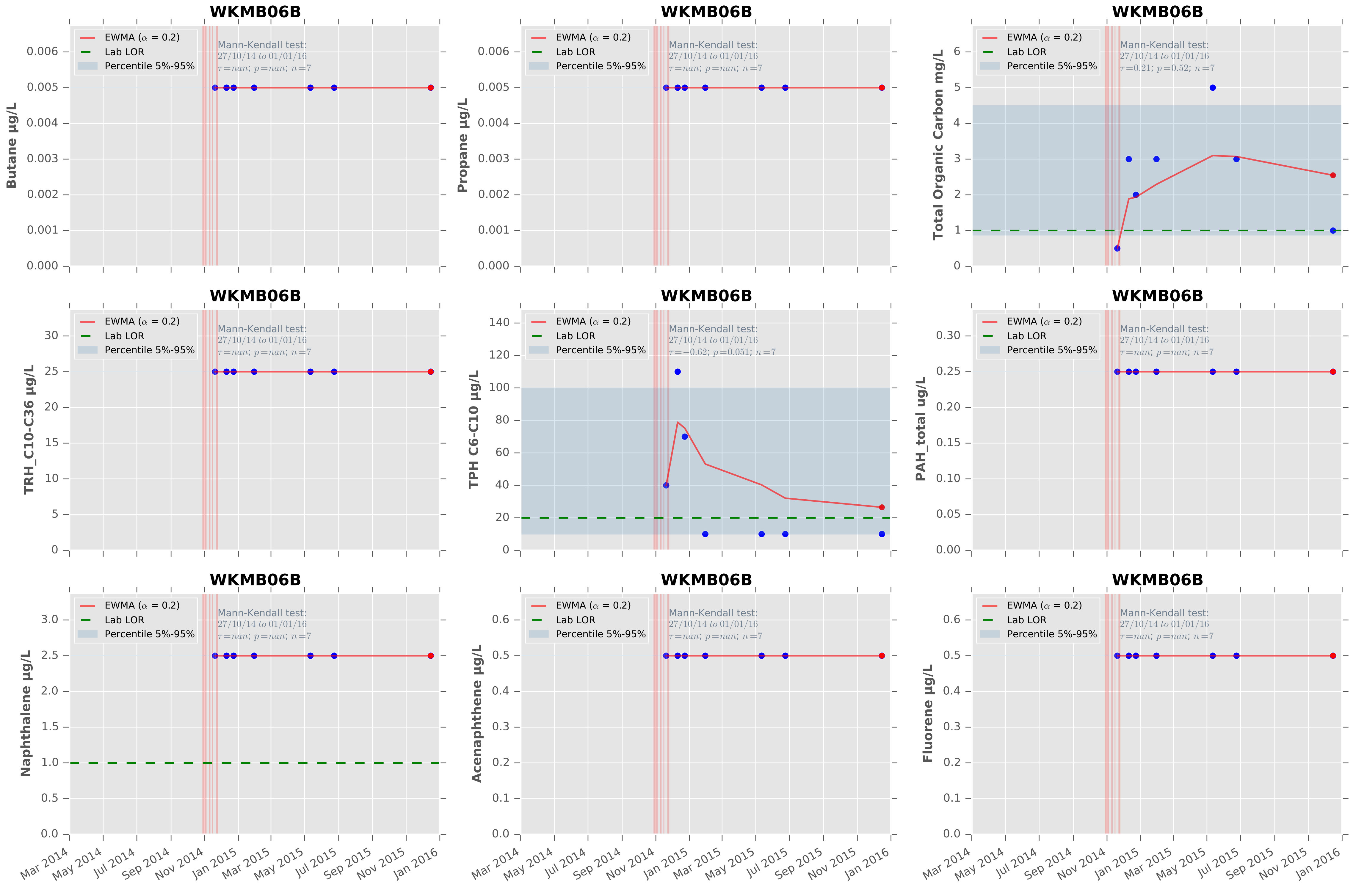
WKMB06B
EC_25C µS/cm
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.78; p=0.014; n=7
WKMB06B
Diethanolamine µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.53; p=0.092; n=7
WKMB06B
Ethanolamine µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.36; p=0.26; n=7
WKMB06B
Methyldiethanolamine µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
WKMB06B
Boron mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.31; p=0.33; n=7
WKMB06B
Chlorine_free mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.36; p=0.26; n=7
WKMB06B
Chlorine_res mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.36; p=0.26; n=7
WKMB06B
Total_BTEX µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.72; p=0.023; n=7
WKMB06B
Benzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

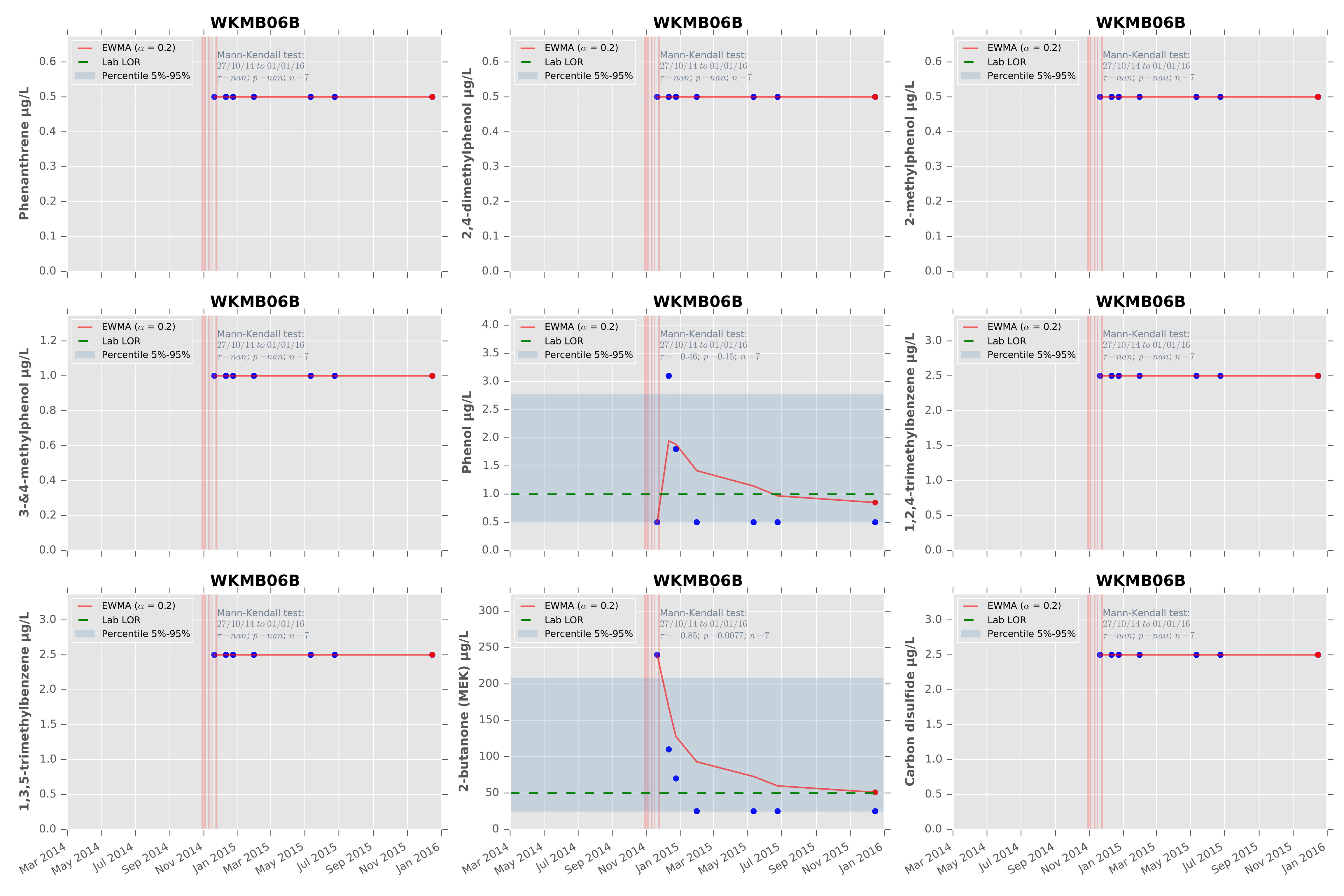

WKMB06B
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.72; p=0.023; n=7
Toluene µg/L
WKMB06B
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
Ethylbenzene µg/L
WKMB06B
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
Xylene Total µg/L
WKMB06B
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.14; p=0.65; n=7
TDS mg/L
WKMB06B
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.43; p=0.18; n=7
pH_Field pH_Units
WKMB06B
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.90; p=0.0043; n=7
Redox_Field mV
WKMB06B
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.90; p=0.0043; n=7
Alk_CaCO3 mg/L
WKMB06B
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.90; p=0.0043; n=7
SO4_turb mg/L
WKMB06B
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.62; p=0.051; n=7
Chloride mg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016


WKMB06B
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.79; p=0.012; n=7
Calcium mg/L
WKMB06B
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.71; p=0.024; n=7
Sodium mg/L
WKMB06B
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.76; p=0.017; n=7
Potassium mg/L
WKMB06B
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.82; p=0.01; n=7
Magnesium mg/L
WKMB06B
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.14; p=0.65; n=7
Reactive Silica mg/L
WKMB06B
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.51; p=0.1; n=7
Ammonia as N mg/L
WKMB06B
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.39; p=0.21; n=7
Nitrate (as N) mg/L
WKMB06B
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.65; p=0.04; n=7
Nitrogen (Total) mg/L
WKMB06B
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.31; p=0.33; n=7
Reactive Phosphorus mg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

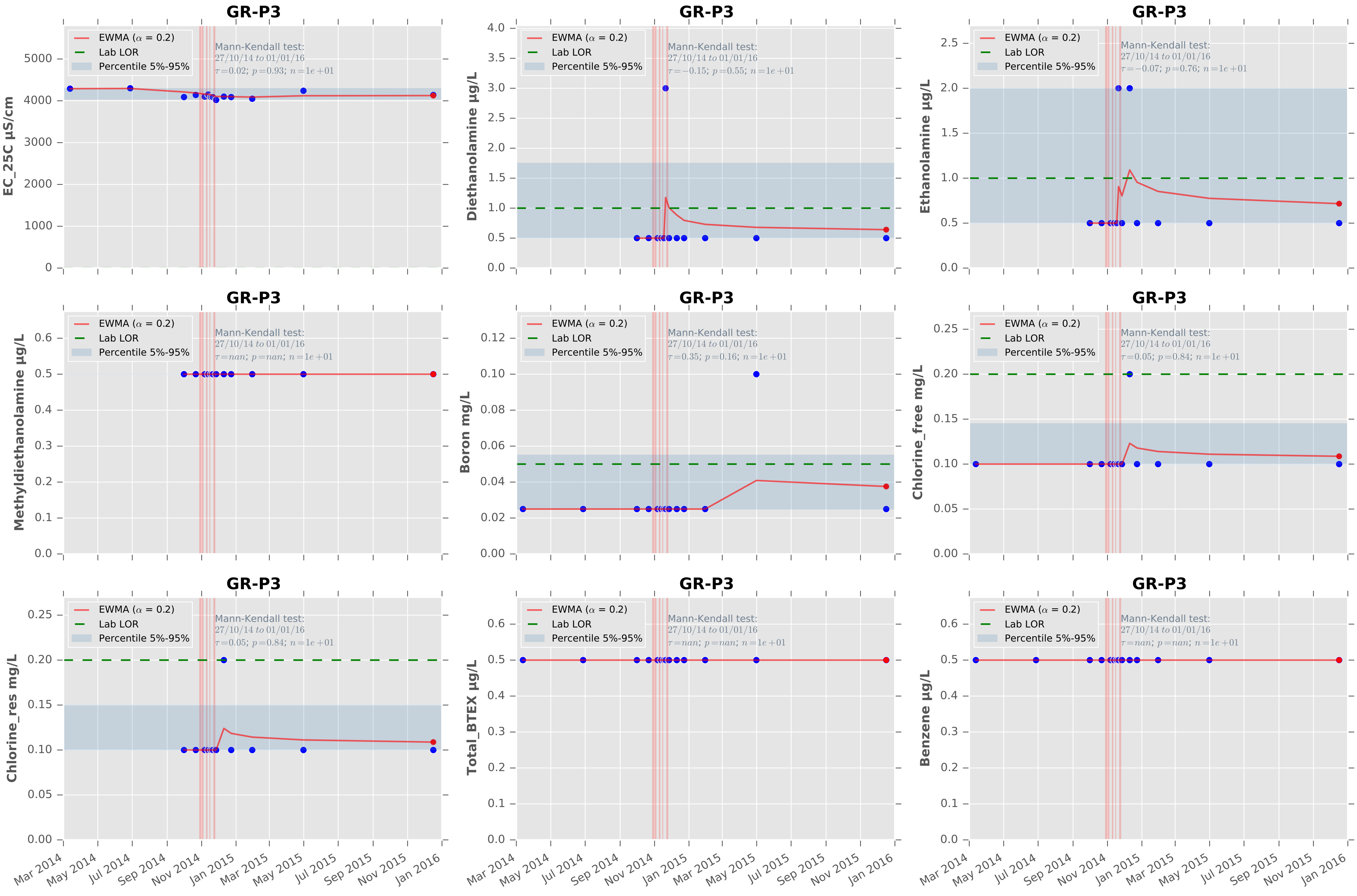

WKMB06B
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = -0.10$; $p = 0.76$; $n = 7$
Phosphorus mg/L
WKMB06B
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = -0.90$; $p = 0.0045$; $n = 7$
Bromine mg/L
WKMB06B
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = -0.73$; $p = 0.021$; $n = 7$
Aluminium mg/L
WKMB06B
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = -0.95$; $p = 0.0027$; $n = 7$
Arsenic mg/L
WKMB06B
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = -0.81$; $p = 0.011$; $n = 7$
Barium mg/L
WKMB06B
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = nan$; $p = nan$; $n = 7$
Cadmium mg/L
WKMB06B
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = nan$; $p = nan$; $n = 7$
Chromium mg/L
WKMB06B
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = -0.85$; $p = 0.0077$; $n = 7$
Copper mg/L
WKMB06B
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = -0.59$; $p = 0.062$; $n = 7$
Iron mg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016


WKMB06B
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=-0.53$; $p=0.092$; $n=7$
Lead mg/L
WKMB06B
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=-0.59$; $p=0.065$; $n=7$
Manganese mg/L
WKMB06B
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=-0.62$; $p=0.051$; $n=7$
Molybdenum mg/L
WKMB06B
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=-0.72$; $p=0.022$; $n=7$
Nickel mg/L
WKMB06B
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=-0.71$; $p=0.024$; $n=7$
Strontium mg/L
WKMB06B
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=-0.93$; $p=0.0035$; $n=7$
Uranium mg/L
WKMB06B
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=-0.72$; $p=0.023$; $n=7$
Zinc mg/L
WKMB06B
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=0.62$; $p=0.051$; $n=7$
Methane mg/L
WKMB06B
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=nan$; $p=nan$; $n=7$
Ethane µg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

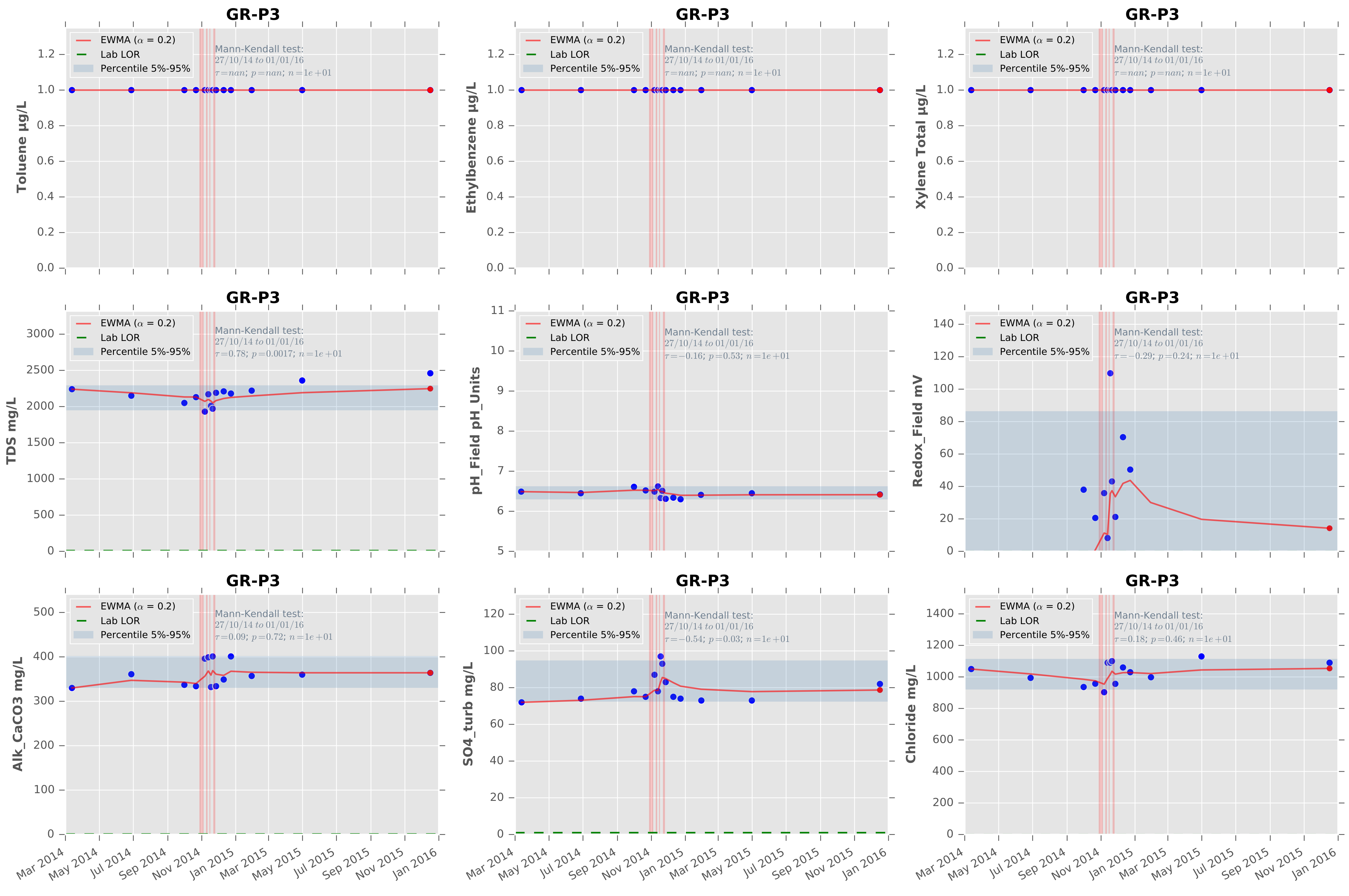

WKMB06B
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
Butane µg/L
Propane µg/L
Total Organic Carbon mg/L
τ=0.21; p=0.52; n=7
TRH_C10-C36 µg/L
TPH C6-C10 µg/L
τ=−0.62; p=0.051; n=7
PAH_total ug/L
Naphthalene µg/L
Acenaphthene µg/L
Fluorene µg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016



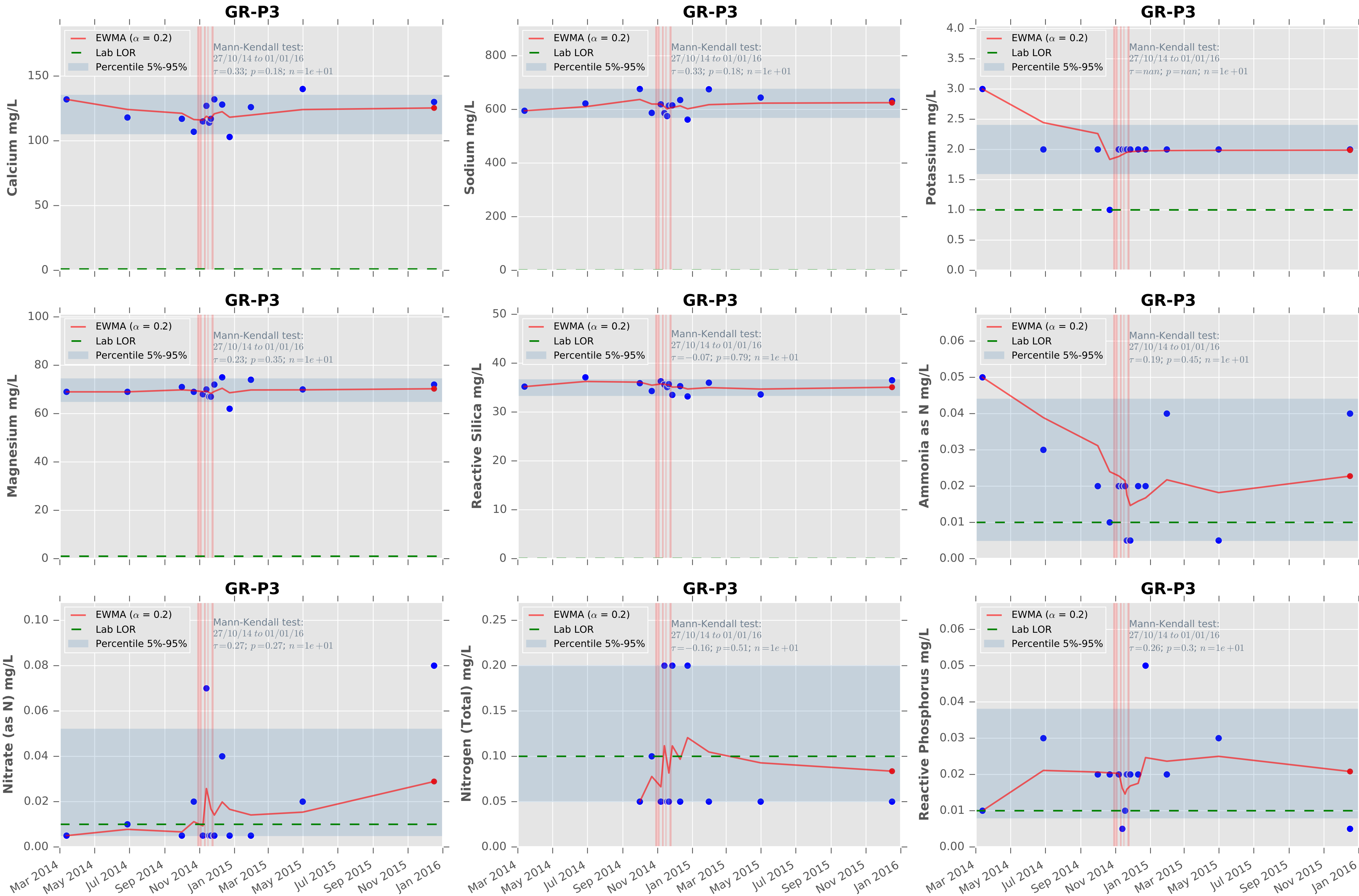
WKMB06B
Phenanthrene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
WKMB06B
2,4-dimethylphenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
WKMB06B
2-methylphenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
WKMB06B
3-&4-methylphenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
WKMB06B
Phenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.46; p=0.15; n=7
WKMB06B
1,2,4-trimethylbenzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
WKMB06B
1,3,5-trimethylbenzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
WKMB06B
2-butanone (MEK) µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.85; p=0.0077; n=7
WKMB06B
Carbon disulfide µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=7
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

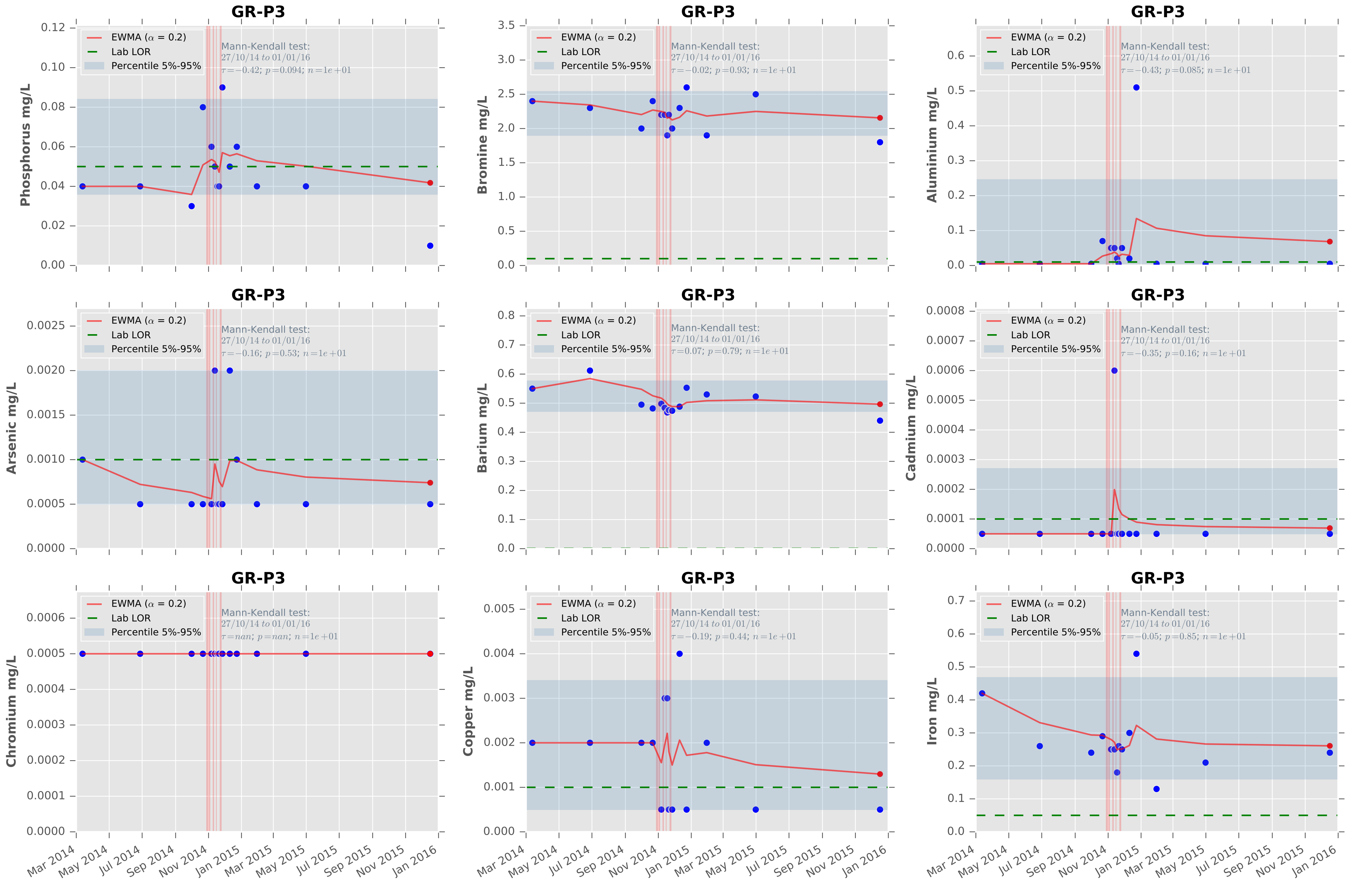


GR-P3
EC_25C µS/cm
Diethanolamine µg/L
Ethanolamine µg/L
Methyldiethanolamine µg/L
Boron mg/L
Chlorine_free mg/L
Chlorine_res mg/L
Total_BTEX µg/L
Benzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.02; p=0.93; n=1e+01
τ=−0.15; p=0.55; n=1e+01
τ=−0.07; p=0.76; n=1e+01
τ=nan; p=nan; n=1e+01
τ=0.35; p=0.16; n=1e+01
τ=0.05; p=0.84; n=1e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

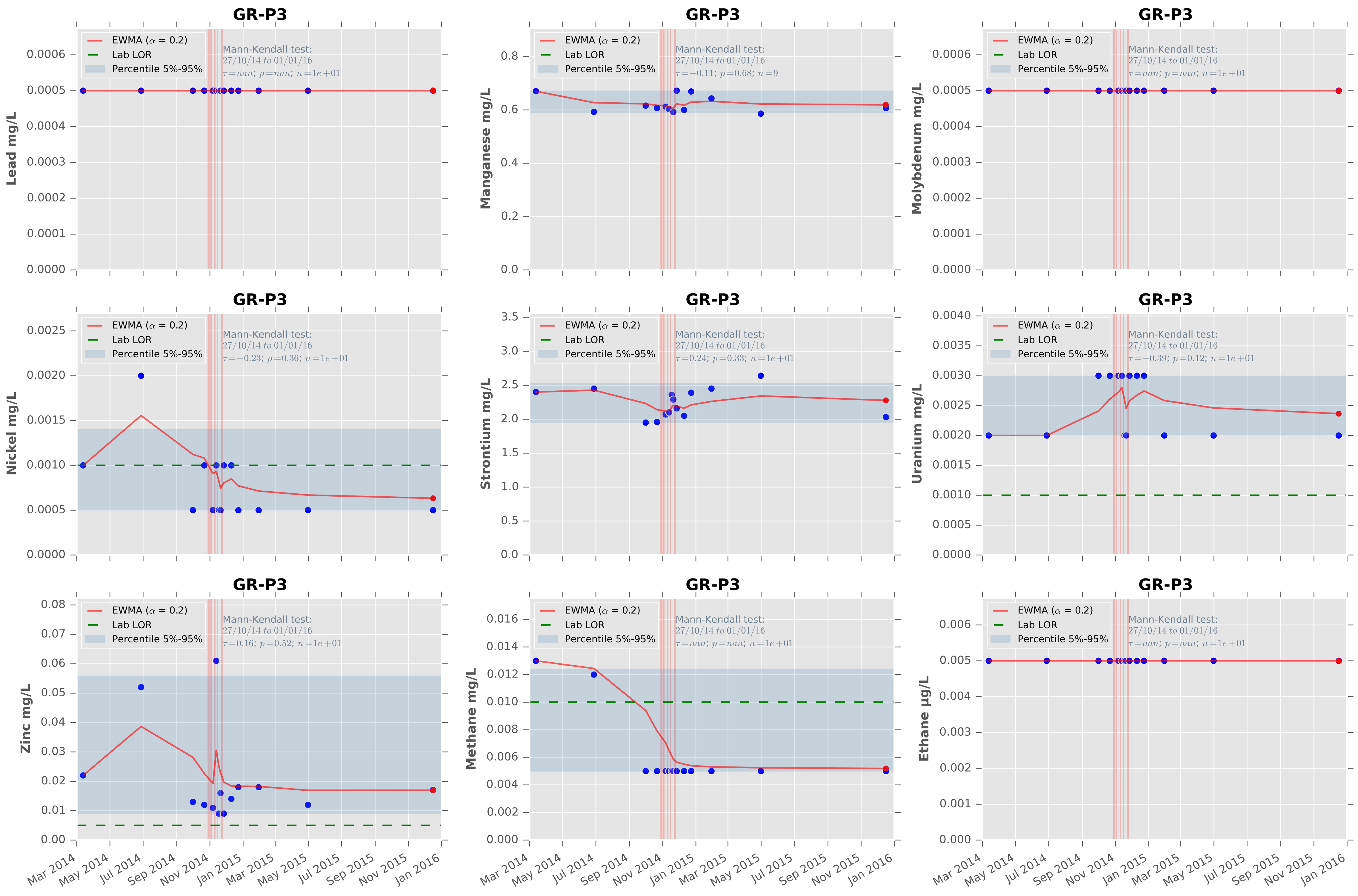


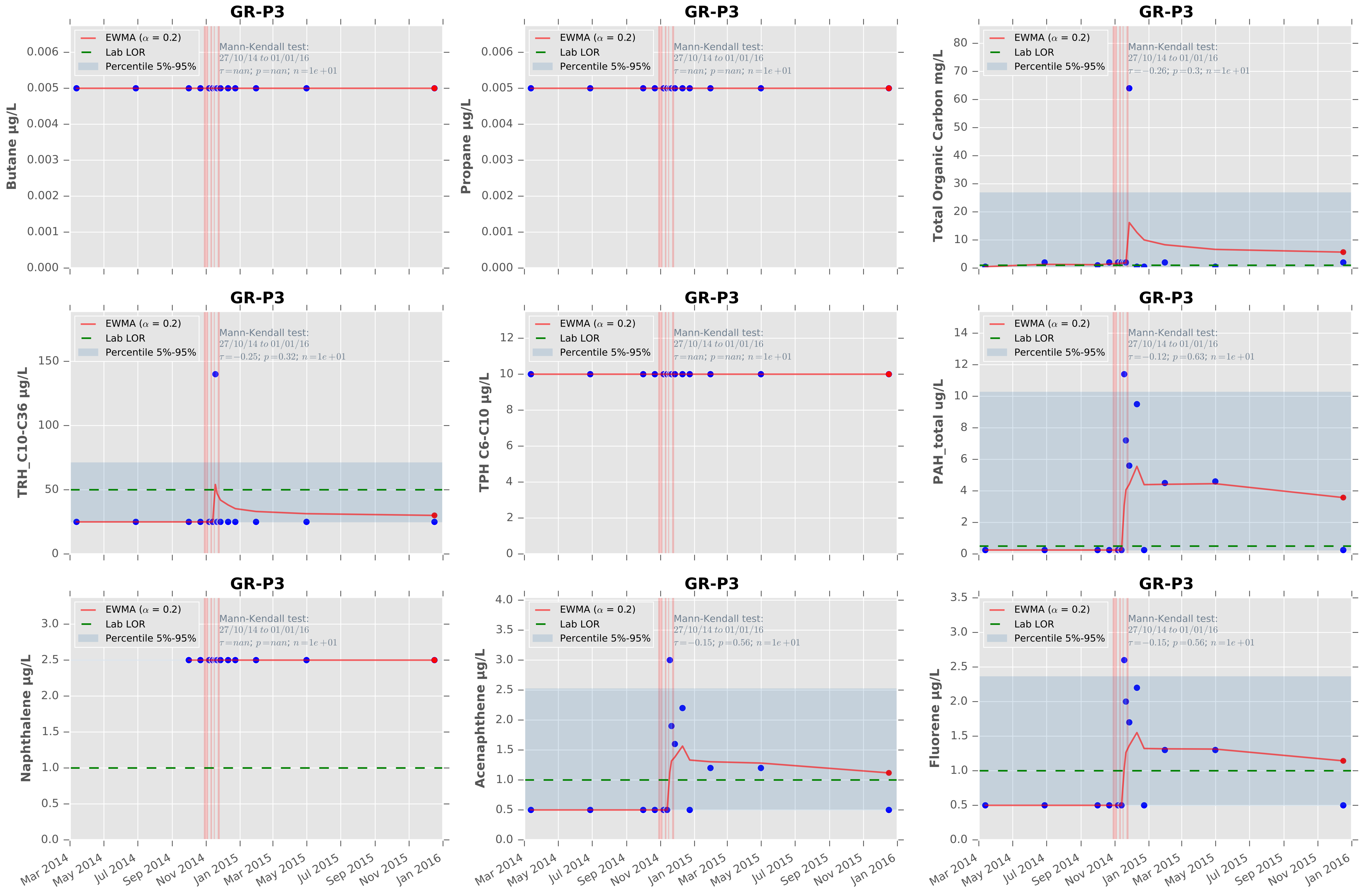
GR-P3
Toluene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GR-P3
Ethylbenzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GR-P3
Xylene Total µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GR-P3
TDS mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.78; p=0.0017; n=1e+01
GR-P3
pH_Field pH_Units
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.16; p=0.53; n=1e+01
GR-P3
Redox_Field mV
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.29; p=0.24; n=1e+01
GR-P3
Alk_CaCO3 mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.09; p=0.72; n=1e+01
GR-P3
SO4_turb mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.54; p=0.03; n=1e+01
GR-P3
Chloride mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.18; p=0.46; n=1e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

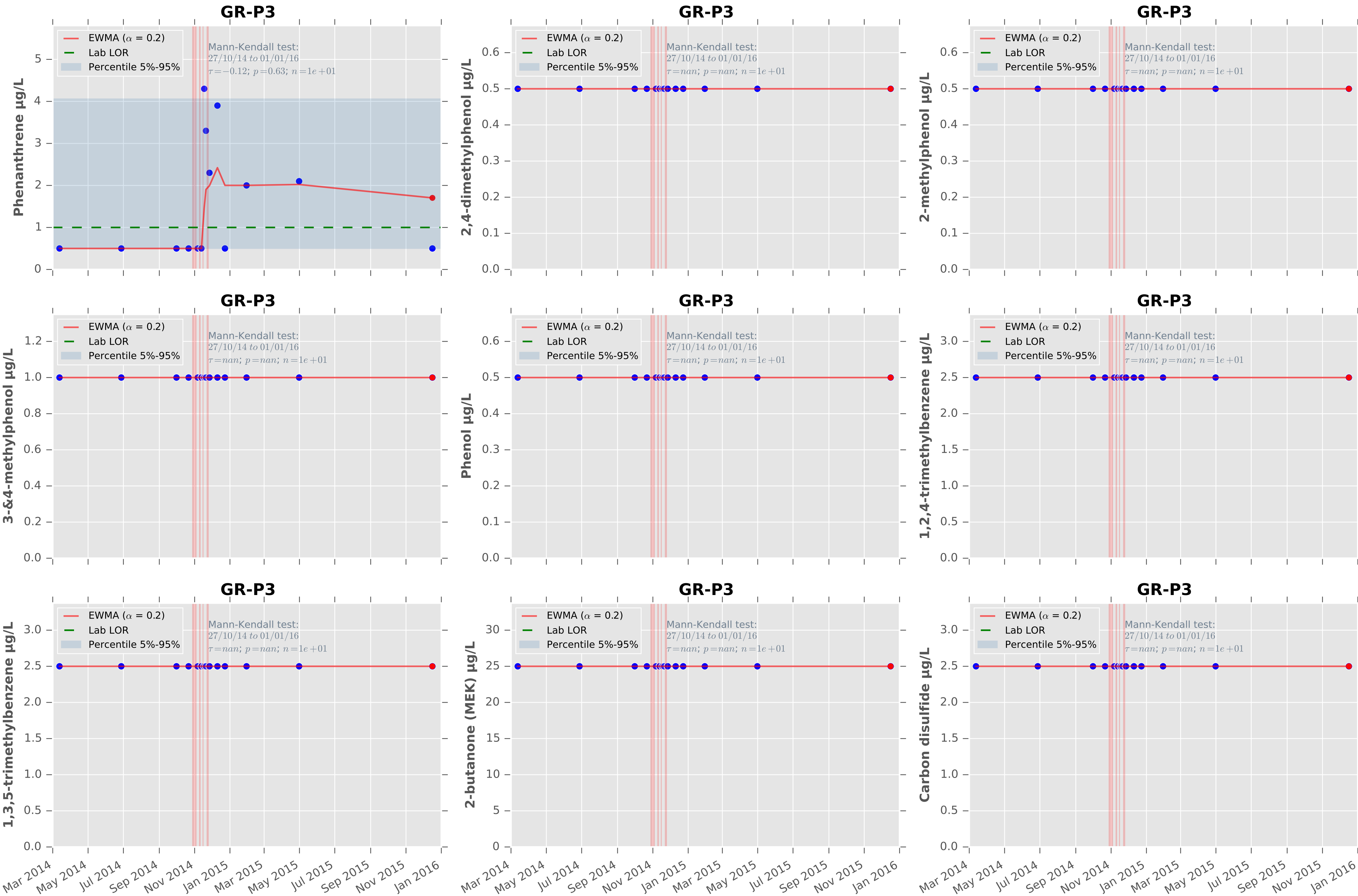

GR-P3
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.33; p=0.18; n=1e+01
Calcium mg/L
GR-P3
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.33; p=0.18; n=1e+01
Sodium mg/L
GR-P3
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Potassium mg/L
GR-P3
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.23; p=0.35; n=1e+01
Magnesium mg/L
GR-P3
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.07; p=0.79; n=1e+01
Reactive Silica mg/L
GR-P3
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.19; p=0.45; n=1e+01
Ammonia as N mg/L
GR-P3
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.27; p=0.27; n=1e+01
Nitrate (as N) mg/L
GR-P3
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.16; p=0.51; n=1e+01
Nitrogen (Total) mg/L
GR-P3
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.26; p=0.3; n=1e+01
Reactive Phosphorus mg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

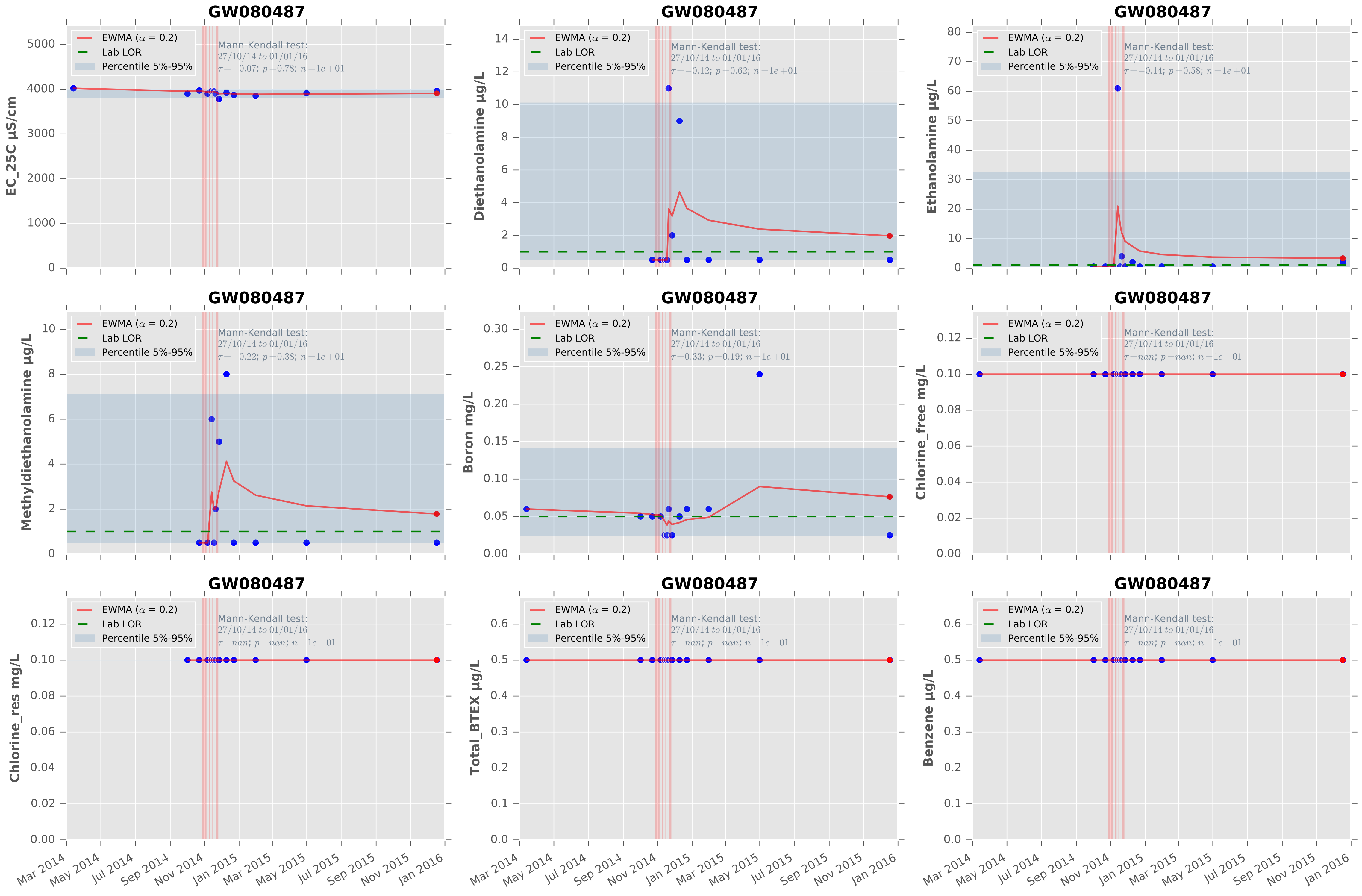


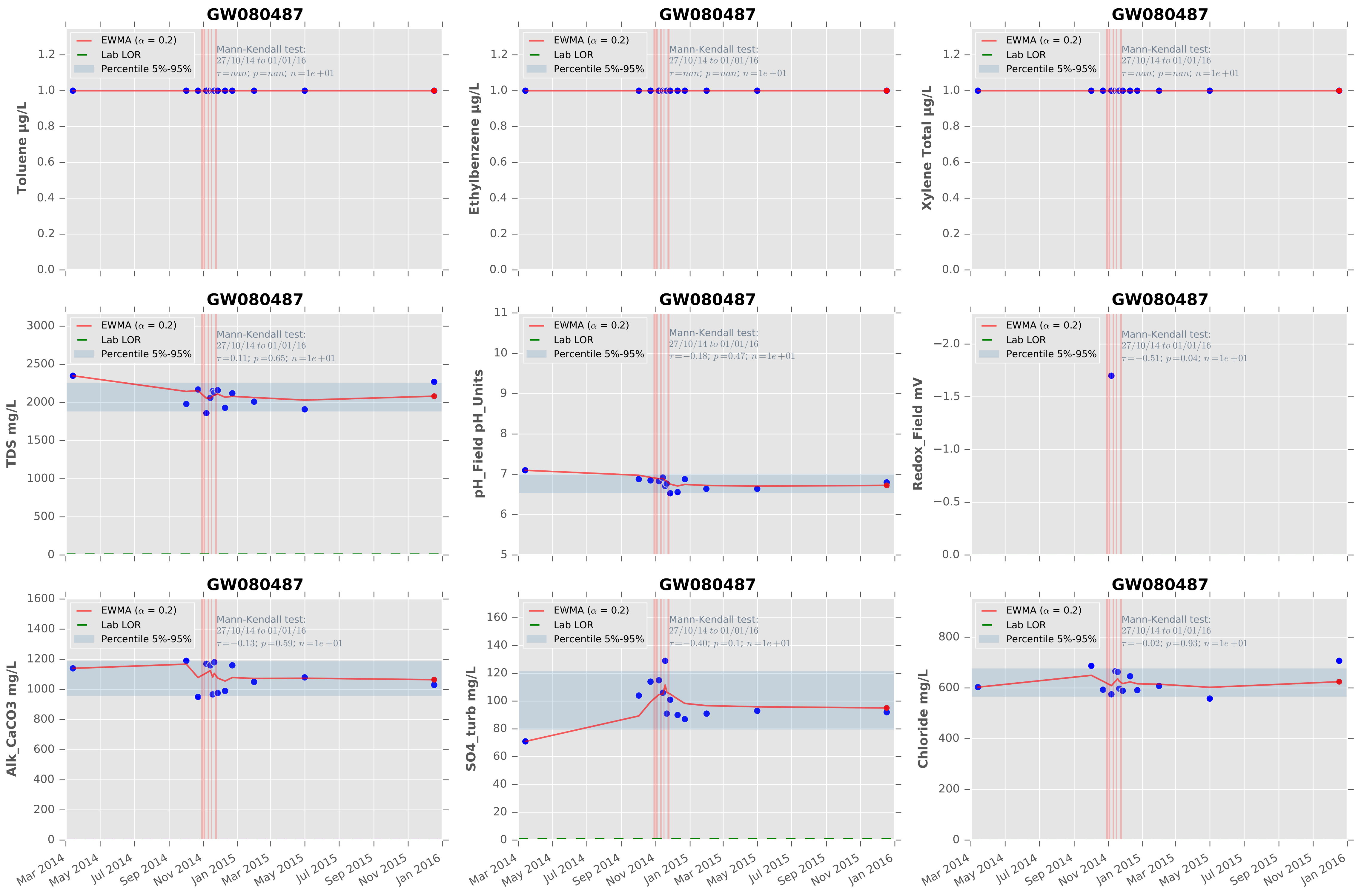
GR-P3
Phosphorus mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.42; p=0.094; n=1e+01
GR-P3
Bromine mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.02; p=0.93; n=1e+01
GR-P3
Aluminium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.43; p=0.085; n=1e+01
GR-P3
Arsenic mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.16; p=0.53; n=1e+01
GR-P3
Barium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.07; p=0.79; n=1e+01
GR-P3
Cadmium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.35; p=0.16; n=1e+01
GR-P3
Chromium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GR-P3
Copper mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.19; p=0.44; n=1e+01
GR-P3
Iron mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.05; p=0.85; n=1e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016


GR-P3
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Lead mg/L
GR-P3
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.11; p=0.68; n=9
Manganese mg/L
GR-P3
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Molybdenum mg/L
GR-P3
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.23; p=0.36; n=1e+01
Nickel mg/L
GR-P3
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.24; p=0.33; n=1e+01
Strontium mg/L
GR-P3
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.39; p=0.12; n=1e+01
Uranium mg/L
GR-P3
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.16; p=0.52; n=1e+01
Zinc mg/L
GR-P3
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Methane mg/L
GR-P3
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Ethane µg/L
Mar 2014 May 2014 Jul 2014 Sep 2014 Nov 2014 Jan 2015 Mar 2015 May 2015 Jul 2015 Sep 2015 Nov 2015 Jan 2016


GR-P3
Butane µg/L
Propane µg/L
Total Organic Carbon mg/L
TRH_C10-C36 µg/L
TPH C6-C10 µg/L
PAH_total ug/L
Naphthalene µg/L
Acenaphthene µg/L
Fluorene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
τ=−0.26; p=0.3; n=1e+01
τ=−0.25; p=0.32; n=1e+01
τ=−0.12; p=0.63; n=1e+01
τ=−0.15; p=0.56; n=1e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016


GR-P3
Phenanthrene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.12; p=0.63; n=1e+01
GR-P3
2,4-dimethylphenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GR-P3
2-methylphenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GR-P3
3-&4-methylphenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GR-P3
Phenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GR-P3
1,2,4-trimethylbenzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GR-P3
1,3,5-trimethylbenzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GR-P3
2-butanone (MEK) µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GR-P3
Carbon disulfide µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016


GW080487
EC_25C µS/cm
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.07; p=0.78; n=1e+01
GW080487
Diethanolamine µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.12; p=0.62; n=1e+01
GW080487
Ethanolamine µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.14; p=0.58; n=1e+01
GW080487
Methyldiethanolamine µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.22; p=0.38; n=1e+01
GW080487
Boron mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.33; p=0.19; n=1e+01
GW080487
Chlorine_free mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GW080487
Chlorine_res mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GW080487
Total_BTEX µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GW080487
Benzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016


GW080487
Toluene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GW080487
Ethylbenzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GW080487
Xylene Total µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GW080487
TDS mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.11; p=0.65; n=1e+01
GW080487
pH_Field pH_Units
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.18; p=0.47; n=1e+01
GW080487
Redox_Field mV
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.51; p=0.04; n=1e+01
GW080487
Alk_CaCO3 mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.13; p=0.59; n=1e+01
GW080487
SO4_turb mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.40; p=0.1; n=1e+01
GW080487
Chloride mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.02; p=0.93; n=1e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
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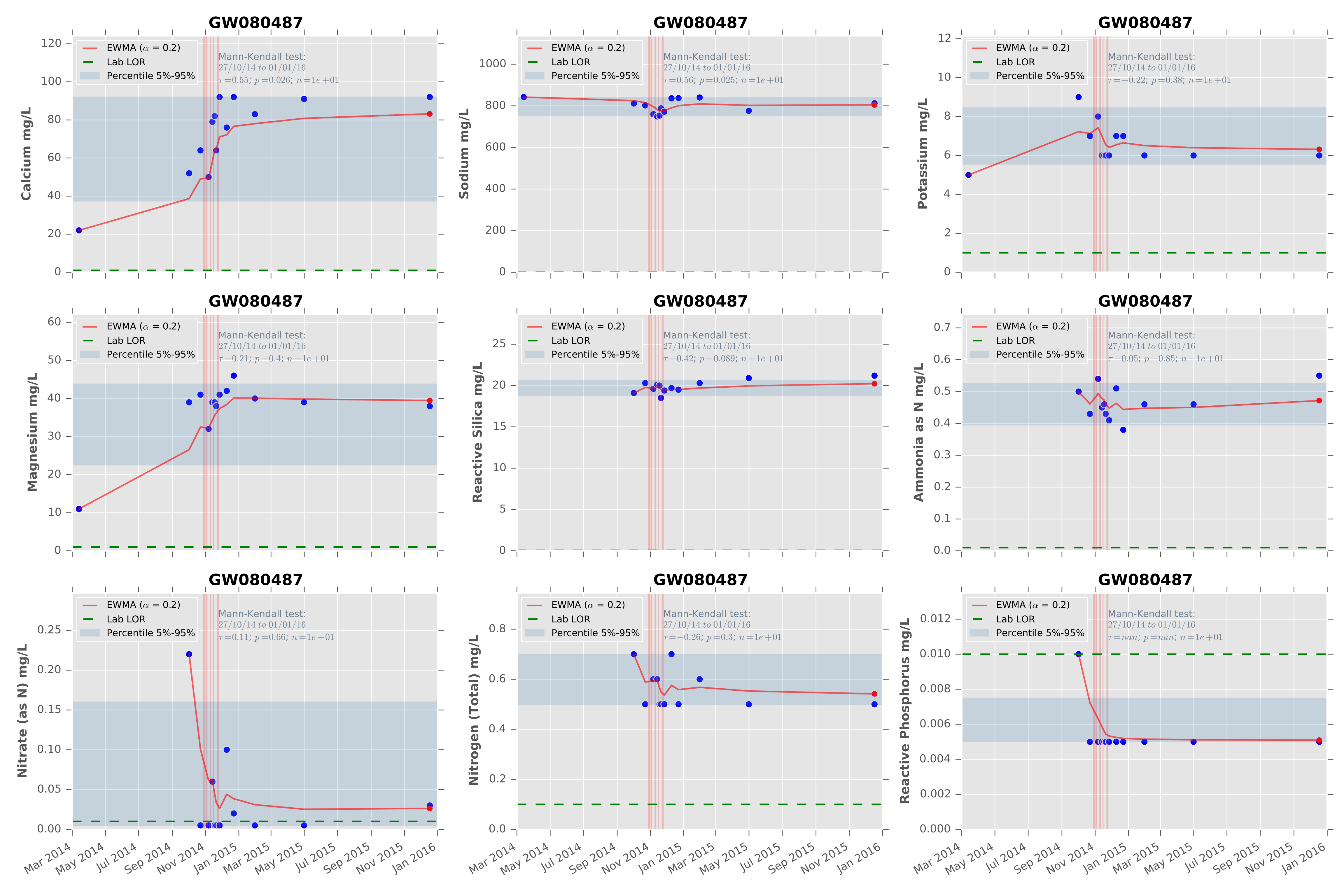
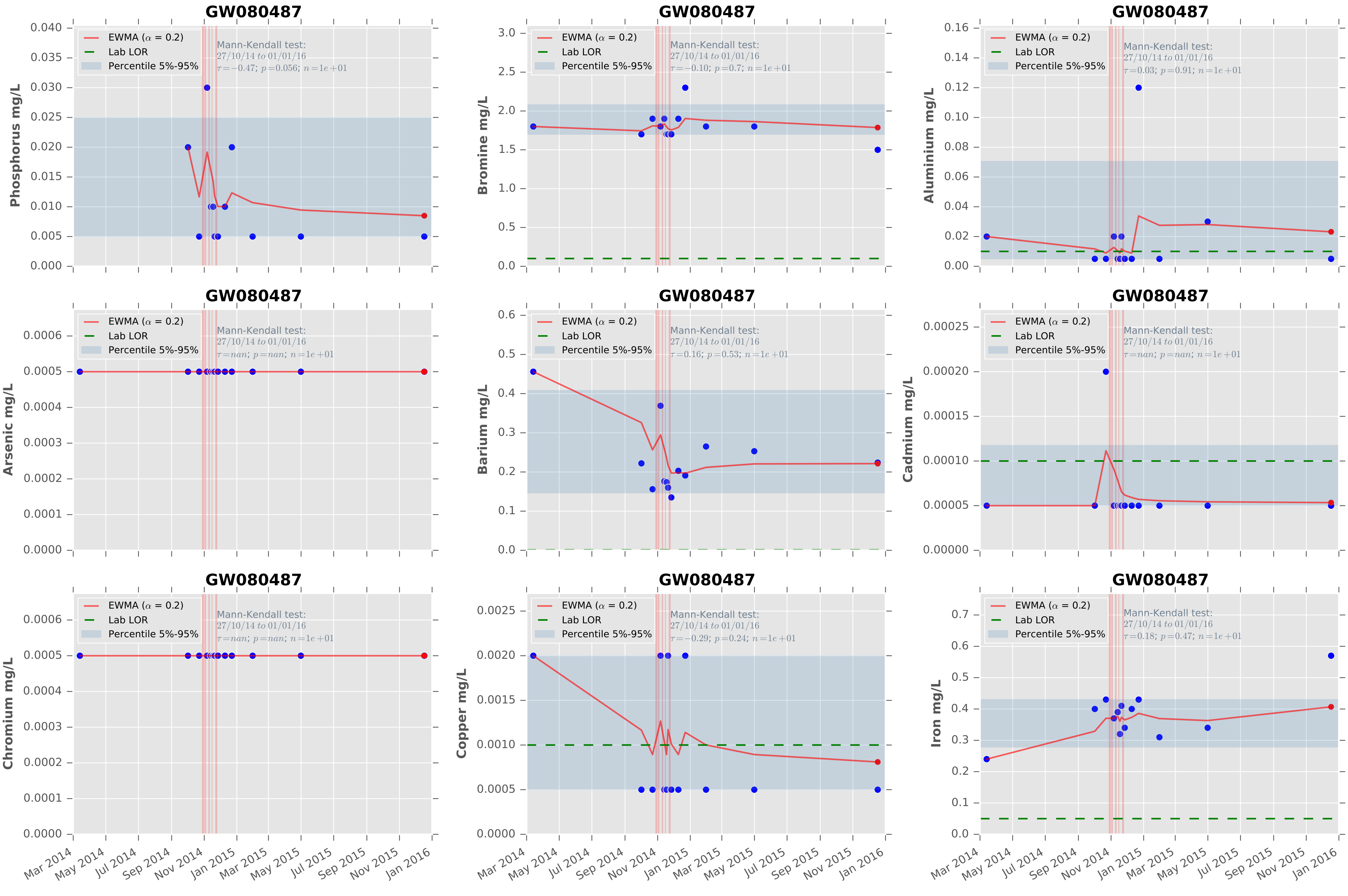
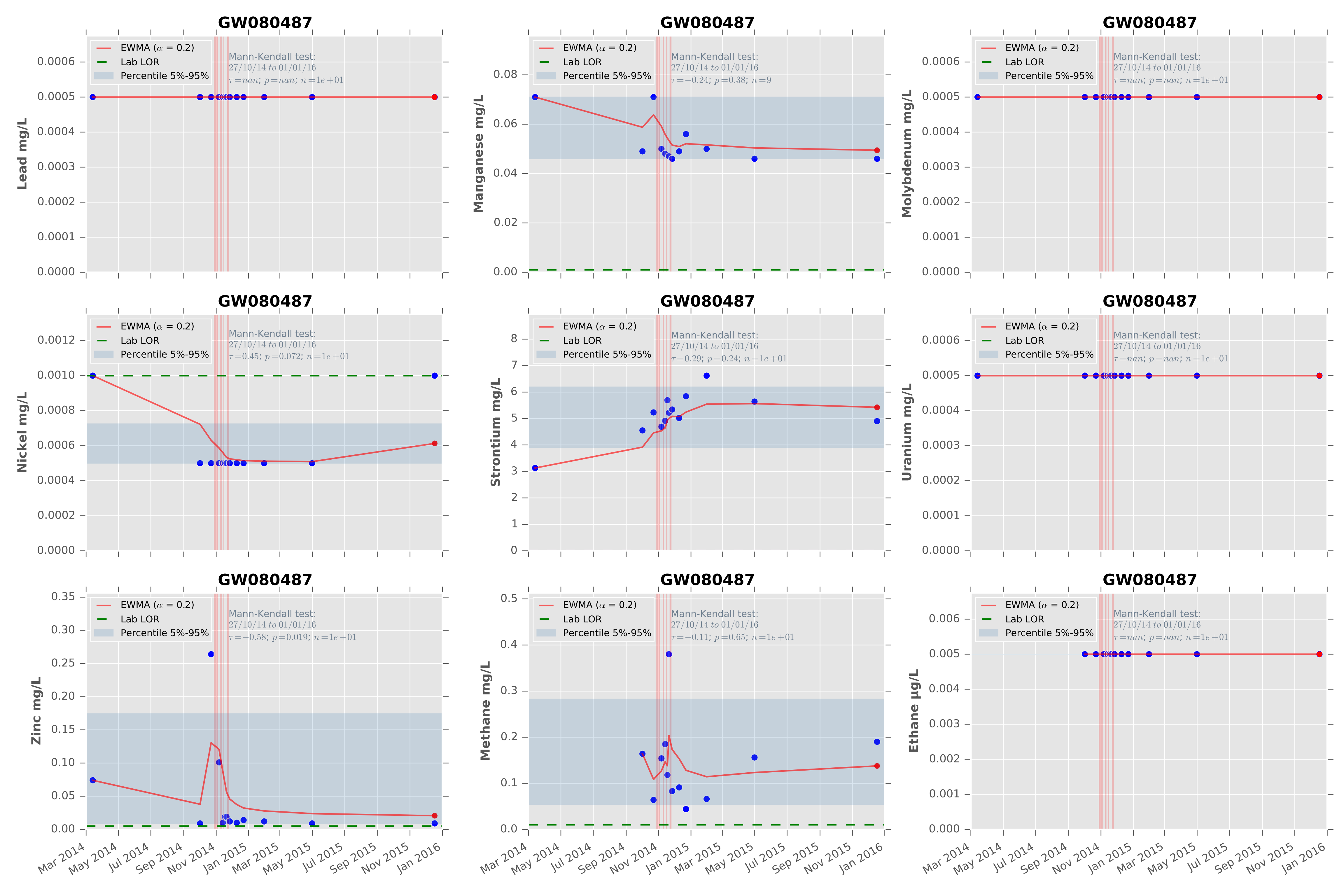
Sep 2015
Nov 2015
Jan 2016

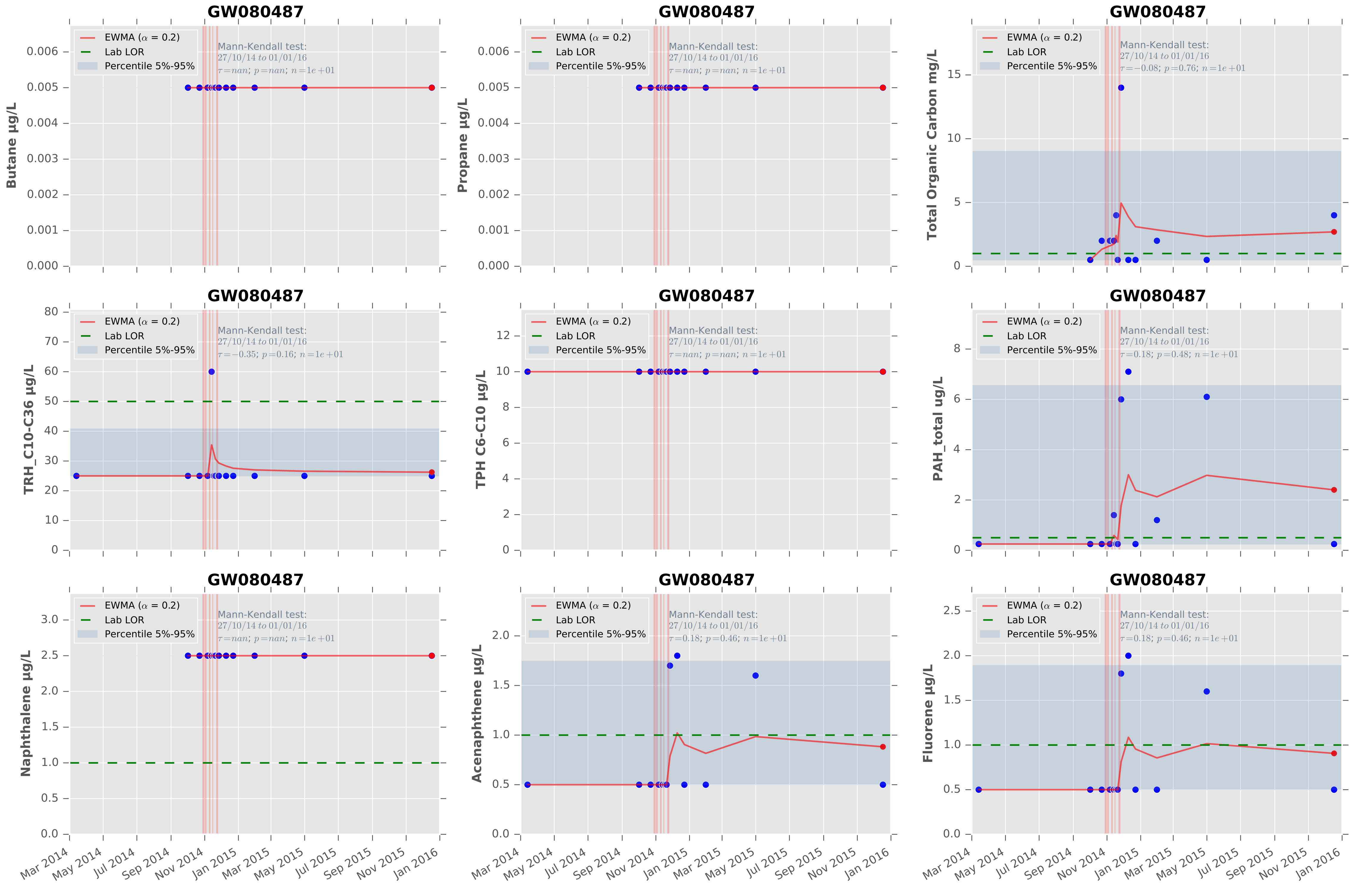


GW080487
Calcium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.55; p=0.026; n=1e+01
GW080487
Sodium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.56; p=0.025; n=1e+01
GW080487
Potassium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.22; p=0.38; n=1e+01
GW080487
Magnesium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.21; p=0.4; n=1e+01
GW080487
Reactive Silica mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.42; p=0.089; n=1e+01
GW080487
Ammonia as N mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.05; p=0.85; n=1e+01
GW080487
Nitrate (as N) mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.11; p=0.66; n=1e+01
GW080487
Nitrogen (Total) mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.26; p=0.3; n=1e+01
GW080487
Reactive Phosphorus mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

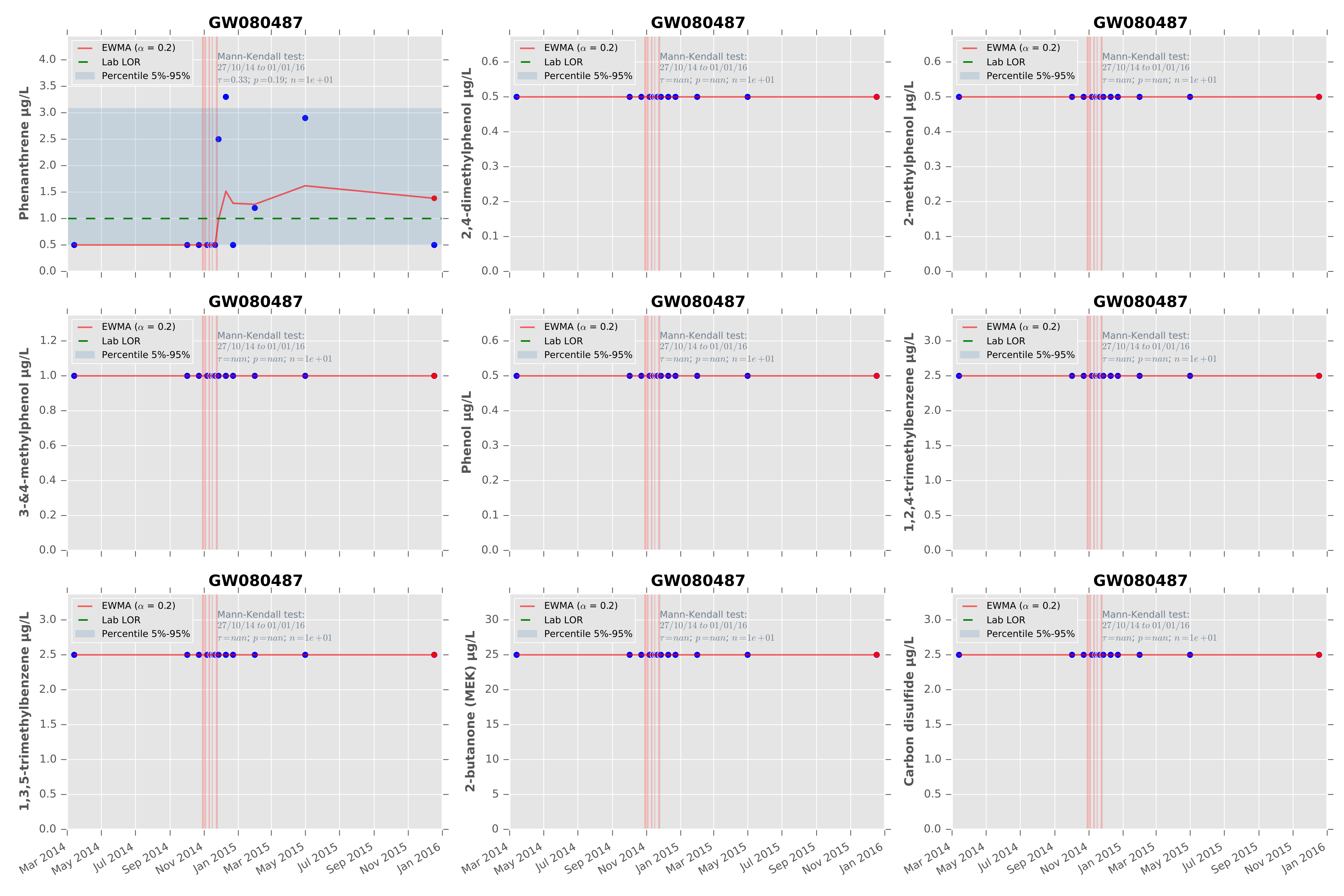

GW080487
Phosphorus mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=-0.47$; $p=0.056$; $n=1e+01$
GW080487
Bromine mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=-0.10$; $p=0.7$; $n=1e+01$
GW080487
Aluminium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=0.03$; $p=0.91$; $n=1e+01$
GW080487
Arsenic mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=nan$; $p=nan$; $n=1e+01$
GW080487
Barium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=0.16$; $p=0.53$; $n=1e+01$
GW080487
Cadmium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=nan$; $p=nan$; $n=1e+01$
GW080487
Chromium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=nan$; $p=nan$; $n=1e+01$
GW080487
Copper mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=-0.29$; $p=0.24$; $n=1e+01$
GW080487
Iron mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=0.18$; $p=0.47$; $n=1e+01$
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

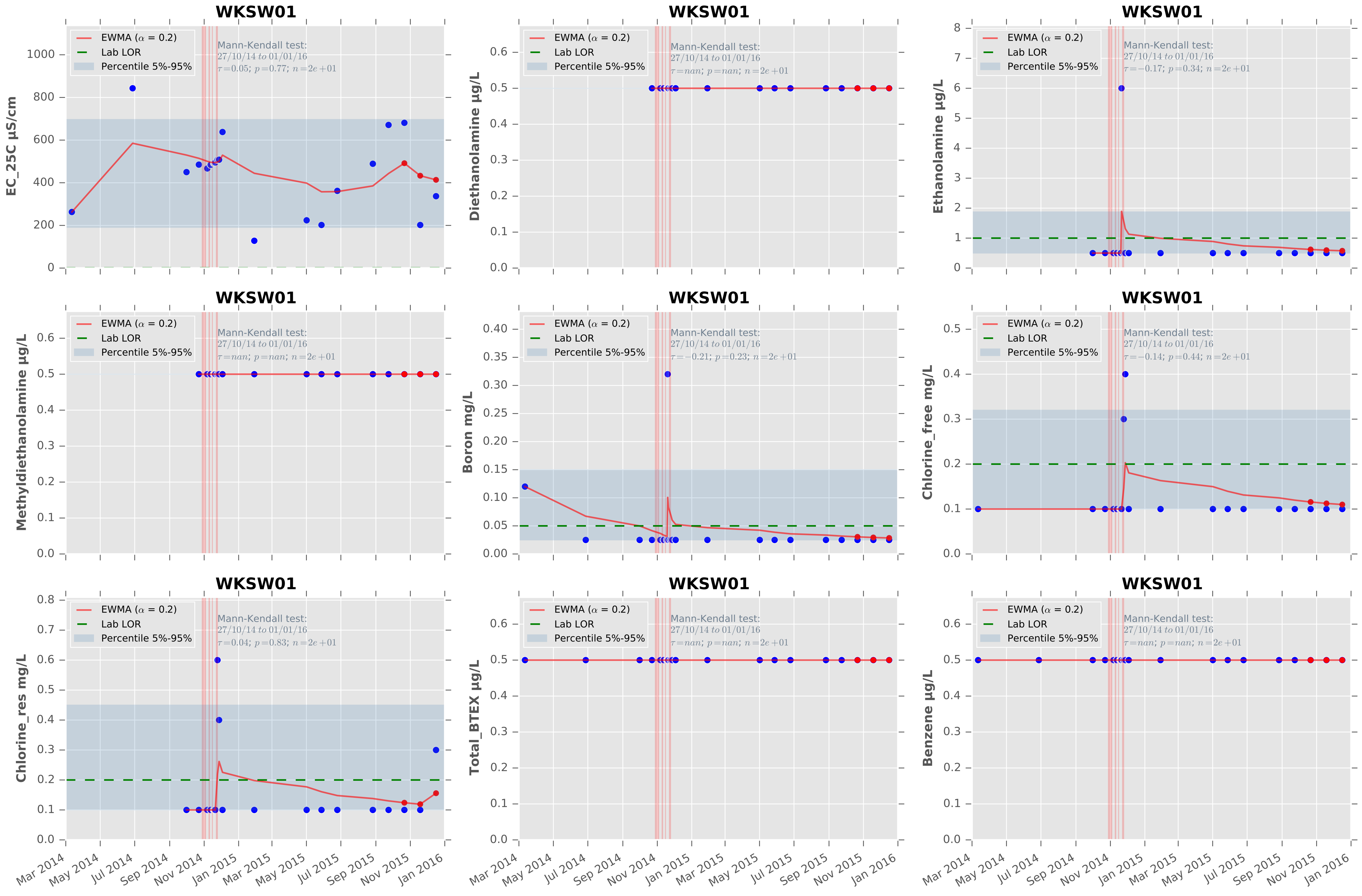


GW080487
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Lead mg/L
GW080487
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.24; p=0.38; n=9
Manganese mg/L
GW080487
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Molybdenum mg/L
GW080487
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.45; p=0.072; n=1e+01
Nickel mg/L
GW080487
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.29; p=0.24; n=1e+01
Strontium mg/L
GW080487
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Uranium mg/L
GW080487
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.58; p=0.019; n=1e+01
Zinc mg/L
GW080487
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.11; p=0.65; n=1e+01
Methane mg/L
GW080487
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Ethane µg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016



GW080487
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Butane µg/L
GW080487
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Propane µg/L
GW080487
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.08; p=0.76; n=1e+01
Total Organic Carbon mg/L
GW080487
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.35; p=0.16; n=1e+01
TRH_C10-C36 µg/L
GW080487
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
TPH C6-C10 µg/L
GW080487
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.18; p=0.48; n=1e+01
PAH_total ug/L
GW080487
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Naphthalene µg/L
GW080487
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.18; p=0.46; n=1e+01
Acenaphthene µg/L
GW080487
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.18; p=0.46; n=1e+01
Fluorene µg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016


GW080487
Phenanthrene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.33; p=0.19; n=1e+01
GW080487
2,4-dimethylphenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GW080487
2-methylphenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GW080487
3-&4-methylphenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GW080487
Phenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GW080487
1,2,4-trimethylbenzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GW080487
1,3,5-trimethylbenzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GW080487
2-butanone (MEK) µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
GW080487
Carbon disulfide µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=1e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016



WKSW01
EC_25C µS/cm
Diethanolamine µg/L
Ethanolamine µg/L
Methyldiethanolamine µg/L
Boron mg/L
Chlorine_free mg/L
Chlorine_res mg/L
Total_BTEX µg/L
Benzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.05; p=0.77; n=2e+01
τ=nan; p=nan; n=2e+01
τ=−0.17; p=0.34; n=2e+01
τ=−0.21; p=0.23; n=2e+01
τ=−0.14; p=0.44; n=2e+01
τ=0.04; p=0.83; n=2e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
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Mar 2015
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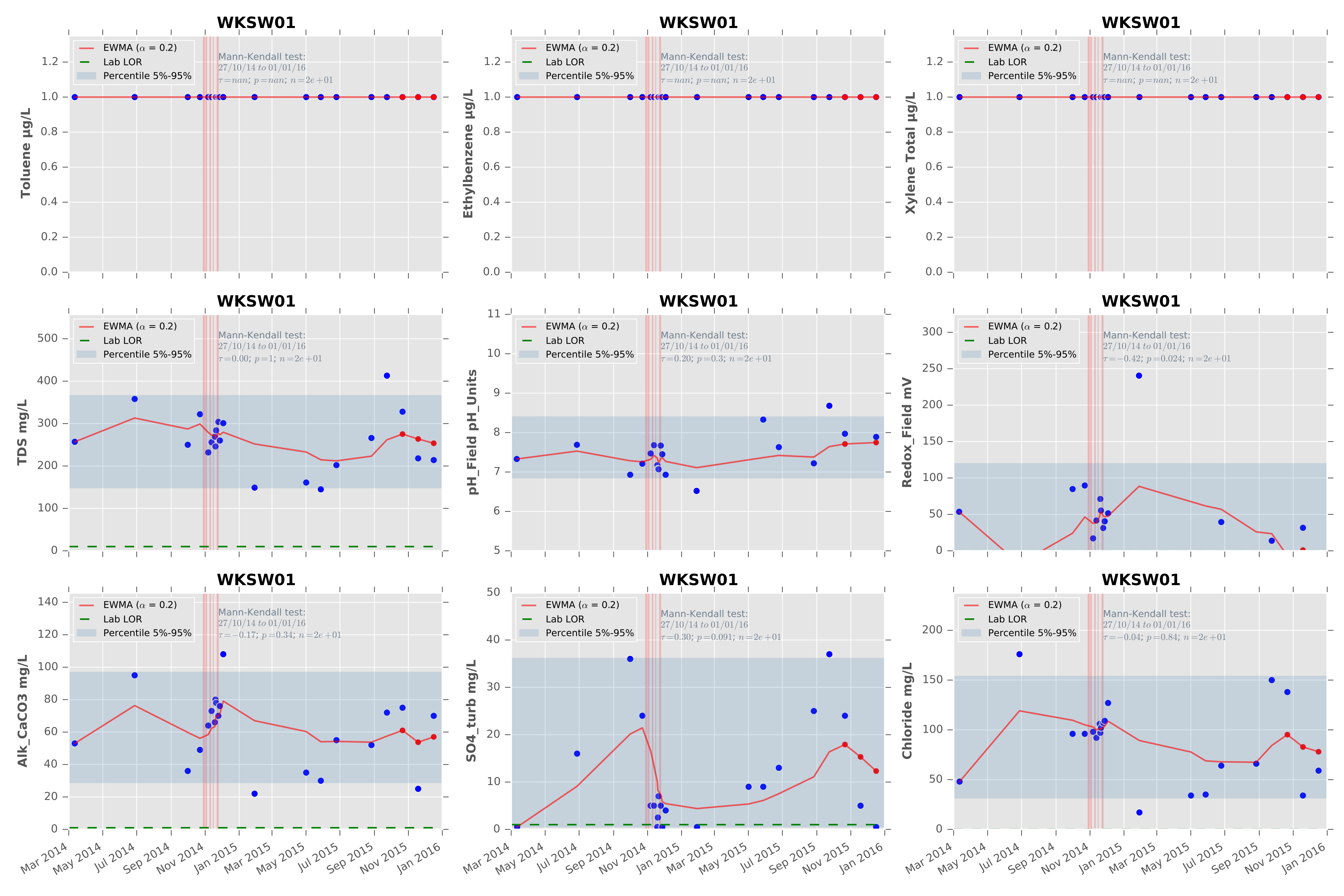
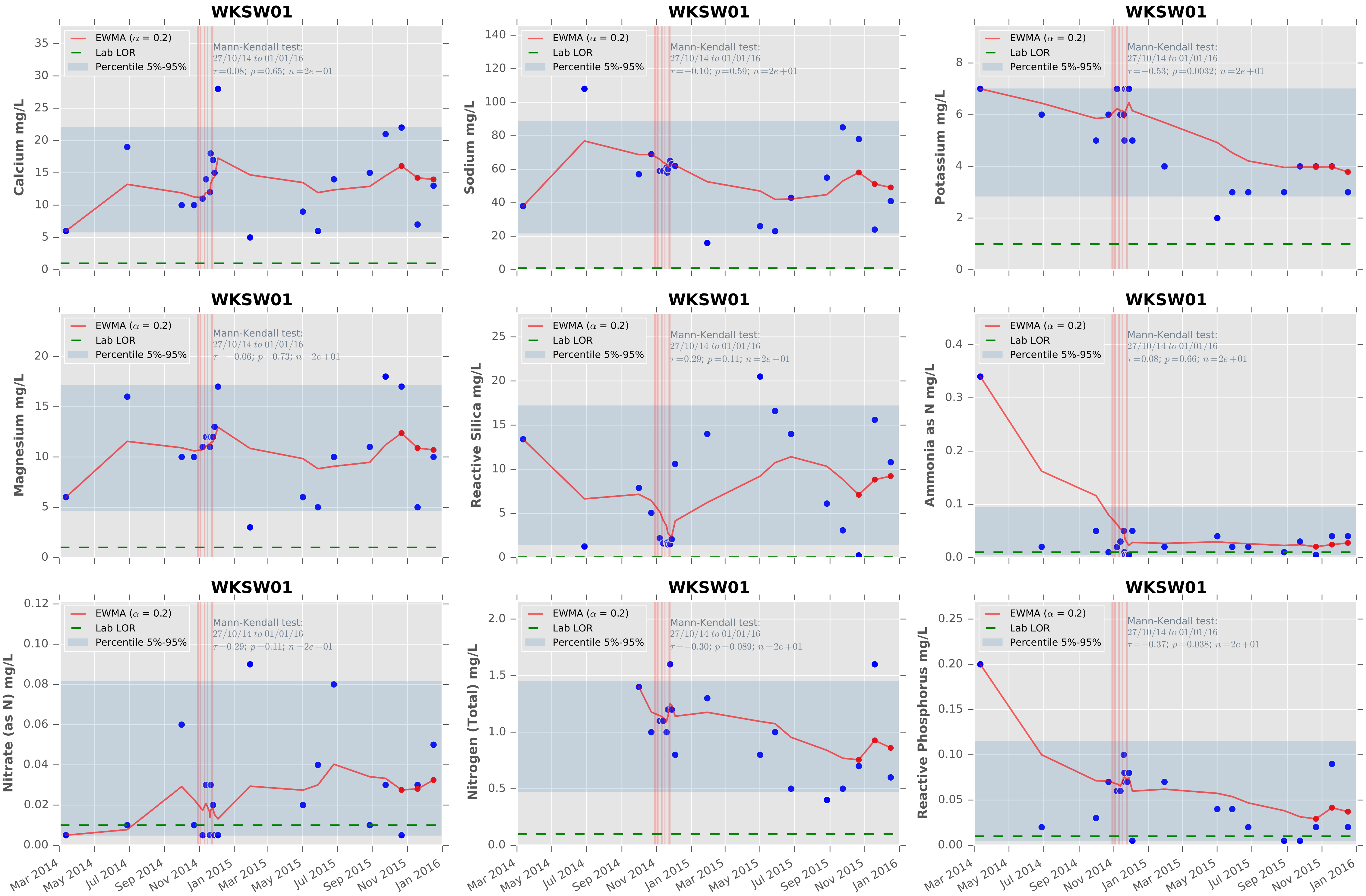
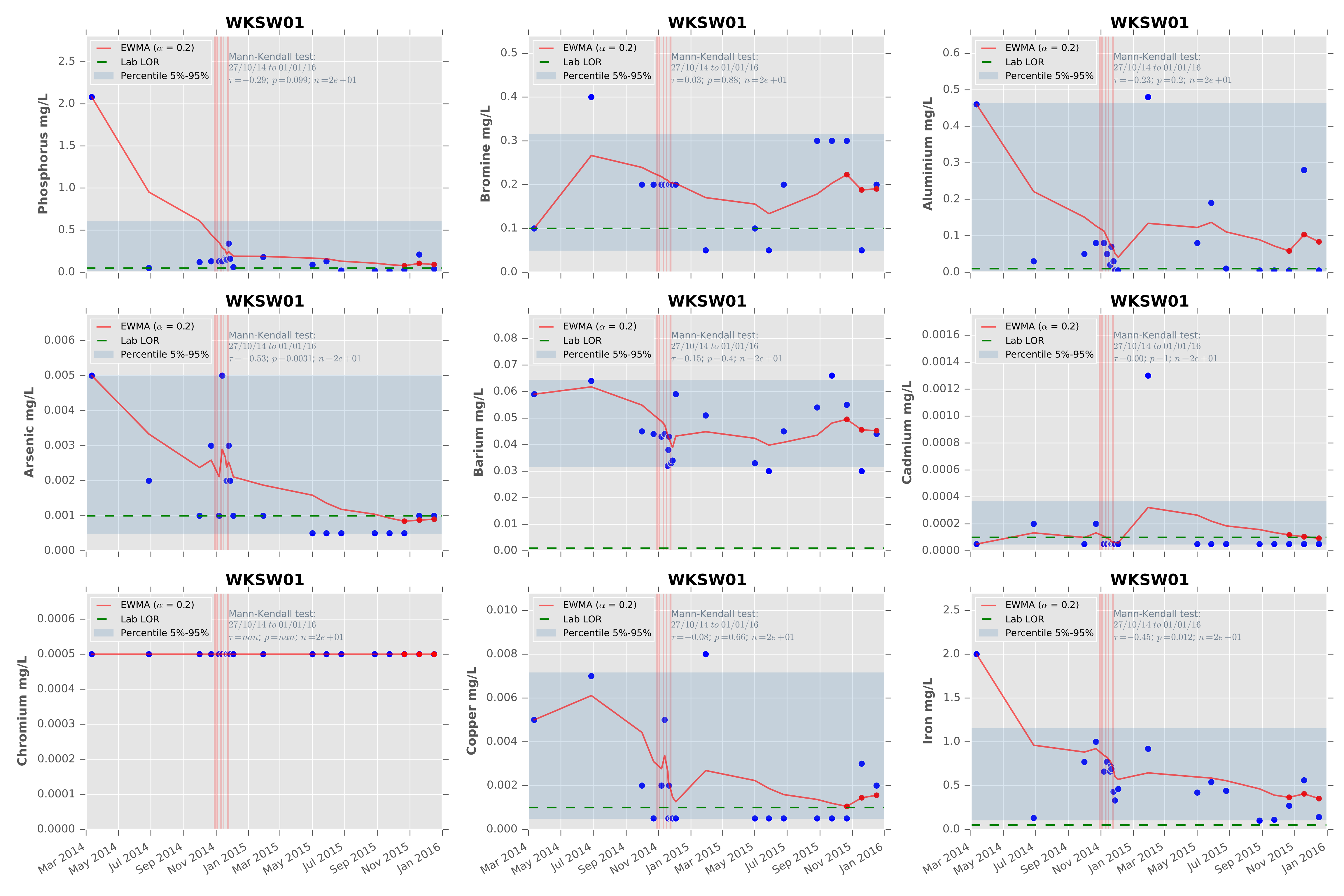
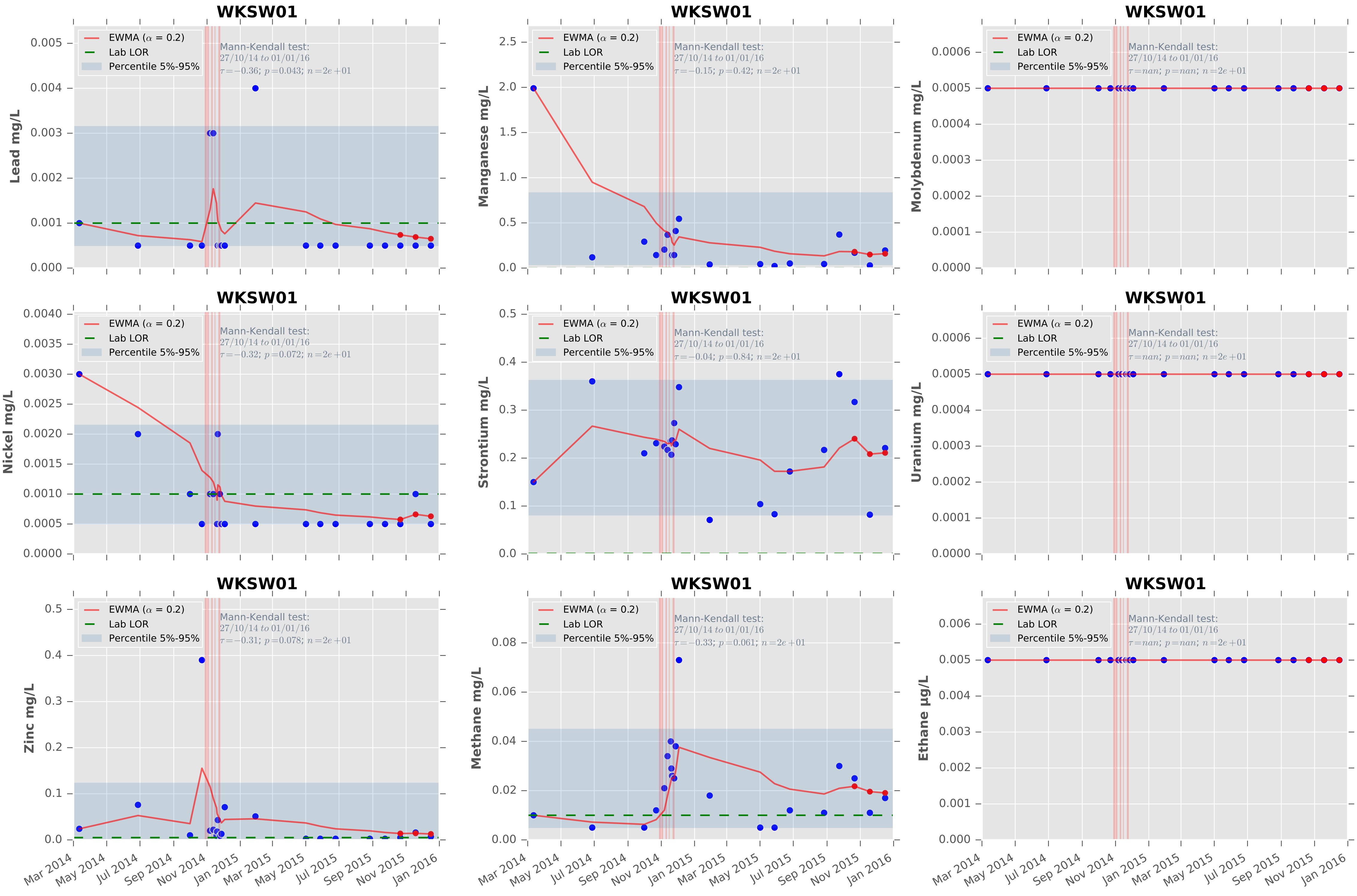
Sep 2015
Nov 2015
Jan 2016

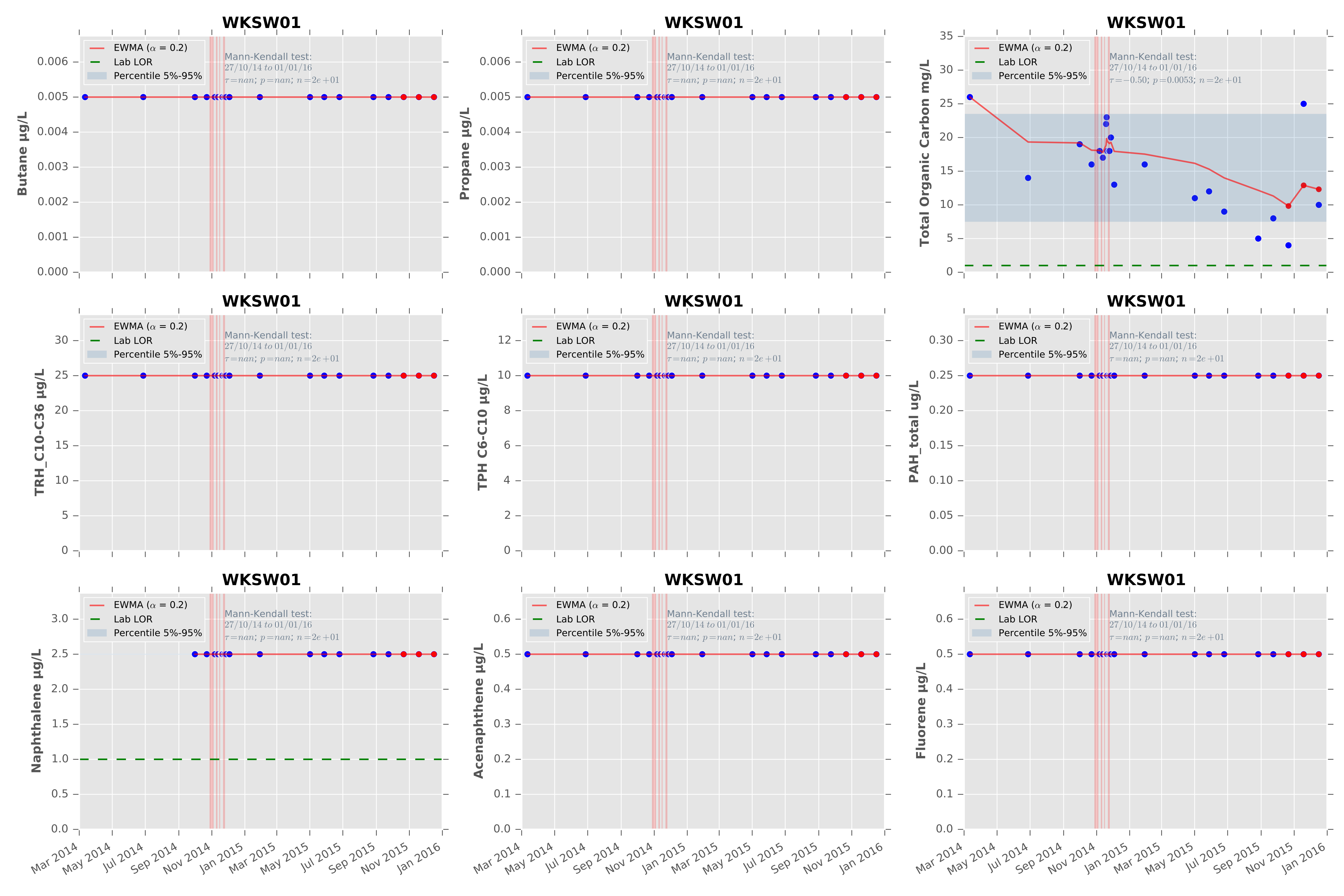

WKSW01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Toluene µg/L
Ethylbenzene µg/L
Xylene Total µg/L
τ=0.00; p=1; n=2e+01
TDS mg/L
τ=0.20; p=0.3; n=2e+01
pH_Field pH_Units
τ=−0.42; p=0.024; n=2e+01
Redox_Field mV
τ=−0.17; p=0.34; n=2e+01
Alk_CaCO3 mg/L
τ=0.30; p=0.091; n=2e+01
SO4_turb mg/L
τ=−0.04; p=0.84; n=2e+01
Chloride mg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016



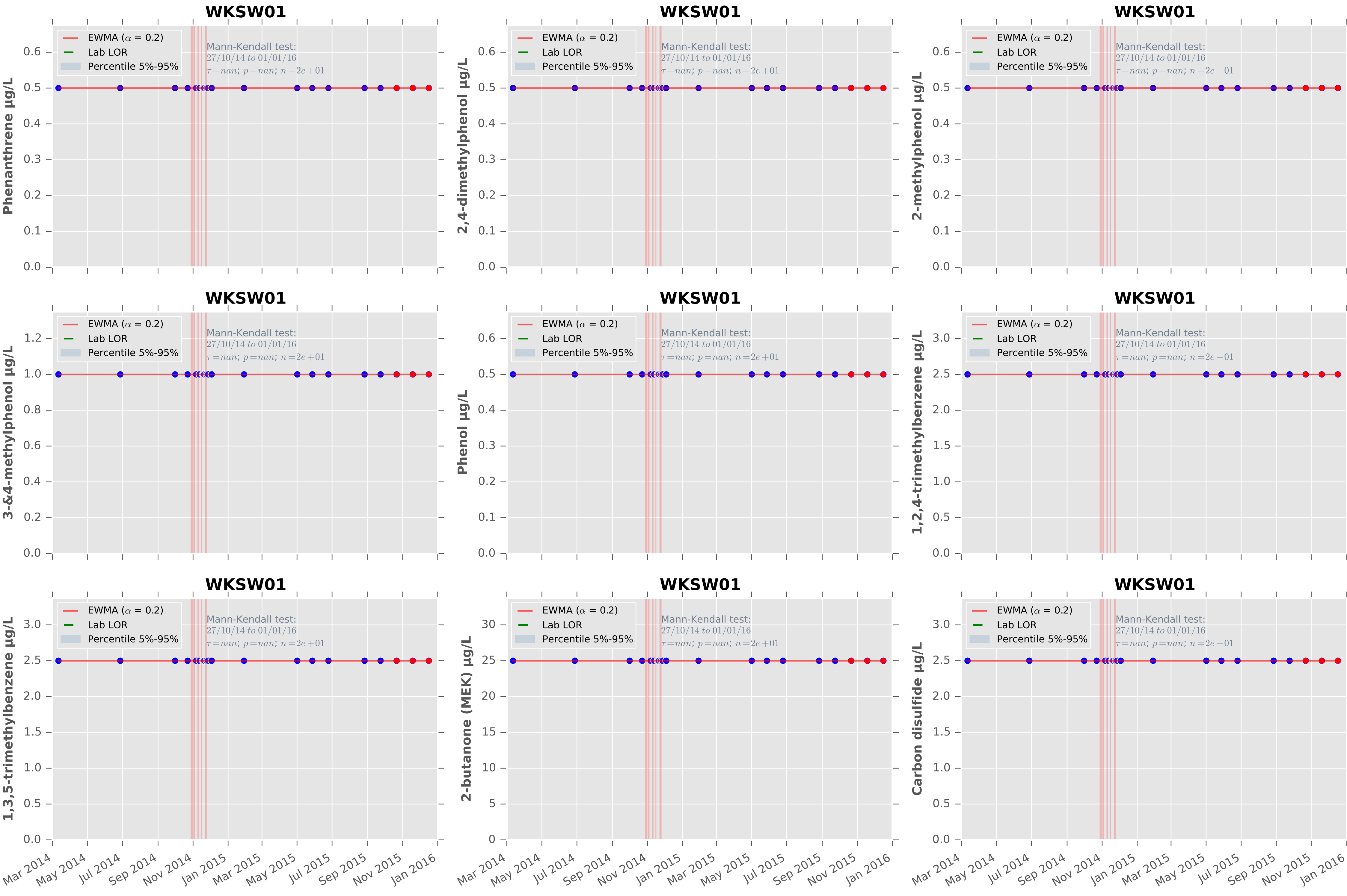
WKSW01
Calcium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.08; p=0.65; n=2e+01
WKSW01
Sodium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.10; p=0.59; n=2e+01
WKSW01
Potassium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.53; p=0.0032; n=2e+01
WKSW01
Magnesium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.06; p=0.73; n=2e+01
WKSW01
Reactive Silica mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.29; p=0.11; n=2e+01
WKSW01
Ammonia as N mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.08; p=0.66; n=2e+01
WKSW01
Nitrate (as N) mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.29; p=0.11; n=2e+01
WKSW01
Nitrogen (Total) mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.30; p=0.089; n=2e+01
WKSW01
Reactive Phosphorus mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.37; p=0.038; n=2e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

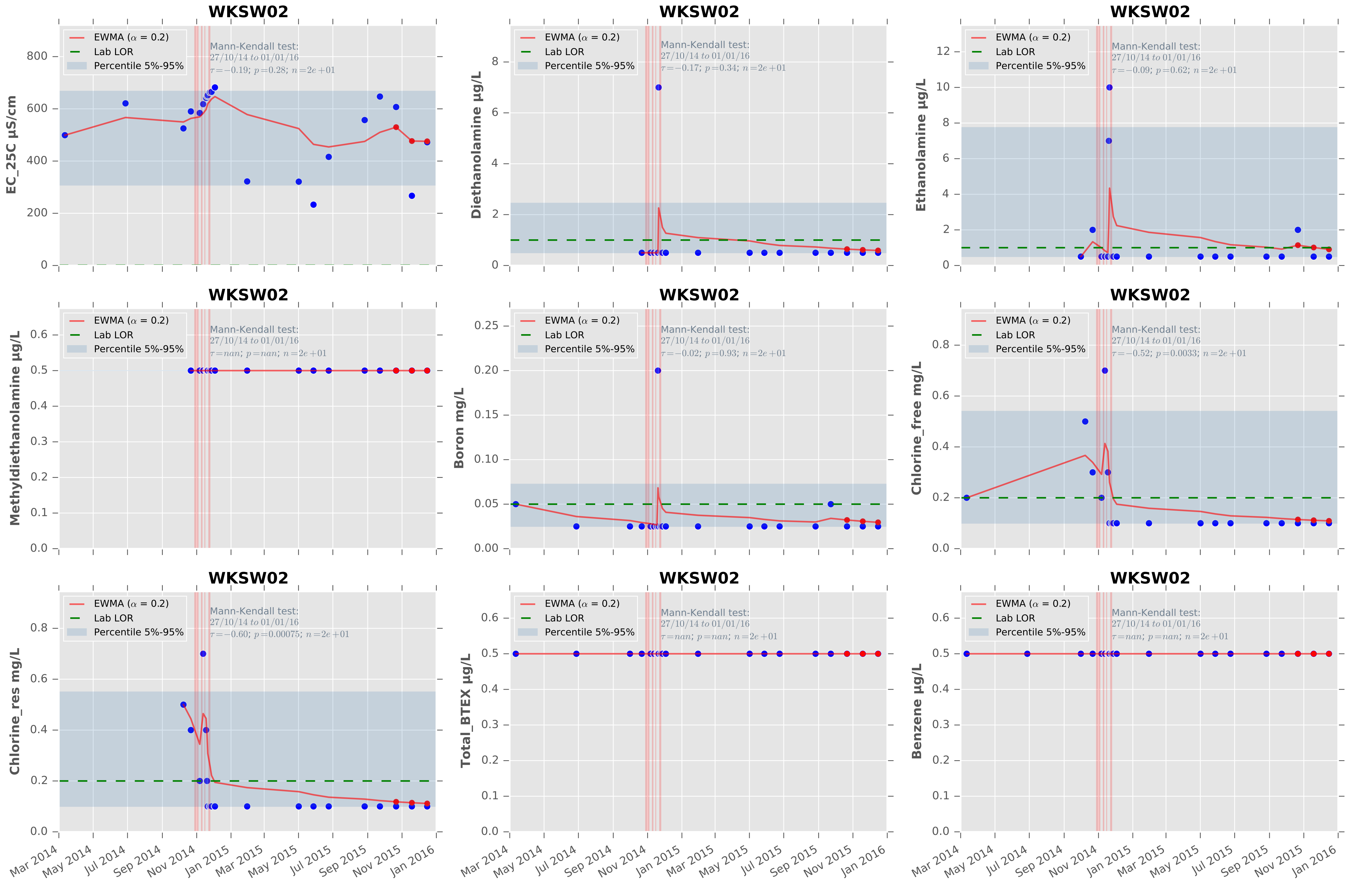

WKSW01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.29; p=0.099; n=2e+01
Phosphorus mg/L
WKSW01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.03; p=0.88; n=2e+01
Bromine mg/L
WKSW01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.23; p=0.2; n=2e+01
Aluminium mg/L
WKSW01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.53; p=0.0031; n=2e+01
Arsenic mg/L
WKSW01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.15; p=0.4; n=2e+01
Barium mg/L
WKSW01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.00; p=1; n=2e+01
Cadmium mg/L
WKSW01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Chromium mg/L
WKSW01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.08; p=0.66; n=2e+01
Copper mg/L
WKSW01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.45; p=0.012; n=2e+01
Iron mg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

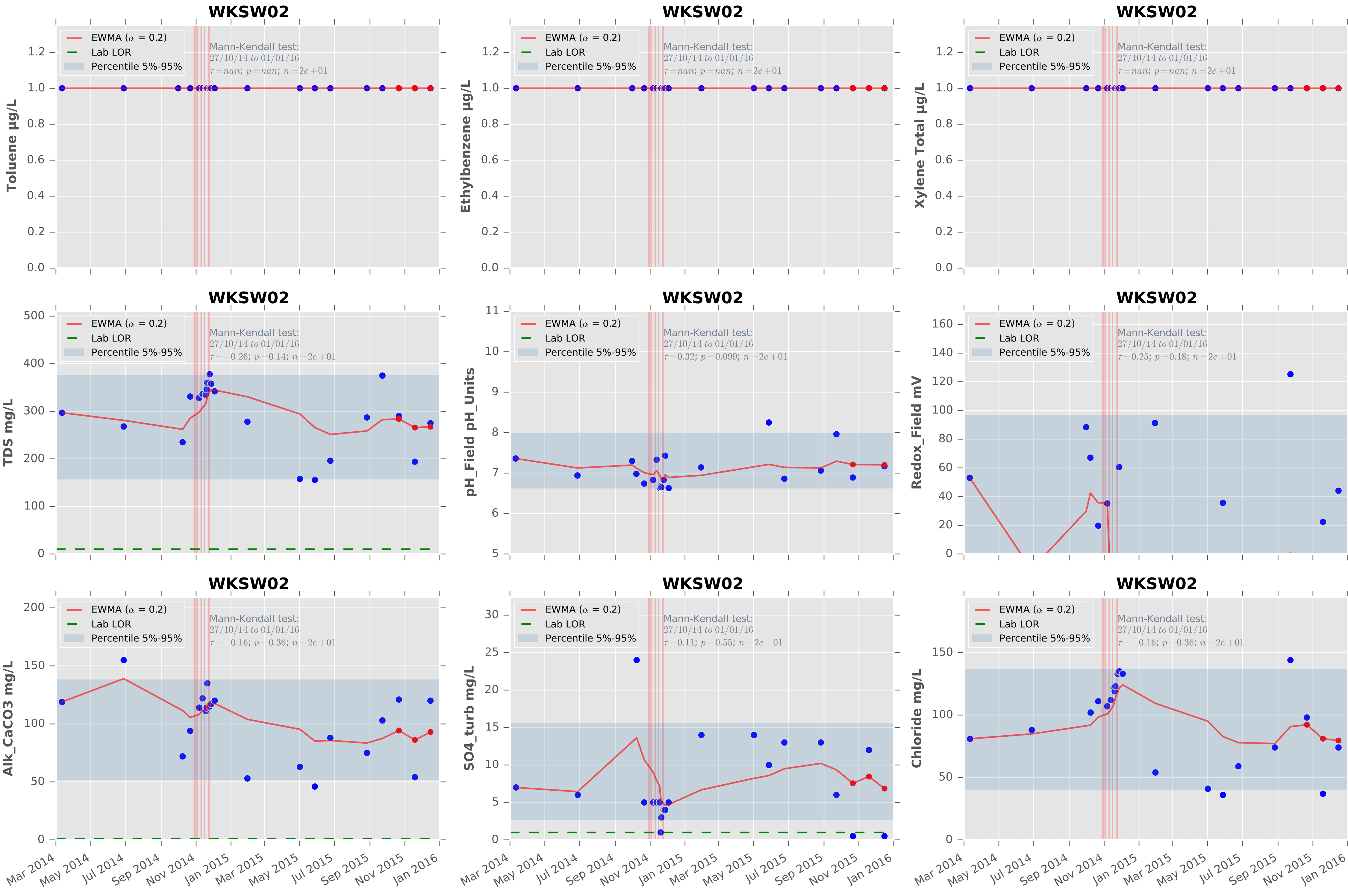

WKSW01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.36; p=0.043; n=2e+01
Lead mg/L
WKSW01
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.15; p=0.42; n=2e+01
Manganese mg/L
WKSW01
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Molybdenum mg/L
WKSW01
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.32; p=0.072; n=2e+01
Nickel mg/L
WKSW01
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.04; p=0.84; n=2e+01
Strontium mg/L
WKSW01
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Uranium mg/L
WKSW01
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.31; p=0.078; n=2e+01
Zinc mg/L
WKSW01
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.33; p=0.061; n=2e+01
Methane mg/L
WKSW01
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Ethane µg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

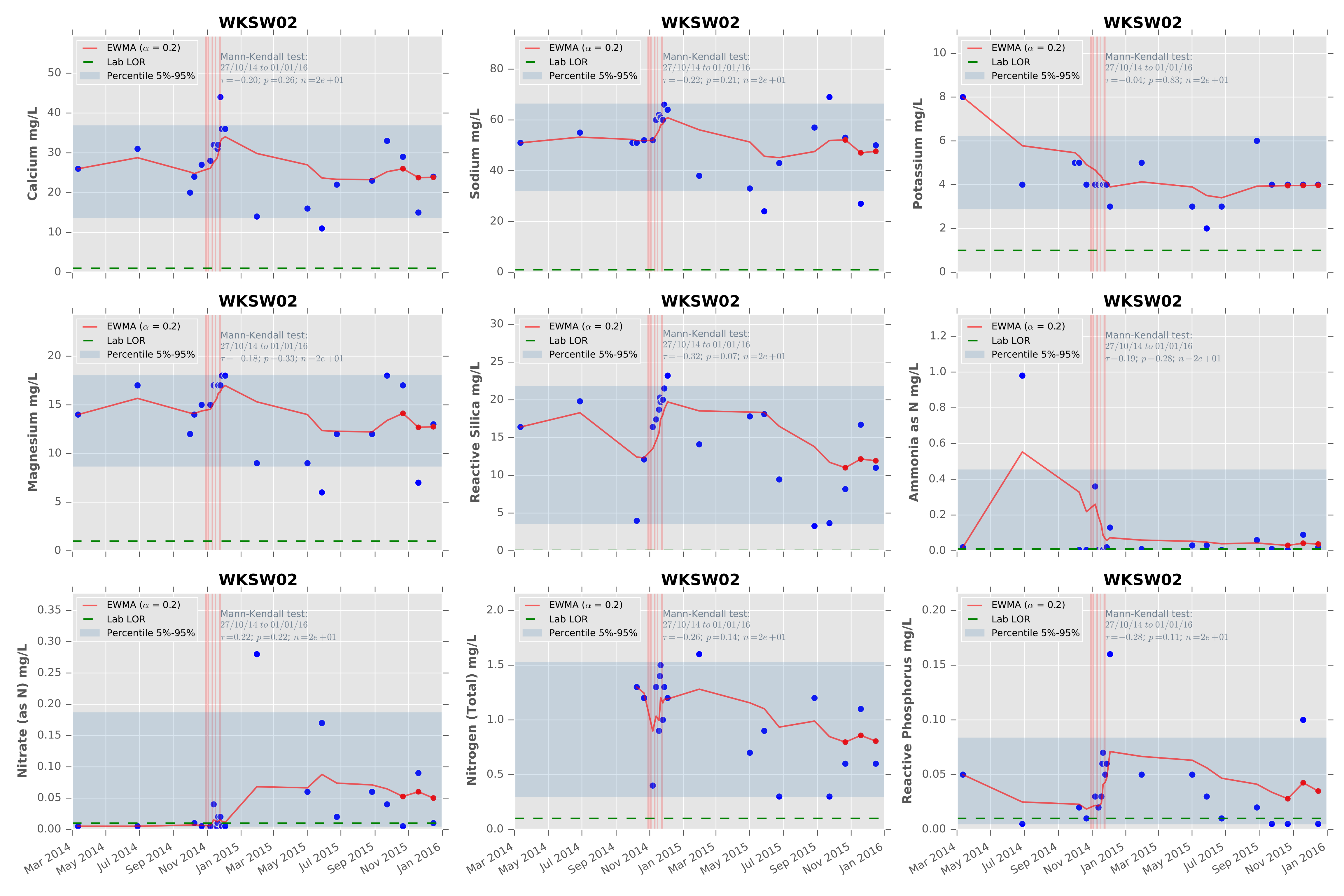


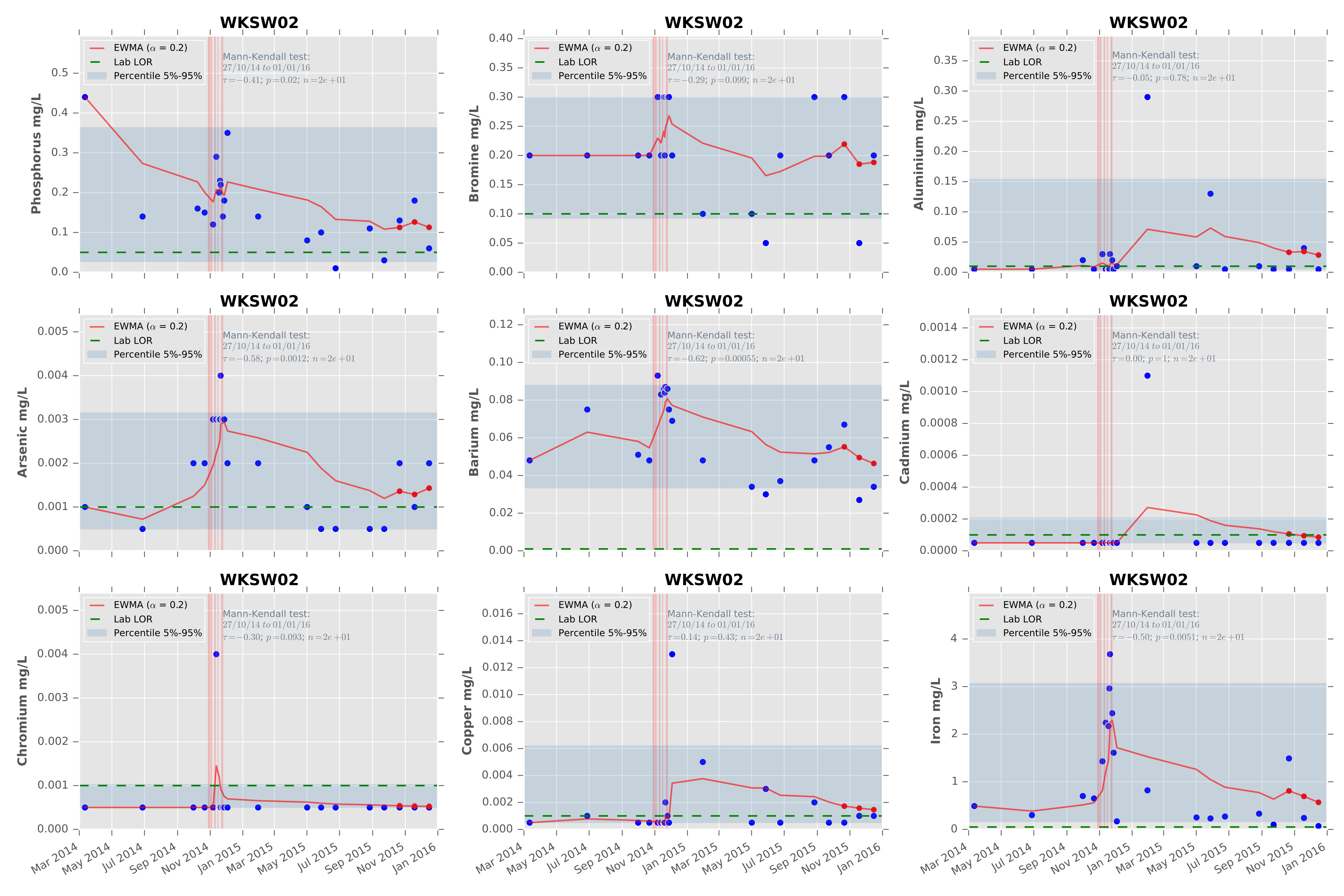
WKSW01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Butane µg/L
WKSW01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Propane µg/L
WKSW01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.50; p=0.0053; n=2e+01
Total Organic Carbon mg/L
WKSW01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
TRH_C10-C36 µg/L
WKSW01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
TPH C6-C10 µg/L
WKSW01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
PAH_total ug/L
WKSW01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Naphthalene µg/L
WKSW01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Acenaphthene µg/L
WKSW01
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Fluorene µg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016


WKSW01
Phenanthrene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
WKSW01
2,4-dimethylphenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
WKSW01
2-methylphenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
WKSW01
3-&4-methylphenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
WKSW01
Phenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
WKSW01
1,2,4-trimethylbenzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
WKSW01
1,3,5-trimethylbenzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
WKSW01
2-butanone (MEK) µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
WKSW01
Carbon disulfide µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

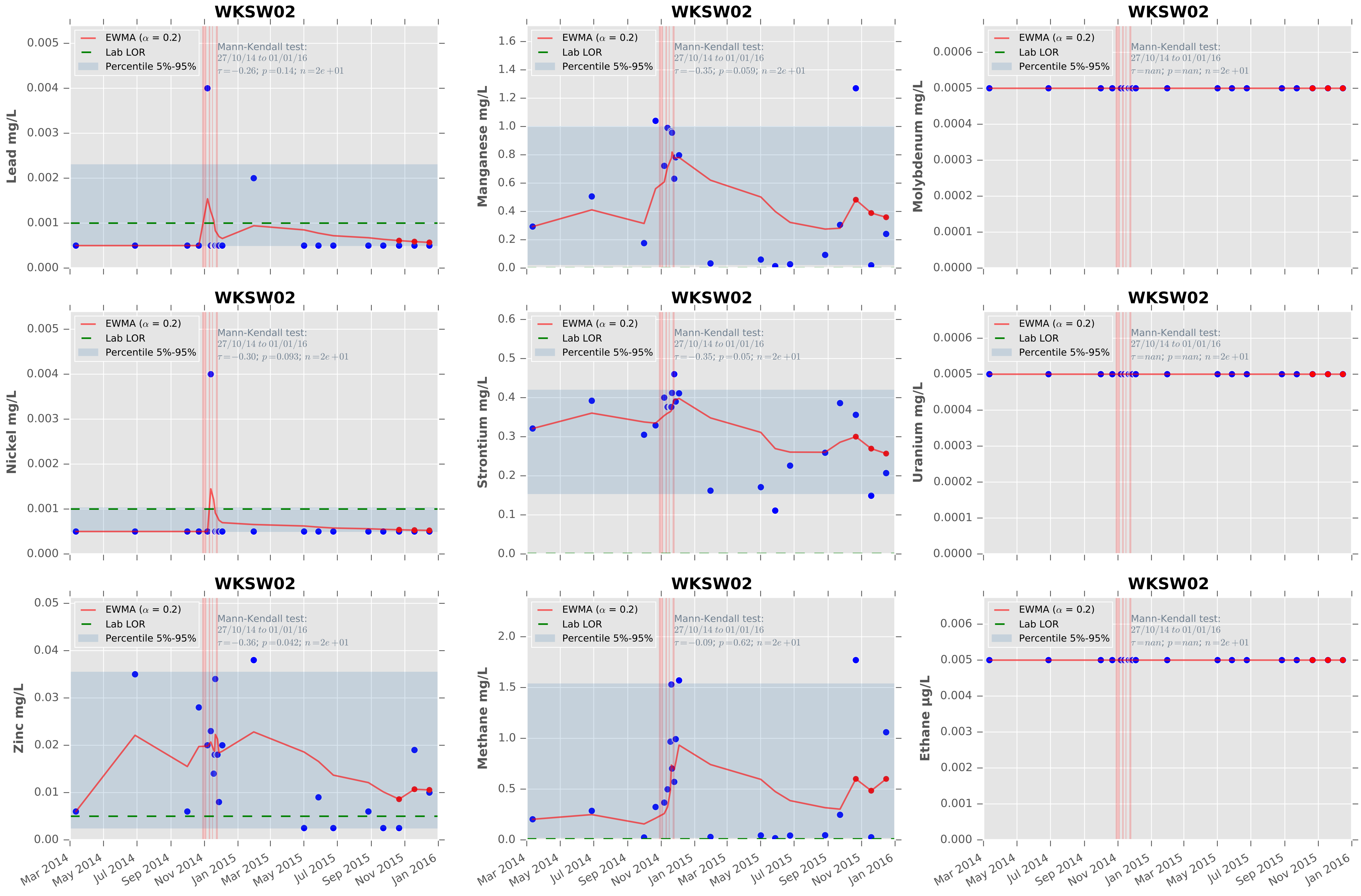

WKSW02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = -0.19$; $p = 0.28$; $n = 2e+01$
EC_25C µS/cm
WKSW02
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = -0.17$; $p = 0.34$; $n = 2e+01$
Diethanolamine µg/L
WKSW02
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = -0.09$; $p = 0.62$; $n = 2e+01$
Ethanolamine µg/L
WKSW02
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = nan$; $p = nan$; $n = 2e+01$
Methyldiethanolamine µg/L
WKSW02
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = -0.02$; $p = 0.93$; $n = 2e+01$
Boron mg/L
WKSW02
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = -0.52$; $p = 0.0033$; $n = 2e+01$
Chlorine_free mg/L
WKSW02
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = -0.60$; $p = 0.00075$; $n = 2e+01$
Chlorine_res mg/L
WKSW02
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = nan$; $p = nan$; $n = 2e+01$
Total_BTEX µg/L
WKSW02
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = nan$; $p = nan$; $n = 2e+01$
Benzene µg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016


WKSW02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Toluene µg/L
WKSW02
Ethylbenzene µg/L
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
WKSW02
Xylene Total µg/L
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
WKSW02
TDS mg/L
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.26; p=0.14; n=2e+01
WKSW02
pH_Field pH_Units
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.32; p=0.099; n=2e+01
WKSW02
Redox_Field mV
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.25; p=0.18; n=2e+01
WKSW02
Alk_CaCO3 mg/L
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.16; p=0.36; n=2e+01
WKSW02
SO4_turb mg/L
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.11; p=0.55; n=2e+01
WKSW02
Chloride mg/L
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.16; p=0.36; n=2e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

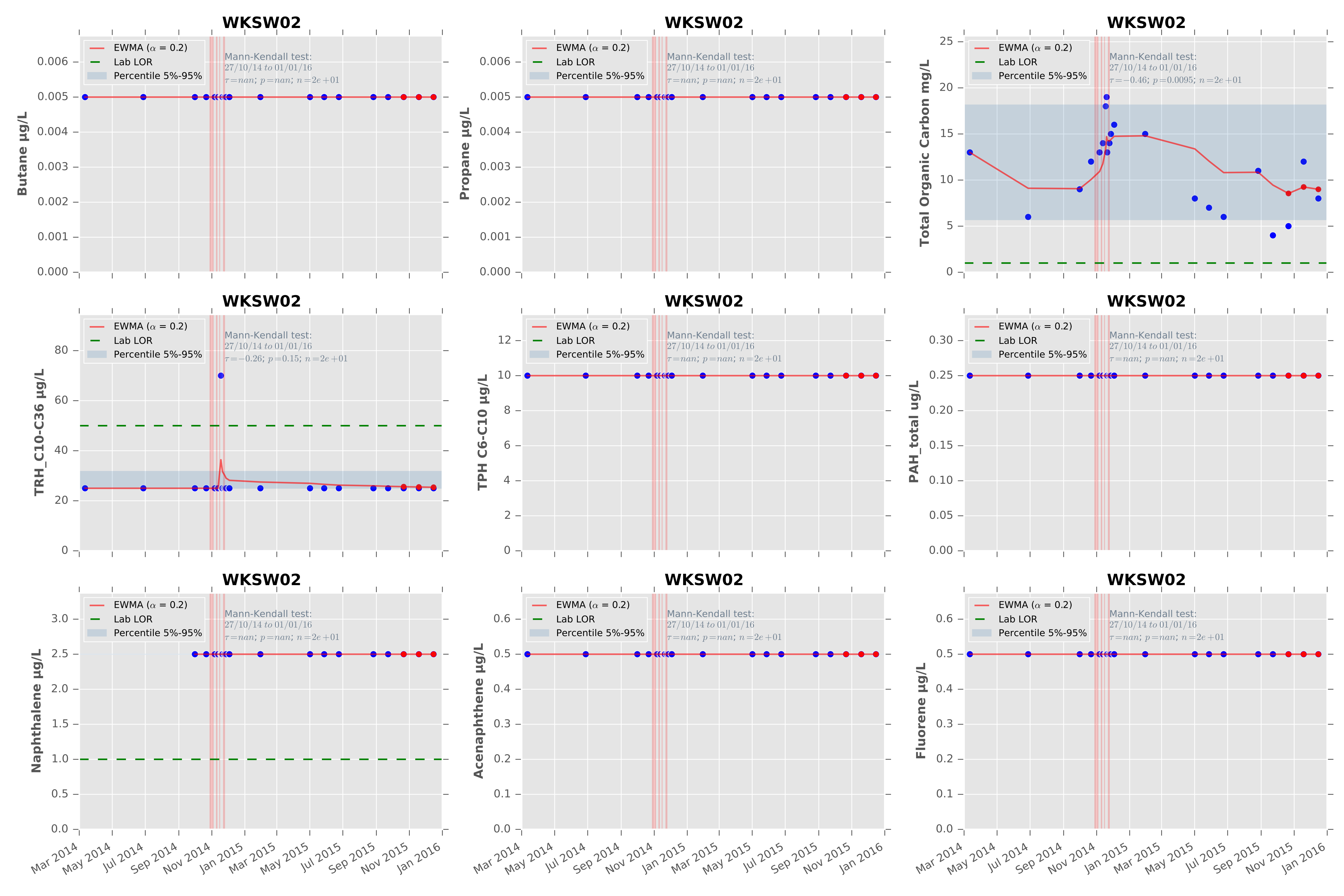

WKSW02
Calcium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.20; p=0.26; n=2e+01
WKSW02
Sodium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.22; p=0.21; n=2e+01
WKSW02
Potassium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.04; p=0.83; n=2e+01
WKSW02
Magnesium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.18; p=0.33; n=2e+01
WKSW02
Reactive Silica mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.32; p=0.07; n=2e+01
WKSW02
Ammonia as N mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.19; p=0.28; n=2e+01
WKSW02
Nitrate (as N) mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.22; p=0.22; n=2e+01
WKSW02
Nitrogen (Total) mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.26; p=0.14; n=2e+01
WKSW02
Reactive Phosphorus mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.28; p=0.11; n=2e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016



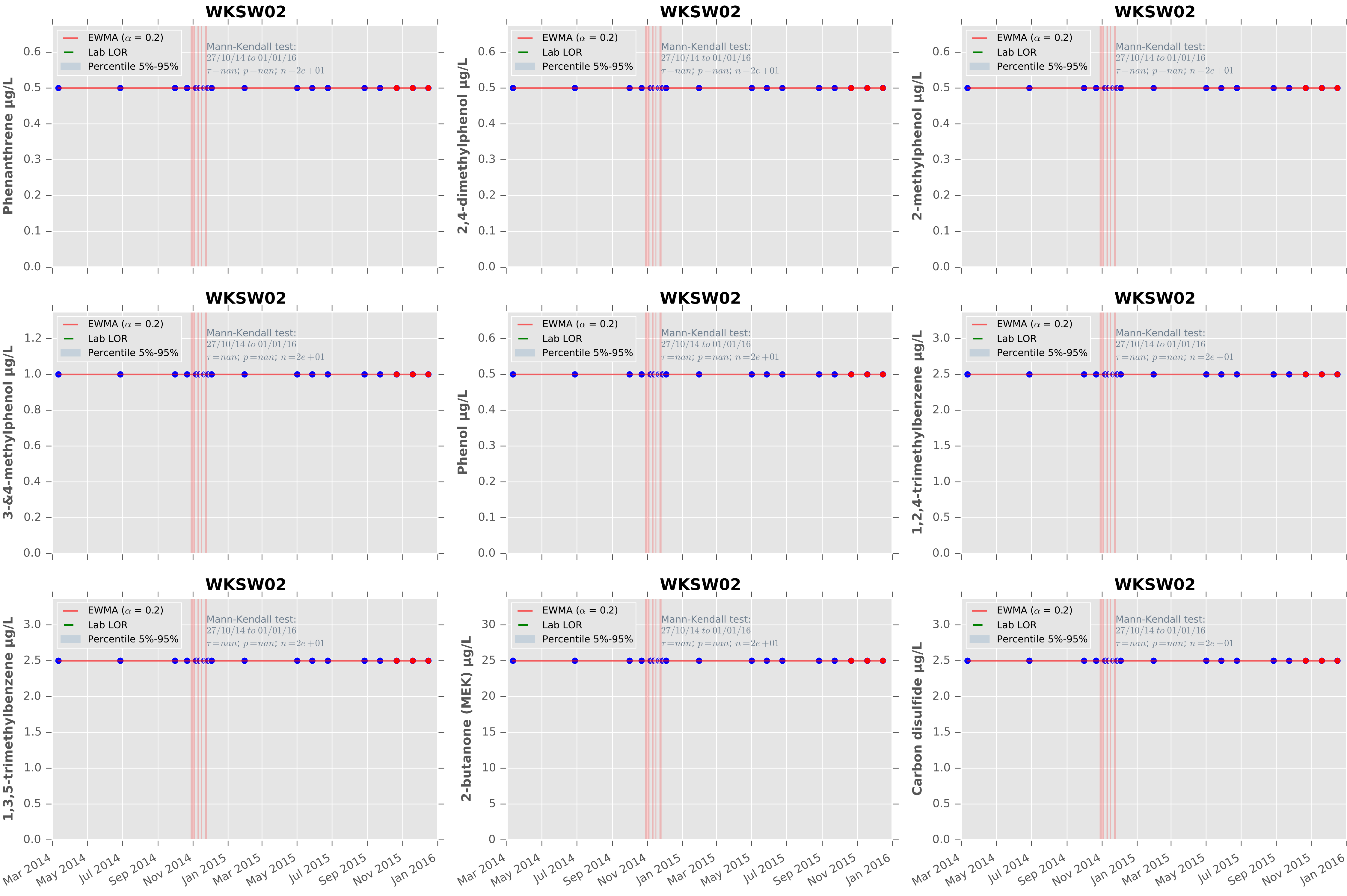
WKSW02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=-0.41$; $p=0.02$; $n=2e+01$
Phosphorus mg/L
WKSW02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=-0.29$; $p=0.099$; $n=2e+01$
Bromine mg/L
WKSW02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=-0.05$; $p=0.78$; $n=2e+01$
Aluminium mg/L
WKSW02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=-0.58$; $p=0.0012$; $n=2e+01$
Arsenic mg/L
WKSW02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=-0.62$; $p=0.00055$; $n=2e+01$
Barium mg/L
WKSW02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=0.00$; $p=1$; $n=2e+01$
Cadmium mg/L
WKSW02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=-0.30$; $p=0.093$; $n=2e+01$
Chromium mg/L
WKSW02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=0.14$; $p=0.43$; $n=2e+01$
Copper mg/L
WKSW02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=-0.50$; $p=0.0051$; $n=2e+01$
Iron mg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016



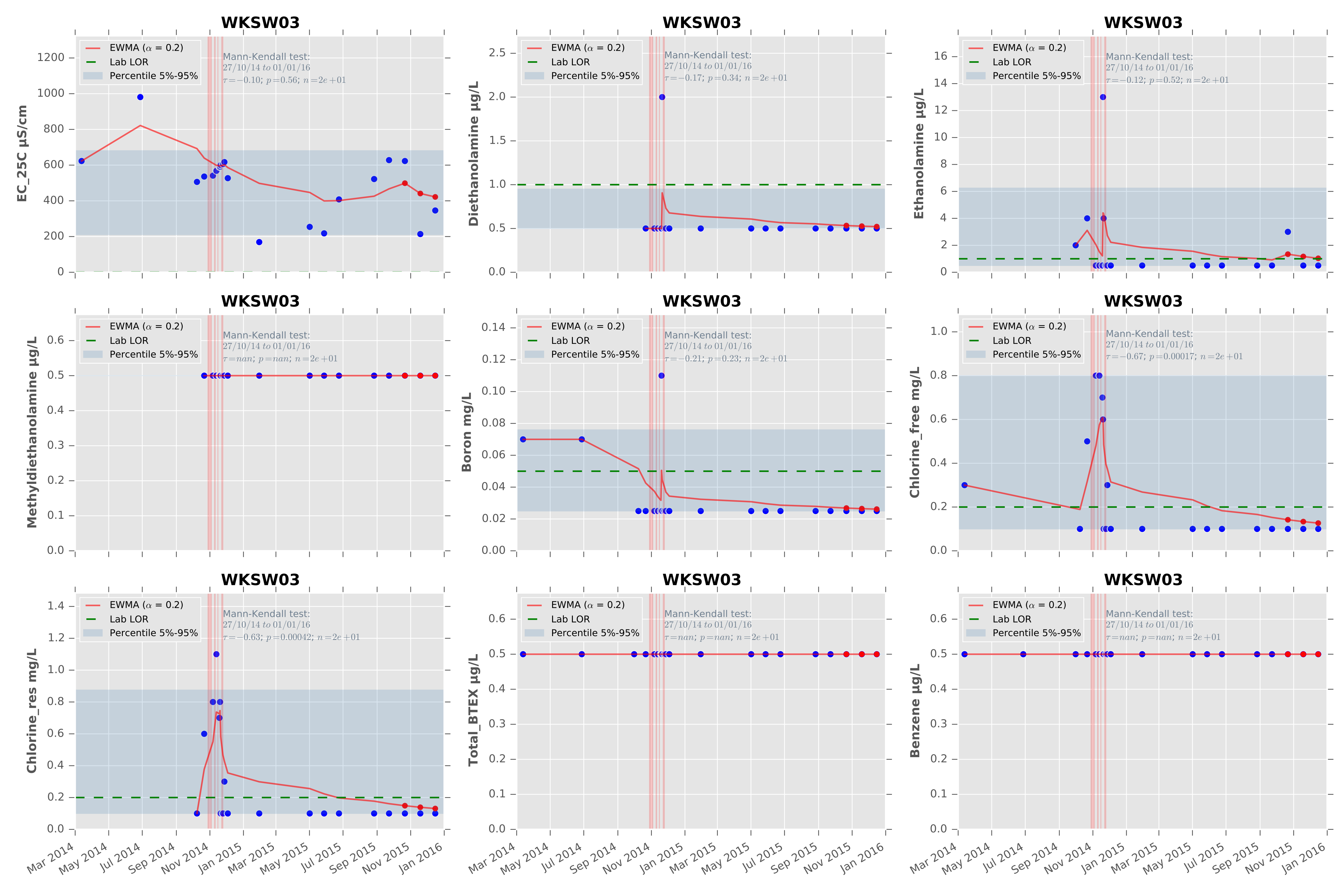
WKSW02
Lead mg/L
Manganese mg/L
Molybdenum mg/L
Nickel mg/L
Strontium mg/L
Uranium mg/L
Zinc mg/L
Methane mg/L
Ethane µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.26; p=0.14; n=2e+01
τ=−0.35; p=0.059; n=2e+01
τ=nan; p=nan; n=2e+01
τ=−0.30; p=0.093; n=2e+01
τ=−0.35; p=0.05; n=2e+01
τ=−0.36; p=0.042; n=2e+01
τ=−0.09; p=0.62; n=2e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

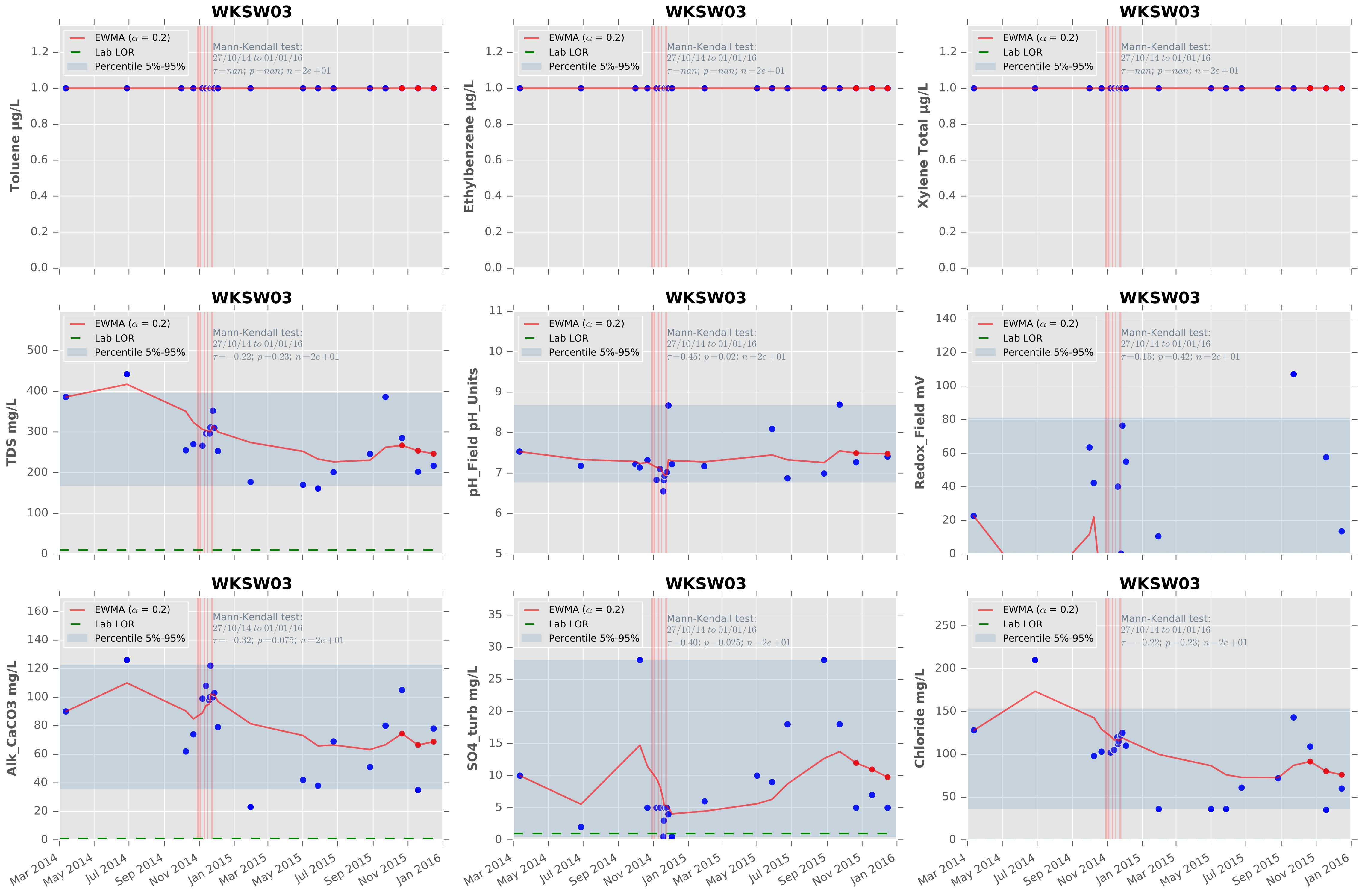


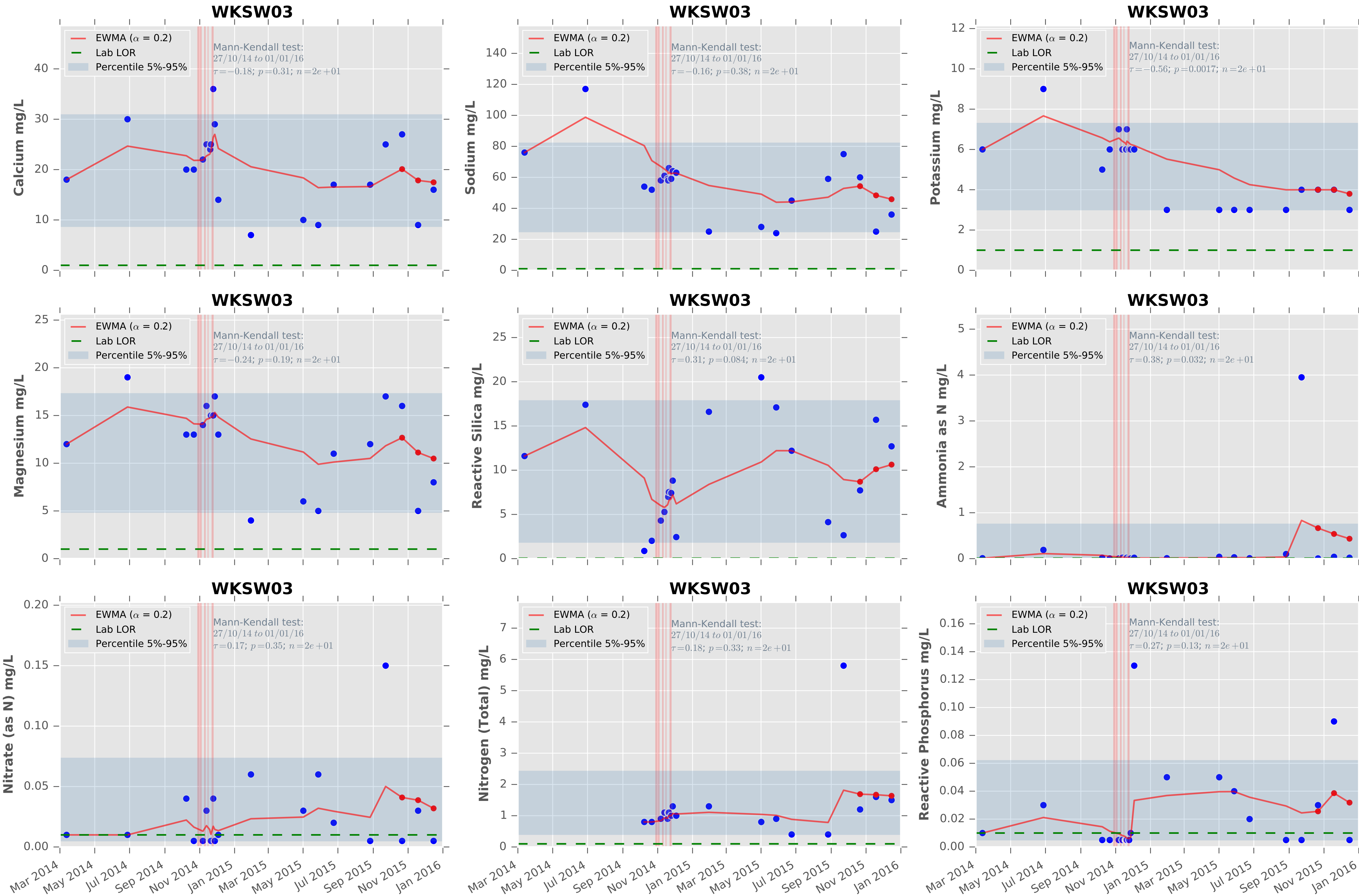
WKSW02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Butane µg/L
WKSW02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Propane µg/L
WKSW02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.46; p=0.0095; n=2e+01
Total Organic Carbon mg/L
WKSW02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.26; p=0.15; n=2e+01
TRH_C10-C36 µg/L
WKSW02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
TPH C6-C10 µg/L
WKSW02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
PAH_total ug/L
WKSW02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Naphthalene µg/L
WKSW02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Acenaphthene µg/L
WKSW02
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Fluorene µg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

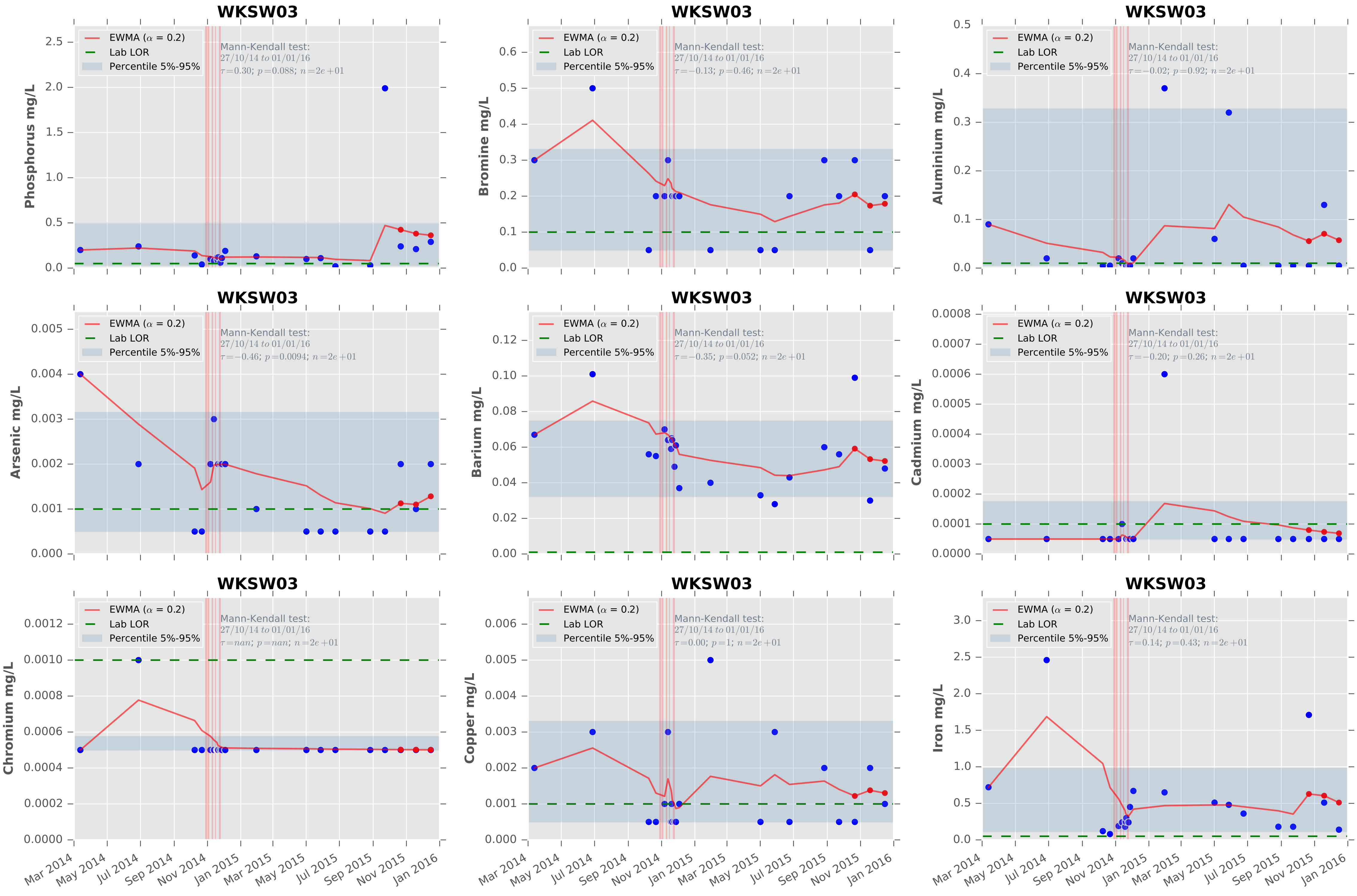


WKSW02
Phenanthrene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
WKSW02
2,4-dimethylphenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
WKSW02
2-methylphenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
WKSW02
3-&4-methylphenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
WKSW02
Phenol µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
WKSW02
1,2,4-trimethylbenzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
WKSW02
1,3,5-trimethylbenzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
WKSW02
2-butanone (MEK) µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
WKSW02
Carbon disulfide µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

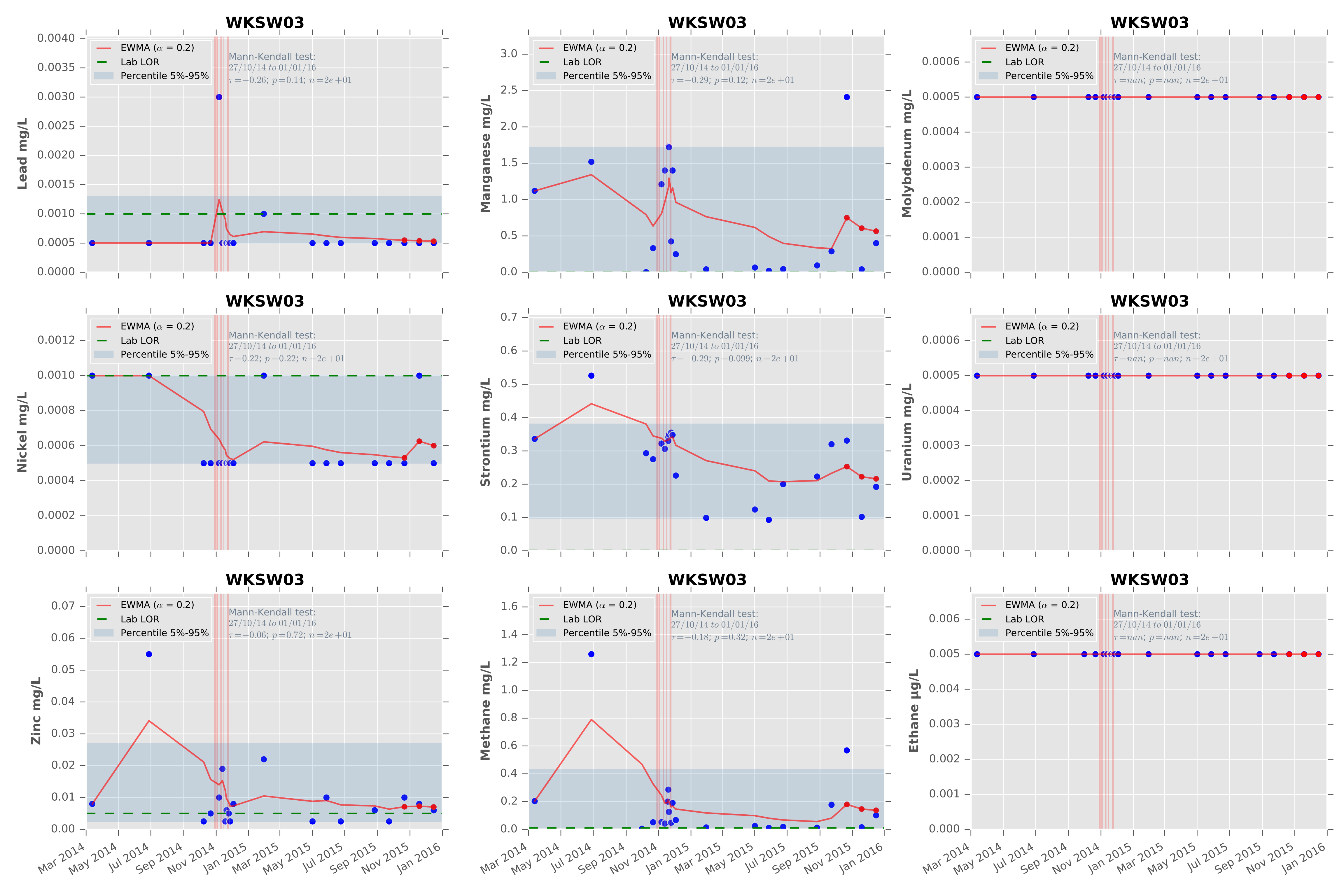

WKSW03
EC_25C µS/cm
Diethanolamine µg/L
Ethanolamine µg/L
Methyldiethanolamine µg/L
Boron mg/L
Chlorine_free mg/L
Chlorine_res mg/L
Total_BTEX µg/L
Benzene µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.10; p=0.56; n=2e+01
τ=−0.17; p=0.34; n=2e+01
τ=−0.12; p=0.52; n=2e+01
τ=nan; p=nan; n=2e+01
τ=−0.21; p=0.23; n=2e+01
τ=−0.67; p=0.00017; n=2e+01
τ=−0.63; p=0.00042; n=2e+01
τ=nan; p=nan; n=2e+01
τ=nan; p=nan; n=2e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016


WKSW03
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Toluene µg/L
WKSW03
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Ethylbenzene µg/L
WKSW03
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Xylene Total µg/L
WKSW03
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.22; p=0.23; n=2e+01
TDS mg/L
WKSW03
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.45; p=0.02; n=2e+01
pH_Field pH_Units
WKSW03
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.15; p=0.42; n=2e+01
Redox_Field mV
WKSW03
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.32; p=0.075; n=2e+01
Alk_CaCO3 mg/L
WKSW03
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.40; p=0.025; n=2e+01
SO4_turb mg/L
WKSW03
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.22; p=0.23; n=2e+01
Chloride mg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

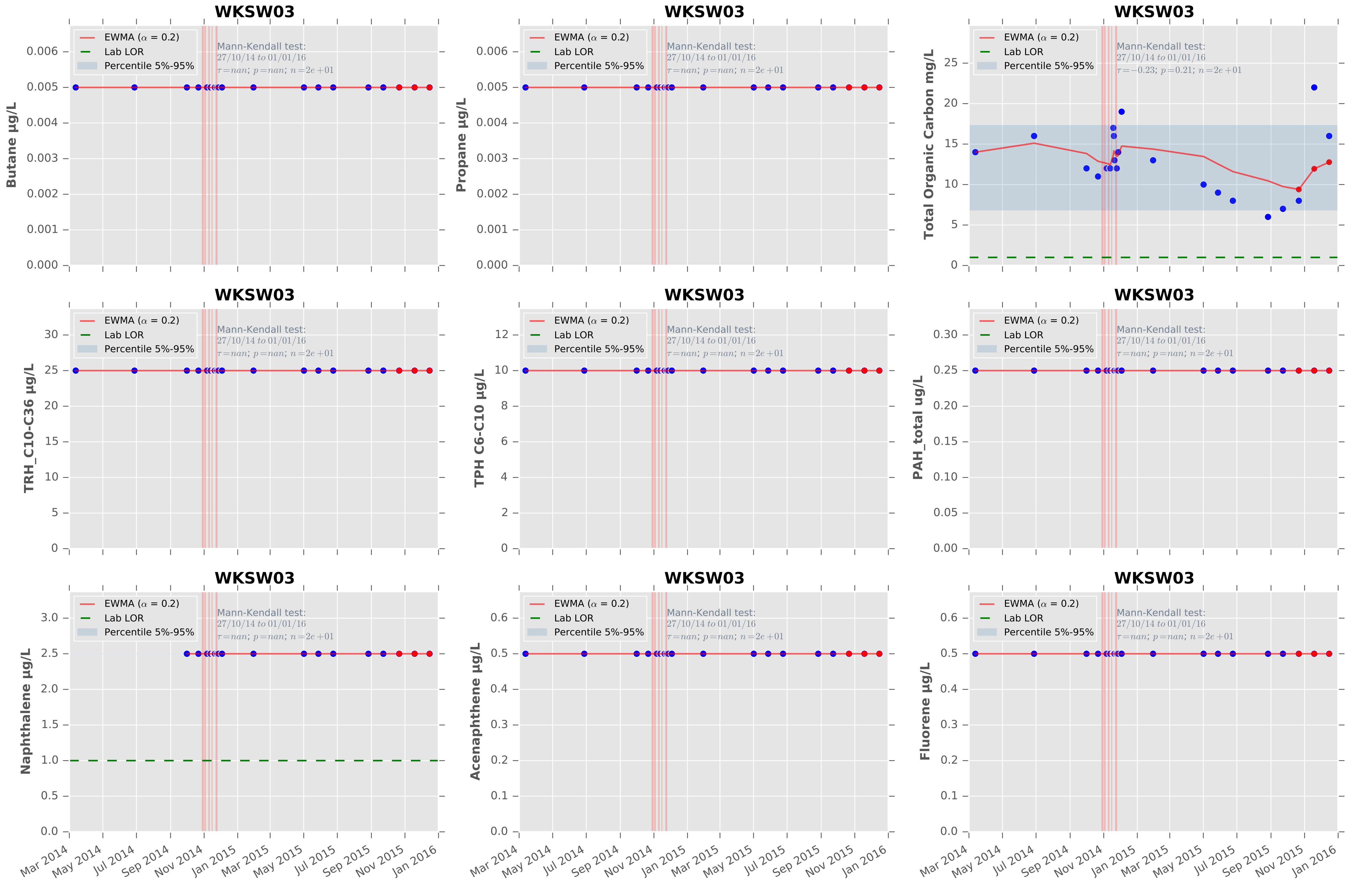

WKSW03
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=-0.18$; $p=0.31$; $n=2e+01$
Calcium mg/L
WKSW03
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=-0.16$; $p=0.38$; $n=2e+01$
Sodium mg/L
WKSW03
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=-0.56$; $p=0.0017$; $n=2e+01$
Potassium mg/L
WKSW03
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=-0.24$; $p=0.19$; $n=2e+01$
Magnesium mg/L
WKSW03
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=0.31$; $p=0.084$; $n=2e+01$
Reactive Silica mg/L
WKSW03
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=0.38$; $p=0.032$; $n=2e+01$
Ammonia as N mg/L
WKSW03
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=0.17$; $p=0.35$; $n=2e+01$
Nitrate (as N) mg/L
WKSW03
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=0.18$; $p=0.33$; $n=2e+01$
Nitrogen (Total) mg/L
WKSW03
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau=0.27$; $p=0.13$; $n=2e+01$
Reactive Phosphorus mg/L
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016

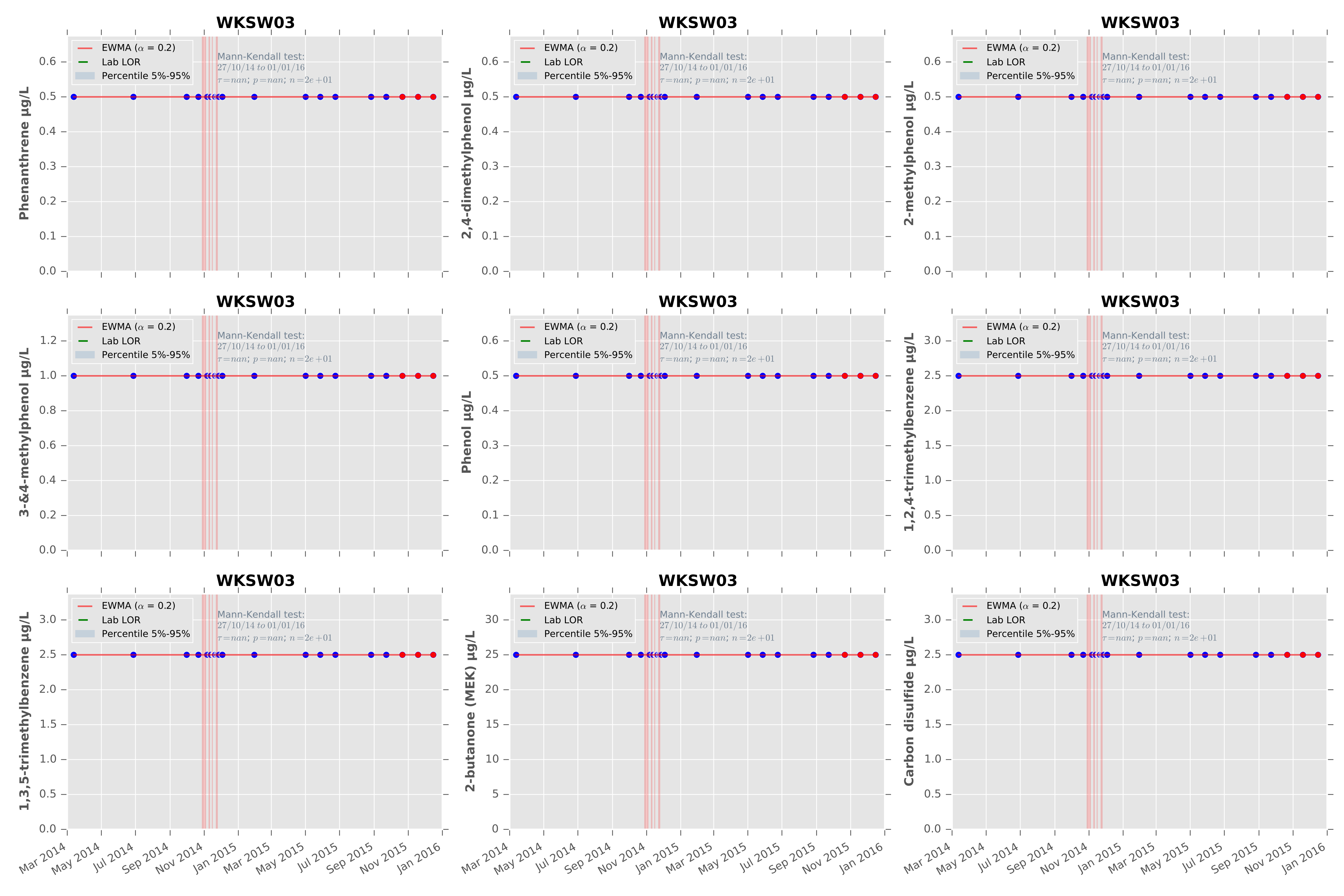


WKSW03
Phosphorus mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.30; p=0.088; n=2e+01
WKSW03
Bromine mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.13; p=0.46; n=2e+01
WKSW03
Aluminium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.02; p=0.92; n=2e+01
WKSW03
Arsenic mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.46; p=0.0094; n=2e+01
WKSW03
Barium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.35; p=0.052; n=2e+01
WKSW03
Cadmium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.20; p=0.26; n=2e+01
WKSW03
Chromium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
WKSW03
Copper mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.00; p=1; n=2e+01
WKSW03
Iron mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.14; p=0.43; n=2e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016



WKSW03
Lead mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.26; p=0.14; n=2e+01
WKSW03
Manganese mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.29; p=0.12; n=2e+01
WKSW03
Molybdenum mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
WKSW03
Nickel mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=0.22; p=0.22; n=2e+01
WKSW03
Strontium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.29; p=0.099; n=2e+01
WKSW03
Uranium mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
WKSW03
Zinc mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.06; p=0.72; n=2e+01
WKSW03
Methane mg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.18; p=0.32; n=2e+01
WKSW03
Ethane µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016


WKSW03
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Butane µg/L
0.000
0.001
0.002
0.003
0.004
0.005
0.006
WKSW03
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Propane µg/L
0.000
0.001
0.002
0.003
0.004
0.005
0.006
WKSW03
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=−0.23; p=0.21; n=2e+01
Total Organic Carbon mg/L
0
5
10
15
20
25
WKSW03
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
TRH_C10-C36 µg/L
0
5
10
15
20
25
30
WKSW03
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
TPH C6-C10 µg/L
0
2
4
6
8
10
12
WKSW03
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
PAH_total ug/L
0.00
0.05
0.10
0.15
0.20
0.25
0.30
WKSW03
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Naphthalene µg/L
0.0
0.5
1.0
1.5
2.0
2.5
3.0
WKSW03
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Acenaphthene µg/L
0.0
0.1
0.2
0.3
0.4
0.5
0.6
WKSW03
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
τ=nan; p=nan; n=2e+01
Fluorene µg/L
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016


WKSW03
Phenanthrene µg/L
2,4-dimethylphenol µg/L
2-methylphenol µg/L
3-&4-methylphenol µg/L
Phenol µg/L
1,2,4-trimethylbenzene µg/L
1,3,5-trimethylbenzene µg/L
2-butanone (MEK) µg/L
Carbon disulfide µg/L
EWMA (α = 0.2)
Lab LOR
Percentile 5%-95%
Mann-Kendall test:
27/10/14 to 01/01/16
$\tau = nan$; $p = nan$; $n = 2e+01$
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016