



ROTTNEST IS

PROGRAMMED
Facility Management

Programmed Facility Management

For the

Rottnest Island Authority

**Quarterly Drinking Water Report to the
Department of Health by the Rottnest Island
Authority
July – Sept 2018**





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1. Water 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 | enquiries@rotnnestisland.com |
| Executive Director | Michelle Reynolds |
| Manager, Major Contracts | Eamonn Williams |
| Utilities Manager (PFM) | Orrin Neale |
| HSE & Risk Manager (PFM) | Jennifer Wright |

1.1. System Information

1.1.1. Consumers

The water demand on Rottnest Island is related to tenancy and is highly seasonal, being low in winter and high in summer. Historical data indicates that over 660,000 visits are typically made to the island on a yearly basis, with a low season minimum of 24,200 visitors/month (August) and a high season maximum of 112,000 visitors/month .

The number of beds on the island for guests is approximately 2,150, with the average length of stay being 3.5 nights. In addition to this, there are approximately 250 permanent residents on the island, which also fluctuates in accordance with high and low seasons.

1.1.2. Distribution System & Water Supply

The Rottnest Island distribution system is relatively small, consisting of approximately 22km of mains. Water is sourced from 15 freshwater bores located in the Wadjemup bore field and 6 saline (seawater) bores located in the Longreach bore field.

The freshwater bores make up approximately only 15% of the water source for the Island and have not been in use since February 2017. Instead being utilised only as a supplementary contingency water supply to the saline production bores.

Water abstracted from the saline bores feeds into the desalination plant, where reverse osmosis occurs. The desalinated water is then disinfected through a dual chlorination system, which ensures the provision of safe drinking water to Rottnest Island customers.

The water demand on Rottnest is highly seasonal, and the monthly consumption can range from approximately 6,000kL in July to 25,000kL in January.

The combined storage capacity of the drinking water infrastructure on the Island is 14,000kL, this volume provides approximately 28 days of water storage.

Remote locations outside the main settlement, such as the outer island ablutions, Wadjemup lighthouse and the Research House, are supplied with water via a tanker. The supplied water in these areas is deemed not suitable for drinking and warning signs are posted accordingly.



Image 1 Example of Public Signage

1.1.3. Sampling Schedule & Procedure

A comprehensive sampling schedule is in place and the distribution sampling points are R12/001, R12/002, R12/003, R12/004, R12/005, R12/006, R12/007 and R12/008. Monitoring of Tank 4 and Tank 7 has been added to the sampling regime in recent years and continues to be monitored weekly, however samples collected do not form part of the Statistical data provided for analysis purposes in this quarterly report.

Potable water sampling is carried out in accordance with the Australian Drinking Water Guidelines (ADWG) and is scheduled as per the Rottneest Island Drinking Water Quality Management Plan (DWQMP).

At times, opportunities for further monitoring is required based on risk assessment, new information, post-incident or as per specialist recommendations. As such, additional testing parameters as suggested by the DoH in November 2017. These additional testing parameters identified the presence of bromate in the distribution system. Initial levels returned were found to be well above the Health levels found in the Australian drinking water guidelines.

The findings resulted in the formation of a specialist working group who implemented a series of proposed corrective actions to address and mitigate this issue. As a result of the findings and implemented controls the monitoring for Bromate has now been added to the regular monitoring schedule of Rottneest Island's distribution sample points.

Testing of the island's drinking fountains was also suggested as an ongoing requirement against defined parameters in the ADWG, which have now been added to the monthly sampling regime.

2. Performance Summary

| Water Quality Meeting the <i>Australia Drinking Water Guidelines v.3.4 (2017) (ADWG)</i> | | | |
|---|--|--|--|
| July - Sept 2018 | | | |
| | ¹No. of Analyses Completed | No. of Analyses Within Guidelines | No. of Non-conformances to Guidelines |
| Microbial | | | |
| Bacterial (<i>E.coli</i>) | 57 | 57 | 0 |
| Thermotolerant Coliforms | 57 | 57 | 0 |
| Thermophilic Amoebae | 24 | 24 | 0 |
| Amoeba (Thermophilic <i>Naegleria</i>) | 24 | 24 | 0 |
| Chemical & Physical | | | |
| Health | 226 | 226 | 0 |
| Aesthetic | 386 | 339 | 47 |
| Radiological | | | |
| Gross Alpha | | Next Schedule April 2019 | |
| Gross Beta | | Next Schedule April 2019 | |

¹ As screened against respective guideline – health / aesthetic. Results from Tank 4, Tank 7 and Drinking fountains are excluded from this table.

3. Microbial Performance

During the July - Sept 2018 reporting period, there was no reported exceedances of Microbial Health against the ADWG in the potable water distribution system.

3.1. Microbial – Compliance Summary

| Rottnest Island Distribution System July - Sept 2018 | | | | |
|---|-------------------------|-----------------|------------------------------------|--------------|
| Microbial Characteristic | MoU Compliance Criteria | No. of Analyses | No. of Analyses Complying with MoU | % Compliance |
| Bacterial | | | | |
| <i>E.coli</i> | Non Detect | 57 | 57 | 100% |
| <i>Thermotolerant Coliforms</i> | Non-Detect | 57 | 57 | 100% |
| Amoeba | | | | |
| Thermophilic Amoebae | Non Detect | 24 | 24 | 100% |
| Thermophilic <i>Naegleria</i> | Non Detect | 24 | 24 | 100% |

3.2. Microbial – Exception Notifications

| Microbial Water Quality Exceptions July - Sept 2018 | | | | | | |
|--|------|--------------------------|-----------------|-----------------|--------------|----------------|
| Population Served | Date | Microbial Characteristic | MoU Alert Level | Remedial Action | DoH Notified | Close Out Date |
| No exceptions | | | | | | |

3.3. Microbial Incident Specific Information

There were no reported exceedances for Microbial Health in the potable water distribution system over the period, however, the island successfully managed 2 Thermotolerant Coliforms and E.coli detections in Tank 7 during July and September 2018. Tank 7 reported 4 exceedances for Total Coliforms in July and September 2018.

Weekly NATA monitoring samples for Tank 7 returned positive results for E.coli and Thermotolerant Coliforms at levels of 10 cfu/100ml on 3rd July 2018 and 1 cfu/100ml on 18th September 2018.

On 3rd July 2018 the weekly NATA monitoring samples for Tank 7 returned positive results for Total Coliforms at levels 11 cfu/100ml on 3rd July 2018, 2 cfu/100ml on 10th July 2018, 1 cfu/100ml on 17th July 2018 and 1 cfu/100ml on 25th September 2018

Tank 7 roof rectification works were completed on the 3rd October 2018, which contribute in part in preventing E.coli and Thermotolerant Coliform detections in Tank 7.



Tank 7 is the first collection and holding tank for potable water before Tank 4 and Tank 5. The disinfection system between Tank 7 and Tank 4 and 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 complied with the ADWG guidelines

Both transfer/chlorination stations replacement works are completed and are being commissioned.

The quality of drinking water supplied within the distribution system was maintained within ADWG guidelines and safe for public use.

4. Chemical: Health Related Performance

During the July - Sept 2018 reporting period, there were 2 reported exceedances of Chemical Health parameters in the potable water distribution system, details are outlined in section 4.3.

4.1. Chemical: Health Related - Compliance Summary

| Rottnest Island Distribution System April - June 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 | 4 | 4 | 100% | <0.001 |
| Bromate | 0.02 | 96 | 94 | 98% | 0.032 |
| Cadmium (Cd) | 0.002 | 4 | 4 | 100% | <0.0001 |
| Chlorine (Cl ₂) <i>(in house testing)</i> | 5 | 90 | 90 | 100% | 1.2 |
| Copper (Cu) | 2 | 4 | 4 | 100% | 0.02 |
| Fluoride (F) | 1.5 | 1 | 1 | 100% | <0.1 |
| Lead (Pb) | 0.01 | 4 | 4 | 100% | <0.001 |
| Manganese (Mn) | 0.5 | 25 | 25 | 100% | 0.005 |
| Nickel (Ni) | 0.02 | 4 | 4 | 100% | <0.001 |
| Nitrate (NO ₃) (Nitrate as nitrate) | 50 mg-NO ₃ /L | 7 | 7 | 100% | <0.05 |
| Nitrite (NO ₂) | 3 mg-NO ₂ /L | 7 | 7 | 100% | <0.5 |
| Trihalomethanes (THMs) | 0.25 | 11 | 11 | 100% | 0.011 |

² As screened against respective guideline – health / aesthetic. Results from Tank 4, Tank 7 and Drinking fountains are excluded from this table.

4.2. Chemical: Health Related - Exception Notifications

| Chemical: Health Related Water Quality Exceptions January - March 2018 | | | | | | |
|---|----------|-------------------------|-----------------|---------------------|--------------|----------------|
| Population Served | Date | Chemical Characteristic | MoU Alert Level | Remedial Action | DoH Notified | Close Out Date |
| *26,333 | Aug 2018 | Bromate | Level 2 | Bromate Action Plan | Yes | On Going |
| | | | | | | |

*Based on RIA total daily visitors for the period includes Ferry (excluding Island workers) Boats and Planes

4.3. Chemical: Health Related Incident Specific Information

During the quarter, there were 2 exceedances of monitoring parameters, being Bromate (two samples) at 2 distribution monitoring points.

The first exceedance was reported at sample point R12/005 with a reading of 0.032mg/L, above the ADWG recommend max level of 0.02 mg/L.

The second exceedance was reported at sample point R12/007 with a reading of 0.021mg/L, being slightly above the ADWG recommend max level of 0.02 mg/L.

Investigations revealed these exceedances occurred during the Water Transfer station upgrade works. Due to these works Tank Water levels were kept higher than usually maintained, resulting in an increase in the bromate levels.

The Bromate working group is continuing to implement the bromate action plan drafted in January 2018 to ensure that the drinking water supplied on the island remains safe to drink.

The flushing regime initiated in January continues to ensure a consistent flow of drinking water at the dead legs, reducing holding time during low occupancy period on the island.

5. Chemical: Aesthetic Performance

5.1. Chemical: Aesthetic – Compliance Summary

| Rottnest Island Distribution System July - Sept 2018 | | | | | |
|--|-------------------------------------|-----------------|-------------------------------------|------------------------|------------------------------|
| Aesthetic Characteristic | ADWG Guideline (mg/L unless stated) | No. of Analyses | No. of Analyses Complying with ADWG | % Compliance with ADWG | Max Value of Analysis (mg/L) |
| Aluminium (Al) | 0.2 | 3 | 3 | 100% | <0.01 |
| Ammonia (NH ₃) | 0.5 | 11 | 11 | 100% | <0.005 |
| Chloride (Cl) | 250 | 4 | 4 | 100% | 200 |
| Chlorine (Cl ₂) <i>(in house testing)</i> | 0.6 | 104 | 8 | 8% | 1.14 |
| Colour | 15 (HU) | 6 | 6 | 100% | <5 |
| Copper (Cu) | >1 | 4 | 4 | 100% | 0.02 |
| Hardness (CaCO ₃) | 200 | 1 | 1 | 100% | 15 |
| Iron (Fe) | 0.3 | 25 | 22 | 88% | 0.07 |
| Manganese (Mn) | 0.1 | 25 | 25 | 100% | 0.005 |
| pH | 6.5 – 8.5 | 27 | 27 | 100% | 8.3 |
| Sodium (Na) | 180 | 104 | 104 | 100% | 130 |
| Sulphate | 250 | 4 | 4 | 100% | 3 |
| Sulphide (H ₂ S) | 0.05 | 7 | 7 | 100% | <0.01 |
| TDS | 600 | 2 | 2 | 100% | 440 |
| Turbidity | 5 (NTU) | 6 | 6 | 100% | 0.4 |
| Zinc (Zn) | 3 | 4 | 4 | 100% | 0.041 |

²As screened against respective guideline – health / aesthetic. Results from Tank 4, Tank 7, investigative samples and Drinking fountains are excluded from this table.

5.2. Chemical: Aesthetic - Incident Specific Information

Instances where analytical results exceeded the aesthetic guidelines for chemical and physical properties, are summarised below:

Iron: There were 3 recorded exceedances of iron in the distribution system over the quarter. As iron has a taste threshold of approximately 0.3 mg/L in water; this may cause taste and odour problems.

The first exceedance was recorded on the 10th July at sample point R12/008 with a reading of 0.70mg/L. This sample point also recorded a further exceedance on 4th September 2018 with a reading of 0.35mg/L; being the third exceedance for Iron this quarter. On both occasions the lines were flushed and resampled, to verify that the corrective actions mitigated the exceedances at this sample point.

The second instance was reported on 28th August 2018 at sample point R12/005 with a reading of 0.70mg/L. The cause was associated with Water transfer station upgrade works being conducted in August. The line was flushed and no further exceedances were recorded for this quarter.

- **Chlorine:** During this quarter, 96 out of 104 recorded samples were reported with chlorine values above the ADWG' Aesthetic limit of 0.6mg/L. These results were found across all distribution sampling points over the 3 month period.

Whilst some monitoring locations reported analytic concentrations outside of the guideline values for aesthetic water quality, it is important to note that these results remain well below the Health limit of 5mg/L, with a maximum value of 1.14mg/L reported at Tank 5 on 25th September 2018.

Allowing chlorine levels to exceed 0.6mg/L occasionally is permissible under ADWG guidelines when necessary in the management of microbiological safety and to ensure safe drinking water.

6. Radiological Performance

No radiological samples were required during the reporting period. The next round of radiological samples are due in April 2019 and will be reported during the appropriate reporting cycle.

6.1. Radiological – Compliance Summary

| Rottnest Island Distribution System April - June 2018 | | | | |
|--|-------------------------|-----------------|------------------------------------|--------------|
| Radiological Characteristic | MoU Compliance Criteria | No. of Analyses | No. of Analyses Complying with MoU | % Compliance |
| Gross Alpha | < 0.5 Bq/L | NR | NR | NR |
| Gross Beta | < 0.5 Bq/L | NR | NR | NR |

7. Planned Sample Summary

7.1. Planned Sample – Compliance Summary

| Planned Samples ¹ July - Sept 2018 | | | | | | | | |
|--|--------------------|---------|----------------------|--------------------|---------|--------------|-------|---------|
| Microbial | | | Chemical | | | Radiological | | |
| Planned ¹ | Taken ² | % Taken | Planned ¹ | Taken ² | % Taken | Planned | Taken | % Taken |
| 81 | 81 | 100% | 364 | 475 | 130% | NR | NR | NR |

¹ A planned sample is defined as being included in the Sampling Schedule for this period.

² Physical number of samples taken for this period.

³ Results from Tank 4, Tank 7, Investigative samples and Drinking fountains are excluded from this table.

7.2. Planned Sample - Exception Notifications

| Planned Sample Exceptions April - June 2018 | | | |
|--|----------|----------------|---------------------------|
| Sampling Point | Date Due | Characteristic | Reason for Missing Sample |
| No Exceptions | | | |

8. Comments

Drinking Fountain Monitoring Initiative

Rottnest Island commenced the Drinking fountain monitoring initiative in December 2018 following a recommendation from the Department of Health. Early results obtained from the sampling program supported the island's drinking fountain replacement project, which includes the replacement of all current drinking fountains, and the addition of new amenities around the settlement.

The final upgrade Drinking Fountain at Kingstown was installed on 25th September and is fully operational.

| Rottnest Island Drinking Fountain July - Sept 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 | 46 | 46 | 100% | <0.001 |
| Bromate | 0.02 | 16 | 16 | 100% | <0.005 |
| Cadmium (Cd) | 0.002 | 46 | 46 | 100% | 0.0006 |
| Copper (Cu) | 2 | 46 | 46 | 100% | 0.16 |
| Lead (Pb) | 0.01 | 46 | 43 | 93% | 0.051 |
| Manganese (Mn) | 0.5 | 8 | 8 | 100% | <0.005 |
| Nickel (Ni) | 0.02 | 46 | 46 | 100% | 0.001 |
| Aesthetic Characteristic | ADWG Guideline (mg/L) | No. of Analyses | No. of Analyses Complying with ADWG | % Compliance with ADWG | Max Value of Analysis (mg/L) |
| Copper (Cu) | 1 | 46 | 46 | 100% | 0.16 |
| Iron (Fe) | 0.3 | 8 | 8 | 100% | <0.01 |
| Sodium (Na) | 180 | 6 | 6 | 100% | 130 |
| Zinc (Zn) | 3 | 45 | 45 | 100% | 0.72 |

The reporting of the Drinking fountain results have been excluded from the distribution system (Tables 3.1, 4.1 and 5.1), as isolated events at these location are not indicative of the distribution system on a whole.

The following isolated instances were identified during the quarter as follows:

Army Jetty Drinking Fountain

14 August, Army Jetty returned lead exceedance. Action: Standard protocol to isolate and resample.



21 August, 2018 Army Jetty samples returned compliant with ADWG. Action: Fountain returned to service

Causeway Drinking Fountain

14 August. Causeway returned lead exceedance. Action: Standard protocol to isolate and resample.

21 August. Causeway 2nd flush sample returned lead exceedance. Action: Isolation remained in place. Filter change undertaken.

Resampled 28 August. Causeway samples returned compliant with ADWG Action: Fountain returned to service

All fountains safe for public use.

There was a recorded detection of Thermophilic Amoebae at the Basin Drinking Fountain on 7th August 2018. The Department of Health was appropriately notified. The drinking fountain was immediately isolated and taken out of service. Resampling undertaken on the 14th August 2018 returned clear and have remained so for the quarter. All samples since then have complied with ADWG guidelines and the drinking water is safe for public use..