



ROTTNEST IS

PROGRAMMED
Facility Management

Programmed Facility Management

for the

Rottnest Island Authority

Annual Drinking Water Report

Rottnest Island Authority

July 2017 – June 2018





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Foreword

The Rottnest Island Authority is committed to providing sustainable, high quality drinking water that consistently meets consumer expectations, the Australian Drinking Water Guidelines and other Regulatory requirements. Further details on Rottnest Island Authority's commitment to drinking water quality can be viewed in the [Rottnest Island Drinking Water Quality Policy](#), appendix 12.4.

The [Rottnest Island Management Plan 2014-19](#), Drinking Water Source Protection Plan, and Groundwater Licence Operating Strategy reflect this commitment and contain the strategies, procedures and processes to meet this objective.

Programmed Facility Management continues its partnership with the Rottnest Island Authority to provide facility management services to Rottnest Island. Hydraulics management is a component of the Utilities services performed by Programmed Facilities Management, which includes the production, monitoring and supply of drinking water.

The 2017 - 2018 Annual Water Quality Report shows that the Rottnest Island Authority and Programmed FM have remained consistent with previous years' performance in the management of the Drinking Water supply on Rottnest Island. Rottnest Island maintained 100% microbiological compliance and in relation to chemical and physical characteristics the majority of microbiological test results were within the Australian Drinking Water Guidelines with the exception of a number of matters which are addressed later in the report.

Submission Approval

This Annual Report describes Rottnest Island's drinking water quality performance for the 2017 - 2018 reporting period. The Rottnest Island Authority is committed to being transparent on its performance by providing the public with accurate and representative information in this report. The report aims to demonstrate to Rottnest Island residents, customers, guests and visitors, the ongoing commitment to the sustainable production and supply of high quality drinking water on Rottnest Island.

| | |
|-------------|---|
| Date | 14 February 2019 |
| Signed |  |
| Name | Jason Banks |
| Designation | A / EXECUTIVE DIRECTOR |



1. Introduction

Rottnest Island is located 19km west of Fremantle, Western Australia, and is 11km long and 4.5km at its widest point. The total land area measures approximately 1,900 hectares, and is managed by the Rottnest Island Authority. Rottnest Island is a Class A Reserve and a popular destination for local, interstate and international visitors.

Water production facilities include fresh and saline groundwater bores, desalination plant, potable water storage tanks, and distribution system. The distribution and supply to customers is via a reticulated network. Programmed Facilities Management (PFM) is contracted by the Rottnest Island Authority (RIA) to manage the production, distribution and monitoring of the drinking water supply to customers, Rottnest Island residents, customers, guests and visitors.

The primary source of water processed through the desalination plant is obtained from six saline production bores located within the Longreach Bay Borefield. Should abnormal operating conditions occur, Rottnest Island has the capability to source additional water from a fresh water aquifer known as the Wadjemup Borefield. Abstraction from the Wadjemup Borefield will only be undertaken in emergency situations to minimise impact to Rottnest Island diverse environmental requirements.

For the 2017 - 2018 reporting period, the total annual water production was 139,077 kL. This is an increase of 13,500 kL drinking water production compared to 2016-17 which was 125,577 kL. The primary feed water to the desalination plant was abstracted from the Longreach saline borefield.

During the 2017 - 2018 reporting period the RIA and PFM conducted additional health monitoring of the Rottnest Island potable distribution system following a request from the Department of Health (DoH) to participate in a voluntary monitoring program for bromate, as part of a broader state-wide study undertaken by the DoH, across several potable drinking water sites in WA.

The additional monitoring characteristics revealed that Bromate was present in Rottnest Island's drinking water distribution system, resulting in the implementation of a Bromate Remediation Plan executed in collaboration between the Rottnest Island Authority, Programmed FM, and supported by the Department of Health. The interim controls implemented in early 2018 proved to be effective in managing Bromate in the drinking water distribution system, returning bromate levels below the Australian Drinking Water Guidelines health limits by the end of March 2018.



1.2 Policy and Commitment

The Rottnest Island Authority is committed to the effective management of the drinking water; providing safe, high quality drinking water supply to consumers on Rottnest Island.

Rottnest Island Authority Drinking Water Policy is committed to:

- Manage water quality at all points along the delivery chain from source water to the consumer;
- Use a risk based approach in which potential threats to water quality are identified and balanced;
- Integrate the needs and expectations of our consumers, stakeholders, regulator and employees into our planning;
- Establish regular monitoring of the quality of drinking water and effective reporting mechanisms to provide relevant and timely information, and promote confidence in the water supply and its management;
- Develop appropriate contingency planning and incident response capability;
- Continually improve our practices by assessing performance against corporate commitments and stakeholder expectations; and
- Ensure that when contracting parties to provide drinking water services on behalf of Rottnest Island Authority that the parties are contracted to deliver on these policy objectives.

Programmed Facility Management (FM) as the contracted Facilities Manager is responsible for overseeing the safe delivery of drinking water and maintaining effective systems for managing drinking water quality and risks, ensuring compliance requirements are aligned with the documented controls and approved Rottnest Island Authority Drinking Water Quality Management Plan.

The objective of the Rottnest Island Authority Drinking Water Quality Policy is to outline the roles, responsibilities and supporting processes and procedures that will enable the delivery of high quality drinking water throughout Rottnest Island.

A copy of the Rottnest Island Authority Drinking Water Quality Policy is available to view on the Rottnest Island Authority website.

1.3 Drinking Water Quality Management

The Drinking Water Quality Management Plan is the principle framework document used by Rottnest Island Authority and Programmed FM to implement the effective management of the Drinking Water Distribution system on Rottnest Island. The Drinking Water Quality Management Plan forms part of the Memorandum of Understanding between the Rottnest Island Authority and the Department of Health, and is supported by the Drinking Water Binding protocols. The Drinking Water Quality Management Plan framework also includes the Drinking Water Incident Response Protocols and other statutory documentation required to ensure compliance with the Australian Drinking Water Guidelines.

The Australian Drinking Water Guidelines are published and updated by the National Health and Medical Research Council, Australia's peak health research body on Australian Drinking Water. The Australian Drinking Water Guidelines are the national standard for Australian Drinking Water; requiring a risk management framework to be established for the effective management of drinking water supplies in Australia.



A copy of the [Memorandum of Understanding](#) is available to view on the Rottnest Island Authority website.

The Australian Drinking Water Guidelines published by the National Health and Medical Research Council, Australia's peak health research body, provides an authoritative reference on what defines safe, good quality drinking water, how it can be achieved and how it can be assured. The Australian Drinking Water Guidelines can be downloaded from:

<https://nhmrc.gov.au/about-us/publications/australian-drinking-water-guidelines>

A key aspect of the Australian Drinking Water Guidelines is a risk management approach. This approach is aimed at ensuring the Australian Drinking Water Guidelines are achieved from the water source, to points of consumption. This ensures, and requires, that there is a monitoring program established with appropriate sampling points throughout the distribution system. This approach enables a true representation of water quality throughout the distribution system, whilst providing a robust tool for identifying preventative and corrective actions for the improvement of water quality.

The Australian Drinking Water Guidelines recognise the significance of a preventative, multi-barrier approach for the protection of public health in drinking water supplies, and have incorporated a framework for management of drinking water quality. This addresses four general areas and includes twelve elements considered good practice in the systematic management of drinking water supplies.

A Drinking Water Quality Management Plan has been developed for Rottnest Island, utilising the elements within the Australian Drinking Water Guidelines – Framework for the Management of Drinking Water Quality.

The Drinking Water Quality Management Plan is an important requirement of the Memorandum of Understanding, and has included a detailed risk assessment for each element of the system including:

- Wadjemup (freshwater) and Longreach (saline) Bore fields
- Desalination Plant
- Storage Tanks
- Treatment System (Chlorination)
- Pumping System
- Distribution and Reticulation system
- Water Sampling and monitoring points

To ensure that the production, monitoring, supply and management of Rottnest Island's drinking water supply continues to remain of high quality, the Drinking Water Quality Management Plan is reviewed at set frequencies.


Presently, the Drinking Water Quality Management Plan is undergoing review with the Department of Health. As the Rottnest Island Authority is committed to ensuring high quality drinking water, any opportunities for improvement identified during this review period will be investigated and assessed for future implementation.

Where changes are made to the Drinking Water Quality Management Plan, these will be presented within subsequent Quarterly and Annual Drinking Water Reports.

1.4 Memorandum of Understanding

April 2012 saw the commencement of a Memorandum of Understanding (MoU) between the Department of Health and Rottnest Island Authority. This commitment to the Memorandum of Understanding by both parties ensures a strong cooperative relationship for the management of drinking water and the protection of public health.

Another important component of the Memorandum of Understanding is the requirement for the Licensee (Rottnest Island Authority) to notify the Department of Health of the provision of other forms of water supply. That is, the supply of water not intended for drinking purposes. The specific items pertaining to management of this commitment as described within the Memorandum of Understanding, and how these items are complied with on Rottnest Island, are detailed within the table below. Primarily, provision of non-potable water on Rottnest Island occurs for the toilet facilities at the western end of the island.

| Memorandum of Understanding and the Provision of Non-Drinking Water on Rottnest Island | |
|---|--|
| Ensure advice is given to customers and their tenants or guests that this water supply is not to be used for drinking or food preparation. | Where water provided is unsuitable for drinking/food preparation, public signage has been installed. Example provided below.  |
| Annual requirement by way of written reminders of water quality. Inspections to ensure affected taps are labelled with “non-drinking water”. | Water quality is reported annually and quarterly. Points have been labelled where the water provided is unsuitable for drinking. |
| If the Licensee provides non drinking water to open public space, areas accessible to general public or via standpipes, then adequate signage advising not suitable for drinking is required. | Where non drinking water is used in public open spaces, and areas accessible to the general public, appropriate signage has been installed clearly stating non-drinking water is in use. |



2. Water Service Provider Information

| Rottnest Island Authority Contact Details | |
|--|--|
| Name of Company | Rottnest Island Authority |
| Company Address | 1st Floor E Shed, Victoria Quay, Fremantle WA 6160 |
| Company Phone | Ph (08) 9432 9300 Fax (08) 9432 9301 |
| Company Website | www.rotnnestisland.com |
| Company Email | rotnnest.compliance@dbca.wa.gov.au |
| A / Executive Director | Jason Banks |
| Manager Major Contracts | Eamonn Williams |
| Health Safety and Environmental Manager (PFM) | Krysia Witty |

2.1 System Information

2.1.1 Consumers

The water demand is highly seasonal and directly related to tenancy and visitation to Rottnest Island, water consumption fluctuates according to these seasons. Typically low consumption in winter and high in summer.

The number of beds available for Rottnest Island guests totals 2,150, with the average length of stay being 3.5 nights. In addition there are approximately 250 permanent residents on Rottnest Island, which also fluctuates with seasonal staffing demands. The above figures do not include visitors arriving by private marine transport. Visitors arriving by private marine access typically sleep on board their vessel, but have access to use Rottnest Island facilities from time to time during their visit.

In 2017 - 2018 there were over 734, 000 visits made to Rottnest Island with an average low season minimum of 23,990 visitors between June - August and an average high season maximum of 104,147 visitors between December - February.

In 2017 - 2018 there were 24 customers on Rottnest Island that were supplied through 421 connection points. This includes 9 shops and 5 public drinking fountains.

2.1.2 Distribution System & Water Supply

The drinking water quality characteristics are regularly monitored by the Programmed FM hydraulic technicians to ensure that drinking water produced on Rottnest Island meets the requirements of the Australian Drinking Water Guidelines. A schematical representation of the drinking water distribution system is provided in Figure 1.



The water demand on Rottnest Island is highly seasonal, with monthly consumption ranging from 7,000kL in July (low season) to 25,000kL in January (peak season). The combined storage capacity of the drinking water infrastructure is 14,000kL, which can maintain up to 28 days water storage reserve.

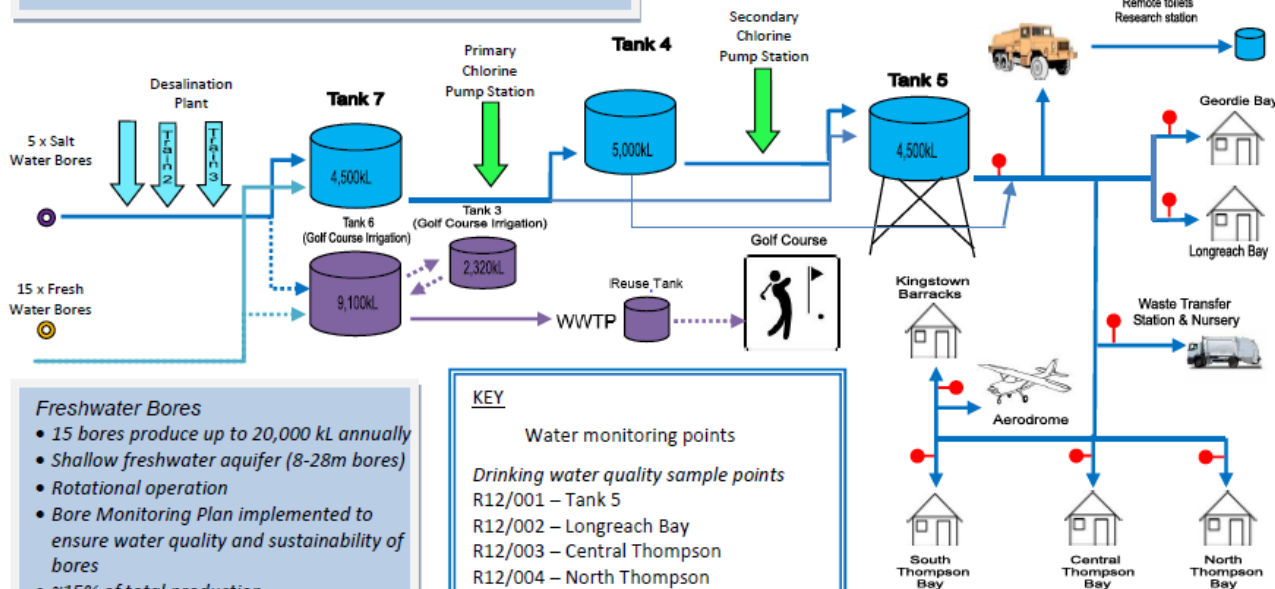
2.1.3 Sampling Schedule & Procedure

The Drinking Water Quality Management Plan details a comprehensive sampling schedule developed by a specialist consultant based on a risk management strategy and adopted by the Rottnest Island Authority and Programmed FM. The schedule includes 8 nominated sampling points throughout the distribution system. The nominated sample points allow for fair representation of the water supply on Rottnest Island.

The sampling locations are shown in Figure 1 – Diagram of Rottnest Island Water Distribution System.

Sampling and in-house monitoring procedures are carried out in accordance with best industry practice and executed by qualified hydraulics technician. Nominated samples in the sampling scheduled are analysed by an approved NATA laboratory based in Perth, in accordance with the requirements of the Department of Health.

Figure 1 - Rottneest Island Water Distribution System



Freshwater Bores

- 15 bores produce up to 20,000 kL annually
- Shallow freshwater aquifer (8-28m bores)
- Rotational operation
- Bore Monitoring Plan implemented to ensure water quality and sustainability of bores
- ~15% of total production

Saltwater Beach Bores

- 5 beach bores
- Supply desalination plant
- ~85 % of total production

Treatment Systems

- Filtering of saltwater to remove particulate matter
- Reverse osmosis (RO) desalination plant
- Three RO trains can produce 273,000kL/annum (750kL/day)
- Calcite filter after RO plant

KEY

Water monitoring points

Drinking water quality sample points

- R12/001 – Tank 5
- R12/002 – Longreach Bay
- R12/003 – Central Thompson
- R12/004 – North Thompson
- R12/005 – South Thompson
- R12/006 – Kingstown Barracks
- R12/007 – Geordie Bay
- R12/008 – Nursery

Demand

- 500,000 visitors annually
- 0 Monthly consumption 6,000 – 25,000kL
- Winter demand 250kL/day
- Summer demand 750kL/day

Storage

- Combined total potable operational tank capacity is 14,000 kL
- Treated disinfected water is stored in Tank 5
- KPI to maintain 14 days storage
- Maximum resistance time to maintain residual chlorine level 4.5 days
- Winter actual resistance time 115 days
- Summer actual resistance time 38 days
- Tank 5 must be closely controlled to maintain residual chlorine levels
- Tanks 6 & 3 store irrigation water for golf course usage

Quality Issues

- Water from freshwater bores of high quality and no treatment is required for irrigation purposes
- Saltwater bores subject to iron bacteria contamination

Disinfection

- Chlorine gas is a primary & secondary disinfection
- Dose before & after tank 4

Distribution System

- Gravity fed from Tank 5
- Bulk cartage to Wadjemup lighthouse tank, remote toilets & UWA house.
- Waste transfer station & Nursery site used for rubbish truck wash down facility and irrigation, is now monitored
- Remote water tanks not suitable for drinking are signed accordingly
- Potential to bypass Tank 4
- Potential to feed gravity feed from tank 4

3. Microbial Performance

The results in Section 3.1 summarise the outcome of microbial characteristics monitored during the 2017 - 2018 period. 100% compliance was reported at the 8 nominated sampling points in 2017 - 2018 maintaining the compliance rate set in 2016-17.

Of note, there was a microbial detection within Tank 4 in June 2018, an intermediary tank known as a Permeate tank, used to supply water to Tank 5.

Specific details are described in the below section 3.2 Microbial Incident Specific Information.

3.1 Microbial – Compliance Summary

| Rottnest Island Distribution System 2017 - 2018 | | | | |
|--|---|-----------------|--|--------------|
| Microbial Characteristic | Memorandum of Understanding Compliance Criteria | No. of Analyses | No. of Analyses Complying with Memorandum of Understanding | % Compliance |
| Bacterial | | | | |
| <i>E.coli</i> | Non Detect | 236 | 236 | 100% |
| Thermotolerant Coliforms | Non Detect | 236 | 236 | 100% |
| Amoeba | | | | |
| Thermophilic <i>Naegleria</i> | Non Detect | 114 | 114 | 100% |

3.2 Microbial Incident Specific Information

There were no recorded microbial non-conformances for *E.coli*, Thermotolerant Coliforms or Thermophilic *Naegleria* at the 8 nominated sample points during the 2017 - 2018 reporting period.

However, sampling undertaken at the intermediary Tank 4 on 19 June 2018 returned a microbial detect for *E.coli* and Thermotolerant Coliforms, both recorded at 24 colony-forming units (cfu)/100 mL. The incident was managed by the hydraulics team over a two-week period with the resulting investigation having identified a failure in the primary chlorination treatment process between Tank 7 and Tank 4. The system was promptly rectified with microbial characteristics returning to below detection limits by 26 June 2018. The DoH was notified of the exceedances on 25 June when upon detection.

The disinfection system between Tank 4 and Tank 5 remained in good working order and was found to be effective in preventing microbial contamination to Tank 5.

All sample locations within the distribution system remained below the microbial detection limit (0 cfu/100 mL) during this time.



Tank 7 has returned *E.coli* and Thermotolerant Coliform exceedances, mainly following heavy rainfall events. Prevention methods are currently under investigation and findings expected to be reported in the 2018 – 2019 period.

Water from tank 7 undergoes two stages of disinfection during transfer from tank 7 to tank 4 and then to tank 5.

Both transfer/chlorination stations are scheduled for full replacement in the Second quarter of 2018 - 19.

4. Chemical: Health Related Performance

The results in Section 4.1 summarise the outcome of Health related characteristics monitored during the 2017 - 2018 reporting period.

The Health characteristics monitored within the 8 nominated sampling points recorded 92% overall compliance with the Australian Drinking Water Guidelines. The reported exceedances were all related to the discovery of Bromate in the drinking water system following a voluntary participation by Rottnest Island in a broader state-wide study undertaken by the Department of Health across several potable drinking water sites in WA.

Specific details are described in the below section 4.2 Health Related Incident Specific Information.

4.1 Chemical: Health Related – Compliance Summary

| Rottnest Island Distribution System 2017 - 2018 | | | | | |
|--|-----------------------|-----------------|-------------------------------------|------------------------|------------------------------|
| Health Characteristic | ADWG Guideline (mg/L) | No. of Analyses | No. of Analyses Complying with ADWG | % Compliance with ADWG | Max Value of Analysis (mg/L) |
| Antimony (Sb) | 0.003 | 25 | 25 | 100% | 0.001 |
| Bromate | 0.02 | 198 | 138 | 70% | 0.26 |
| Cadmium (Cd) | 0.002 | 25 | 25 | 100% | 0.0001 |
| Chlorine (Cl) | 5 | 208 | 208 | 100% | 1.9 |
| Copper (Cu) | 2 | 26 | 26 | 100% | 0.078 |
| ^A Fluoride (F) | 1.5 | 3 | 3 | 100% | 0.1 |
| Lead (Pb) | 0.01 | 25 | 25 | 100% | 0.002 |
| Manganese (Mn) | 0.5 | 93 | 93 | 100% | 0.064 |
| Nickel (Ni) | 0.02 | 25 | 25 | 100% | 0.001 |
| Nitrate (NO ₃) (Nitrate as nitrate) | 50 | 18 | 18 | 100% | 0.5 |
| Nitrite (NO ₂) | 3 | 42 | 42 | 100% | 0.5 |
| ^B Trihalomethanes (THM) | 0.25 | 46 | 46 | 100% | 0.022 |

Notes: ^A Fluoride is sometimes naturally occurring in groundwater. Fluoride is not added to the drinking water on Rottnest.

^B Trihalomethanes can be present in drinking water as a by-product of chlorination or chloramination. Chlorine is the only source of disinfection currently used on Rottnest.

4.2 Chemical: Health Related Incident Specific Information

The Health characteristics sampled during the 2017 - 2018 reporting period returned results comparable with those taken during the 2016-17 period, with No recorded exceedance recorded at the nominated 8 distribution system sample points.

A new Health characteristic was added to the agreed sampling characteristics during the year, following a request from the Department of Health to participate in a voluntary monitoring program for Bromate. 60 Bromate exceedances were recorded between December 2017 and March 2018 whilst an investigation into the presence of Bromate on Rottneest Island was undertaken by both the Rottneest Island Authority and Programmed FM. Theoretically, and based on current literature, Bromate should not be found in the Rottneest Island drinking water supply as the current method of disinfection utilised at the Rottneest Island Desalination plant does not include ozonation, a known factor in the production of Bromate.

The additional monitoring characteristics revealed that Bromate was prominent in Rottneest Island's drinking water distribution system. Initial results returned levels exceeding the Health values set in the Australian Drinking Water Guidelines. These reported findings resulted in the development and implementation of a Bromate Remediation Plan (BRP) being executed in collaboration between the Rottneest Island Authority, Programmed FM, and supported by the Department of Health and with additional industry best practice advice provided by the Water Corporation. The interim controls implemented in early 2018 proved to be effective with Bromate levels in the drinking water distribution system returning within the required limits by the end of March 2018.

Current controls implemented to manage Bromate are:

- Holding tank volume reduction: The reduced volume stored in each tank lowers the retention time in which bromate could develop from bromide ions.
- Chlorine Automation upgrade: Scheduled installation of an automated chlorine dosing system to reduce the risk of over chlorination when done manually. Over chlorinating of water is believed to be a contributing factor in the production of Bromate in the drinking water system.
- Flushing regime: A flushing schedule was implemented to reduce quantity and duration of the drinking water remaining in the pipes during low occupancy period, specifically at known deadleg areas on the island. The holding time in pipes is also believed to be a contributing factor in the production of Bromate in the drinking water system.
- Review of Maintenance and Training: A review of the maintenance program and scheduled activities, along with specialist training with the hydraulics team in sampling techniques.

Sampling for Total Chlorine is recorded from daily readings of Tanks 4 and 5 and regular readings of four sample points across the Distribution System. Hence the difference in the Chlorine quantities recorded for the Aesthetic Internal sampling for Chlorine.

4.3 Special Interest Health & Aesthetic Compliance Summary for Drinking Fountains

The following table summarises the outcomes for the Special interest Drinking Water Quality Monitoring Program completed at the Rottnest Island drinking fountains, for specific health and aesthetic related characteristics during the 2017 - 2018 reporting period.

| Rottnest Island Drinking Fountain Network 2017 - 2018 | | | | | |
|---|---|-----------------|---|--|------------------------------|
| Health Characteristic | Australian Drinking Water Guidelines (mg/L) | No. of Analyses | No. of Analyses Complying with Australian Drinking Water Guidelines | % Compliance with Australian Drinking Water Guidelines | Max Value of Analysis (mg/L) |
| Antimony (Sb) | 0.003 | 83 | 83 | 100% | <0.001 |
| Bromate | 0.02 | 62 | 43 | 69% | 0.17 |
| Cadmium (Cd) | 0.002 | 78 | 76 | 97% | 0.015 |
| Copper (Cu) | 2 | 85 | 83 | 98% | 4.7 |
| Lead (Pb) | 0.01 | 87 | 81 | 93% | 0.036 |
| Manganese (Mn) | 0.5 | 4 | 4 | 100% | <0.005 |
| Nickel (Ni) | 0.02 | 85 | 82 | 96% | 0.2 |
| Nitrate (NO ₃) (Nitrate as nitrate) | 50 | 18 | 18 | 100% | 0.5 |

There were several instances where analytical results exceeded the Health guidelines for chemical and physical properties on the first flush sample, with the second flush being within Australian Drinking Water Guidelines. Details are as follows:

- **Bromate:** 19 out of 62 samples reported Bromate concentrations above the Australian Drinking Water Guidelines health value of 0.02mg/L, with the highest concentration reported at 0.17mg/L.
- **Cadmium:** 2 out of 78 samples reported Cadmium concentrations over the Australian Drinking Water Guidelines characteristics for health quality of 0.002mg/L.
- **Copper:** 2 out of 85 samples reported copper concentrations above the Australian Drinking Water Guidelines health value of 2mg/L, with the highest concentration reported at 4.7mg/L.
- **Lead:** 6 out of 87 samples reported Lead concentrations over the Australian Drinking Water Guidelines characteristics for health quality of 0.01mg/L
- **Nickel:** 3 out of 85 samples reported Nickel concentrations over the Australian Drinking Water Guidelines characteristics for health quality of 0.02mg/L



For all instances of detected health results exceeding the Australian Drinking Water Guidelines limits, the drinking fountain was immediately taken out of service whilst an investigation was undertaken by the hydraulics team. Secondary sampling was taken and the drinking fountain returned to service once the health exceedance had been resolved.

| Rottnest Island Drinking Fountain Network 2017 - 2018 | | | | | |
|---|--|-----------------|--|---|------------------------------|
| Aesthetic Characteristic | Australian Drinking Water Guideline (mg/L) | No. of Analyses | No. of Analyses Complying with Australian Drinking Water Guideline | % Compliance with Australian Drinking Water Guideline | Max Value of Analysis (mg/L) |
| Chloride (Cl ⁻) | 250 | 22 | 22 | 100% | 180 |
| Iron (Fe) | 0.3 | 4 | 4 | 100% | 0.04 |
| Sodium (Na) | 180 | 32 | 32 | 100% | 120 |
| Sulphate | 250 | 22 | 22 | 100% | 3 |
| TDS | 600 | 36 | 36 | 100% | 390 |
| Zinc (Zn) | 3 | 83 | 83 | 100% | 1.3 |

Drinking fountains that continuously returned exceedance levels for health or aesthetic over the 2017-2018 reporting year were kept isolated from use. These drinking fountains were prioritised on the replacement list for the 2018 Drinking Fountain upgrade project.

5. Chemical: Aesthetic Performance

5.1 Chemical: Aesthetic – Compliance Summary

| Rottnest Island Distribution System 2017 - 2018 | | | | | |
|---|-----------------------|-----------------|-------------------------------------|------------------------|------------------------------|
| Aesthetic Characteristic | ADWG Guideline (mg/L) | No. of Analyses | No. of Analyses Complying with ADWG | % Compliance with ADWG | Max Value of Analysis (mg/L) |
| Aluminium (Al) | 0.2 | 10 | 10 | 100% | 0.01 |
| Ammonia (NH ₄) | 0.5 | 47 | 47 | 100% | 0.01 |
| Chloride (Cl) | 250 | 200 | 199 | 99.5% | 260 |
| Chlorine (Cl) | 0.6 | 205 | 41 | 20% | 1.73 |
| Colour | 15 (HU) | 25 | 25 | 100% | <5 |
| Hardness (CaCO ₃) | 200 | 4 | 4 | 100% | 17 |
| Iron (Fe) | 0.3 | 96 | 83 | 86% | 3.8 |
| pH | 6.5 - 8.5 | 172 | 148 | 86% | 9.66 |
| Sodium (Na) | 180 | 175 | 175 | 100% | 150 |
| Sulphate | 250 | 4 | 4 | 100% | 4 |
| Sulfide (H ₂ S) | 0.05 | 10 | 10 | 100% | <0.01 |
| Total Dissolved Solids | 600 | 5 | 5 | 100% | 500 |
| Turbidity | 5 (NTU) | 25 | 25 | 100% | 0.8 |
| Zinc (Zn) | 3 | 25 | 25 | 100% | 0.14 |

5.2 Chemical: Aesthetic Incident Specific Information

Whilst exceedances of aesthetic guidelines can affect consumer experience, it is important to note that exceedances to Aesthetic Guidelines do not pose a health risk.

There were several instances where analytical results exceeded the aesthetic guidelines for chemical and physical properties as follows:

- Chlorine:** 164 out of 205 samples reported chlorine concentrations above the Australian Drinking Water Guidelines aesthetic value of 0.6mg/L, with the highest concentration reported at 1.73mg/L in January 2018. This is likely a result of the manual chlorination disinfection process for the drinking water on Rottnest Island.

The Australian Drinking Water Guidelines states that chlorine has an aesthetic odour threshold of 0.6mg/L, however the reported concentrations exceeding this threshold do not pose any health risks, as values are generally below the specific health guideline value of 5.0mg/L.

Whilst impacts to aesthetic quality of drinking water may occur due to greater concentrations of chlorine, it is important to note that adequate disinfection is paramount for the provision of safe drinking water. No complaints were recorded during the year with regards to odour.

Sampling for Chlorine is taken as a free chlorine measurement from Daily Readings of Tanks 4 and 5 and weekly readings of 4 sample points across the Distribution System. Hence the difference in the Chlorine quantities recorded for the Health Internal sampling for Chlorine.

- **Chloride:** 1 of 200 samples reported a Chloride concentrations over the Australian Drinking Water Guidelines aesthetic value of 250mg/L.

The exceedance was recorded at R12/006 (Kingstown Barracks), at 260mg/L in October 2017.

No complaints were recorded during the year regarding water quality with no evidence of microbial activity present.

- **Iron:** 13 of 96 samples recorded iron concentrations above the Australian Drinking Water Guidelines aesthetic value of 0.3mg/L, with the highest concentration reported at 3.8mg/L at R12/005 (South Thomson) in March 2018.

R12/008 (Nurse/Stables) recorded 10 exceedances averaging 0.63mg/L with the highest concentration reported 0.97mg/L in February 2018.

R12/005 (South Thompson) recorded 2 exceedances over the reporting period, one in March 2018 at 3.8mg/L and the other in April 2018 at 1.6mg/L.

R12/007 (Geordie Bay) recorded 1 exceedance in August 2017 at 0.74mg/L.

All other samples were reported below the Australian Drinking Water Guidelines aesthetic range of 0.3mg/L for the 2017 – 2018 period.

Iron has a taste threshold of 0.3mg/L in water, and becomes objectionable above 3mg/L. No complaints were recorded during the year regarding taste quality during the reporting period.

Note:

Iron detection occurrences are expected to increase as pipeline infrastructure approach their end of serviceable life. Aging pipelines can attract growths of iron bacteria which cause high readings as the iron accumulates and becomes concentrated in the pipe. This can cause an undesirable rust-brown appearance, which can cause staining and may also cause taste and odour problems, along with other possible pipeline restrictions such as blockages and corrosion. Current monitoring schedule and management strategies will enable the Rottneast Island Authority and Programmed FM in identifying at risk infrastructure and take preventative measure.

- **pH:** 24 of 172 samples reported pH values outside the Australian Drinking Water Guidelines aesthetic pH range of 6.5 - 8.5. The exceedances for the 2017 - 2018 period were at the following locations:

R12/001 (Tank 5) reported 4 occurrence of pH values of 0.64, slightly below the recommended Australian Drinking Water Guidelines value of 6.5 for aesthetic quality during October and November 2017, with the last exceedance recorded in May 2018.

R12/002 (Longreach Bay) reported 10 exceedances of pH, with an average exceedance pH value of 9.5, above the recommended Australian Drinking Water Guidelines value of 8.5 for

aesthetic quality. The exceedances were recorded each month between December 2017 and May 2018.

R12/006 (Kingstown Barracks) reported 4 exceedances averaging a pH value 8.77, which is above than the recommended Australian Drinking Water Guidelines value of 8.5 for aesthetic quality. These exceedances were recorded in September, October and November 2017.

R12/007 (Geordie Bay) reported four exceedances averaging a pH value of 8.85, which is above the recommended Australian Drinking Water Guidelines value of 8.5 for aesthetic quality. These exceedances were reported in July and August 2017 with a final exceedance reported in May 2018.

R12/008 (Nurse/Stables) reported 2 exceedances averaging a pH value of 6.30, lower than the recommended Australian Drinking Water Guidelines value of 6.5 for aesthetic quality. These occurred in November 2017 and February 2018.

There were no complaints regarding water quality during the reporting period and no evidence of microbial activity present during this time. All other locations remained within the AWDG for the remainder of the 2017 - 2018 period.

The cause of higher pH can likely be attributed to long retention times in the water main and the infrastructure of the distribution system, being constructed partly of concrete tanks and cement-mortar lined pipes. The Australian Drinking Water Guidelines indicates that pipeline systems constructed of these materials can significantly increase pH, with higher values tolerated provided monitoring indicates no deterioration in microbial quality.

6. Radiological – Performance

Radiological sampling of Gross Alpha and Gross Beta was not required for the 2017 - 2018 period. These are scheduled to be conducted in March 2019 and will be reported during the appropriate reporting cycle.

6.1 Radiological – Compliance Summary

| Rottnest Island Distribution System 2017 – 2018 | | | | | |
|--|--|-----------------|---|--|------------------------------|
| Radiological Characteristic | Australian Drinking Water Guideline (Bq/L) | No. of Analyses | No. of Analyses Complying with Australian Drinking Water Guidelines | % Compliance with Australian Drinking Water Guidelines | Max Value of Analysis (Bq/L) |
| Gross Alpha | <0.5 | Not Required | NR | | |
| Gross Beta | <0.5 | Not Required | NR | | |

Radiological testing is undertaken on a biannual basis (odd years only) and was completed during April 2017. Next testing is due in March 2019. The 2017 data was compliant.

7. Pesticides

Rottnest Island is a Class A Reserve and maintain a Silver certification as a sustainable destination from Earth Check. As part of Rottnest Island commitment to providing a sustainable environment, pesticide usage is minimised on Rottnest Island.

8. Customer Service & Notifiable Incidents

8.1 Customer Service Charter

The Rottnest Island Authority Customer Service Charter sets out the principal terms and conditions upon which the Rottnest Island Authority intends to provide water services to its customers, in accordance with the license issued by the Economic Regulation Authority under the *Water Services Licensing Act 1995*.

The charter informs the customers of Rottnest Island of their rights in accordance with the provisions of the license, including service interruptions, levels of service, and complaint procedures.

A copy of the operating license is available on request from the Rottnest Island Authority or from the Economic Regulation Authority.

8.2 Customer Complaints

The Rottnest Island Authority and Programmed FM are committed to handling complaints and enquiries in a courteous and efficient manner. The customer complaint procedure is available to view on the Rottnest Island Authority website www.ria.wa.gov.au

Complaints are managed centrally by the Rottnest Island Authority and each complaint is assigned a unique identification number and delegated to an appropriate Rottnest Island Authority representative to resolve. Complaints received are continuously monitored to identify any trends and areas for improvement.

Where the Rottnest Island Authority is in receipt of complaints, the issue is investigated immediately to determine the best process for resolution and rectification of the concern.

There was a single complaint reported during the 2017 - 2018 reporting period. This complaint was reported directly to the Department of Health and not Rottnest Island Authority or Programmed FM.

On the 10th May 2018, the Department of Health forwarded to Rottnest Island Authority a photograph of a discoloured liquid (rust coloured), within a plastic container labelled "Tap water from back kitchen". The photograph was sent from an undisclosed person. The hydraulics team immediately isolated the suspected tap and commenced an investigation into this issue. The team collected an initial sample from the tap for both microbial and chemical analysis, which was reported as within Australian Drinking Water Guidelines characteristics at the time. It was later found that the rust coloured water happened only on occasion, and only upon turning on the water after a period of being unused. The water then cleared within a few seconds. It was found that this particular tap was fed from an old galvanised section of pipework. The recommended solution was to remove the old pipework and resupply from another source.

8.3 Notifiable Incidents

During the 2017 - 2018 reporting period, there were 60 health exceedance samples out of 198 samples for Bromate reportable to the DoH concerning the Drinking Water Distribution system.

An additional 15 health exceedances reported were for Bromate, Copper, Lead, Nickel and Cadmium related to the Drinking Fountains that do not form part of the Drinking Water Distribution program. These exceedances were notified to the DoH at the time of occurrence.

9. Comments

During the 2017 - 2018 period, the Rottneest Island Authority submitted the revised Drinking Water Quality Management Plan and MoU to the DoH for formal acceptance.

Improvements have commenced in several areas throughout the Drinking Water Distribution System, including:

- Streamlining the preventive maintenance schedule making key inspections and checks into a real-time electronic management system. Removing the manual handwritten paper trail and encouraging a more environmental and sustainable work practice, as well as ensuring greater quality control and data management for auditing and reporting requirements.
- Refurbishment of Tank 4's roof and the addition of whirly birds to reduce heat were completed to ensure peak period supply requirements over summer were met.
- Increased Water monitoring; extra monitoring of bromate as requested by the Department of Health, Drinking Fountains have been included as a special project into the Drinking Water Quality's monthly schedule.
- Development of a Bromate Remediation Plan and implementation of the controls such as flushing to ensure the ongoing management of maintaining low Bromate levels.
- Remote Operated Vehicle (ROV) inspections of Tank 7 and Tank 5 were conducted as part of the routine maintenance program and to assess the structural integrity of the tanks.
- Successful completion of the Annual Drinking Water Test Exercise, with improvements currently being assessed so they can be included in the upcoming yearly actions register
- Upgrade to the Drinking Fountain infrastructure.
- Improved flushing regime as part of the Bromate Remediation Plan
- Installation of Automatic timers on key hydrants to allow for additional water movement in known dead legs in the drinking water distribution system during low occupancy periods



10. Acknowledgements

The Rottnest Island Authority acknowledges the work of Programmed FM in managing Drinking Water Quality at Rottnest Island, and the assistance of the Department of Health throughout the year.

11. Enquiries

To request further information, or to seek clarification on information provided within this Rottnest Island Annual Drinking Water Report, please contact the Rottnest Island Authority Administration by phone at (08) 9432 9300 (8:30 am to 5:00 pm, Monday to Friday). Alternatively, enquiries may also be sent by e-mail to rotnest.compliance@dbca.wa.gov.au.



12. Appendices

12.1 Annual Data Summary

2017-18 Annual Data Distribution System Only

| Health | Quarter | July – Sept 2017 | | | | Oct – Dec 2017 | | | | Jan – Mar 2018 | | | | Apr – Jun 2018 | | | | 2017-2018 Summary | | | |
|-------------------------|---------|--|--------------------|-----------------------------------|------------------------|----------------------------------|--------------------|--|------------------------|----------------------------------|--------------------|--|------------------------|----------------------------------|--------------------|--|------------------------|----------------------------------|-------------------|-----------------|--------------|
| | | ADVG Compliance Guideline Maximum Value (mg/L) | Number of Analyses | Number of Analyses Complying with | % Compliance with ADVG | Maximum Value of Analysis (mg/L) | Number of Analyses | Number of Analyses Complying with ADVG | % Compliance with ADVG | Maximum Value of Analysis (mg/L) | Number of Analyses | Number of Analyses Complying with ADVG | % Compliance with ADVG | Maximum Value of Analysis (mg/L) | Number of Analyses | Number of Analyses Complying with ADVG | % Compliance with ADVG | Maximum Value of Analysis (mg/L) | Total No Analyses | Total Compliant | % Compliance |
| Antimony Sb | 0.003 | 3 | 3 | 100% | <0.001 | 15 | 15 | 100% | 0.001 | 3 | 3 | 100% | <0.001 | 4 | 4 | 100% | <0.001 | 25 | 25 | 100 | 0.001 |
| Bromate | 0.02 | | | | | 22 | 2 | 11% | 0.26 | 73 | 33 | 22% | 0.063 | 103 | 103 | 100% | 0.02 | 198 | 138 | 70 | 0.26 |
| Cadmium Ca | 0.002 | 3 | 3 | 100% | <0.0001 | 15 | 15 | 100% | 0.0001 | 3 | 3 | 100% | <0.0001 | 4 | 4 | 100% | <0.0001 | 25 | 25 | 100 | 0.0001 |
| Chlorine | 5 | 21 | 21 | 100% | 0.95 | 80 | 80 | 100% | 1.57 | 54 | 54 | 100% | 1.9 | 53 | 53 | 100% | 1.1 | 208 | 208 | 100 | 1.9 |
| Copper Cu | 2 | 3 | 3 | 100% | 0.02 | 16 | 16 | 100% | 0.078 | 3 | 3 | 100% | 0.014 | 4 | 4 | 100% | 0.016 | 26 | 26 | 100 | 0.078 |
| Fluoride F | 1.5 | 1 | 1 | 100% | 0.1 | | | | | 1 | 1 | 100% | <0.1 | 1 | 1 | 100% | <0.1 | 3 | 3 | 100 | 0.1 |
| Lead Pb | 0.01 | 3 | 3 | 100% | 0.002 | 15 | 15 | 100% | 0.002 | 3 | 3 | 100% | <0.001 | 4 | 4 | 100% | <0.001 | 25 | 25 | 100 | 0.002 |
| Manganese | 0.5 | 19 | 19 | 100% | 0.018 | 25 | 25 | 100% | 0.008 | 25 | 25 | 100% | 0.064 | 24 | 24 | 100% | <0.005 | 93 | 93 | 100 | 0.064 |
| Nickel | 0.02 | 3 | 3 | 100% | <0.001 | 15 | 15 | 100% | 0.001 | 3 | 3 | 100% | <0.001 | 4 | 4 | 100% | <0.001 | 25 | 25 | 100 | 0.001 |
| Nitrate NO ₃ | 50 | 3 | 3 | 100% | <0.5 | 8 | 8 | 100% | 0.5 | 3 | 3 | 100% | 0.013 | 4 | 4 | 100% | <0.05 | 18 | 18 | 100 | 0.5 |
| Nitrite NO ₂ | 3 | 11 | 11 | 100% | <0.5 | 10 | 10 | 100% | 0.5 | 11 | 11 | 100% | <0.005 | 10 | 10 | 100% | <0.05 | 42 | 42 | 100 | 0.5 |
| Trihalomethanes THMs | 0.25 | 11 | 11 | 100% | 0.018 | 14 | 14 | 100% | 0.022 | 11 | 11 | 100% | 0.018 | 10 | 10 | 100% | 0.013 | 46 | 46 | 100 | 0.022 |

1532 Health + Aesthetic
700 Micro

| Aesthetic | Quarter | July – Sept 2017 | | | | Oct – Dec 2017 | | | | Jan – Mar 2018 | | | | Apr – Jun 2018 | | | | 2017-2018 Summary | | | |
|-------------------------------|-----------|--|--------------------|-----------------------------------|------------------------|----------------------------------|--------------------|--|------------------------|----------------------------------|--------------------|--|------------------------|----------------------------------|--------------------|--|------------------------|----------------------------------|-------------------|-----------------|--------------|
| | | ADVG Compliance Guideline Maximum Value (mg/L unless stated) | Number of Analyses | Number of Analyses Complying with | % Compliance with ADVG | Maximum Value of Analysis (mg/L) | Number of Analyses | Number of Analyses Complying with ADVG | % Compliance with ADVG | Maximum Value of Analysis (mg/L) | Number of Analyses | Number of Analyses Complying with ADVG | % Compliance with ADVG | Maximum Value of Analysis (mg/L) | Number of Analyses | Number of Analyses Complying with ADVG | % Compliance with ADVG | Maximum Value of Analysis (mg/L) | Total No Analyses | Total Compliant | % Compliance |
| Aluminium, Al | 0.2 | 1 | 1 | 100% | 0.01 | 3 | 3 | 100% | 0.01 | 3 | 3 | 100% | <0.01 | 3 | 3 | 100% | <0.01 | 10 | 10 | 100 | 0.01 |
| Ammonia, NH ₃ | 0.5 | 15 | 15 | 100% | 0.01 | 14 | 14 | 100% | 0.005 | 11 | 11 | 100% | <0.005 | 7 | 7 | 100% | 0.008 | 47 | 47 | 100 | 0.01 |
| Chloride, Cl | 250 | 45 | 45 | 100% | 240 | 54 | 54 | 100% | 260 | 59 | 59 | 100% | 210 | 41 | 41 | 100% | 200 | 200 | 100 | 260 | |
| Chlorine, Cl ₂ | 0.6 | 21 | 5 | 420% | 1.21 | 80 | 9 | 83% | 1.57 | 47 | 6 | 783% | 1.73 | 57 | 21 | 271% | 1.65 | 205 | 41 | 20 | 1.73 |
| Colour | 15 (HZU) | 6 | 6 | 100% | <5 | 6 | 6 | 100% | <5 | 6 | 6 | 100% | <5 | 7 | 7 | 100% | <5 | 25 | 25 | 100 | 0 |
| Copper (Cu) | >1 | 3 | 3 | 100% | 0.022 | 16 | 16 | 100% | 0.14 | 3 | 3 | 100% | 0.014 | 4 | 4 | 100% | 0.016 | 26 | 26 | 100 | 0.14 |
| Hardness [CaCO ₃] | 200 | 1 | 1 | 100% | 17 | 1 | 1 | 100% | 11 | 1 | 1 | 100% | 12 | 1 | 1 | 100% | 11 | 4 | 4 | 100 | 17 |
| Iron, Fe | 0.3 | 19 | 16 | 119% | 0.74 | 25 | 22 | 114% | 0.93 | 25 | 20 | 125% | 3.8 | 27 | 25 | 108% | 0.5 | 96 | 83 | 86 | 3.8 |
| Manganese, Mn | 0.1 | 19 | 19 | 100% | 0.018 | 25 | 25 | 100% | 0.008 | 25 | 25 | 100% | 0.064 | 24 | 24 | 100% | <0.005 | 93 | 93 | 100 | 0.064 |
| pH | 6.5 – 8.5 | 22 | 17 | 129% | 9.5 | 29 | 22 | 132% | 9.2 | 31 | 26 | 119% | 9.7 | 90 | 83 | 108% | 9.5 | 172 | 148 | 86 | 9.7 |
| Sodium Sulfate | 180 | 1 | 1 | 100% | 150 | | | | | 70 | 70 | 100% | 120 | 104 | 104 | 100% | 140 | 175 | 175 | 100 | 150 |
| Sulphide in Water | 0.05 | 3 | 3 | 100% | <0.01 | 4 | 4 | 100% | <0.01 | 3 | 3 | 100% | <0.01 | 3 | 1 | 100% | 3 | 4 | 4 | 100 | 0 |
| TDS | 600 | 1 | 1 | 100% | 500 | 1 | 1 | 100% | 430 | 1 | 1 | 100% | 430 | 2 | 2 | 100% | 390 | 5 | 5 | 100 | 500 |
| Turbidity | 5 (NTU) | 6 | 6 | 100% | 0.8 | 6 | 6 | 100% | 0.8 | 6 | 6 | 100% | 0.2 | 7 | 7 | 100% | 0.5 | 25 | 25 | 100 | 0.8 |
| Zinc, Zn | 3 | 3 | 3 | 100% | 0.049 | 15 | 15 | 100% | 0.14 | 3 | 3 | 100% | 0.033 | 4 | 4 | 100% | 0.042 | 25 | 25 | 100 | 0.14 |

Reported sample figures

Micro

| Microbial Characteristic | MoU Compliance Criteria | July – Sept 2017 | | | Oct – Dec 2017 | | | Jan – Mar 2018 | | | Apr – Jun 2018 | | | Total |
|-------------------------------|-------------------------|------------------|---------------------------|--------------|-----------------|------------------------------------|--------------|-----------------|------------------------------------|--------------|-----------------|------------------------------------|--------------|-------|
| | | No. of Analyses | No. of Analyses Complying | % Compliance | No. of Analyses | No. of Analyses Complying with MoU | % Compliance | No. of Analyses | No. of Analyses Complying with MoU | % Compliance | No. of Analyses | No. of Analyses Complying with MoU | % Compliance | |
| Bacterial | | | | | | | | | | | | | | |
| Total Coliforms | Non Detect | 57 | 57 | 100% | 60 | 60 | 100% | 57 | 57 | 100% | 62 | 62 | 100% | 236 |
| <i>E. coli</i> | Non Detect | 57 | 57 | 100% | 60 | 60 | 100% | 57 | 57 | 100% | 62 | 62 | 100% | 236 |
| Amoeba | | | | | | | | | | | | | | |
| Thermophilic Amoeba | Non Detect | 27 | 27 | 100% | 30 | 30 | 100% | 33 | 33 | 100% | 24 | 24 | 100% | 114 |
| Thermophilic <i>Naegleria</i> | Non Detect | 27 | 27 | 100% | 30 | 30 | 100% | 33 | 33 | 100% | 24 | 24 | 100% | 114 |
| Total | | 168 | 168 | | 180 | 180 | | 180 | 180 | | 172 | 172 | | |



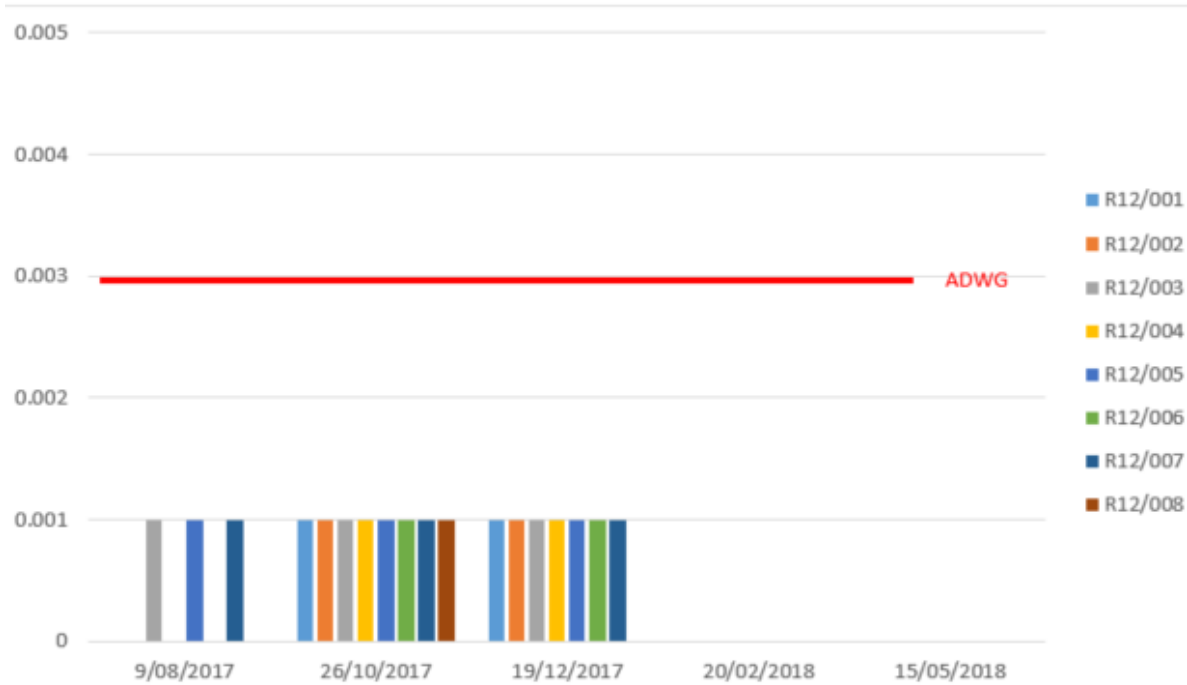
2017-18 Annual Data Drinking Fountains Only

| Health Characteristic | Quarter | July - Sept 2017 | | | | Oct - Dec 2017 | | | | Jan - Mar 2018 | | | | Apr - Jun 2018 | | | | 2017-2018 Summary | | | |
|-------------------------|---------|--|--------------------|--|------------------------|----------------------------------|--------------------|--|------------------------|----------------------------------|--------------------|--|------------------------|----------------------------------|--------------------|--|------------------------|----------------------------------|-------------------|-----------------|--------------|
| | | ADWG Compliance Guideline Maximum Value (mg/L) | Number of Analyses | Number of Analyses Complying with ADWG | % Compliance with ADWG | Maximum Value of Analysis (mg/L) | Number of Analyses | Number of Analyses Complying with ADWG | % Compliance with ADWG | Maximum Value of Analysis (mg/L) | Number of Analyses | Number of Analyses Complying with ADWG | % Compliance with ADWG | Maximum Value of Analysis (mg/L) | Number of Analyses | Number of Analyses Complying with ADWG | % Compliance with ADWG | Maximum Value of Analysis (mg/L) | Total No Analyses | Total Compliant | % Compliance |
| Antimony Sb | 0.003 | | | | | | | | | 42 | 42 | 100% | <0.001 | 41 | 41 | 100% | <0.001 | 83 | 83 | 100 | 0 |
| Bromate | 0.02 | | | | | | | | | 32 | 16 | 50% | 0.17 | 30 | 27 | 90% | 0.048 | 62 | 48 | 69 | 0.17 |
| Cadmium Ca | 0.002 | | | | | | | | | 42 | 40 | 95% | 0.015 | 36 | 36 | 100% | 0.0004 | 78 | 76 | 97 | 0.015 |
| Chlorine | 5 | | | | | | | | | | | | | | | | | 0 | 0 | 0 | 0 |
| Copper Cu | 2 | | | | | | | | | 42 | 41 | 98% | 4.7 | 43 | 42 | 98% | 2.4 | 85 | 83 | 97.6 | 4.7 |
| Fluoride F | 1.5 | | | | | | | | | | | | | | | | | 0 | 0 | 0 | 0 |
| Lead Pb | 0.01 | | | | | | | | | 42 | 38 | 90% | 0.036 | 45 | 43 | 96% | 0.018 | 87 | 81 | 93 | 0.036 |
| Manganese | 0.5 | | | | | | | | | | | | | | | | | 4 | 4 | 100 | 0 |
| Nickel | 0.02 | | | | | | | | | 42 | 40 | 95% | 0.065 | 43 | 42 | 98% | 0.2 | 85 | 82 | 96.5 | 0.2 |
| Nitrate NO ₂ | 50 | | | | | | | | | | | | | | | | | 0 | 0 | 0 | 0 |
| Nitrite NO ₂ | 3 | | | | | | | | | | | | | | | | | 0 | 0 | 0 | 0 |
| Trihalomethanes THMs | 0.25 | | | | | | | | | | | | | | | | | 0 | 0 | 0 | 0 |

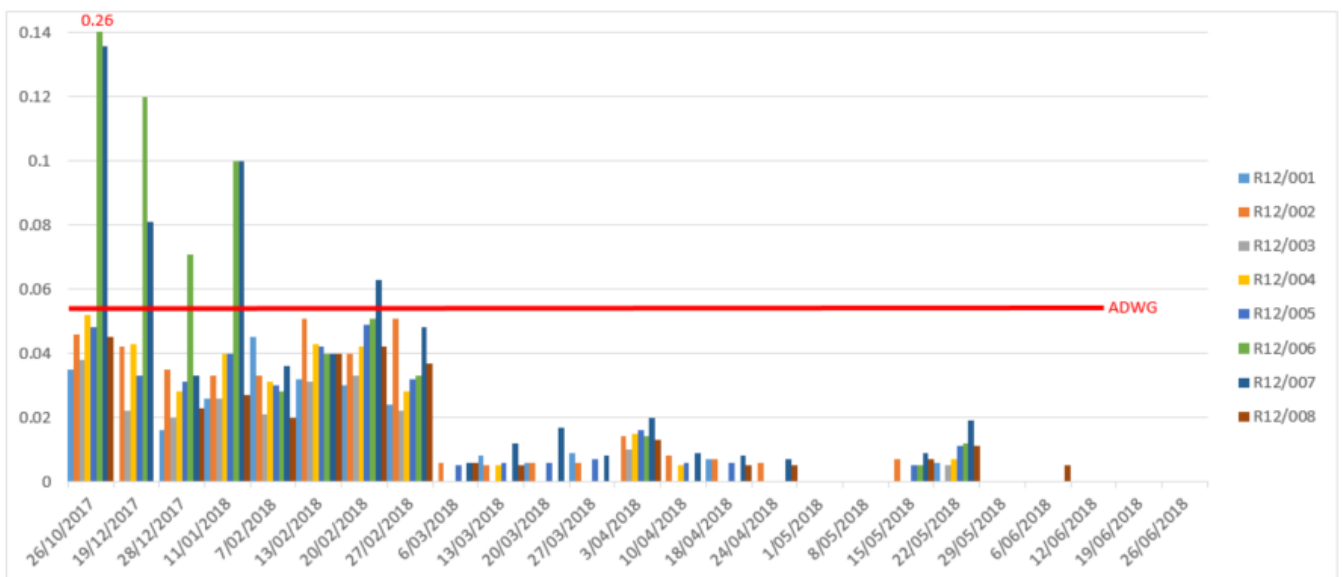
| Aesthetic Characteristic | Quarter | July - Sept 2017 | | | | Oct - Dec 2017 | | | | Jan - Mar 2018 | | | | Apr - Jun 2018 | | | | 2017-2018 Summary | | | | |
|-------------------------------|-----------|--|--------------------|--|------------------------|----------------------------------|--------------------|--|------------------------|----------------------------------|--------------------|--|------------------------|----------------------------------|--------------------|--|------------------------|----------------------------------|-------------------|-----------------|--------------|-------|
| | | ADWG Compliance Guideline Maximum Value (mg/L unless stated) | Number of Analyses | Number of Analyses Complying with ADWG | % Compliance with ADWG | Maximum Value of Analysis (mg/L) | Number of Analyses | Number of Analyses Complying with ADWG | % Compliance with ADWG | Maximum Value of Analysis (mg/L) | Number of Analyses | Number of Analyses Complying with ADWG | % Compliance with ADWG | Maximum Value of Analysis (mg/L) | Number of Analyses | Number of Analyses Complying with ADWG | % Compliance with ADWG | Maximum Value of Analysis (mg/L) | Total No Analyses | Total Compliant | % Compliance | Max |
| Aluminium, Al | 0.2 | | | | | | | | | | | | | | | | | <0.01 | 0 | 0 | | 0 |
| Ammonia, NH ₄ | 0.5 | | | | | | | | | | | | | | | | | 0.008 | 0 | 0 | | 0.008 |
| Chloride, Cl | 250 | | | | | | | | | 10 | 10 | 100% | 180 | 12 | 12 | 100% | 180 | 22 | 22 | 100 | 180 | |
| Chlorine, Cl ₂ | 0.6 | | | | | | | | | | | | | | | | | 1.65 | 0 | 0 | | 1.65 |
| Colour | 15 (HZU) | | | | | | | | | | | | | | | | | <5 | 0 | 0 | | 0 |
| Copper (Cu) | >1 | | | | | | | | | 42 | 41 | 98% | 4.7 | 43 | 42 | 98% | 2.4 | 85 | 83 | 98 | 4.7 | |
| Hardness (CaCO ₃) | 200 | | | | | | | | | | | | | | | | | 11 | 0 | 0 | | 11 |
| Iron, Fe | 0.3 | | | | | | | | | | | | | 4 | 4 | 100% | 0.04 | 4 | 4 | 100 | 0.04 | |
| Manganese, Mn | 0.1 | | | | | | | | | | | | | 4 | 4 | 100% | <0.005 | 4 | 4 | 100 | 0 | |
| pH | 6.5 - 8.5 | | | | | | | | | | | | | | | | | 9.5 | 0 | 0 | | 9.5 |
| Sodium | 180 | | | | | | | | | 10 | 10 | 100% | 120 | 22 | 22 | 100% | 110 | 32 | 32 | 100 | 120 | |
| Sulfate | 250 | | | | | | | | | 10 | 10 | 100% | 3 | 12 | 12 | 100% | 3 | 22 | 22 | 100 | 3 | |
| Sulphide in Water | 0.05 | | | | | | | | | | | | | | | | | 0 | 0 | 0 | | 0 |
| TDS | 600 | | | | | | | | | 10 | 10 | 100% | 390 | 26 | 26 | 100% | 390 | 36 | 36 | 100 | 390 | |
| Turbidity | 5 (NTU) | | | | | | | | | | | | | | | | | 0.5 | 0 | 0 | | 0.5 |
| Zinc, Zn | 3 | | | | | | | | | 42 | 42 | 100% | 1.2 | 41 | 41 | 100% | 0.27 | 83 | 83 | 100 | 1.2 | |

12.2 ADWG Sample Point Graph Summaries (Health)

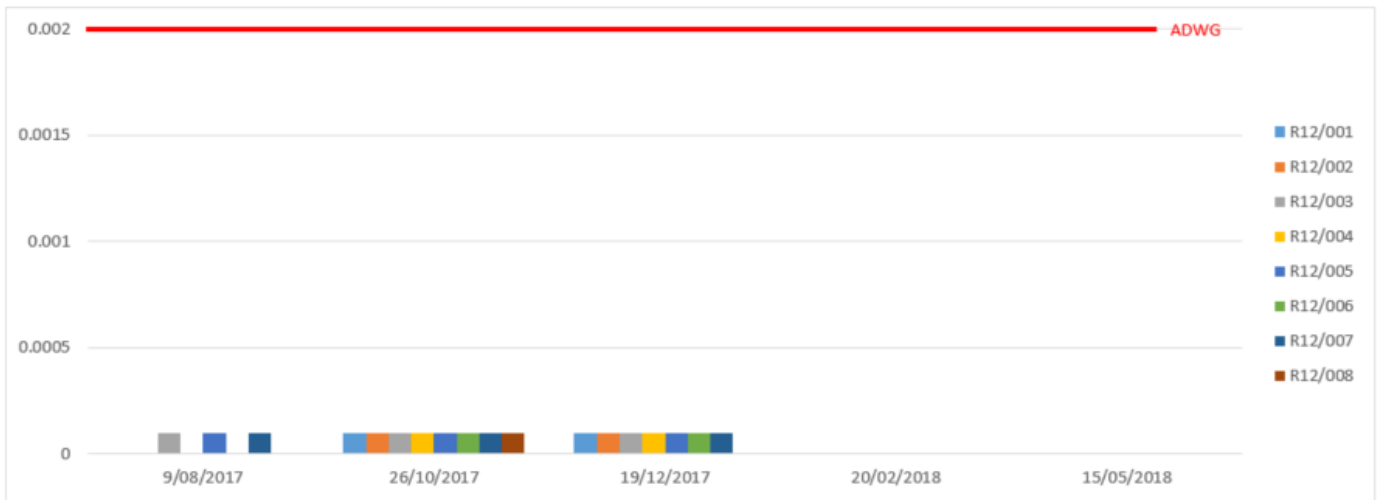
2017-2018 Antimony



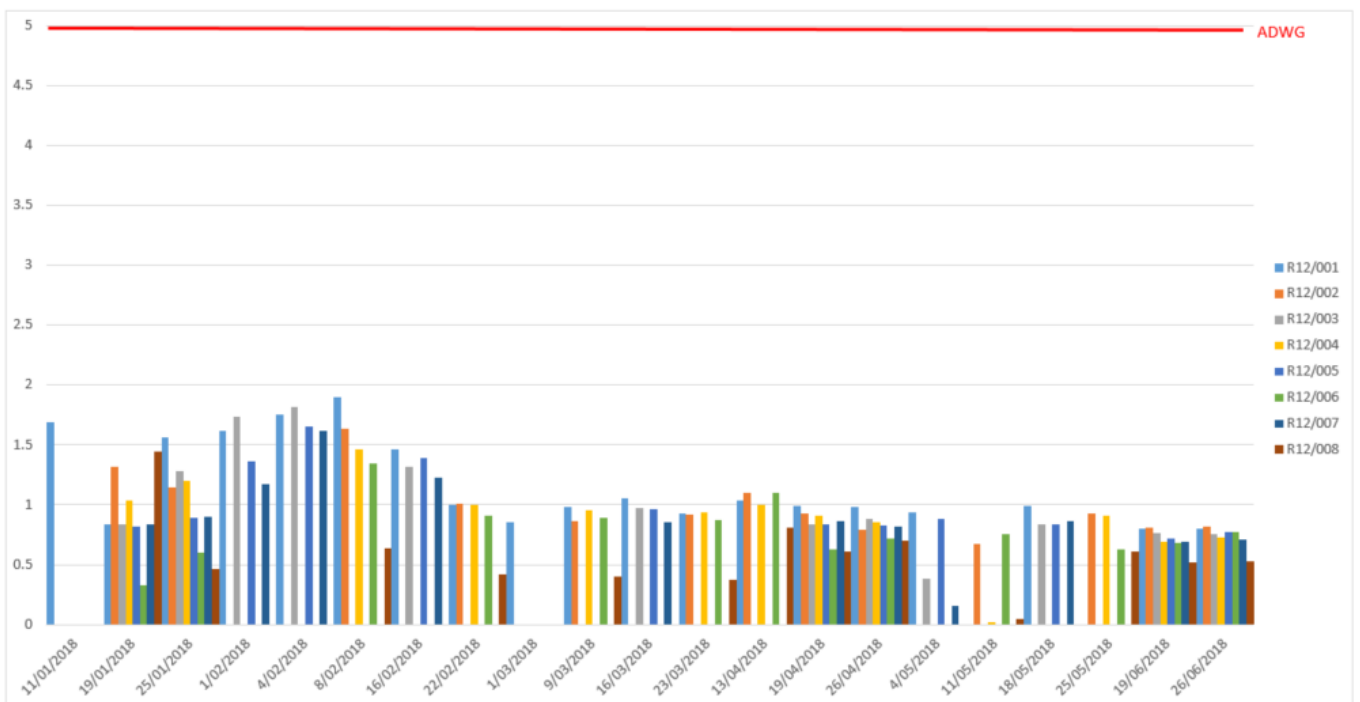
2017-2018 Bromate



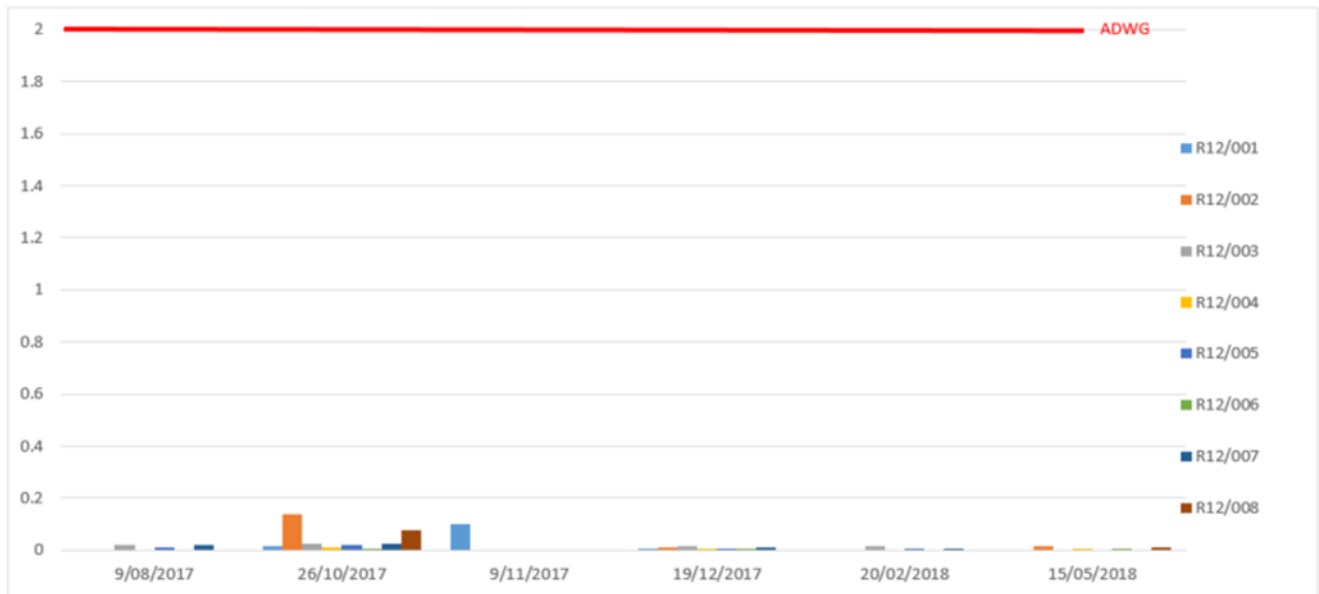
2017-2018 Cadmium



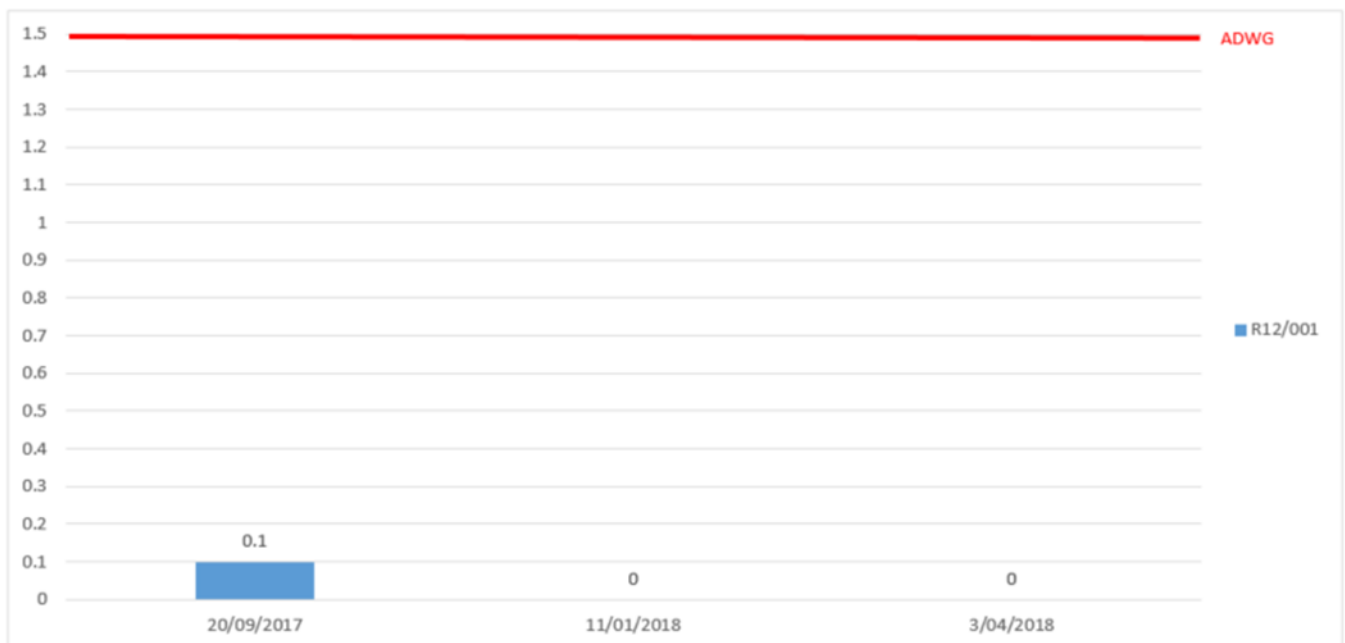
2017 -2018 Chlorine (Health_Internal)



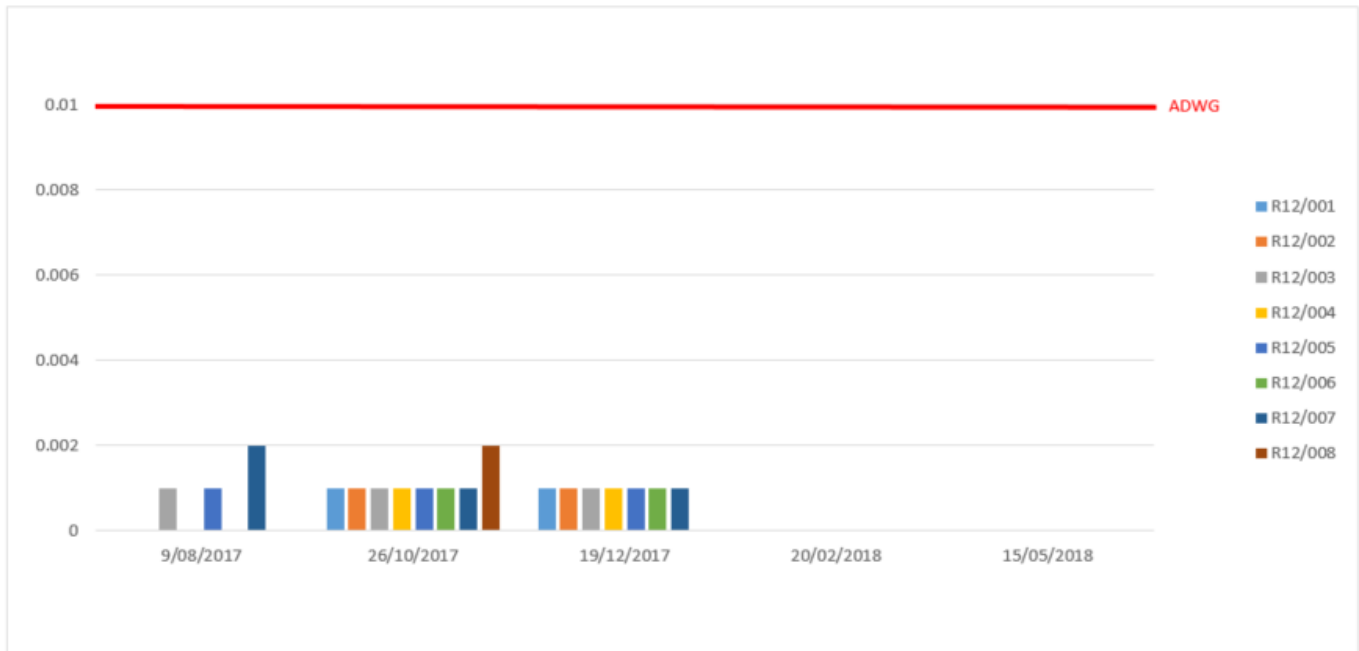
2017-2018 Copper (Health)



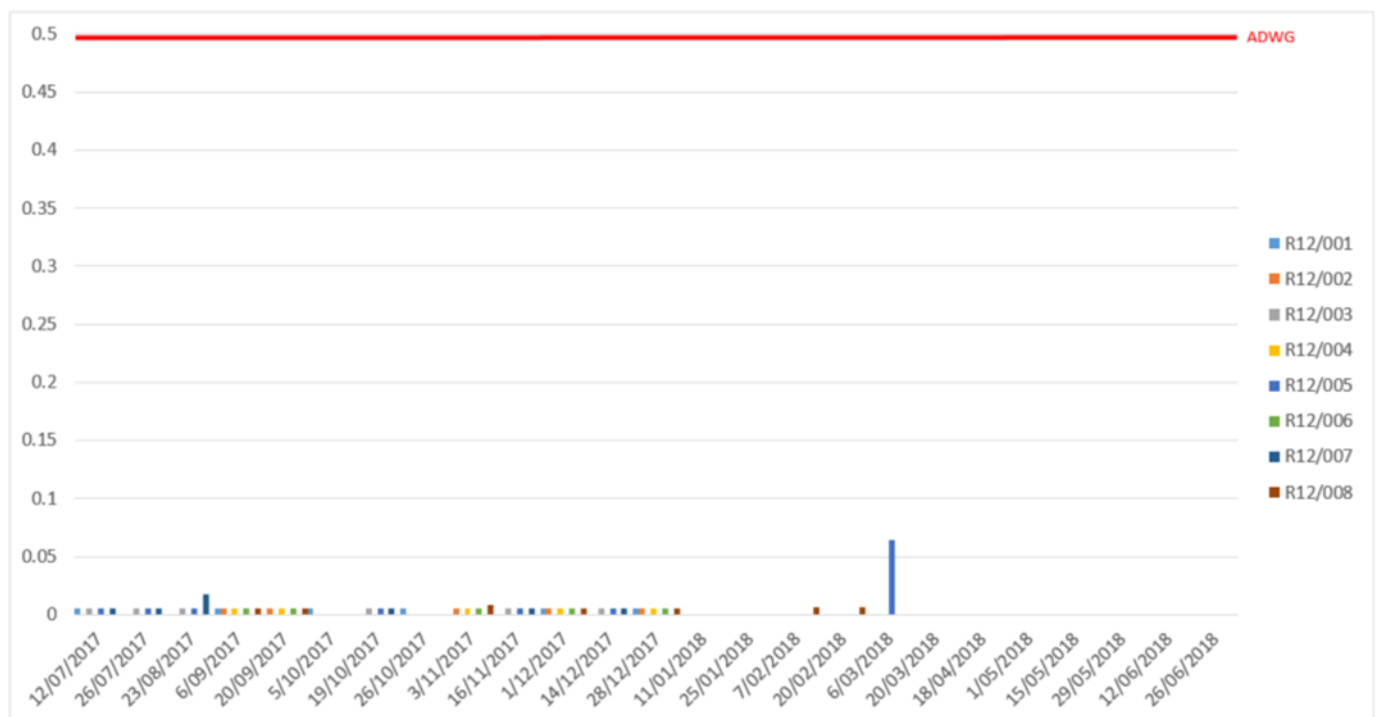
2017-2018 Fluoride



2017-2018 Lead



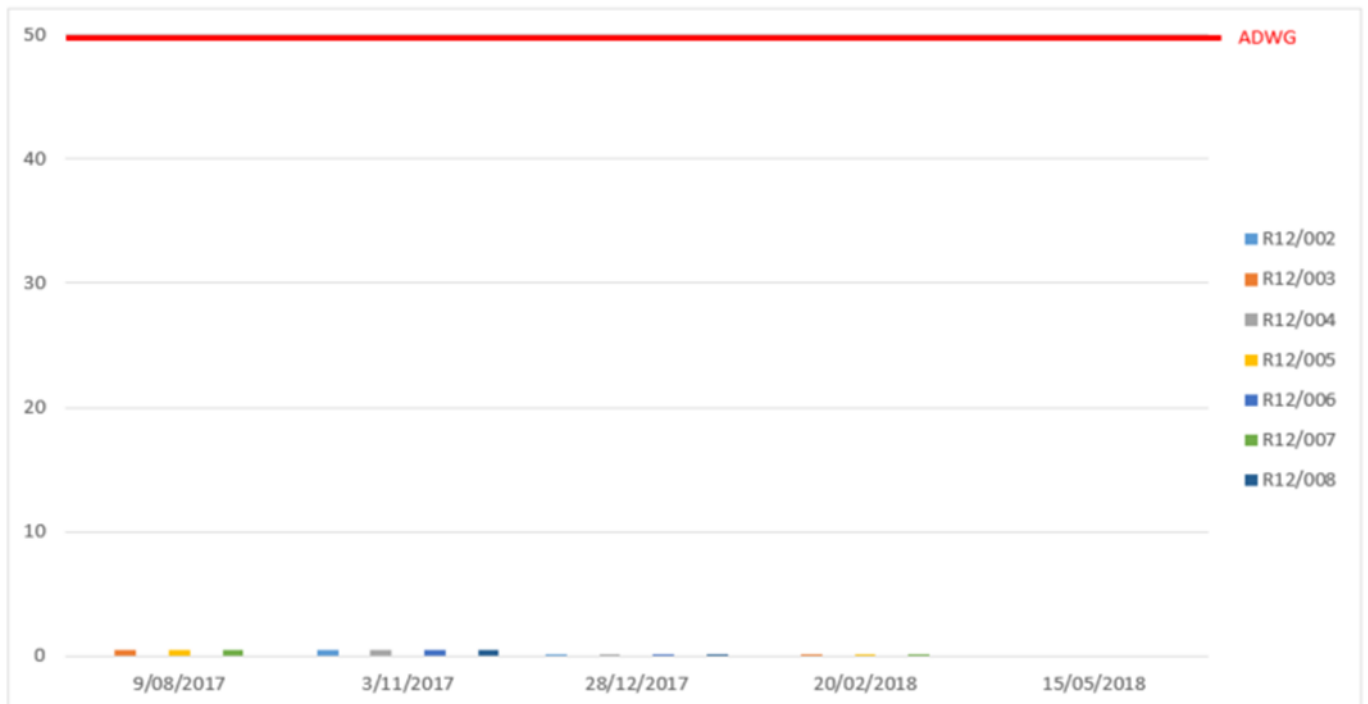
2017-2018 Manganese



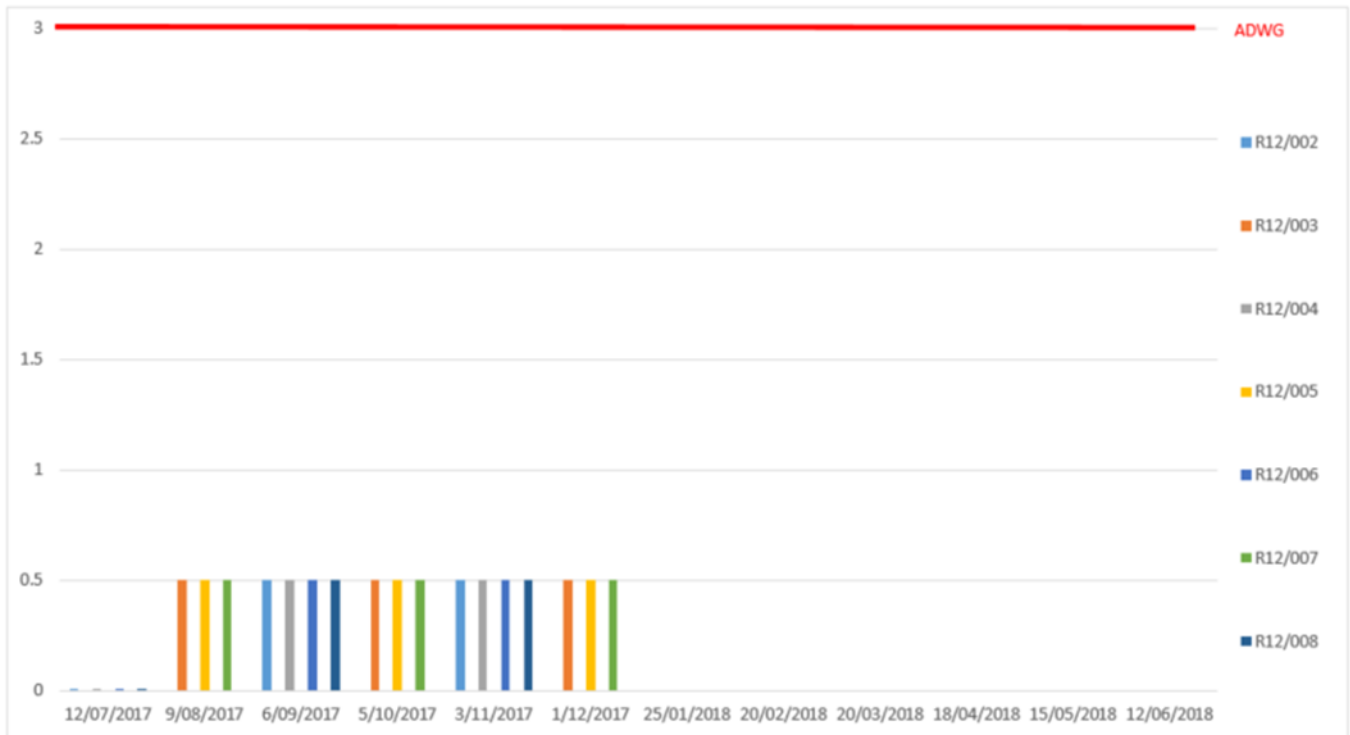
2017-2018 Nickel



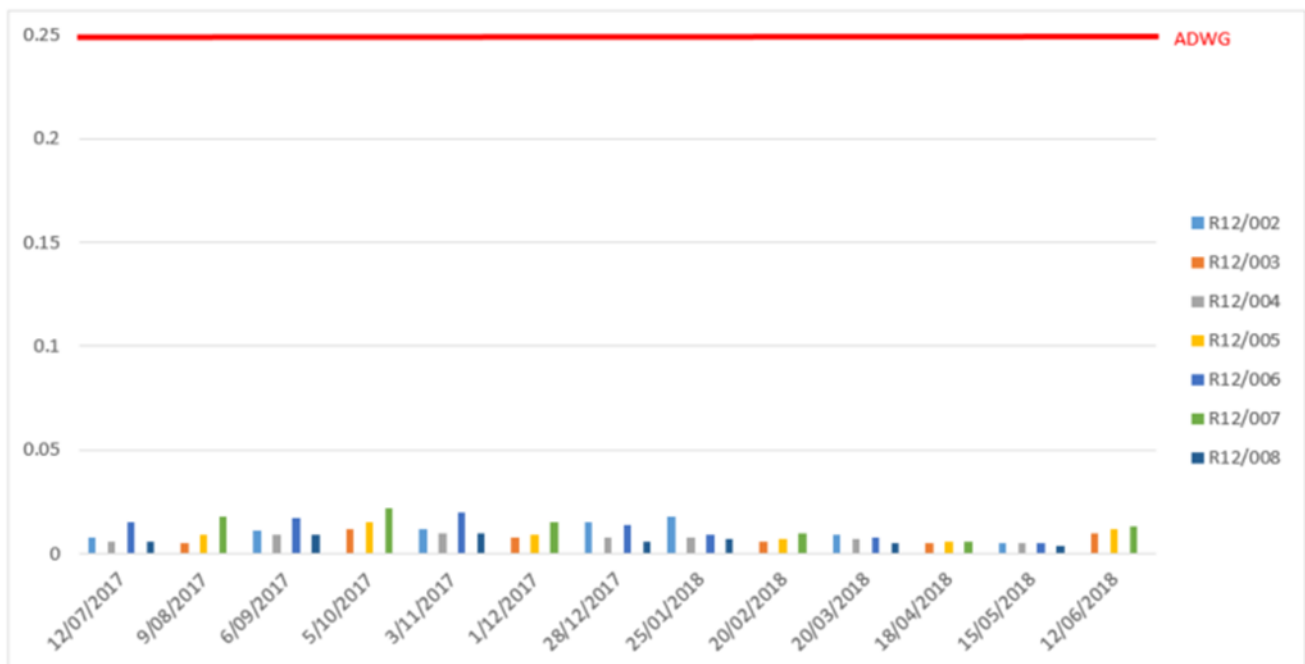
2017-2018 Nitrate



2017-2018 Nitrite

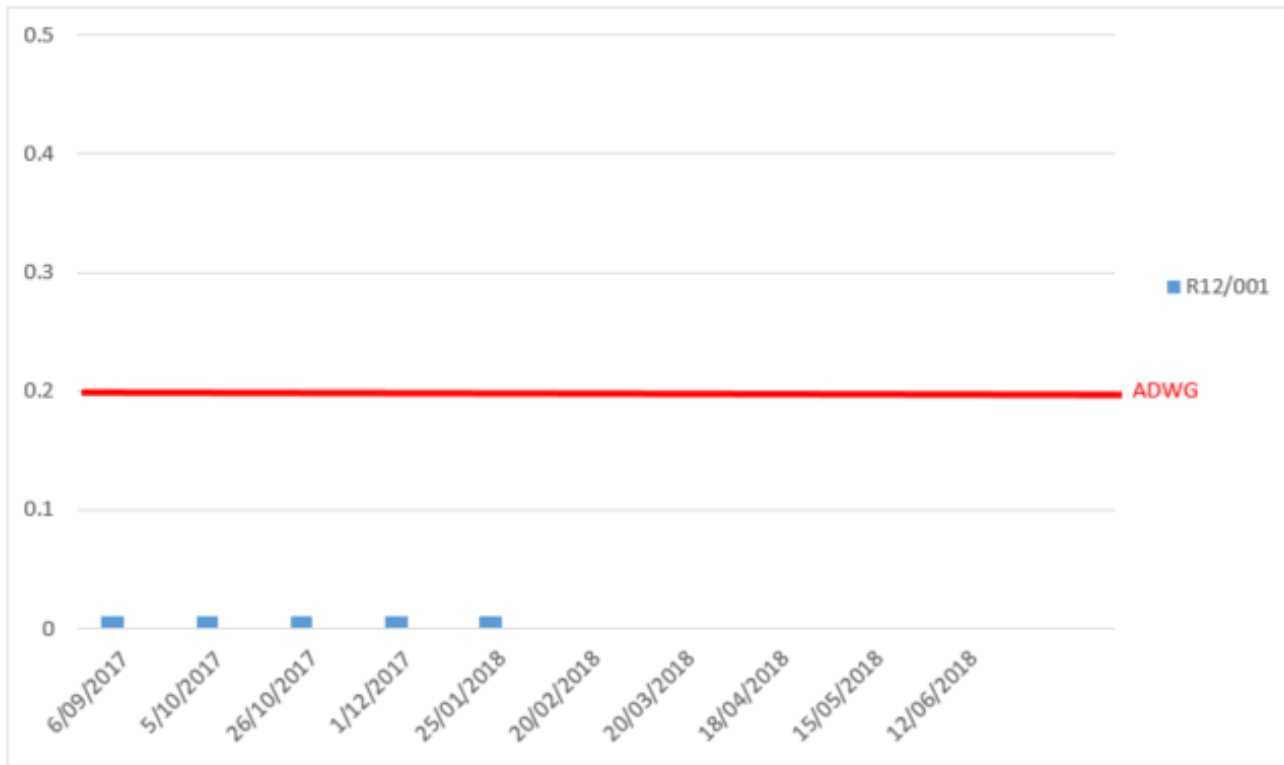


2017-2018 Trihalomethanes

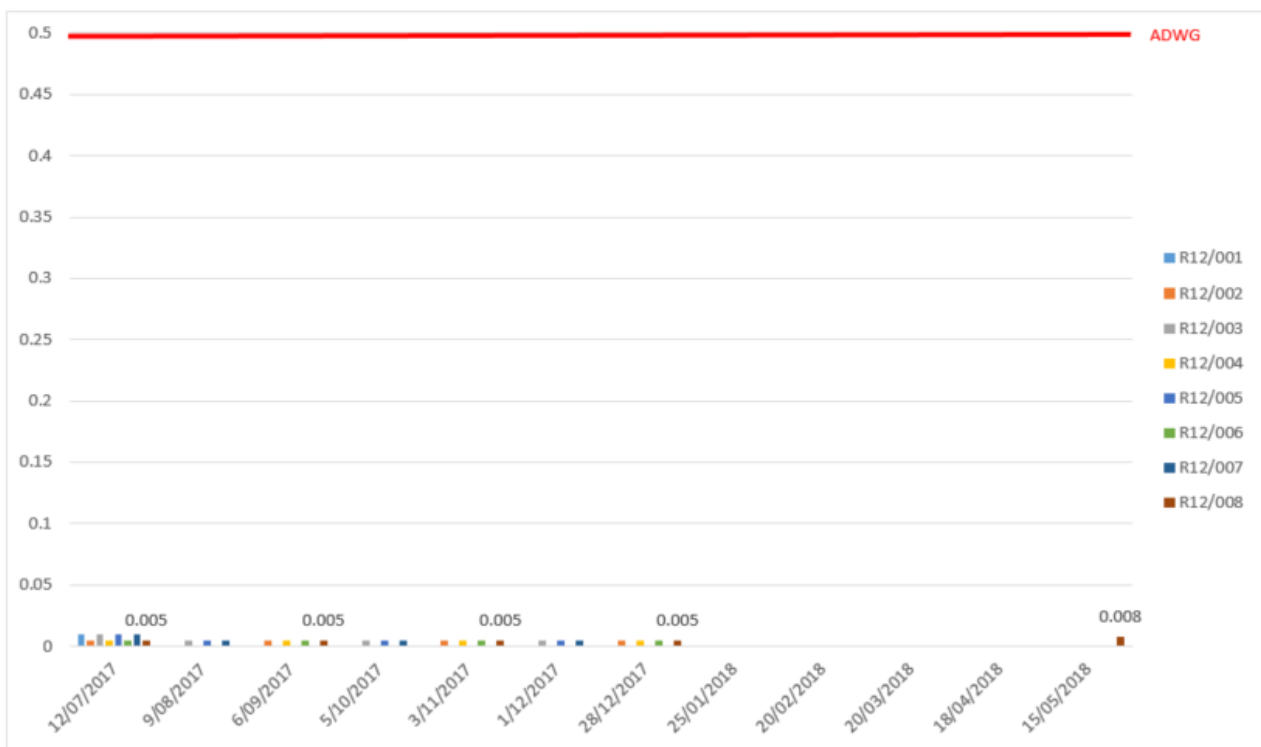


12.3 ADWG Sample Point Graph Summaries (Aesthetic)

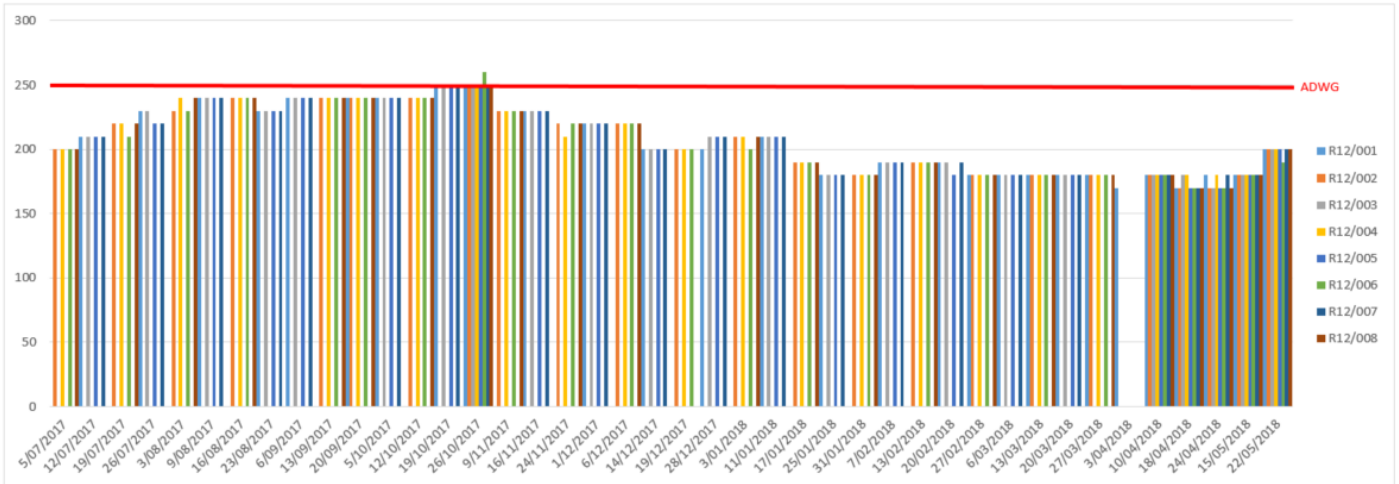
2017-2018 Aluminum



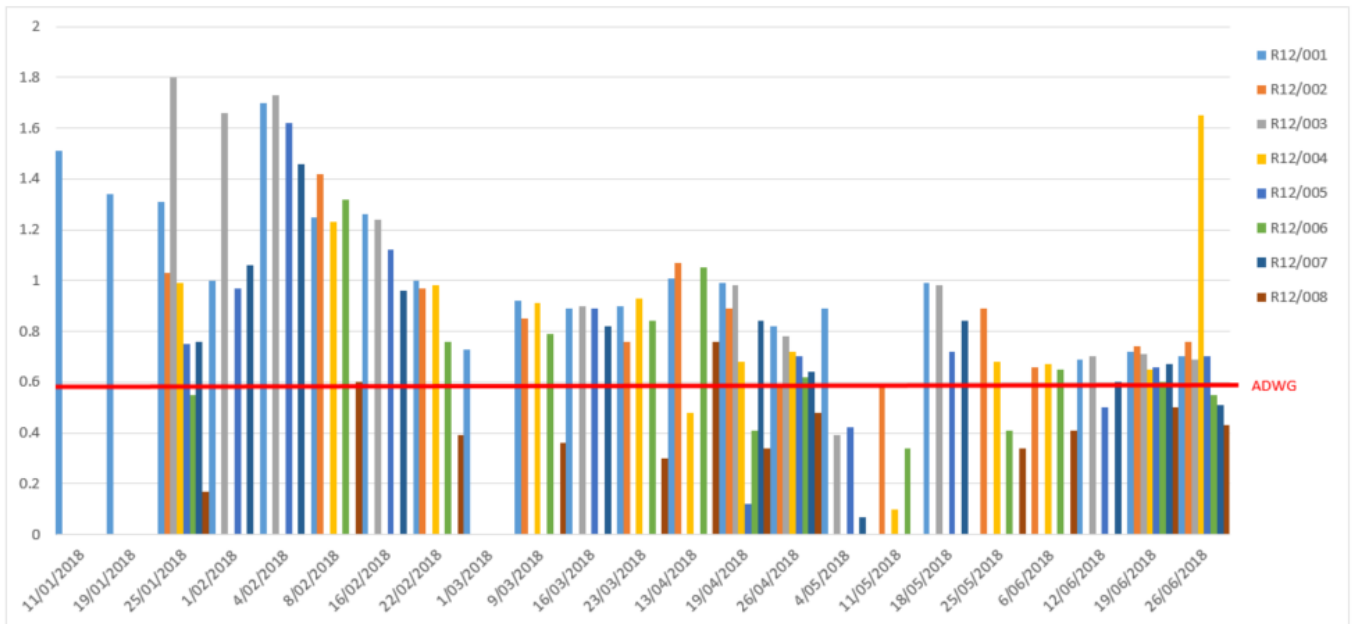
2017-2018 Ammonia



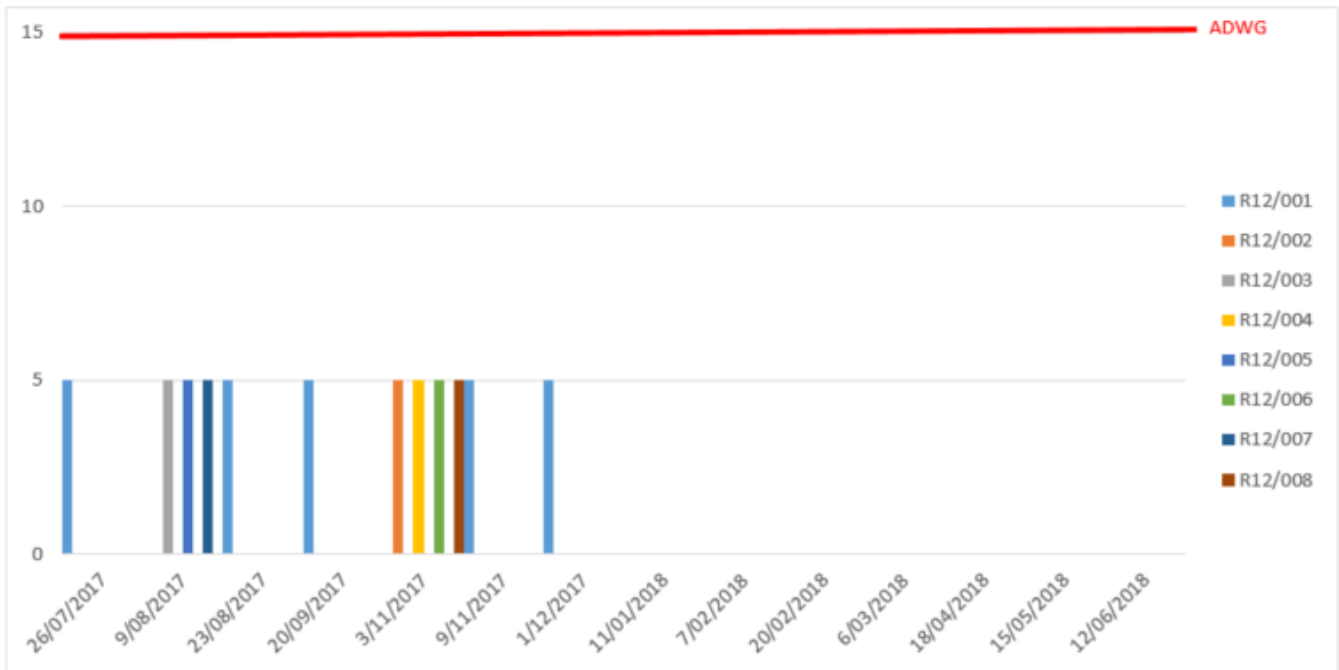
2017-2018 Chloride



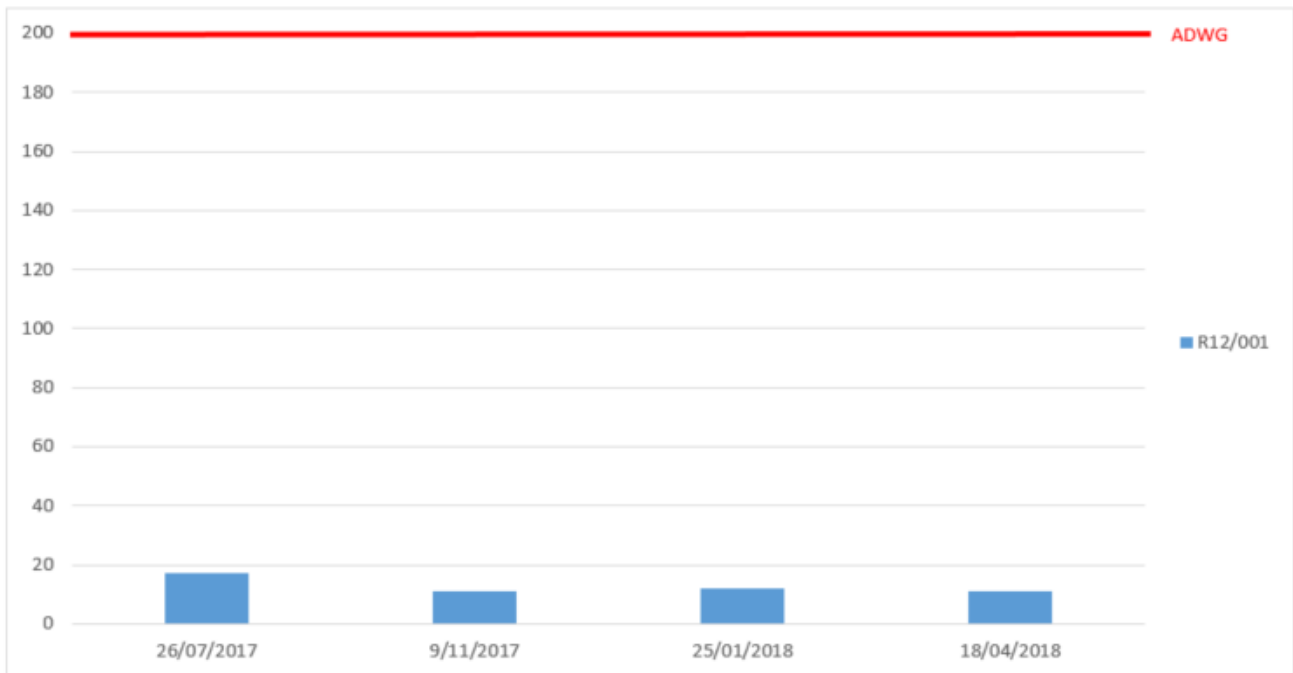
2017-2018 Chlorine Aesthetic (Internal)



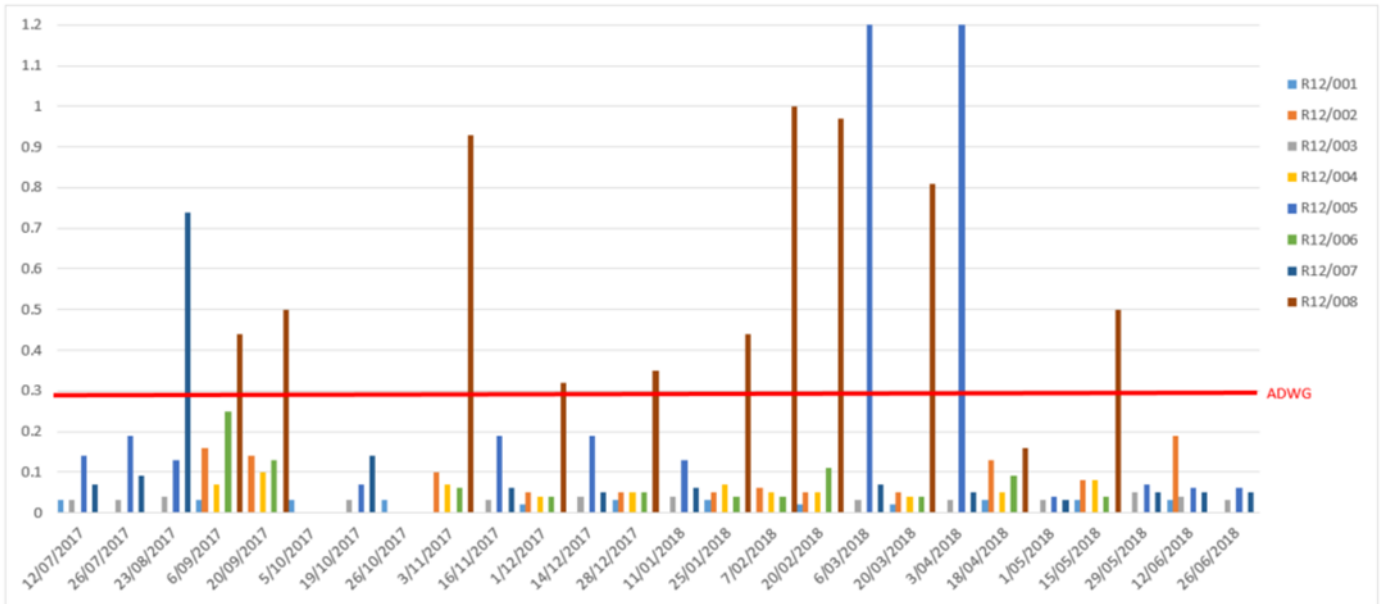
2017-2018 Colour (True)



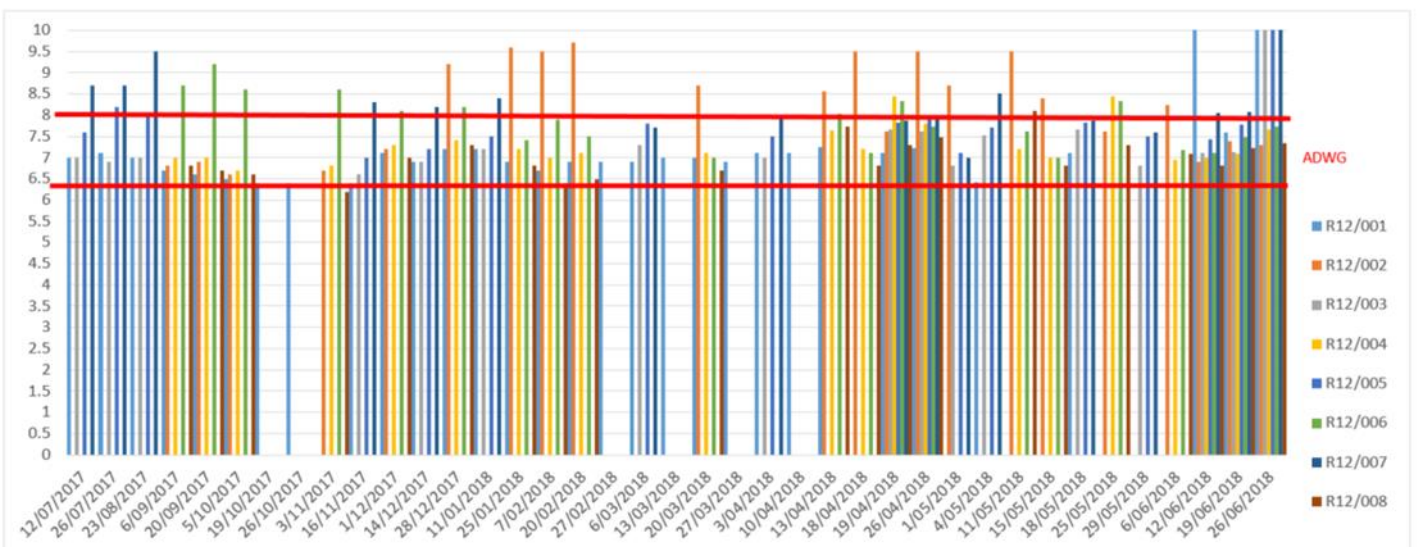
2017-2018 Hardness



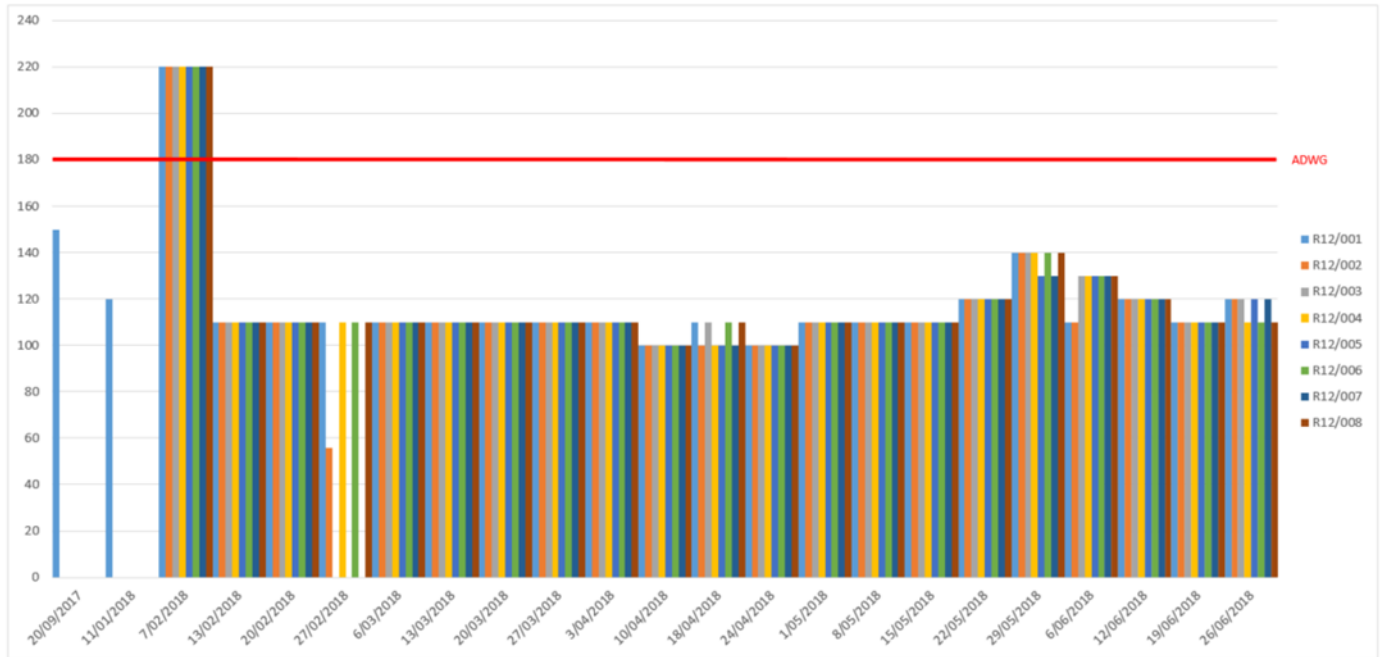
2017-2018 Iron



2017-2018 pH



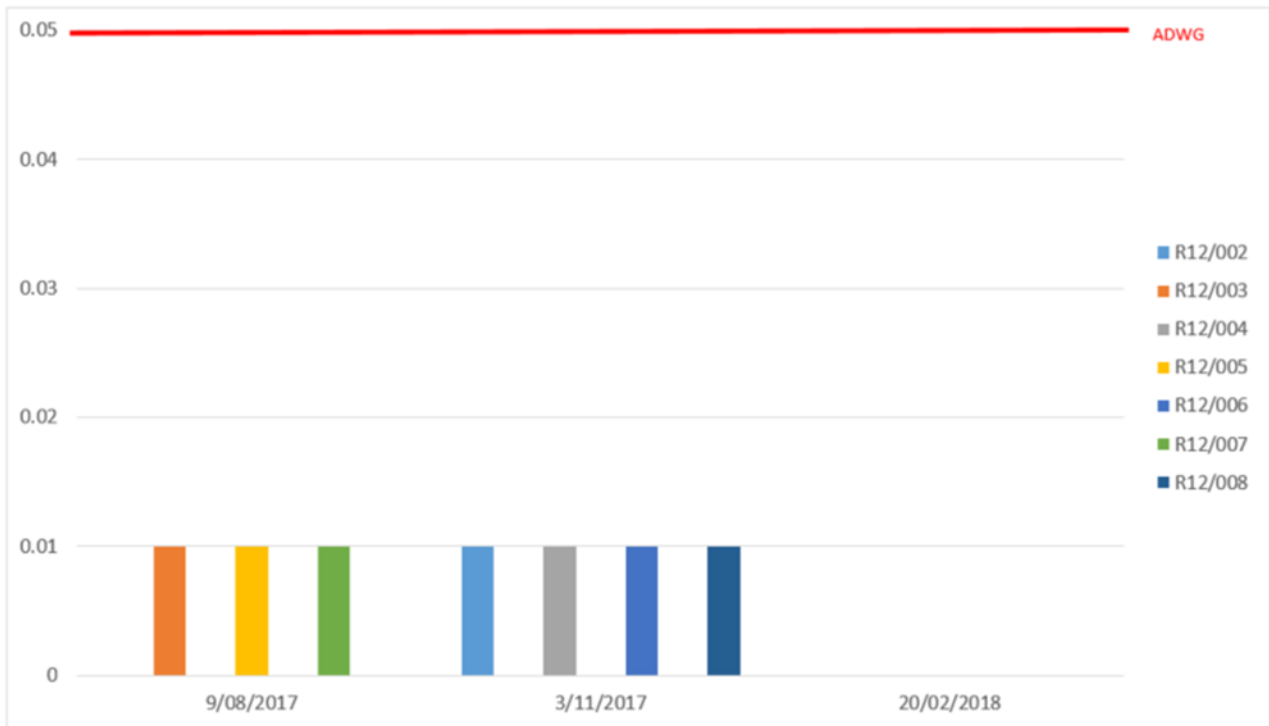
2017-2018 Sodium



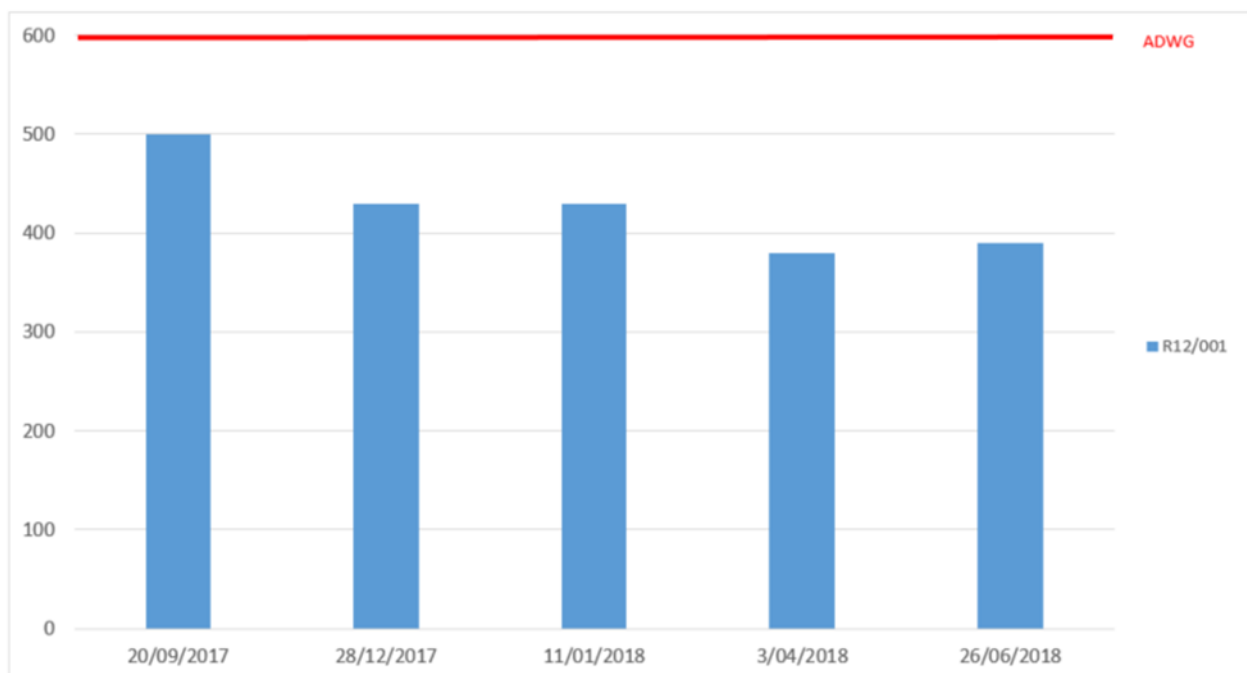
2017-2018 Sulfate



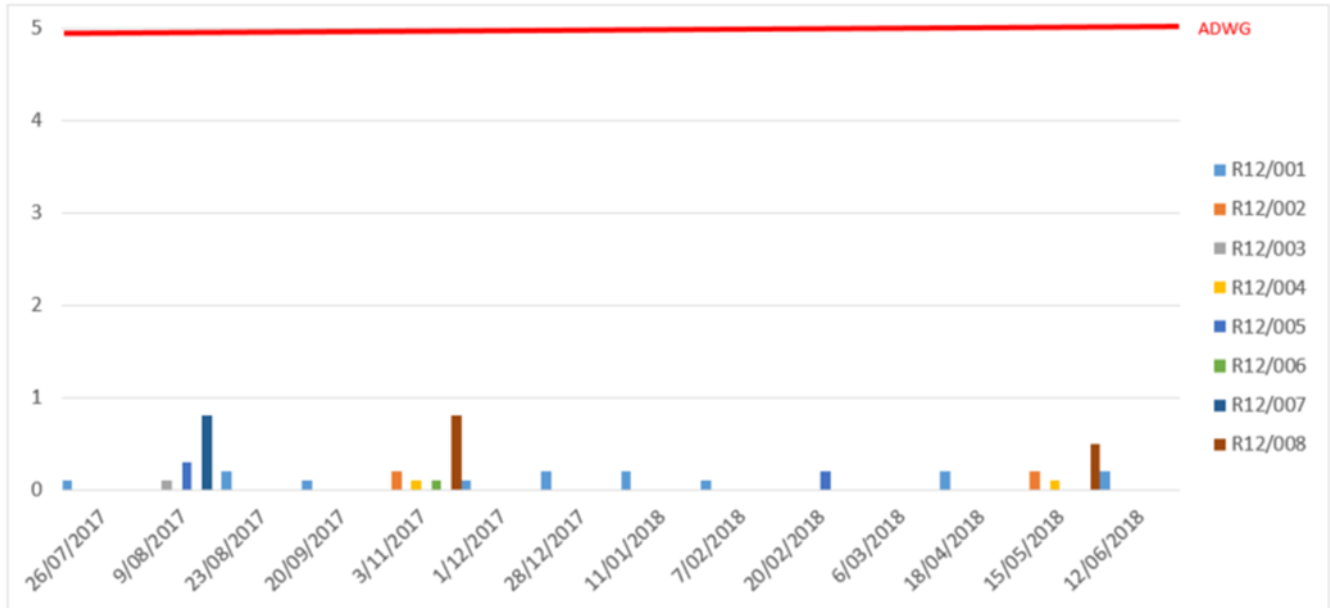
2017-2018 Sulphide



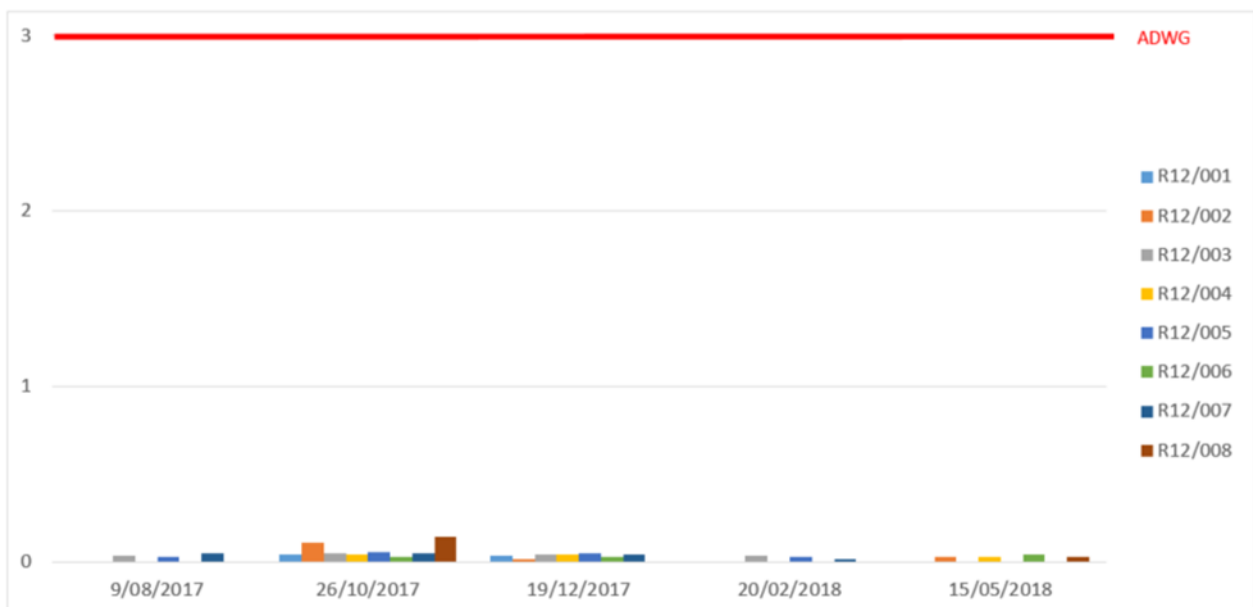
2017-2018 Total Dissolved Solids



2017-2018 Turbidity



2017-2018 Zinc



12.4 Rottnest Island Drinking Water Quality Policy



ROTTNEST IS

ROTTNEST ISLAND AUTHORITY

POLICY

DRINKING WATER QUALITY

1. OVERVIEW

The Rottnest Island Authority (RIA) provides safe, high-quality drinking water supply to consumers on Rottnest Island.

The RIA is committed to managing its water supply effectively in order to provide drinking water that consistently meets *Australian Drinking Water Guidelines*, consumer and other regulatory requirements.

2. OBJECTIVES

The key objective of this policy is to provide safe, high-quality drinking water that consistently meets *Australian Drinking Water Guidelines*, consumer and other regulatory requirements.

3. SCOPE

This policy and any associated procedures and forms are applicable to the RIA, in partnership with the Department of Health and parties contracted to provide drinking water services on the Island.

4. DEFINITIONS

Australian Drinking Water Guidelines, as published by the National Health and Medical Research Council (NHMRC).

5. POLICY STATEMENT/S

It is RIA policy to:

- **manage water quality at all points along the delivery chain from source water to the consumer;**
- **use a risk-based approach in which potential threats to water quality are identified and balanced;**
- **integrate the needs and expectations of our consumers, stakeholders, regulators and employees into our planning;**
- **establish regular monitoring of the quality of drinking water and effective reporting mechanisms to provide relevant and timely information, and promote confidence in the water supply and its management;**
- **develop appropriate contingency planning and incident response capability;**
- **continually improve our practices by assessing performance against corporate commitments and stakeholder expectations; and**
- **ensure that when contracting parties to provide drinking water services on behalf of RIA, that the parties are contracted to deliver on these policy objectives.**



6. STATUTORY COMPLIANCE and RELEVANT DOCUMENTATION

This policy is established and implemented pursuant to RIA's commitments under clause 4.1 of the *Memorandum of Understanding between the Department of Health and Rottnest Island Authority for Drinking Water*. The policy reflects the requirements of the *Australian Drinking Water Guidelines*.

7. EFFECTIVE DATE

The policy initially came into effect from 1 January 2016 and has been reviewed and revised with effect from 31 January 2018.

8. REVIEW DATE

The policy is to be reviewed every three (3) years.

9. CUSTODIAN

General Manager, Project and Contracts Services

10. POLICY AUTHORISATION

This policy details the Rottnest Island Authority's policy for Drinking Water Quality.

Signed:  Date: 10/1/18
 Michelle Reynolds
 Executive Director

11. POLICY REVISION

| Rev | Water Policy | Completed | Issue Date | Page |
|-----|--------------------------|----------------|------------|-------|
| 1.0 | 1. Final Version | Tracey Hornsey | 04/02/2016 | 1 - 2 |
| 2.0 | 2. Revised Version | Jason Banks | 05/01/2018 | 1 - 2 |
| 3.0 | 3. Final Revised Version | Jason Banks | 09/01/2018 | 1 - 2 |