

2015/16

Water Quality ANNUAL REPORT



Prepared for: Department of Health
and Human Services (Water Program)

Dated: October 2016



Cover photo – Water, essential for life – Photo by Ben Pohlner

TABLE OF CONTENTS

| | | |
|-----------|---|-----------|
| 1. | INTRODUCTION | 5 |
| | Defining Drinking Water | 5 |
| | Sources of Water | 5 |
| 2. | MANAGING WATER QUALITY | 10 |
| | Undertakings under Section 30 of The Act..... | 10 |
| | Variation to Aesthetic Standards | 10 |
| | Regulated Water | 10 |
| | Non-potable supplies | 11 |
| 3. | ENSURING SAFE DRINKING WATER | 12 |
| | Water Quality Management System | 12 |
| | Risk Management Plan Audit..... | 12 |
| 4. | WATER TREATMENT..... | 14 |
| 5. | MAINTAINING HIGH QUALITY WATER..... | 16 |
| | Staff Awareness and Training | 16 |
| | Distribution System | 16 |
| | Water Treatment Plant Changes and Improvements | 17 |
| 6. | DRINKING WATER QUALITY RESULTS 2015/16 | 18 |
| | Sampling Frequency | 18 |
| | Testing Programs | 18 |
| | Interpreting the results | 18 |
| | <i>Safe Drinking Water Regulations 2005 Standards</i> | 19 |
| | <i>Escherichia coli (E. coli)</i> | 20 |
| | <i>Safe Drinking Water Regulations 2005</i> | 20 |
| | Compliance – Trihalomethanes Results..... | 21 |
| | <i>Safe Drinking Water Regulations 2005</i> | 21 |
| | Turbidity | 22 |
| | <i>Safe Drinking Water Regulations 2005</i> | 22 |
| | <i>Safe Drinking Water Regulations 2015 Standards</i> | 23 |
| | <i>Escherichia coli (E. coli)</i> | 23 |
| | Compliance – Trihalomethanes Results..... | 24 |
| | Turbidity | 25 |
| | Other – May Pose A Risk To Human Health | 26 |
| | Fluoride..... | 26 |
| | Manganese Results..... | 28 |
| | Lead Results..... | 29 |
| | Copper Results | 30 |
| | Arsenic Results | 31 |
| | Water treatment related chemicals | 32 |
| | Inorganics | 32 |
| | Polycyclic Aromatic Hydrocarbon Results | 32 |
| | Disinfection by-products | 32 |
| | Pesticide/Herbicide Results..... | 33 |
| | Industrial Chemical Results..... | 34 |
| | Radionuclides – Gross Beta, Gross Alpha Radioactivity Results | 35 |
| | Other Results | 35 |
| | Aesthetic Parameters..... | 36 |
| | Iron Results | 38 |
| | Colour Results | 40 |
| | Alkalinity and Hardness..... | 41 |

| | | |
|-----------|--|-----------|
| | Total Dissolved Solids Results..... | 44 |
| | Analysis of Results | 45 |
| | Compliance as a Percentage of Localities | 45 |
| | Compliance as a Percentage of Population | 45 |
| 7. | EMERGENCY AND INCIDENT MANAGEMENT | 46 |
| | Section 22 Incidents..... | 46 |
| | Section 18 Incidents..... | 48 |
| | Other Incidents..... | 49 |
| | Customer Complaints..... | 50 |
| 8. | GLOSSARY | 52 |

I. INTRODUCTION

Wannon Water is committed to providing safe, reliable drinking water to South-west Victoria. Wannon Water provides water and water reclamation services to a population of approximately 84,000 people (100,000 during peak season) in South-west Victoria. The area serviced extends from the South Australian border in the west, to Balmoral in the north, to Lismore in the east and the lower Gellibrand River catchment on the coast.

Wannon Water has aligned its drinking water quality management system with the Australian Drinking Water Guidelines 2011 (ADWG) and Hazard Analysis and Critical Control Point (HACCP) risk management principles. Wannon Water will continue to improve its drinking water quality management program to ensure that water is delivered to our customers within the limits of the *Safe Drinking Water Act 2003* and associated Regulations.

This 2015/16 Drinking Water Quality annual report has been developed in accordance with the requirements of the *Safe Drinking Water Act 2003*. The report highlights the programs and initiatives Wannon Water has in place to provide safe drinking water to the people living in Wannon Water's water sampling localities.

Wannon Water has a comprehensive water quality monitoring program extending across a region of 24,500 square kilometres. Samples are collected from: raw water sources; water entry points; water storages and at specific points in the reticulation representing the "customers tap". All samples collected are analysed by an independent laboratory certified by the National Association of Testing Authorities (NATA).

During 2015/16, Wannon Water continued to achieve a high level of compliance against the requirements of the *Safe Drinking Water Act 2003*.

The high standard of drinking water provided is reflected in customers' continued satisfaction with Wannon Water's performance. The 2015 customer satisfaction survey showed that 95% of domestic customers were satisfied or very satisfied with the performance of Wannon Water.

This 2015/16 report includes the transition from the Safe Drinking Water Regulations 2005 to the Safe Drinking Water Regulations 2015. The Safe Drinking Water Regulations 2015 commenced on 18 July 2015.

Defining Drinking Water

The *Safe Drinking Water Act 2003* defines three types of water quality categories.

Drinking Water – Water that is intended for human consumption or for purposes connected with human consumption, such as the preparation of food or the making of ice for consumption or for the preservation of unpackaged food, whether or not the water is used for other purposes.

Regulated Water – This is water that is not intended for human consumption, but could be mistaken as drinking water. If there is a potential for the supply to be mistaken as drinking water, then the Minister for Health may declare the water as Regulated Water.

Non Potable Water – This is water that is not intended for human consumption and cannot be mistaken as drinking water. This water falls outside the *Safe Drinking Water Act 2003* and *Safe Drinking Water Regulations 2015*.

Sources of Water

During 2015/16, Wannon Water supplied drinking water to residential, rural, commercial and industrial customers. The water is harvested from a variety of sources and supplied through approximately 1,889 kilometres of water mains.

Wannon Water harvested approximately 14,700 megalitres (ML) of water to supply its customers. This water comes from an array of sources; namely, protected catchment areas, agricultural land, groundwater and, in three supply systems are supplied/subsidised with raw water supply from another regional water corporation. Specifically Rocklands Reservoir supplies Balmoral and subsidises the Hamilton System and various source water is supplied from the Willaura pipeline to Glenthompson. This water is supplied to customers with varying degrees of treatment, dependent on the characteristics of the raw water quality. Wannon Water also provides water to areas outside our catchment to Parks Victoria at the 12 Apostles. This drinking water supply is taken from one of three drinking water sites.

Wannon Water has commenced sanitary surveys of all of its source waters in accordance with the *Safe Drinking Water Regulations 2015*. This has included an increased monitoring program of source water.

Figure 1 - I illustrates the localities and where the water is sourced from. Table 1-I details: Wannon Water's water sampling localities; the sources of supply; how the water is stored subsequent to treatment and the treatment facilities operated by Wannon Water.



Figure 11 - Wannon Water Service Area

Table I-1 - Source water and treatment systems summary

| Water Sampling Locality | Source Water | Raw Water Storage | Treatment Plant | Number of customers ¹ |
|--|---|--|------------------------------------|----------------------------------|
| Allansford - via Warrnambool Water Treatment Plant (WTP) | Arkins Creeks (3) | Gellibrand Tank | Warrnambool WTP | 360 |
| | Gellibrand River | South Otway Tank | Allansford Disinfection Plant (DP) | |
| | Carlisle Bores (2) | Ewen's Hill Reservoir | | |
| | – via North Otway Pipeline | Plantation Rd Storage | | |
| | Gellibrand River – South Otway Pipeline | Tank Hill Reservoir | | |
| | | Warrnambool Storage1 | | |
| | | Warrnambool Storage 2 | | |
| | Albert Park Bores (3) | Brierly Basin | | |
| Roof water (North Warrnambool) | Albert Park Raw Water Storage | | | |
| Balmoral | Rocklands Reservoir (Grampians Wimmera Mallee Water) | Balmoral Service Basin | Balmoral WTP | 150 |
| Camperdown (Rural) | Arkins Creeks (3) | Gellibrand Tank | Camperdown WTP | 390 |
| | Gellibrand River | Donald's Hill Reservoir | | |
| | Carlisle Bores (2) | | | |
| | – via North Otway Pipeline | | | |
| Camperdown (Urban) | Arkins Creeks (3) | Gellibrand Tank | Camperdown WTP | 1830 |
| | Gellibrand River | Donald's Hill Reservoir | | |
| | Carlisle Bores (2) | | | |
| | – via North Otway Pipeline | | | |
| Caramut | Caramut Bores (2) | Caramut Service Basin | Caramut DP | 80 |
| | | Caramut Tank (Raw Water) | | |
| Casterton | Tullich Bores (4) | N/A | Casterton WTP | 990 |
| Cavendish | Grampians National Park | Cavendish Service Basin | Cavendish Disinfection Plant | 90 |
| | 7 streams on the western slopes of the Victoria Range and drought relief bores (2) | | | |
| Cobden | Arkins Creeks (3) | Gellibrand Tank | Cobden WTP | 900 |
| | Gellibrand River | Cobden Service Basin | | |
| | Carlisle Bores (2) | | | |
| | – via North Otway Pipeline | | | |
| Coleraine - via Casterton WTP | Tullich Bores (4) | N/A | Casterton WTP | 620 |
| | | | Coleraine DP | |
| Darlington (Regulated Supply) | Darlington Bore (1) | Darlington Elevated Tank | Nil Treatment | 20 |
| Dartmoor | Dartmoor Bore (1) | N/A | Dartmoor DP | 140 |
| Derrinallum - via Camperdown WTP | Arkins Creeks (3) | Gellibrand Tank | Camperdown WTP | 250 ² |
| | Gellibrand River | Donald's Hill Reservoir | Ettrick's Springs DP | |
| | Carlisle Bores (2) | | Lismore/Derrinallum Tank DP | |
| | – via North Otway Pipeline | | | |
| Dunkeld - via Hamilton WTP | Grampians National Park | Hayes Reservoir | Hamilton WTP | 390 |
| | 7 streams on the western slopes of the Victoria Range and drought relief bores (2) | Cruckoor Reservoir | Dunkeld DP | |
| | | Hartwicks Reservoir | | |
| | | Rocklands Reservoir (Grampians Wimmera Mallee Water) | | |
| Glenthompson | Yuppeckiar Creek Catchment and Grampians Wimmera Mallee Water (32ML supplementary purchase from Willaura Catchment) | Glenthompson Reservoir | Glenthompson WTP | 130 |
| | | Railway Reservoir | | |
| Hamilton | Grampians National Park | Hayes Reservoir | Hamilton WTP | 5400 |

| Water Sampling Locality | Source Water | Raw Water Storage | Treatment Plant | Number of customers ¹ |
|--------------------------------------|--|-------------------------------|-----------------------------|----------------------------------|
| | 7 streams on the western slopes of the Victoria Range and drought relief bores (2) | Cruckoor Reservoir | | |
| | | Hartwicks Reservoir | | |
| | | Hamilton Service Basins 1 & 2 | | |
| | Rocklands Reservoir (Grampians Wimmera Mallee Water) | | | |
| Heywood | Heywood Bores (2) | N/A | Heywood WTP | 760 |
| Koroit - via Warrnambool WTP | Arkins Creeks (3) | Gellibrand Tank | Warrnambool WTP | 780 |
| | Gellibrand River | South Otway Tank | Illowa (Koroit) DP | |
| | Carlisle Bores (2) | Ewen's Hill Reservoir | | |
| | – via North Otway Pipeline | Plantation Rd Storage | | |
| | | Tank Hill Reservoir | | |
| | Gellibrand River – South Otway Pipeline | Warrnambool Storage 1 | | |
| | | Warrnambool Storage 2 | | |
| | Albert Park Bores (3) | Brierly Basin | | |
| Roof water (North Warrnambool) | Albert Park Raw Water Storage | | | |
| Lismore - via Camperdown WTP | Arkins Creeks (3) | Gellibrand Tank | Camperdown WTP | 250 ² |
| | Gellibrand River | Donald's Hill Reservoir | Ettrick's Springs DP | |
| | Carlisle Bores (2) | | Lismore/Derrinallum Tank DP | |
| | – via North Otway Pipeline | | | |
| Macarthur | Macarthur Bore | N/A | Macarthur WTP | 180 |
| Merino - via Casterton WTP | Tullich Bores - Bore Field (4) | N/A | Casterton WTP | 180 |
| | | | Merino DP | |
| Mortlake - via Terang WTP | Arkins Creeks (3) | Gellibrand Tank | Terang WTP | 690 |
| | Gellibrand River | Ewen's Hill Reservoir | Mortlake DP | |
| | Carlisle Bores (2) | Absolom's Bore Balance Tank | | |
| | – via North Otway Pipeline | | | |
| | and Absolom's Bore (2) | | | |
| Noorat/Glenormiston - via Terang WTP | Arkins Creeks (3) | Gellibrand Tank | Terang WTP | 250 |
| | Gellibrand River | Ewen's Hill Reservoir | | |
| | Carlisle Bores (2) | | | |
| | – via North Otway Pipeline | | | |
| Paaratte - via Port Campbell WTP | Port Campbell Bore (1) | N/A | Port Campbell WTP | 30 |
| Penshurst | Penshurst Bore (1) | N/A | Penshurst DP | 320 |
| Peterborough - via Port Campbell WTP | Port Campbell Bore (1) | N/A | Port Campbell WTP | 350 |
| Port Campbell | Port Campbell Bore (1) | N/A | Port Campbell WTP | 300 |
| Port Fairy | Port Fairy Bores (2) | N/A | Port Fairy WTP | 2320 |
| Portland | Wyatt Street Bore (1) | N/A | Portland Wyatt St WTP | 5790 |
| | Bald Hill Bores (2) | | Portland Bald Hill WTP | |
| Purnim | Arkins Creeks (3) | Gellibrand Tank | Purnim DP | 100 |
| | Gellibrand River | Ewen's Hill Reservoir | | |
| | Carlisle Bores (2) | Tank Hill Reservoir | | |
| | – via North Otway Pipeline | Purnim Raw Water Tank | | |
| Sandford - via Casterton WTP | Tullich Bores - (4) | N/A | Casterton WTP | 90 |

| Water Sampling Locality | Source Water | Raw Water Storage | Treatment Plant | Number of customers ¹ |
|---------------------------------|--|-------------------------------|-------------------|----------------------------------|
| Simpson | Arkins Creeks (3) | Gellibrand Tank | Simpson WTP | 110 |
| | Gellibrand River | Simpson Service Basin | | |
| | Carlisle Bores (2) | | | |
| | – via North Otway Pipeline | | | |
| Tarrington - via Hamilton WTP | Grampians National Park | Hayes Reservoir | Hamilton WTP | 160 |
| | 7 streams on the western slopes of the Victoria Range and drought relief bores (2) | Cruckoor Reservoir | | |
| | | Hartwich's Reservoir | | |
| | Rocklands Reservoir (Grampians Wimmera Mallee Water) | Hamilton Service Basins 1 & 2 | | |
| Terang | Arkins Creeks (3) | Gellibrand Tank | Terang WTP | 1090 |
| | Gellibrand River | Ewen's Hill Reservoir | | |
| | Carlisle Bores (2) | | | |
| | – via North Otway Pipeline | | | |
| Timboon - via Port Campbell WTP | Port Campbell Bore (1) | N/A | Port Campbell WTP | 600 |
| Warrnambool | Arkins Creeks (3) | Gellibrand Tank | Warrnambool WTP | 15800 |
| | Gellibrand River | South Otway Tank | | |
| | Carlisle Bores (2) | Ewen's Hill Reservoir | | |
| | – via North Otway Pipeline | Plantation Rd Storage | | |
| | | Tank Hill Reservoir | | |
| | Gellibrand River – South Otway Pipeline | Warrnambool Storage 1 | | |
| | | Warrnambool Storage 2 | | |
| | Albert Park Bores (3) | Brierly Basin | | |
| | Roof water (North Warrnambool) | Albert Park Raw Water Storage | | |

N/A not applicable

¹ The figure used is the number of connections² Assumption (Lismore and Derrinallum customers 485)

2. MANAGING WATER QUALITY

Wannon Water bases its water quality compliance on the ADWG, as governed by the *Safe Drinking Water Act 2003* and associated Regulations. These guidelines are used for establishing microbiological, physical and chemical monitoring programs, which provide the basis for assessing drinking water quality.

Water Quality Standards

The Safe Drinking Water Regulations 2015 specify the water quality standards and the frequency at which they will be sampled. An explanation of the water quality standards is given below.

Escherichia coli (E. coli) - is a bacterial species belonging to the Coliforms group. It is only found naturally in the digestive tract of warm blooded animals. The presence of *E. coli* is indicative that faecal contamination may have occurred. One sample per week is required per locality. The water quality standard for *E. coli* is zero organisms per 100mL. Any detection of *E. coli* must be thoroughly investigated and the investigation will confirm whether or not the standard was met (a false positive) or not. Specifically:

- All other factors that would indicate the presence of *E. coli* in that water are not present in the water in the water sampling locality at the time of the investigation; and
- The drinking water treatment process applied, or other specified actions taken by the water supplier, are such as would be reasonably expected to have eliminated the presence of *E. coli* in the water sampling locality at the relevant time; and
- All plant and infrastructure associated with the water treatment process were operating to specification at all relevant times; and
- There were no issues arising from degradation of plant or infrastructure in or around the relevant water sampling locality that could reasonably be suspected to have contributed to the presence of *E. coli* in the drinking water in that water sampling locality.

Trihalomethanes - forms when chlorine reacts with naturally-occurring organic matter in the water supply. One sample per month is required per locality. Trihalomethanes (THMs) has a standard limit of 0.25 mg/L.

Turbidity - is a measure of particulate and suspended matter in water (cloudiness). Turbidity is caused by the presence of fine suspended matter such as clay, silt, colloidal particles and micro-organisms. Turbidity is measured in Nephelometric Turbidity Units (NTU). One sample per week is required per locality. The standard is defined as the 95th percentile of results for samples in any 12 month period must be less than or equal to 5.0 NTU.

Aluminium, chloroacetic acid, Dichloroacetic acid and trichloroacetic acid have been removed as mandated water quality standards. Wannon Water carried out an assessment of parameters to include in the water sampling programs and the data demonstrated that these were no longer required to be tested at the customer tap.

Wannon Water's water sampling programs monitors for additional algal, microbiological, chemical, physical and radiological parameters. Results from the monitoring of the parameters that have a potential health or aesthetic impact on customers are presented in Section 6.

Undertakings under Section 30 of The Act

Should drinking water continually not meet the quality criterion then the Corporation is required to commit to an undertaking with the Department of Health and Human Services (DHHS) to remediate the problem. Wannon Water did not apply for any undertakings in 2015/16.

Variation to Aesthetic Standards

In accordance with the *Safe Drinking Water Act 2003* a water supplier may apply to the Minister for Health for an exemption to a water quality standard. The Minister will, if satisfied, exempt the water supplier from complying with the water quality standard, as it applies to drinking water supplied by the water supplier. As noted, approved exemptions release water suppliers from the requirement to meet a specified quality standard for a period of time, but do not release them from the obligation to minimise any risk to the public.

Consultation was undertaken with Cavendish customers, and an exemption from complying with the aluminium water quality standard was granted by the Minister on 30 June 2013; the exemption applies until 30 June 2018.

Regulated Water

The Minister for Health has declared the following systems as regulated water:

- Darlington was declared a regulated water supply on 7 September 2006 (Gazette number G36). Darlington's water is sourced from a bore at Darlington. The number of properties connected to this system is 22.
- North Otway Pipeline was declared a regulated water supply on 26 June 2008 (Gazette number S168). The North Otway Pipeline is sourced from Arkins Creek Catchment and Gellibrand River Catchment and is supplemented in the drier months from the Carlisle River Borefield. The number of properties connected to the system is 454.

In accordance with section 7 of the *Safe Drinking Water Act 2003* Wannon Water has a regulated water risk management plan that covers the two regulated water localities.

Wannon Water communicates to customers and the general public via notices on the regular water bill and a 12 monthly notice for each non-drinking water supply. This information is also included in the new customer welcome package. Customers are offered stickers or signage at any time where required.

Wannon Water has a list of where public taps are located. All public taps are signed and Wannon Water audits the signage on a regular basis. Wannon Water communicates the locations of signage to the Environmental Health Officer of the relevant councils on an annual basis and will supply council with extra signage if new public taps are installed.

Non-potable supplies

Nine of the 34 systems contain customers that are supplied with non-potable water.

All these customers are known as non-drinking water 'supply-by-agreement' customers. They have each signed a contract with Wannon Water that indicates that the water is not fit for human consumption. Customers also receive regular notifications via the billing process. These customers receive water from the system prior to disinfection.

3. ENSURING SAFE DRINKING WATER

Water Quality Management System

Wannon Water maintains a drinking water quality management system based on Hazard Analysis Critical Control Point (HACCP) and the ADWG risk management principles. Wannon Water utilises a multiple barrier approach to ensure that drinking water is safe and aesthetically pleasing. The strength of this approach is that if a barrier is compromised it is able to be compensated for by the effective operation of the remaining barriers. This approach minimises the likelihood of contaminants passing through the treatment system and potentially causing harm to consumers.

The barriers utilised are:

- Catchment management and source water protection;
- Detention in protected reservoirs or storages;
- Extraction management;
- Treatment;
- Disinfection; and
- Maintenance of the distribution system; including maintaining adequate chlorine or chloramine residuals.

Raw (source) water from surface and groundwater supplies may contain contaminants such as sediment, microorganisms and dissolved organic compounds. Such water may not be aesthetically pleasing or safe to drink. To create a safe drinking supply Wannon Water monitors at various locations from source to tap and then treats the water through differing processes. The treated water is then reticulated through a number of storage tanks and pipes before being delivered to customers.

Risk Management Plan Audit

A regulatory audit was required within the period of 1 January 2016 to 30 June 2016. Wannon Water conducted its audit in May 2016. The audit covered the period from November 2013 to the date of the audit. The audit was carried out by Frank Kiss of KISS Water Quality.

The audit found that Wannon Water complied with the obligations of the Act. Three improvement opportunities were identified during the audit, namely:

1. Opportunity for Improvement
Traceability of batch numbers of chemicals used for water treatment could be improved as not all deliveries were being adequately recorded and some chemical delivery checklists were missing.

Some supplied test certificates did not have traceable batch numbers.

Actions

Wannon Water recently introduced an electronic form (e-form) which incorporates chemical deliveries. Once staff are trained this will eliminate missing forms and allow easier identification if batch numbers are missing. Wannon Water has recently entered into a new chemical contract brokered through VicWater providing for a more stringent batch tracking system. We will explore this system further with the chemical providers. These actions are intended to partly address this opportunity for improvement. Wannon Water is attending workshops around bulk chemicals used for drinking water of which traceability is an agenda item.

2. Opportunity for Improvement

Online SCADA limits at some sites were not effectively protected from change by Operational staff.

Actions

Wannon Water has investigated and found that the system is not flexible enough to allow only some operators to change limits (in consultation with water quality staff members) hence the ability has been removed for all staff and limits can be altered by request only through Managers and Coordinators of the various work areas.

3. Opportunity for Improvement

Protocols/methodologies for Health Based Target (HBT) assessments need to be finalised.

Actions

Wannon Water has updated its Optimiser tool to include HBT calculations. Wannon Water has used two different methods to assess its supplies, one method for surface water and another for groundwater. Wannon Water will document a final methodology/protocol. Wannon Water is also supporting research into a guide on the HBT sanitary survey and monitoring guide, to help with this process.



ABN: 97089400888

Schedule 1

Safe Drinking Water Regulations 2015 – Regulation 10

RISK MANAGEMENT PLAN AUDIT CERTIFICATE

Certificate Number: 84

Audit Period: Nov 2013 to May 2016

To: *Ms Catherine Huf,
Manager Operational Monitoring and Reporting,
Wannon Region Water Corporation,
25 Gateway Road, Warrnambool, VIC., 3280*
Australian Business Number (ABN): 94 007 404 851

I, *Frank Kiss*, after conducting a risk management plan audit of the water supplied by *Wannon Region Water Corporation*, am of the opinion that—

Wannon Region Water Corporation has complied with the obligations imposed by section 7(1) of the *Safe Drinking Water Act 2003* during the audit period.

A handwritten signature in black ink, appearing to read 'Frank Kiss'.

Signature of approved auditor:

Date: 30 May 2016

4. WATER TREATMENT

Water treatment at Wannon Water varies by system, ranging from no treatment for regulated water supplies, to full treatment via a water treatment plant.

Table 4-1 details the treatment processes utilised within each of Wannon Water's drinking water treatment plants.

The water treatment processes employed during 2015/16 were similar to 2014/15. Changes and improvements to the system are outlined in Section 5.

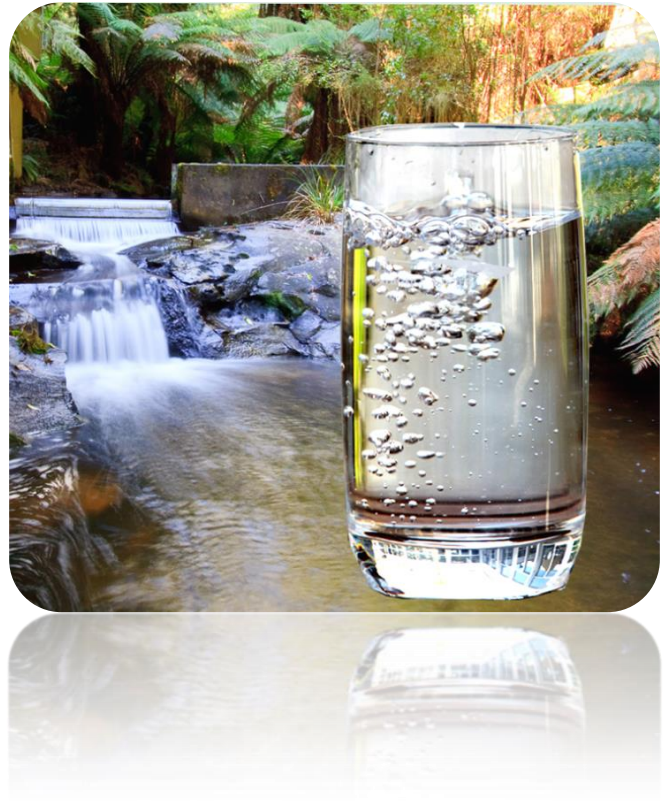


Table 4-1 - Treatment Processes and Added Substances 2015/16

| Treatment Plant/ Disinfection Plant | Treatment Process[^] | Added substance(s) |
|--|--|---|
| Allansford DP | Disinfection | Sodium hypochlorite |
| Balmoral WTP | Coagulation, Flocculation and Clarification, Filtration, Sequestration, Disinfection | Soda Ash, Aluminium chlorohydrate (ACH), Calgon, Sodium hypochlorite, Aqueous ammonia |
| Camperdown WTP | Coagulation, Flocculation and Clarification Filtration | Hydrated Lime, Aluminium Sulphate, Chlorine gas, Powdered Activated Carbon (PAC) |
| Caramut DP | Disinfection | Sodium hypochlorite |
| Casterton WTP | Oxidation, Coagulation, Flocculation and Clarification, Filtration, Disinfection | Ferric Chloride, Magnafloc LT20 flocculant, Sodium hypochlorite |
| Cavendish DP | Disinfection # | Sodium hypochlorite |
| Cobden WTP | Coagulation, Flocculation and Clarification, Filtration, Sequestration, Disinfection | Soda Ash, Aluminium Sulphate, Polymer Klaraid, Calgon, Chlorine gas |
| Coleraine DP | Disinfection | Sodium hypochlorite |
| Dartmoor DP | Disinfection | Sodium hypochlorite |
| Dunkeld DP | Disinfection | Sodium hypochlorite |
| Ettrick Springs DP | Disinfection | Chlorine gas |
| Glenthompson WTP | Coagulation, Flocculation and Clarification, Filtration, Sequestration, Disinfection # | Aluminium chlorohydrate (ACH), Calgon, Sodium hypochlorite, Aqueous ammonia |
| Hamilton WTP | Coagulation, Flocculation and Clarification, Filtration, Disinfection, Fluoridation | Hydrated Lime, Aluminium Sulphate, Polymer Nalclean 8170PULN, Chlorine gas, Aqueous ammonia, Fluorosilicic acid |
| Heywood WTP | Cooling/ aeration towers, Sequestration, Disinfection | Calgon, Chlorine gas |
| Illowa DP | Disinfection | Chlorine gas |
| Macarthur WTP | Oxidation, Coagulation, Flocculation and Clarification, Filtration *, Disinfection | Ferric Chloride, Magnafloc LT20 flocculant, Sodium hypochlorite |
| Merino DP | Disinfection | Sodium hypochlorite |
| Mortlake DP | Disinfection | Chlorine gas |
| Penshurst DP | Disinfection | Sodium hypochlorite |
| Port Campbell WTP | Cooling/ aeration towers, Disinfection | Chlorine gas |
| Port Fairy WTP | Cooling/ aeration towers, Sequestration, Disinfection | Calgon, Chlorine gas |
| Portland Bald Hill WTP | Cooling/ aeration towers, Disinfection | Chlorine gas |
| Portland Wyatt Street WTP | Cooling/ aeration towers, Disinfection | Chlorine gas |
| Purnim DP | Disinfection# | Sodium hypochlorite |
| Simpson WTP | Coagulation, Flocculation and Clarification, Filtration, Disinfection | Caustic soda, Aluminium sulphate, Chlorine gas |
| Terang WTP | Coagulation, Flocculation and Clarification, Filtration, Disinfection | Soda Ash, Aluminium sulphate, Polymer Klaraid, Chlorine gas |
| Warrnambool WTP | Coagulation, Flocculation and Clarification, Filtration, Disinfection, Fluoridation | Aluminium sulphate, Polyelectrolyte Nalco 3482, Chlorine gas, Hydrated lime, Fluorosilicic acid |

[^] See Glossary for description of each treatment process

*Pressure filters plus iron sorption filters

#Disinfection includes UV

5. MAINTAINING HIGH QUALITY WATER

Staff Awareness and Training

Wannon Water has adopted the Best Practice Guidelines for Victorian Framework for Water Treatment Operator Competencies. Wannon Water is dedicated to providing relevant employees with water industry training and awareness in via formal training and attendance at relevant conferences and information sessions. In 2015/16 this included:

- Internal auditor training
- Certification III and IV in Water Industry Operations
- Attendance at Water Industry Operators Association (WIOA) Conference
- Oz Water Conference
- Attendance at Victorian Drinking Water Network meetings

Distribution System

Flushing Program

Wannon Water has a regular flushing program for drinking water localities. Frequency of flushing is risk-based and Wannon Water utilises field data and customer feedback in scheduling the program, which is reviewed as required.

Wannon Water uses flushing to remove colour or turbidity in response to reaching critical limits or when a customer complaint is received. Flushing is also used to increase chlorine residual at locations where water usage is low.

Air Scouring Program

Wannon Water utilises contractors to conduct air scouring within its reticulation systems. Frequency of air scouring is risk based. No air scouring was conducted during 2015/16.

Mains Renewal Program

Wannon Water has an asset replacement program created and prioritised via a risk-based process using event information, condition assessments and asset modelling. In 2015/16 Wannon Water spent approximately \$600 thousand replacing approximately 3.3 kilometres of mains at Camperdown Urban, Camperdown Rural, Coleraine, Hamilton and Merino.

Tank Cleaning Program

Wannon Water utilises contractors on a regular basis to inspect or clean tanks within the distribution system and storages at water treatment plants. In 2015/16 cleaning occurred at:

- Arundel Road basin at Casterton
- Bald Hill cooling tower sumps at Portland
- Bald Hill clear water storage
- Dunkeld service basin
- Glenthompson clear water storage
- Heywood clear water storage

Inspections were carried out at:

- Koroit service basin
- Noorat tank
- Mortlake tank
- Cobden clear water storage

Water Treatment Plant Changes and Improvements

Balmoral distribution system

Corroded and unlined fittings were replaced to improve water quality.

Camperdown WTP

A new mixing system for PAC dosing system was installed.

Casterton WTP

A clarifier was installed to improve water quality.

Cavendish DP

Dosing equipment was replaced.

Hamilton WTP

Hamilton Service Basin 1 was de-sludged to improve raw water quality.

Penshurst DP

Dosing equipment was replaced.

Port Campbell WTP

Pre-cooling tower chlorine dosing has been set up to oxidise iron for enhanced iron removal.

Port Fairy

The Port Fairy water tower was repaired and relined.

Purnim

The Purnim water tower outlet was replaced;

South Otway catchment

A turbidity monitoring system was installed at Gellibrand River to allow improved water harvesting decision making.

Tank Hill Reservoir

Dual drum scales were installed with auto changeover for chlorine gas including SCADA monitoring.

6. DRINKING WATER QUALITY RESULTS 2015/16

Sampling Frequency

The frequency of sampling of the water quality standards (*Escherichia coli*, Trihalomethanes and turbidity) is specified in Schedule 2 of the Safe Drinking Water Regulations 2015. Wannon Water uses its risk assessment process to select an appropriate sampling frequency for additional microbiological, chemical, physical, radiological and algal monitoring.

Regulation 13 (2) of the Safe Drinking Water Regulations 2015 (the Regulations) provides that the Secretary to the DHHS may, by notice published in the Government Gazette, vary the frequencies specified in Schedule 2 of the Regulations at which samples of drinking water are to be collected at a water sampling point located within a water sampling locality. On 5 June 2009 the Secretary approved a variation to the frequency at which a sample of drinking water for *Escherichia coli* (*E.coli*) and turbidity were to be collected at:

- Port Fairy – from 1 sample per week to 2 samples per week
- Portland – from 1 sample per week to 2 samples per week
- Hamilton – from 1 sample per week to 2 samples per week
- Warrnambool – from 1 sample per week to 3 samples per week

Testing Programs

The number of samples collected and frequency of testing varies for each locality according to population and risk. The geographic location of customer sampling taps is designed to ensure that the samples are collected representative of the supply system. The sampling program is reviewed on a regular basis to align with changes in the risk profile of each locality.

During 2015/16 Wannon Water performed over 45,000 individual tests. Approximately 42% of the tests were sampled at customer's taps within 34 localities.

On occasion, scheduled testing will be missed for various reasons, such as human error, broken or missing sample bottles or the sample point being out of action (e.g. bore not operational at time of sampling). Any missed regulatory samples are communicated to the DHHS at the time. **In 2015/16 no Schedule 2 regulatory samples were missed.**

Interpreting the results

The units of results are dependent on the parameter being analysed. The most common unit used within this report is milligrams per litre (**mg/L**). This unit is interchangeable with parts per million (ppm). Other units within this report include:

- **orgs/100mL** used for measurement of *E.coli*
- Nephelometric Turbidity Units (**NTU**) a measurement for turbidity
- **pH units** for measurement of pH
- Platinum-Cobalt (**Pt.-Co.**) units for measurement of colour. This unit is interchangeable with Hazen Units (HU)
- **mg/L as calcium carbonate (CaCO₃)** used for measuring total hardness

More than one sample collected per week – Localities where more than one sample is collected per week are marked with an asterisk (*).

Missing tests – All missing tests are marked with the hash symbol (#) within the report and due to reasons stated under Testing Programs.

Less than limit of detection – The symbol for less than (<) is used when the concentration of a parameter is less than what can be detected accurately by the instrument. The level which an instrument can accurately detect is known as the "limit of detection".

Aesthetic exceedance – All tests marked with "A^x" are aesthetic exceedance, "x" indicating the number of exceedances.

Safe Drinking Water Regulations 2005 Standards

Table 6.1 – Summary of water quality data: 1 July 2015 - 17 July 2015

| Parameter | Sampling Frequency | Maximum Result | Standard met | Comment |
|-------------------------|--------------------|-------------------|--------------|---|
| <i>Escherichia coli</i> | Weekly | 0 orgs/ 100 mL | Yes | All localities were compliant for the period – refer to Table 6.2 |
| Trihalomethanes | Monthly | 0.14 mg/L | Yes | All localities were compliant for the period – refer to Table 6.3 |
| Turbidity | Weekly | 0.8 NTU | Yes | All localities were compliant for the period – refer to Table 6.4 |
| Chloroacetic acid | Monthly* | N/A | N/A | Wannon Water didn't test for these parameters as 100% compliance had been received over the previous three years. It was known that these parameters were to be removed in the new regulations. If the new regulations were not in by the final week of July, samples were scheduled to be collected. |
| Dichloroacetic acid | Monthly* | N/A | N/A | |
| Trichloroacetic acid | Monthly* | N/A | N/A | |
| Aluminium | Monthly* | N/A | N/A | Wannon Water didn't test for aluminium as greater than 98% compliance had been received over the previous three years. It was known that aluminium was to be removed in the new regulations. If the new regulations were not in by the final week of July, samples were scheduled to be collected. |

Escherichia coli (E. coli)**Safe Drinking Water Regulations 2005**

Standard At least 98% of all samples of drinking water collected within a locality in any 12 month period to contain no *E. coli* (SDWR 2005).

Table 6-2 E. coli results by locality 1 July – 17 July 2015

| E.coli | | | | | | |
|---------------------|---------------------------|-----------------------|-------------------------------------|------------------------------------|--|------------------|
| Locality | Sampling Frequency | No. of Samples | No. of Non complying samples | % of samples with no E.coli | Maximum result (orgs/100ml) Raw | Compliant |
| ALLANSFORD | Weekly | 2 | 0 | 100 | 0 | Yes |
| BALMORAL | Weekly | 2 | 0 | 100 | 0 | Yes |
| CAMPERDOWN (RURAL) | Weekly | 2 | 0 | 100 | 0 | Yes |
| CAMPERDOWN (URBAN) | Weekly | 2 | 0 | 100 | 0 | Yes |
| CARAMUT | Weekly | 2 | 0 | 100 | 0 | Yes |
| CASTERTON | Weekly | 3 | 0 | 100 | 0 | Yes |
| CAVENDISH | Weekly | 2 | 0 | 100 | 0 | Yes |
| COBDEN | Weekly | 2 | 0 | 100 | 0 | Yes |
| COLERAINE | Weekly | 3 | 0 | 100 | 0 | Yes |
| DARTMOOR | Weekly | 3 | 0 | 100 | 0 | Yes |
| DERRINALLUM | Weekly | 2 | 0 | 100 | 0 | Yes |
| DUNKELD | Weekly | 3 | 0 | 100 | 0 | Yes |
| GLENTHOMPSON | Weekly | 3 | 0 | 100 | 0 | Yes |
| HAMILTON * | Weekly | 6 | 0 | 100 | 0 | Yes |
| HEYWOOD | Weekly | 3 | 0 | 100 | 0 | Yes |
| KOROIT | Weekly | 2 | 0 | 100 | 0 | Yes |
| LISMORE | Weekly | 2 | 0 | 100 | 0 | Yes |
| MACARTHUR | Weekly | 2 | 0 | 100 | 0 | Yes |
| MERINO | Weekly | 3 | 0 | 100 | 0 | Yes |
| MORTLAKE | Weekly | 2 | 0 | 100 | 0 | Yes |
| NOORAT/GLENORMISTON | Weekly | 2 | 0 | 100 | 0 | Yes |
| PAARATTE | Weekly | 2 | 0 | 100 | 0 | Yes |
| PENSHURST | Weekly | 2 | 0 | 100 | 0 | Yes |
| PETERBOROUGH | Weekly | 2 | 0 | 100 | 0 | Yes |
| PORT CAMPBELL | Weekly | 2 | 0 | 100 | 0 | Yes |
| PORT FAIRY * | Weekly | 4 | 0 | 100 | 0 | Yes |
| PORTLAND * | Weekly | 6 | 0 | 100 | 0 | Yes |
| PUENIM | Weekly | 2 | 0 | 100 | 0 | Yes |
| SANDFORD | Weekly | 3 | 0 | 100 | 0 | Yes |
| SIMPSON | Weekly | 2 | 0 | 100 | 0 | Yes |
| TARRINGTON | Weekly | 2 | 0 | 100 | 0 | Yes |
| TERANG | Weekly | 2 | 0 | 100 | 0 | Yes |
| TIMBOON | Weekly | 2 | 0 | 100 | 0 | Yes |
| WARRNAMBOOL * | Weekly | 6 | 0 | 100 | 0 | Yes |

* Weekly sampling with increases for population (ADWG, Section 9.5.2)

Compliance – Trihalomethanes Results

Safe Drinking Water Regulations 2005

Standard All samples of drinking water collected within a locality in any 12 month period must not exceed 0.25 mg/L (SDWR 2005)

Table 6-3 Trihalomethanes results by locality 1 July – 17 July 2015

| Trihalomethanes | | | | | |
|---------------------|--------------------|----------------|------------------------------|-----------------------|-----------|
| Locality | Sampling Frequency | No. of Samples | No. of Non complying samples | Maximum result (mg/L) | Compliant |
| ALLANSFORD | Monthly | 1 | 0 | 0.073 | Yes |
| BALMORAL | Monthly | 1 | 0 | 0.065 | Yes |
| CAMPERDOWN (RURAL) | Monthly | 1 | 0 | 0.035 | Yes |
| CAMPERDOWN (URBAN) | Monthly | 1 | 0 | 0.036 | Yes |
| CASTERTON | Monthly | 1 | 0 | 0.130 | Yes |
| CAVENDISH | Monthly | 1 | 0 | 0.019 | Yes |
| COBDEN | Monthly | 1 | 0 | 0.050 | Yes |
| COLERAINE | Monthly | 1 | 0 | 0.140 | Yes |
| DARTMOOR | Monthly | 1 | 0 | 0.001 | Yes |
| DERRINALLUM | Monthly | 1 | 0 | 0.096 | Yes |
| DUNKELD | Monthly | 1 | 0 | 0.039 | Yes |
| GLENTHOMPSON | Monthly | 1 | 0 | 0.120 | Yes |
| HAMILTON | Monthly | 1 | 0 | 0.009 | Yes |
| HEYWOOD | Monthly | 1 | 0 | 0.005 | Yes |
| KOROIT | Monthly | 1 | 0 | 0.073 | Yes |
| LISMORE | Monthly | 1 | 0 | 0.089 | Yes |
| MACARTHUR | Monthly | 1 | 0 | 0.031 | Yes |
| MERINO | Monthly | 1 | 0 | 0.130 | Yes |
| MORTLAKE | Monthly | 1 | 0 | 0.068 | Yes |
| NOORAT/GLENORMISTON | Monthly | 1 | 0 | 0.038 | Yes |
| PAARATTE | Monthly | 1 | 0 | 0.006 | Yes |
| PENSHURST | Monthly | 1 | 0 | 0.022 | Yes |
| PETERBOROUGH | Monthly | 1 | 0 | 0.008 | Yes |
| PORT CAMPBELL | Monthly | 1 | 0 | 0.011 | Yes |
| PORT FAIRY | Monthly | 1 | 0 | 0.001 | Yes |
| PORTLAND | Monthly | 1 | 0 | 0.001 | Yes |
| PURNIM | Monthly | 1 | 0 | 0.140 | Yes |
| SANDFORD | Monthly | 1 | 0 | 0.130 | Yes |
| SIMPSON | Monthly | 1 | 0 | 0.027 | Yes |
| TARRINGTON | Monthly | 1 | 0 | 0.005 | Yes |
| TERANG | Monthly | 1 | 0 | 0.038 | Yes |
| TIMBOON | Monthly | 1 | 0 | 0.034 | Yes |
| WARRNAMBOOL | Monthly | 1 | 0 | 0.058 | Yes |

Turbidity

Safe Drinking Water Regulations 2005

Standard 95% upper confidence limit (UCL) of the mean of samples of drinking water collected in a 12 month period must be less than or equal to 5.0 NTU (SDWR 2005)

Table 6-4 Turbidity results by locality 1 July – 17 July 2015

| Turbidity | | | | | |
|---------------------|--------------------|----------------|--------------------|-----------------|-----------|
| Locality | Sampling Frequency | No. of Samples | Maximum result NTU | 95% UCL of Mean | Compliant |
| ALLANSFORD | Weekly | 2 | <0.1 | <0.1 | Yes |
| BALMORAL | Weekly | 2 | 0.2 | 0.2 | Yes |
| CAMPERDOWN (RURAL) | Weekly | 2 | 0.1 | 0.1 | Yes |
| CAMPERDOWN (URBAN) | Weekly | 2 | 0.2 | 0.3 | Yes |
| CARAMUT | Weekly | 2 | <0.1 | <0.1 | Yes |
| CASTERTON | Weekly | 3 | <0.1 | 0.1 | Yes |
| CAVENDISH | Weekly | 2 | 0.6 | 0.6 | Yes |
| COBDEN | Weekly | 2 | 0.1 | 0.1 | Yes |
| COLERAINE | Weekly | 3 | 0.2 | 0.2 | Yes |
| DARTMOOR | Weekly | 3 | <0.1 | <0.1 | Yes |
| DERRINALLUM | Weekly | 2 | 0.3 | 0.4 | Yes |
| DUNKELD | Weekly | 3 | 0.2 | 0.2 | Yes |
| GLENTHOMPSON | Weekly | 3 | 0.4 | 0.4 | Yes |
| HAMILTON * | Weekly | 6 | 0.2 | 0.2 | Yes |
| HEYWOOD | Weekly | 3 | 0.5 | 0.5 | Yes |
| KOROIT | Weekly | 2 | 0.1 | 0.1 | Yes |
| LISMORE | Weekly | 2 | <0.1 | <0.1 | Yes |
| MACARTHUR | Weekly | 2 | <0.1 | <0.1 | Yes |
| MERINO | Weekly | 3 | <0.1 | <0.1 | Yes |
| MORTLAKE | Weekly | 2 | 0.1 | 0.1 | Yes |
| NOORAT/GLENORMISTON | Weekly | 2 | 0.1 | 0.1 | Yes |
| PAARATTE | Weekly | 2 | 0.1 | 0.1 | Yes |
| PENSHURST | Weekly | 2 | 0.1 | 0.1 | Yes |
| PETERBOROUGH | Weekly | 2 | 0.2 | 0.3 | Yes |
| PORT CAMPBELL | Weekly | 2 | 0.2 | 0.3 | Yes |
| PORT FAIRY * | Weekly | 4 | 0.4 | 0.4 | Yes |
| PORTLAND * | Weekly | 6 | 0.4 | 0.3 | Yes |
| PURNIM | Weekly | 2 | 0.8 | 0.7 | Yes |
| SANDFORD | Weekly | 3 | <0.1 | <0.1 | Yes |
| SIMPSON | Weekly | 2 | <0.1 | <0.1 | Yes |
| TARRINGTON | Weekly | 2 | 0.3 | 0.4 | Yes |
| TERANG | Weekly | 2 | 0.1 | 0.1 | Yes |
| TIMBOON | Weekly | 2 | 0.2 | 0.3 | Yes |
| WARRNAMBOOL * | Weekly | 6 | 0.2 | 0.2 | Yes |

* Weekly sampling with increases for population (ADWG, Section 9.5.2)

Safe Drinking Water Regulations 2015 Standards

Escherichia coli (*E. coli*)

Standard: No *E.coli* per 100 millilitres of drinking water, with the exception of any false positive sample.

Outcome: The Standard was met at all localities

Table 6-5 *E. coli* results by locality 18 July 2015 – 30 June 2016

| <i>E.coli</i> | | | |
|---------------------|---|----------------------------------|---|
| Locality | No. of investigations conducted (s. 22) | No. of confirmed false positives | No. of investigations where standard not met (s.18) |
| ALLANSFORD | 0 | 0 | 0 |
| BALMORAL | 0 | 0 | 0 |
| CAMPERDOWN (RURAL) | 0 | 0 | 0 |
| CAMPERDOWN (URBAN) | 0 | 0 | 0 |
| CARAMUT | 0 | 0 | 0 |
| CASTERTON | 0 | 0 | 0 |
| CAVENDISH | 0 | 0 | 0 |
| COBDEN | 0 | 0 | 0 |
| COLERAINE | 0 | 0 | 0 |
| DARTMOOR | 0 | 0 | 0 |
| DERRINALLUM | 0 | 0 | 0 |
| DUNKELD | 0 | 0 | 0 |
| GLENTHOMPSON | 0 | 0 | 0 |
| HAMILTON | 0 | 0 | 0 |
| HEYWOOD | 0 | 0 | 0 |
| KOROIT | 0 | 0 | 0 |
| LISMORE | 0 | 0 | 0 |
| MACARTHUR | 0 | 0 | 0 |
| MERINO | 1 | 1 | 0 |
| MORTLAKE | 0 | 0 | 0 |
| NOORAT/GLENORMISTON | 1 | 1 | 0 |
| PAARATTE | 0 | 0 | 0 |
| PENSHURST | 0 | 0 | 0 |
| PETERBOROUGH | 0 | 0 | 0 |
| PORT CAMPBELL | 0 | 0 | 0 |
| PORT FAIRY | 0 | 0 | 0 |
| PORTLAND | 1 | 1 | 0 |
| PURNIM | 0 | 0 | 0 |
| SANDFORD | 0 | 0 | 0 |
| SIMPSON | 0 | 0 | 0 |
| TARRINGTON | 0 | 0 | 0 |
| TERANG | 0 | 0 | 0 |
| TIMBOON | 0 | 0 | 0 |
| WARRNAMBOOL | 0 | 0 | 0 |

Compliance – Trihalomethanes Results

Standard: Less than or equal to 0.25 milligrams per litre of drinking water

Outcome: The Standard was met at all localities

Table 6-6 Trihalomethanes results by locality 18 July 2015 – 30 June 2016

Trihalomethanes

| Locality | Sampling Frequency | No. of Samples | No. of samples above the standard | Max. mg/L | Met the standard (yes/no) ¹ |
|---------------------|--------------------|----------------|-----------------------------------|-----------|--|
| ALLANSFORD | Monthly | 11 | 0 | 0.079 | Yes |
| BALMORAL | Monthly | 11 | 0 | 0.140 | Yes |
| CAMPERDOWN (RURAL) | Monthly | 11 | 0 | 0.084 | Yes |
| CAMPERDOWN (URBAN) | Monthly | 11 | 0 | 0.075 | Yes |
| CARAMUT | Monthly | 11 | 0 | 0.042 | Yes |
| CASTERTON | Monthly | 11 | 0 | 0.140 | Yes |
| CAVENDISH | Monthly | 11 | 0 | 0.060 | Yes |
| COBDEN | Monthly | 11 | 0 | 0.081 | Yes |
| COLERAINE | Monthly | 11 | 0 | 0.190 | Yes |
| DARTMOOR | Monthly | 11 | 0 | 0.003 | Yes |
| DERRINALLUM | Monthly | 11 | 0 | 0.160 | Yes |
| DUNKELD | Monthly | 11 | 0 | 0.100 | Yes |
| GLENTHOMPSON | Monthly | 11 | 0 | 0.120 | Yes |
| HAMILTON | Monthly | 11 | 0 | 0.018 | Yes |
| HEYWOOD | Monthly | 11 | 0 | 0.030 | Yes |
| KOROIT | Monthly | 11 | 0 | 0.110 | Yes |
| LISMORE | Monthly | 11 | 0 | 0.130 | Yes |
| MACARTHUR | Monthly | 11 | 0 | 0.047 | Yes |
| MERINO | Monthly | 11 | 0 | 0.170 | Yes |
| MORTLAKE | Monthly | 11 | 0 | 0.170 | Yes |
| NOORAT/GLENORMISTON | Monthly | 11 | 0 | 0.160 | Yes |
| PAARATTE | Monthly | 11 | 0 | 0.009 | Yes |
| PENSHURST | Monthly | 11 | 0 | 0.030 | Yes |
| PETERBOROUGH | Monthly | 11 | 0 | 0.013 | Yes |
| PORT CAMPBELL | Monthly | 11 | 0 | 0.013 | Yes |
| PORT FAIRY | Monthly | 11 | 0 | 0.001 | Yes |
| PORTLAND | Monthly | 11 | 0 | 0.002 | Yes |
| PURNIM | Monthly | 11 | 0 | 0.130 | Yes |
| SANDFORD | Monthly | 11 | 0 | 0.160 | Yes |
| SIMPSON | Monthly | 11 | 0 | 0.092 | Yes |
| TARRINGTON | Monthly | 11 | 0 | 0.018 | Yes |
| TERANG | Monthly | 11 | 0 | 0.150 | Yes |
| TIMBOON | Monthly | 11 | 0 | 0.054 | Yes |
| WARRNAMBOOL | Monthly | 11 | 0 | 0.074 | Yes |

I - For Trihalomethanes, if the maximum result is 0.255mg/L or greater, then the locality is non-compliant

Turbidity

Standard: The 95th percentile of results for samples in any 12 month period must be less than or equal to 5.0 NTU

Outcome: The Standard was met at all localities

Table 6-7 Turbidity results by locality 18 July 2015 – 30 June 2016

| Turbidity | | | | | |
|---------------------|--------------------|----------------|--------------------|-----------------|---------------------------|
| Locality | Sampling Frequency | No. of Samples | Maximum result NTU | 95th percentile | Met the standard (yes/no) |
| ALLANSFORD | Weekly | 50 | 0.6 | 0.6 | Yes |
| BALMORAL | Weekly | 49 | 3.7 | 1.0 | Yes |
| CAMPERDOWN (RURAL) | Weekly | 51 | 2.4 | 0.6 | Yes |
| CAMPERDOWN (URBAN) | Weekly | 51 | 0.3 | 0.3 | Yes |
| CARAMUT | Weekly | 49 | 0.3 | 0.3 | Yes |
| CASTERTON | Weekly | 49 | 0.2 | 0.2 | Yes |
| CAVENDISH | Weekly | 50 | 2.4 | 1.5 | Yes |
| COBDEN | Weekly | 51 | 0.6 | 0.4 | Yes |
| COLERAINE | Weekly | 49 | 0.2 | 0.1 | Yes |
| DARTMOOR | Weekly | 49 | 0.2 | 0.1 | Yes |
| DERRINALLUM | Weekly | 51 | 0.5 | 0.4 | Yes |
| DUNKELD | Weekly | 49 | 1.0 | 0.9 | Yes |
| GLENTHOMPSON | Weekly | 49 | 0.8 | 0.7 | Yes |
| HAMILTON * | Weekly | 98 | 1.8 | 1.1 | Yes |
| HEYWOOD | Weekly | 49 | 2.1 | 1.8 | Yes |
| KOROIT | Weekly | 51 | 0.8 | 0.2 | Yes |
| LISMORE | Weekly | 50 | 0.8 | 0.7 | Yes |
| MACARTHUR | Weekly | 49 | 1.1 | 0.3 | Yes |
| MERINO | Weekly | 49 | 0.2 | 0.2 | Yes |
| MORTLAKE | Weekly | 50 | 2.4 | 1.5 | Yes |
| NOORAT/GLENORMISTON | Weekly | 49 | 0.3 | 0.3 | Yes |
| PAARATTE | Weekly | 50 | 0.9 | 0.3 | Yes |
| PENSHURST | Weekly | 49 | 19.0 | 1.8 | Yes |
| PETERBOROUGH | Weekly | 50 | 0.2 | 0.2 | Yes |
| PORT CAMPBELL | Weekly | 50 | 1.7 | 0.7 | Yes |
| PORT FAIRY * | Weekly | 102 | 3.8 | 2.1 | Yes |
| PORTLAND * | Weekly | 96 | 6.3 | 1.4 | Yes |
| PUENIM | Weekly | 51 | 2.1 | 1.4 | Yes |
| SANDFORD | Weekly | 49 | 0.7 | 0.2 | Yes |
| SIMPSON | Weekly | 50 | 1.6 | 1.2 | Yes |
| TARRINGTON | Weekly | 50 | 1.6 | 0.9 | Yes |
| TERANG | Weekly | 51 | 0.6 | 0.4 | Yes |
| TIMBOON | Weekly | 50 | 2.0 | 1 | Yes |
| WARRNAMBOOL * | Weekly | 154 | 0.6 | 0.4 | Yes |

* Weekly sampling with increases for population (ADWG, Section 9.5.2)

Other – May Pose A Risk To Human Health

Fluoride

Standard All samples of drinking water collected within a locality not to exceed 1.5 mg/L (ADWG – Health).

Table 6-8 Fluoride results by locality 2015/16

Fluoride

| Locality | Sampling Frequency | No. of Samples | Maximum | Minimum | Average | Compliant |
|---------------------|--------------------|----------------|---------|---------|---------|-----------|
| ALLANSFORD + | Weekly | 38# | 0.91 | 0.05 | 0.65 | Yes |
| BALMORAL | Yearly | 1 | 0.05 | | | NA |
| CAMPERDOWN (RURAL) | Yearly | 1 | 0.05 | | | NA |
| CAMPERDOWN (URBAN) | Yearly | 1 | 0.05 | | | NA |
| CARAMUT | Yearly | 1 | 0.09 | | | NA |
| CASTERTON | Yearly | 1 | 0.10 | | | NA |
| CAVENDISH | Yearly | 1 | 0.05 | | | NA |
| COBDEN | Yearly | 1 | 0.05 | | | NA |
| COLERAINE | Yearly | 1 | 0.10 | | | NA |
| DARTMOOR | Yearly | 1 | 0.10 | | | NA |
| DERRINALLUM | Yearly | 1 | 0.05 | | | NA |
| DUNKELD + | Weekly | 41# | 0.90 | 0.41 | 0.73 | Yes |
| GLENTHOMPSON | Yearly | 1 | 0.14 | | | NA |
| HAMILTON + * | Weekly | 80# | 0.93 | 0.05 | 0.73 | Yes |
| HEYWOOD | Yearly | 1 | 0.46 | | | NA |
| KOROIT + | Weekly | 40# | 0.95 | 0.05 | 0.69 | Yes |
| LISMORE | Yearly | 1 | 0.22 | | | NA |
| MACARTHUR | Yearly | 1 | 0.42 | | | NA |
| MERINO | Yearly | 1 | 0.10 | | | NA |
| MORTLAKE | Yearly | 1 | 0.05 | | | NA |
| NOORAT/GLENORMISTON | Yearly | 1 | 0.05 | | | NA |
| PAARATTE | Yearly | 1 | 0.16 | | | NA |
| PENSHURST | Yearly | 1 | 0.05 | | | NA |
| PETERBOROUGH | Yearly | 1 | 0.16 | | | NA |
| PORT CAMPBELL | Yearly | 1 | 0.16 | | | NA |
| PORT FAIRY^ | Yearly | 1 | 0.81 | 0.81 | 0.81 | NA |
| PORTLAND^ | Monthly | 12 | 1.20 | 0.92 | 1.08 | NA |
| PURNIM | Yearly | 1 | 0.05 | | | NA |
| SANDFORD | Yearly | 1 | 0.10 | | | NA |
| SIMPSON | Yearly | 1 | 0.05 | | | NA |
| TARRINGTON + | Weekly | 42# | 1.00 | 0.33 | 0.73 | Yes |
| TERANG | Yearly | 1 | 0.05 | | | NA |
| TIMBOON | Yearly | 1 | 0.16 | | | NA |
| WARRNAMBOOL + * | Weekly | 119# | 0.96 | 0.05 | 0.67 | NA |

+ Fluoride added to drinking water supply. For supplies where fluoride has been added, compliance is measured against the ADWG health guideline value

* More than one sample site was analysed per week for fluoride (based on population) where fluoride is added to the supply.

^ It is noted that the Port Fairy and Portland localities have naturally occurring fluoride which achieves the average concentration.

Weekly samples were collected from the Warrnambool clear water storage and Hamilton clear water storage and samples for the period of July – October 2015 were compliant with the average, however during this period weekly samples were not collected from the customer tap. This was a result of using a risk-based approach and overlooking the requirement to sample at a customer tap in each locality. When this was discovered the sampling program was rectified.

Manganese Results

Standard All samples of drinking water collected within a locality in any 12 month period having a concentration less than 0.5 mg/L (ADWG)

Table 6-9 Manganese results by locality 2015/16

| Manganese | | | | | |
|---------------------|--------------------|----------------|------------------------------|-----------------------|-----------|
| Locality | Sampling Frequency | No. of Samples | No. of Non complying samples | Maximum result (mg/L) | Compliant |
| ALLANSFORD | Monthly | 12 | 0 | 0.009 | Yes |
| BALMORAL | Monthly | 12 | 0 | 0.009 | Yes |
| CAMPERDOWN (RURAL) | Monthly | 12 | 0 | 0.019 | Yes |
| CAMPERDOWN (URBAN) | Monthly | 12 | 0 | 0.024 | Yes |
| CARAMUT | Monthly | 12 | 0 | 0.002 | Yes |
| CASTERTON | Monthly | 12 | 0 | 0.002 | Yes |
| CAVENDISH | Monthly | 12 | 0 | 0.002 | Yes |
| COBDEN | Monthly | 12 | 0 | 0.150 A ¹ | Yes |
| COLERAINE | Monthly | 12 | 0 | 0.002 | Yes |
| DARTMOOR | Monthly | 12 | 0 | 0.002 | Yes |
| DERRINALLUM | Monthly | 12 | 0 | 0.015 | Yes |
| DUNKELD | Monthly | 12 | 0 | 0.006 | Yes |
| GLENTHOMPSON | Monthly | 12 | 0 | 0.005 | Yes |
| HAMILTON | Monthly | 12 | 0 | 0.011 | Yes |
| HEYWOOD | Monthly | 12 | 0 | 0.091 | Yes |
| KOROIT | Monthly | 12 | 0 | 0.002 | Yes |
| LISMORE | Monthly | 12 | 0 | 0.047 | Yes |
| MACARTHUR | Weekly | 12 | 0 | 0.004 | Yes |
| MERINO | Monthly | 12 | 0 | 0.002 | Yes |
| MORTLAKE | Monthly | 12 | 0 | 0.010 | Yes |
| NOORAT/GLENORMISTON | Monthly | 12 | 0 | 0.006 | Yes |
| PAARATTE | Monthly | 12 | 0 | 0.002 | Yes |
| PENSHURST | Monthly | 12 | 0 | 0.050 | Yes |
| PETERBOROUGH | Monthly | 12 | 0 | 0.002 | Yes |
| PORT CAMPBELL | Monthly | 12 | 0 | 0.002 | Yes |
| PORT FAIRY | Monthly | 12 | 0 | 0.037 | Yes |
| PORTLAND | Monthly | 12 | 0 | 0.002 | Yes |
| PURNIM | Monthly | 12 | 0 | 0.018 | Yes |
| SANDFORD | Monthly | 12 | 0 | 0.002 | Yes |
| SIMPSON | Monthly | 12 | 0 | 0.069 | Yes |
| TARRINGTON | Monthly | 12 | 0 | 0.021 | Yes |
| TERANG | Monthly | 12 | 0 | 0.009 | Yes |
| TIMBOON | Monthly | 12 | 0 | 0.002 | Yes |
| WARRNAMBOOL | Monthly | 12 | 0 | 0.002 | Yes |

If the maximum result manganese is 0.55 mg/L or greater, then the locality is non-compliant.

Lead Results

Standard All samples of drinking water collected within a locality in any 12 month period having a concentration less than 0.01 mg/L (ADWG)

Table 6-10 Lead results by locality 2015/16

| Lead | | | | | |
|---------------------|--------------------|----------------|------------------------------|-----------------------|-----------|
| Locality | Sampling Frequency | No. of Samples | No. of Non complying samples | Maximum result (mg/L) | Compliant |
| ALLANSFORD | Yearly | 1 | 0 | <0.001 | Yes |
| BALMORAL | Yearly | 1 | 0 | <0.001 | Yes |
| CAMPERDOWN (RURAL) | Yearly | 1 | 0 | <0.001 | Yes |
| CAMPERDOWN (URBAN) | Yearly | 1 | 0 | <0.001 | Yes |
| CARAMUT | Yearly | 1 | 0 | <0.001 | Yes |
| CASTERTON | Yearly | 1 | 0 | <0.001 | Yes |
| CAVENDISH | Yearly | 1 | 0 | <0.001 | Yes |
| COBDEN | Yearly | 1 | 0 | <0.001 | Yes |
| COLERAINE | Yearly | 1 | 0 | 0.002 | Yes |
| DARTMOOR | Yearly | 1 | 0 | <0.001 | Yes |
| DERRINALLUM | Yearly | 1 | 0 | <0.001 | Yes |
| DUNKELD | Yearly | 1 | 0 | <0.001 | Yes |
| GLENTHOMPSON | Yearly | 1 | 0 | <0.001 | Yes |
| HAMILTON | Yearly | 1 | 0 | <0.001 | Yes |
| HEYWOOD | Yearly | 1 | 0 | <0.001 | Yes |
| KOROIT | Yearly | 1 | 0 | <0.001 | Yes |
| LISMORE | Yearly | 1 | 0 | <0.001 | Yes |
| MACARTHUR | Yearly | 1 | 0 | 0.003 | Yes |
| MERINO | Yearly | 1 | 0 | <0.001 | Yes |
| MORTLAKE | Yearly | 1 | 0 | <0.001 | Yes |
| NOORAT/GLENORMISTON | Yearly | 1 | 0 | <0.001 | Yes |
| PAARATTE | Yearly | 1 | 0 | <0.001 | Yes |
| PENSHURST | Yearly | 1 | 0 | <0.001 | Yes |
| PETERBOROUGH | Yearly | 1 | 0 | <0.001 | Yes |
| PORT CAMPBELL | Yearly | 1 | 0 | <0.001 | Yes |
| PORT FAIRY | Yearly | 1 | 0 | <0.001 | Yes |
| PORTLAND | Yearly | 1 | 0 | <0.001 | Yes |
| PUENIM | Yearly | 1 | 0 | 0.001 | Yes |
| SANDFORD | Yearly | 1 | 0 | <0.001 | Yes |
| SIMPSON | Yearly | 1 | 0 | <0.001 | Yes |
| TARRINGTON | Yearly | 1 | 0 | <0.001 | Yes |
| TERANG | Yearly | 1 | 0 | <0.001 | Yes |
| TIMBOON | Yearly | 1 | 0 | <0.001 | Yes |
| WARRNAMBOOL | Yearly | 1 | 0 | <0.001 | Yes |

Copper Results

Standard All samples of drinking water collected within a locality in any 12 month period having a concentration less than 2 mg/L (ADWG)

Table 6-11 Copper results by locality 2015/16

| Copper | | | | | |
|---------------------|--------------------|----------------|------------------------------|-----------------------|-----------|
| Locality | Sampling Frequency | No. of Samples | No. of Non complying samples | Maximum result (mg/L) | Compliant |
| ALLANSFORD | Yearly | 1 | 0 | 0.013 | Yes |
| BALMORAL | Yearly | 1 | 0 | 0.004 | Yes |
| CAMPERDOWN (RURAL) | Yearly | 1 | 0 | <0.001 | Yes |
| CAMPERDOWN (URBAN) | Yearly | 1 | 0 | 0.004 | Yes |
| CARAMUT | Yearly | 1 | 0 | 0.008 | Yes |
| CASTERTON | Yearly | 1 | 0 | 0.009 | Yes |
| CAVENDISH | Yearly | 1 | 0 | 0.003 | Yes |
| COBDEN | Yearly | 1 | 0 | 0.008 | Yes |
| COLERAINE | Yearly | 1 | 0 | 0.099 | Yes |
| DARTMOOR | Yearly | 1 | 0 | 0.005 | Yes |
| DERRINALLUM | Yearly | 1 | 0 | 0.006 | Yes |
| DUNKELD | Yearly | 1 | 0 | 0.009 | Yes |
| GLENTHOMPSON | Yearly | 1 | 0 | <0.001 | Yes |
| HAMILTON | Yearly | 1 | 0 | 0.008 | Yes |
| HEYWOOD | Yearly | 1 | 0 | 0.012 | Yes |
| KOROIT | Yearly | 1 | 0 | 0.011 | Yes |
| LISMORE | Yearly | 1 | 0 | 0.002 | Yes |
| MACARTHUR | Yearly | 1 | 0 | 0.073 | Yes |
| MERINO | Yearly | 1 | 0 | 0.011 | Yes |
| MORTLAKE | Yearly | 1 | 0 | 0.001 | Yes |
| NOORAT/GLENORMISTON | Yearly | 1 | 0 | 0.002 | Yes |
| PAARATTE | Yearly | 1 | 0 | <0.001 | Yes |
| PENSHURST | Yearly | 1 | 0 | 0.008 | Yes |
| PETERBOROUGH | Yearly | 1 | 0 | 0.005 | Yes |
| PORT CAMPBELL | Yearly | 1 | 0 | 0.004 | Yes |
| PORT FAIRY | Yearly | 1 | 0 | 0.010 | Yes |
| PORTLAND | Yearly | 1 | 0 | 0.001 | Yes |
| PURNIM | Yearly | 1 | 0 | 0.072 | Yes |
| SANDFORD | Yearly | 1 | 0 | 0.062 | Yes |
| SIMPSON | Yearly | 1 | 0 | 0.009 | Yes |
| TARRINGTON | Yearly | 1 | 0 | 0.003 | Yes |
| TERANG | Yearly | 1 | 0 | 0.015 | Yes |
| TIMBOON | Yearly | 1 | 0 | 0.003 | Yes |
| WARRNAMBOOL | Yearly | 1 | 0 | 0.013 | Yes |

Arsenic Results

Standard All samples of drinking water collected within a locality in any 12 month period having a concentration less than 0.01 mg/L (ADWG)

Table 6-12 Arsenic results by locality 2015/16

| Arsenic | | | | | |
|---------------------|--------------------|----------------|------------------------------|-----------------------|-----------|
| Locality | Sampling Frequency | No. of Samples | No. of Non complying samples | Maximum result (mg/L) | Compliant |
| ALLANSFORD | Yearly | 1 | 0 | 0.001 | Yes |
| BALMORAL | Yearly | 1 | 0 | 0.001 | Yes |
| CAMPERDOWN (RURAL) | Yearly | 1 | 0 | 0.001 | Yes |
| CAMPERDOWN (URBAN) | Yearly | 1 | 0 | 0.001 | Yes |
| CARAMUT | Yearly | 1 | 0 | 0.001 | Yes |
| CASTERTON | Yearly | 1 | 0 | 0.001 | Yes |
| CAVENDISH | Yearly | 1 | 0 | 0.001 | Yes |
| COBDEN | Yearly | 1 | 0 | 0.001 | Yes |
| COLERAINE | Yearly | 1 | 0 | 0.001 | Yes |
| DARTMOOR | Yearly | 1 | 0 | 0.001 | Yes |
| DERRINALLUM | Yearly | 1 | 0 | 0.001 | Yes |
| DUNKELD | Yearly | 1 | 0 | 0.001 | Yes |
| GLENTHOMPSON | Yearly | 1 | 0 | 0.001 | Yes |
| HAMILTON | Yearly | 1 | 0 | 0.001 | Yes |
| HEYWOOD | Yearly | 1 | 0 | 0.001 | Yes |
| KOROIT | Yearly | 1 | 0 | 0.001 | Yes |
| LISMORE | Yearly | 1 | 0 | 0.001 | Yes |
| MACARTHUR | Weekly | 48# | 0 | 0.001 | Yes |
| MERINO | Yearly | 1 | 0 | 0.001 | Yes |
| MORTLAKE | Yearly | 1 | 0 | 0.001 | Yes |
| NOORAT/GLENORMISTON | Yearly | 1 | 0 | 0.001 | Yes |
| PAARATTE | Yearly | 1 | 0 | 0.001 | Yes |
| PENSHURST | Yearly | 1 | 0 | 0.002 | Yes |
| PETERBOROUGH | Yearly | 1 | 0 | 0.001 | Yes |
| PORT CAMPBELL | Yearly | 1 | 0 | 0.001 | Yes |
| PORT FAIRY | Yearly | 1 | 0 | 0.003 | Yes |
| PORTLAND | Yearly | 1 | 0 | 0.001 | Yes |
| PURNIM | Yearly | 1 | 0 | 0.001 | Yes |
| SANDFORD | Yearly | 1 | 0 | 0.001 | Yes |
| SIMPSON | Yearly | 1 | 0 | 0.001 | Yes |
| TARRINGTON | Yearly | 1 | 0 | 0.001 | Yes |
| TERANG | Yearly | 1 | 0 | 0.001 | Yes |
| TIMBOON | Yearly | 1 | 0 | 0.001 | Yes |
| WARRNAMBOOL | Yearly | 1 | 0 | 0.001 | Yes |

#- Samples missed in July 2015 due to scheduling error.

Water treatment related chemicals

Table 6-13 lists the water treatment related chemicals monitored at each locality during 2015/16. All test results were less than the ADWG health-related guideline values.

Table 6-13 water treatment related chemical sampling summary and health-related guideline values

| Parameter | Sampling frequency | ADWG Value (mg/L) |
|-----------------------------|----------------------|-------------------|
| 1,1,1-Trichloropropan-2-one | Yearly * | - |
| 1,1,3-Trichloropropan-2-one | Yearly * | - |
| 1,1-Dichloropropan-2-one | Yearly * | - |
| 1,3-Dichloropropan-2-one | Yearly * | - |
| 2,4,6-Trichlorophenol | Yearly * | - |
| 2,4-Dichlorophenol | Yearly * | 0.2 |
| 2-Chlorophenol | Yearly * | 0.3 |
| Carbon tetrachloride | Yearly * | 0.003 |
| Cyanogen Chloride | Yearly * | 0.08 |
| Trichloroacetaldehyde | Quarterly/ Yearly | 0.021 |

*All results were less than detection limits

There have been historic detections of Trichloroacetaldehyde in Purnim and Cavendish; hence these localities are tested quarterly.

Inorganics

Table 6-14 lists the metals monitored at each locality during 2015/16. All localities recorded levels less than the ADWG health-related guideline values.

Table 6-14 – metals sampling summary and health-related guideline values

| Parameter | Sampling Frequency | ADWG Value (mg/L) |
|------------|--------------------|-------------------|
| Cadmium | Yearly * | 0.002 |
| Chromium | Yearly | 0.05 |
| Nickel | Yearly * | 0.02 |
| Zinc | Yearly | 3 |
| Tin | Yearly | - |
| Silver | Yearly * | 0.1 |
| Beryllium | Yearly * | 0.06 |
| Uranium | Yearly * | 0.017 |
| Iodide | Yearly | 0.5 |
| Molybdenum | Yearly | 0.05 |
| Boron | Yearly | 4 |
| Barium | Yearly | 2 |
| Selenium | Yearly | 0.01 |
| Mercury | Yearly * | 0.001 |

*All results were less than detection limits

Polycyclic Aromatic Hydrocarbon Results

Table 6-15 lists the suite of polycyclic aromatic hydrocarbons monitored at each locality during 2015/16. All test results were below the limit of detection.

Table 6-15 - PAH sampling summary and health related guideline values

| Parameter | Sampling Frequency | ADWG Value (mg/L) |
|------------------------|--------------------|-------------------|
| Acenaphthene | Yearly * | - |
| Acenaphthylene | Yearly * | - |
| Anthracene | Yearly * | - |
| Benz(a)anthracene | Yearly * | - |
| Benzo(a)pyrene | Yearly * | 0.00001 |
| Benzo(b)fluoranthene | Yearly * | - |
| Benzo(g,h,i)perylene | Yearly * | - |
| Benzo(k)fluoranthene | Yearly * | - |
| Chrysene | Yearly * | - |
| Dibenz(a,h)anthracene | Yearly * | - |
| Fluoranthene | Yearly * | - |
| Indeno(1,2,3-cd)pyrene | Yearly * | - |
| Phenanthrene | Yearly * | - |
| Pyrene | Yearly * | - |
| Total PAH | Yearly * | - |

*All results were less than detection limits

Disinfection by-products

Chlorite

Wannon Water does not disinfect with chlorine dioxide therefore this parameter is not included in the testing regime. Table 6-16 lists the chloramine disinfection by-products monitored at each locality during 2015/16. All test results were less than the ADWG health-related guideline values.

Table 6-16 – chloramine disinfection by-products sampling summary and health-related guideline values

| Parameter | Sampling Frequency | ADWG Value (mg/L) |
|-----------------------------|--------------------|-------------------|
| Nitrate (as nitrate) | Monthly/Quarterly* | 50 |
| Nitrite (as nitrite) | Monthly/Yearly** | 3 |
| 1,2-Dibromo-3-Chloropropane | Yearly | - |
| 1,2-Dibromoethane | Yearly | - |

* Monthly at Mortlake and Quarterly at Caramut only.

** Monthly at localities where ammonia is added to the drinking water supply, yearly at all other localities.

Pesticide/Herbicide Results

Table 6-17 lists the pesticides and herbicides monitored at representative raw water storage, rivers/creeks or at the customer tap during 2015/16. All test results were less than the ADWG health-related guideline values.

Table 6-17 – pesticide and herbicide sampling summary and health-related guideline values

| Parameter | Sampling Frequency | ADWG Value (mg/L) |
|-----------------------------|--------------------|-------------------|
| 2,4,5-T | Yearly * | 100 |
| 2,4,5-TP | Yearly * | 0.1 |
| 2,4,6-T | Yearly * | 20 |
| 2,4-D | Yearly * | 0.03 |
| 2,4-DB | Yearly * | - |
| 2,4-DP | Yearly * | 0.03 |
| 2,6-D | Yearly * | - |
| 4,4-DDD | Yearly * | - |
| 4,4-DDE | Yearly * | - |
| 4,4-DDT | Yearly * | 0.009 |
| 4-Chlorophenoxy acetic acid | Yearly * | - |
| Aldrin | Yearly * | 0.0003 |
| Ametryn | Yearly * | 0.07 |
| Atrazine | Yearly * | 0.02 |
| BHC (Alpha Isomer) | Yearly * | - |
| BHC (Beta Isomer) | Yearly * | - |
| BHC (Delta Isomer) | Yearly * | - |
| Chlordane | Yearly * | 0.0015 |
| Chlorpyrifos | Yearly * | 10 |
| CIS-1,3-Dichloropropene | Yearly * | - |
| cis-Chlordane | Yearly * | 0.002 |
| Dicamba | Yearly * | 0.1 |
| Dieldrin | Yearly * | 0.003 |
| Endosulphan 1 | Yearly * | 0.02 |
| Endosulphan 2 | Yearly * | 0.02 |
| Endosulphan Sulphate | Yearly * | 0.02 |
| Endrin | Yearly * | - |
| Endrin Aldehyde | Yearly * | - |
| Endrin Ketone | Yearly * | - |
| Glyphosate | Yearly * | 1 |
| Heptachlor | Yearly * | 0.0003 |
| Heptachlor Epoxide | Yearly * | 0.0003 |
| Hexachlorbenzene | Yearly * | - |
| Hexazinone | Yearly * | 400 |
| Lindane | Yearly * | 0.01 |
| MCPA | Yearly * | 0.04 |
| MCPB | Yearly * | - |
| Mecoprop | Yearly * | - |
| Methoxychlor | Yearly * | 0.3 |
| Molinate | Yearly * | 4 |
| oxy-Chlordane | Yearly * | 0.11 |
| Prometon | Yearly * | - |
| Prometryn | Yearly * | - |
| Propazine | Yearly * | 0.05 |
| Propiconazole | Yearly * | 100 |
| Simazine | Yearly * | 0.02 |
| Simetryn | Yearly * | - |
| Temephos | Yearly * | 400 |
| Terbutryn | Yearly * | 0.4 |
| Tertbutylazine | Yearly * | 0.01 |
| Trans-1,3-Dichloropropene | Yearly * | - |
| Trans-Chlordane | Yearly * | 0.011 |
| Trichlopyr | Yearly | 0.02 |

*All results were less than detection limits

Industrial Chemical Results

Table 6-18 lists industrial chemical health-related parameters tested at each locality during 2015/16. All test results were below the limit of detection.

Table 6-18 – Industrial chemicals sampling summary and health-based guideline values

| Parameter | Sampling Frequency | ADWG Value |
|---------------------------|--------------------|------------|
| 1,1,1,2-Tetrachlorethane | Yearly * | - |
| 1,1,1-Trichloroethane | Yearly * | - |
| 1,1,2,2-Tetrachloroethane | Yearly * | - |
| 1,1,2-Trichloroethane | Yearly * | - |
| 1,1-Dichloroethane | Yearly * | - |
| 1,1-Dichloroethene | Yearly * | 0.03 |
| 1,1-Dichloropropene | Yearly * | - |
| 1,2,3-Trichlorobenzene | Yearly * | - |
| 1,2,3-Trichloropropane | Yearly * | - |
| 1,2,4-Trichlorobenzene | Yearly * | 0.03 |
| 1,2,4-Trimethylbenzene | Yearly * | - |
| 1,2-Dichlorobenzene | Yearly * | 1.5 |
| 1,2-Dichloroethane | Yearly * | 0.003 |
| 1,2-Dichloropropane | Yearly * | - |
| 1,3,5-Trimethylbenzene | Yearly * | - |
| 1,3-Dichlorobenzene | Yearly * | 0.02 |
| 1,3-Dichloropropane | Yearly * | - |
| 1,4-Dichlorobenzene | Yearly * | 0.04 |
| 2,2-Dichloropropane | Yearly * | - |
| 2-Chlorotoluene | Yearly * | - |
| 4-Chlorotoluene | Yearly * | - |
| Benzene | Yearly * | 0.0011 |
| Bromobenzene | Yearly * | - |
| Bromochloromethane | Yearly * | - |
| Carbon Disulphide | Yearly * | - |
| Chlorobenzene | Yearly * | 0.3 |
| CIS-1,2-Dichloroethene | Yearly * | 0.06 |
| Dibromomethane | Yearly * | - |
| Ethylbenzene | Yearly * | 0.3 |
| Hexachloro-1,3-Butadiene | Yearly * | 0.0007 |
| Isopropylbenzene | Yearly * | - |
| M-&-P-Xylene | Yearly * | 0.6 |
| Methylenechloride | Yearly * | 0.04 |
| N-Butylbenzene | Yearly * | - |
| N-Propylbenzene | Yearly * | - |
| o-Xylene | Yearly * | 0.6 |
| P-Isopropyltoluene | Yearly * | - |
| Sec-Butylbenzene | Yearly * | - |
| Styrene | Yearly * | 0.03 |
| Tert-Butylbenzene | Yearly * | - |
| Tetrachloroethene | Yearly * | 0.05 |
| Toluene | Yearly * | 0.8 |
| Trans-1,2-Dichloroethene | Yearly * | 0.06 |
| Tributyltin as Sn | Yearly * | 10.1 |
| Trichloroethene | Yearly * | - |
| Vinyl chloride | Yearly * | 0.0003 |

*All results were less than detection limits

Algae Results

Wannon water has an obligation to notify DHHS if the presence of blue green algae (BGA) may pose a problem for drinking water supplies. The Blue Green algae circular (DELWP) sets out different ways toxic blue green algae species are measured. Where blooms relates to drinking water the triggers are:

- Total microcystins ≥ 1.3 ug/L (microcystin_LR toxicity equivalents)
- ≥ 6500 cells/mL *Microcystis aeruginosa*
- Total combined biovolume of known toxic species ≥ 0.6 mm³/L
- Total combined biovolume of all cyanobacterial > 10 mm³/L OR
- BGA is present in drinking water at levels that may cause widespread public complaint for example through taste and odour. If this occurs then a section 22 notification in accordance with the Safe Drinking Water Act should be made

During 2015/16 Wannon Water collected samples following a risk-rated approach, sampling fortnightly to monthly from all storages that supply raw water to drinking water localities. These samples were sent to a NATA certified laboratory for algal identification and counts. The sampling frequency was increased if blue green algae were detected and the numbers were noted to be increasing.

On three occasions raw water sources were isolated because the BGA results indicated trigger levels were exceeded

During 2015/16 trigger levels for Blue Green Algae were exceeded at Ewen's Hill Reservoir, Simpson Service Basin, and Warrnambool Storage I. The storages were all isolated from the system and dosed with copper sulphate

Radionuclides – Gross Beta, Gross Alpha Radioactivity Results

Table 6-19 lists the radionuclides monitored in surface water (rivers/creeks) during 2015/16. All test results were less than the detection limits.

Table 6-19 – radionuclides sampling summary and health-related guideline values

| Parameter | Sampling Frequency | ADWG Value (Bq/L) |
|-------------|--------------------|-------------------|
| Gross Alpha | Every two years* | 0.5 |
| Gross Beta | Every two years* | 0.5 |

*All results were less than detection limits

Other Results

Table 6-20 lists other parameters tested at the customer tap during 2015/16. All test results were less than the ADWG health-related guideline values.

Table 6-20 - Other parameters sampling summary and health-based guideline values

| Parameter | Sampling Frequency | ADWG Value (mg/L) |
|-----------|--------------------|-------------------|
| Sulphate | Quarterly | 500 |

Aesthetic Parameters

pH Results

Guideline The guideline limit for pH is 6.5-8.5 pH units. There is no health-based guideline.

Table 6-21 pH results by locality 2015/16

| pH | | | | |
|---------------------|--------------------|----------------|------|-----|
| Locality | Sampling Frequency | No. of Samples | Max | Min |
| ALLANSFORD | Weekly | 52 | 7.7 | 7.1 |
| BALMORAL | Weekly | 52 | 7.8 | 6.8 |
| CAMPERDOWN (RURAL) | Weekly | 52 | 9.4 | 7.2 |
| CAMPERDOWN (URBAN) | Weekly | 52 | 7.7 | 7.1 |
| CARAMUT | Weekly | 52 | 8.7 | 7.7 |
| CASTERTON | Weekly | 52 | 8.1 | 7.2 |
| CAVENDISH | Weekly | 52 | 10.0 | 6.8 |
| COBDEN | Weekly | 52 | 7.9 | 7.0 |
| COLERAINE | Weekly | 52 | 7.9 | 7.5 |
| DARTMOOR | Weekly | 52 | 8.2 | 7.7 |
| DERRINALLUM | Weekly | 52 | 10.0 | 8.1 |
| DUNKELD | Weekly | 52 | 7.1 | 6.4 |
| GLENTHOMPSON | Weekly | 52 | 8.7 | 7.2 |
| HAMILTON | Weekly | 104* | 7.5 | 6.1 |
| HEYWOOD | Weekly | 52 | 9.1 | 8.2 |
| KOROIT | Weekly | 52 | 7.6 | 6.8 |
| LISMORE | Weekly | 52 | 9.5 | 7.6 |
| MACARTHUR | Weekly | 52 | 8.4 | 7.9 |
| MERINO | Weekly | 52 | 8.1 | 7.6 |
| MORTLAKE | Weekly | 52 | 8.2 | 7.7 |
| NOORAT/GLENORMISTON | Weekly | 52 | 9.3 | 7.2 |
| PAARATTE | Weekly | 52 | 8.2 | 6.8 |
| PENSHURST | Weekly | 52 | 8.8 | 8.1 |
| PETERBOROUGH | Weekly | 52 | 8.3 | 7.9 |
| PORT CAMPBELL | Weekly | 52 | 8.3 | 7.9 |
| PORT FAIRY | Weekly | 104* | 8.7 | 8.2 |
| PORTLAND | Weekly | 104* | 8.8 | 7.0 |
| PURNIM | Weekly | 52 | 7.4 | 6.8 |
| SANDFORD | Weekly | 52 | 8.2 | 7.2 |
| SIMPSON | Weekly | 52 | 7.6 | 6.9 |
| TARRINGTON | Weekly | 52 | 8.2 | 6.2 |
| TERANG | Weekly | 52 | 8.6 | 7.0 |
| TIMBOON | Weekly | 52 | 8.4 | 8.1 |
| WARRNAMBOOL | Weekly | 156* | 7.7 | 6.8 |

* More than one sample per week

Description

A pH of less than 6.5 may be corrosive; greater than pH 8 progressively decreases efficiency of chlorination, greater than 8.5 may cause scale and taste problems. New concrete tanks and cement-mortar lined pipes can significantly increase pH and a value of up to 9.2 may be tolerated provided monitoring indicates no deterioration in microbial quality.

Management of high pH

Camperdown Rural, Derrinallum and Lismore

These localities are all supplied from Camperdown WTP. There is a chlorine booster station at Ettrick Springs which services Derrinallum and Lismore, the chlorination was changed from liquid to gas during 2013/14, which improved pH. In 2015/16 Wannon Water restructured its Service Delivery department to become Operations and Maintenance. Wannon Water will refocus on improving aesthetic compliance in 2016/17 through system optimisation.

Cavendish and Noorat/Glenormiston

These localities are both small in population and frequently experience low demand, which leads to long detention times in cement lined mains. Regular flushing is conducted to reduce detention times and improve pH levels.

Iron Results

Guideline The guideline value for iron is 0.3 mg/L. There is no health-related guideline value.

Table 6-22 Iron results by locality 2015 /16

| Iron | | | | |
|---------------------|--------------------|----------------|------------------------------|-----------------------|
| Locality | Sampling Frequency | No. of Samples | No. of Non complying samples | Maximum result (mg/L) |
| ALLANSFORD | Monthly | 12 | 0 | 0.071 |
| BALMORAL | Monthly | 12 | 0 | 0.110 |
| CAMPERDOWN (RURAL) | Monthly | 12 | 0 | 0.033 |
| CAMPERDOWN (URBAN) | Monthly | 12 | 0 | 0.032 |
| CARAMUT | Monthly | 12 | 0 | 0.011 |
| CASTERTON | Monthly | 12 | 0 | 0.050 |
| CAVENDISH | Monthly | 12 | 2 | 0.360 |
| COBDEN | Monthly | 12 | 0 | 0.120 |
| COLERAINE | Monthly | 12 | 0 | 0.027 |
| DARTMOOR | Monthly | 12 | 0 | 0.009 |
| DERRINALLUM | Monthly | 12 | 1 | 0.350 |
| DUNKELD | Monthly | 12 | 0 | 0.096 |
| GLENTHOMPSON | Monthly | 12 | 0 | 0.170 |
| HAMILTON | Monthly | 12 | 0 | 0.081 |
| HEYWOOD | Monthly | 12 | 0 | 0.065 |
| KOROIT | Monthly | 12 | 0 | 0.045 |
| LISMORE | Monthly | 12 | 0 | 0.095 |
| MACARTHUR | Monthly | 12 | 0 | 0.070 |
| MERINO | Monthly | 12 | 0 | 0.014 |
| MORTLAKE | Monthly | 12 | 1 | 0.790 |
| NOORAT/GLENORMISTON | Monthly | 12 | 0 | 0.046 |
| PAARATTE | Monthly | 12 | 0 | 0.140 |
| PENSHURST | Monthly | 12 | 1 | 2.900 |
| PETERBOROUGH | Monthly | 12 | 0 | 0.120 |
| PORT CAMPBELL | Monthly | 12 | 0 | 0.110 |
| PORT FAIRY | Monthly | 12 | 1 | 0.350 |
| PORTLAND | Monthly | 12 | 0 | 0.026 |
| PURNIM | Monthly | 12 | 0 | 0.260 |
| SANDFORD | Monthly | 12 | 0 | 0.015 |
| SIMPSON | Monthly | 12 | 0 | 0.042 |
| TARRINGTON | Monthly | 12 | 0 | 0.290 |
| TERANG | Monthly | 12 | 0 | 0.037 |
| TIMBOON | Monthly | 12 | 0 | 0.069 |
| WARRNAMBOOL | Monthly | 12 | 0 | 0.023 |

Description

Iron occurs naturally in water, the taste threshold is 0.3 mg/L. High concentrations stain laundry and fittings. Iron bacteria cause blockages, taste/odour and corrosion.

Management of Iron

- Refer to Table 6-22 All exceedances were isolated incidents, the response action is to flush if field tests indicate turbidity or colour issues or if a customer contact is received.

Colour Results

Guideline < 15 HU. There is no health-based guideline.

Table 6-23 True Colour results by locality 2015/16

| True Colour | | | |
|---------------------|--------------------|----------------|------------------------|
| Locality | Sampling Frequency | No. of Samples | Maximum result (Pt-Co) |
| ALLANSFORD | Monthly | 12 | 1 |
| BALMORAL | Monthly | 12 | 4 |
| CAMPERDOWN (RURAL) | Monthly | 12 | 3 |
| CAMPERDOWN (URBAN) | Monthly | 12 | 2 |
| CARAMUT | Monthly | 12 | 1 |
| CASTERTON | Monthly | 12 | 2 |
| CAVENDISH | Monthly | 12 | 78 |
| COBDEN | Monthly | 12 | 2 |
| COLERAINE | Monthly | 12 | 1 |
| DARTMOOR | Monthly | 12 | 1 |
| DERRINALLUM | Monthly | 12 | 1 |
| DUNKELD | Monthly | 12 | 2 |
| GLENTHOMPSON | Monthly | 12 | 3 |
| HAMILTON | Monthly | 12 | 4 |
| HEYWOOD | Monthly | 12 | 1 |
| KOROIT | Monthly | 12 | 2 |
| LISMORE | Monthly | 12 | 2 |
| MACARTHUR | Monthly | 12 | 1 |
| MERINO | Monthly | 12 | 1 |
| MORTLAKE | Monthly | 12 | 4 |
| NOORAT/GLENORMISTON | Monthly | 12 | 1 |
| PAARATTE | Monthly | 12 | 2 |
| PENSHURST | Monthly | 12 | 1 |
| PETERBOROUGH | Monthly | 12 | 1 |
| PORT CAMPBELL | Monthly | 12 | 2 |
| PORT FAIRY | Monthly | 12 | 2 |
| PORTLAND | Monthly | 12 | 3 |
| PUENIM | Monthly | 12 | 7 |
| SANDFORD | Monthly | 12 | 1 |
| SIMPSON | Monthly | 12 | 1 |
| TARRINGTON | Monthly | 12 | 3 |
| TERANG | Monthly | 12 | 2 |
| TIMBOON | Monthly | 12 | 4 |
| WARRNAMBOOL | Monthly | 12 | 2 |

Description

Colour is an important aesthetic characteristic for customer acceptance. Treatment processes can be optimised to remove colour.

Management of Colour

- Refer to Table 6-23
- Cavendish – The colour of the Cavendish supply is derived from the raw source water of the Grampians Headworks. Surface water run-off, particularly the initial flows, tends to be high in colour due to high levels of tannin. Cavendish is a disinfection-only plant and therefore there is no capacity for colour removal.

Alkalinity and Hardness

Alkalinity Guideline

There is no health-based or aesthetic guideline for alkalinity however low levels (<50) can corrode surfaces. High levels (>200) tend to deposit calcium carbonate on pipes, fittings and hot water services.

Description Alkalinity is the ability of water to buffer changes in pH.

Hardness Guideline The guideline limit for hardness is 200 mg/L as calcium carbonate (CaCO_3). There is no health based guideline.

Description Caused by calcium and magnesium salts. Hard water is difficult to lather.

Less than 60 mg/L CaCO_3 – soft but possible corrosive

60-200 mg/L CaCO_3 – good quality

200-500 mg/L CaCO_3 – increasing scaling problems

Greater than 500 mg/L CaCO_3 – severe scaling

Alkalinity and hardness is not controllable by treatment processes at any of Wannon Water localities. Wannon Water has a large data set of very consistent data for all localities and hence elected not to test for these parameters during 2015/16. Refer to Tables 6-24 and 6-25 for historical data for information purposes.

Table 6-24 Total Alkalinity as CaCO₃ results by locality June 2010- July 2015

| Total Alkalinity as CaCO₃ | | | | |
|---|-----------------------|---|---|---|
| Locality | No. of Samples | Minimum result (mg/L CaCO₃) | Average result (mg/L CaCO₃) | Maximum result (mg/L CaCO₃) |
| ALLANSFORD | 60 | 31 | 45 | 130 |
| BALMORAL | 121 | 8 | 22 | 36 |
| CAMPERDOWN (RURAL) | 123 | 7 | 19 | 210 |
| CAMPERDOWN (URBAN) | 131 | 6 | 17 | 51 |
| CARAMUT | 147 | 56 | 84 | 160 |
| CASTERTON | 184 | 190 | 214 | 240 |
| CAVENDISH | 116 | 7 | 21 | 58 |
| COBDEN | 125 | 6 | 17 | 30 |
| COLERAINE | 75 | 26 | 161 | 230 |
| DARTMOOR | 84 | 170 | 242 | 340 |
| DERRINALLUM | 55 | 4 | 27 | 51 |
| DUNKELD | 79 | 4 | 11 | 43 |
| GLENTHOMPSON | 111 | 17 | 33 | 45 |
| HAMILTON | 58 | 4 | 14 | 21 |
| HEYWOOD | 90 | 190 | 251 | 280 |
| KOROIT | 57 | 28 | 39 | 53 |
| MACARTHUR | 93 | 190 | 413 | 560 |
| MERINO | 54 | 190 | 213 | 340 |
| MORTLAKE | 92 | 43 | 145 | 310 |
| NOORAT/GLENORMISTON | 84 | 13 | 21 | 43 |
| PAARATTE | 60 | 130 | 145 | 160 |
| PENSHURST | 87 | 150 | 200 | 230 |
| PETERBOROUGH | 59 | 130 | 147 | 250 |
| PORT CAMPBELL | 120 | 120 | 143 | 160 |
| PORT FAIRY | 128 | 290 | 327 | 380 |
| PORTLAND | 174 | 280 | 357 | 490 |
| PURNIM | 96 | 7 | 12 | 26 |
| SIMPSON | 21 | 200 | 220 | 240 |
| TARRINGTON | 110 | 6 | 15 | 26 |
| TERANG | 48 | 4 | 9 | 27 |
| TIMBOON | 120 | 8 | 17 | 34 |
| WARRNAMBOOL | 181 | 9 | 42 | 64 |

Table 6-25 Total Hardness as CaCO₃ results by locality June 2010- July 2015**Total Hardness as CaCO₃**

| Locality | No. of Samples | Minimum result (mg/L CaCO ₃) | Average result (mg/L CaCO ₃) | Maximum result (mg/L CaCO ₃) |
|---------------------|----------------|--|--|--|
| ALLANSFORD | 20 | 22 | 69 | 98 |
| BALMORAL | 69 | 61 | 85 | 190 |
| CAMPERDOWN (RURAL) | 73 | 16 | 30 | 55 |
| CAMPERDOWN (URBAN) | 34 | 16 | 41 | 54 |
| CARAMUT | 66 | 79 | 101 | 110 |
| CASTERTON | 88 | 1.5 | 224 | 270 |
| CAVENDISH | 66 | 15 | 23 | 59 |
| COBDEN | 72 | 14 | 22 | 36 |
| COLERAINE | 40 | 230 | 283 | 590 |
| DARTMOOR | 42 | 210 | 246 | 280 |
| DERRINALLUM | 20 | 32 | 49 | 65 |
| DUNKELD | 27 | 37 | 87 | 190 |
| GLENTHOMPSON | 60 | 60 | 101 | 160 |
| HAMILTON | 24 | 37 | 79 | 190 |
| HEYWOOD | 43 | 0.3 | 163 | 240 |
| KOROIT | 20 | 57 | 73 | 92 |
| LISMORE | 8 | 33 | 48 | 64 |
| MACARTHUR | 45 | 0 | 304 | 350 |
| MERINO | 17 | 130 | 233 | 260 |
| MORTLAKE | 43 | 48 | 134 | 250 |
| NOORAT/GLENORMISTON | 24 | 17 | 22 | 33 |
| PAARATTE | 20 | 130 | 156 | 170 |
| PENSHURST | 40 | 360 | 400 | 440 |
| PETERBOROUGH | 19 | 140 | 154 | 170 |
| PORT CAMPBELL | 48 | 130 | 152 | 170 |
| PORT FAIRY | 68 | 130 | 169 | 190 |
| PORTLAND | 77 | 8.3 | 57 | 200 |
| PUENIM | 31 | 18 | 25 | 78 |
| SANDFORD | 3 | 240 | 250 | 260 |
| SIMPSON | 64 | 0.3 | 21 | 35 |
| TARRINGTON | 8 | 100 | 134 | 190 |
| TIMBOON | 30 | 130 | 158 | 180 |
| WARRNAMBOOL | 41 | 62 | 75 | 93 |

Total Dissolved Solids Results

Guideline 600 mg/L. There is no health-based guideline.

Table 6-26 Total Dissolved Solids results by locality 2015/16

| Total Dissolved Solids | | | | |
|------------------------|--|--------------------|----------------|-----------------------|
| Treatment Plant | Locality | Sampling Frequency | No. of Samples | Maximum result (mg/L) |
| Balmoral WTP | Balmoral | Quarterly | 4 | 660 |
| Camperdown WTP | Camperdown, Derrinallum, Lismore | Quarterly | 4 | 160 |
| Caramut DP | Caramut | Quarterly | 3# | 230 |
| Casterton WTP | Casterton, Coleraine, Sandford, Merino | Quarterly | 3# | 440 |
| Cavendish DP | Cavendish | Quarterly | 4 | 130 |
| Cobden WTP | Cobden | Quarterly | 4 | 130 |
| Dartmoor WTP | Dartmoor | Quarterly | 4 | 420 |
| Glenthompson WTP | Glenthompson | Quarterly | 4 | 890 |
| Hamilton WTP | Dunkeld, Hamilton, Tarrington | Quarterly | 4 | 220 |
| Heywood WTP | Heywood | Quarterly | 4 | 680 |
| Macarthur WTP | Macarthur | Quarterly | 4 | 1,100 |
| Mortlake DP | Mortlake | Quarterly | 4 | 190 |
| Penshurst DP | Penshurst | Quarterly | 4 | 790 |
| Port Campbell WTP | Peterborough, Port Campbell, Timboon | Quarterly | 4 | 310 |
| Port Fairy WTP | Port Fairy | Quarterly | 4 | 930 |
| Portland Bald Hill WTP | Portland | Quarterly | 4 | 740 |
| Purnim DP | Purnim | Quarterly | 4 | 170 |
| Simpson WTP | Simpson | Quarterly | 4 | 110 |
| Terang WTP | Mortlake, Noorat/ Glenormiston, Terang | Quarterly | 4 | 140 |
| Warrnambool WTP | Allansford, Koroit, Warrnambool | Quarterly | 4 | 210 |

Single sample missed due to scheduling error

Description

Based on taste:

Less than 600 mg/L is regarded as good quality drinking water.

600 – 900 mg/L is regarded as fair quality

900 – 1200 mg/L is regarded as poor quality

Greater than 1200 mg/L is regarded as unacceptable

Management of Total Dissolved Solids

- Refer to Table 6-26
- Total Dissolved Solids is not controllable by treatment at any of Wannon Water's localities. This is an opportunity for improvement.

Analysis of Results

Compliance as a Percentage of Localities

Table 6-27 shows the percentage of localities compliant with each of the Safe Drinking Water Regulation 2005 and the Safe Drinking Water Regulation 2015 Schedule 2 parameters. Compliance has been relatively consistent over the past three years.

Table 6-27 Compliance as a Percentage of Localities

| Parameter | % of Localities Receiving Compliant Water | | | |
|--------------------------|---|------------------------------|---------|---------|
| | 1 July to 17 July 2015 | 18 July 2015 to 30 June 2016 | 2014/15 | 2013/14 |
| <i>Escherichia coli</i> | 100 | 100 | 100 | 100 |
| Trihalomethanes | 100 | 100 | 100 | 99.8 |
| Chloroacetic acid | N/A | N/A | 100 | 100 |
| Dichloroacetic acid | N/A | N/A | 100 | 100 |
| Trichloroacetic acid | 100 | 100 | 100 | 100 |
| Aluminium (acid soluble) | N/A | N/A | 99.1 | 98.6 |
| Turbidity | 100 | 100 | 100 | 100 |

Compliance as a Percentage of Population

The percentage of Wannon Water customers that were supplied with drinking water that complied with the SDWR Schedule 2 standards are detailed in Table 6-28. The percentage of customers receiving compliant water has remained relatively steady over the past three years for all parameters.

Table 6-28 Compliance as a Percentage of Population

| Parameter | % of Customers Receiving Compliant Water | | | |
|--------------------------|--|------------------------------|---------|---------|
| | 1 July to 17 July 2015 | 18 July 2015 to 30 June 2016 | 2014/15 | 2013/14 |
| <i>Escherichia coli</i> | 100 | 100 | 100 | 100 |
| Trihalomethanes | 100 | 100 | 100 | 99.8 |
| Chloroacetic acid | N/A | N/A | 100 | 100 |
| Dichloroacetic acid | N/A | N/A | 100 | 100 |
| Trichloroacetic acid | 100 | 100 | 100 | 100 |
| Aluminium (acid soluble) | N/A | N/A | 96.4 | 80.6 |
| Turbidity | 100 | 100 | 100 | 100 |

7. EMERGENCY AND INCIDENT MANAGEMENT

Whilst every effort is made to prevent water quality incidents from occurring, there will inevitably be times when things go wrong. Such instances may be due to equipment failure, human error or unforeseen events. Wannon Water has incident management plans to manage such events to ensure the minimum possible impact on water quality. The incident management plans are a component of Wannon Water's Emergency Management Plan which uses the principles of prevention, response and recovery as outlined in the Australian Inter-Service Incidents Management System (AIIMS) structure. The objectives of the Emergency Management Plan are to ensure:

- The safety of customers, employees and the community in general;
- Continuity of operations;
- Protection of the environment; and
- Compliance with legislated and regulatory requirements

Wannon Water undertakes regular training and joint exercises in emergency simulations and emergency management with key stakeholders. These sessions are designed to put systems, processes and facilities into an environment as close as possible to a real event. The exercises provide participants with an opportunity to test communications, planning and management procedures and to include emergency management training.

Section 22 Incidents

The objective of Section 22 of the *Safe Drinking Water Act 2003* is to protect public health. Wannon Water must inform the DHHS of any potential or actual contaminated water supplied for drinking purposes. Information relating to all Section 22 incidents during 2015/16 is listed in Table 7-1.

Table 7-1 – Section 22 incidents 2015/16

| Date (and Duration) of Incident | Location of Incident | Nature of Incident | Potentially Affected/ Affected Drinking Water Supplies | Actions Taken in Response to Incident |
|---------------------------------|--------------------------------|---|--|--|
| 3 August 2015 (4 days) | Noorat clear water tank | <i>E.coli</i> – 1 MPN/ 100 mL | Noorat/ Glenormiston | An investigation concluded the water quality analysis of turbidity and free chlorine residual were both found to be at levels consistent with safe drinking water for this locality. Resampling was undertaken without any modifications to the system or processes. The Terang water treatment plant was found to be working effectively at the time of the positive <i>E.coli</i> detection. No breaches of critical control limits were experienced during this time. The tank was inspected on 5 August 2015. The structure was found to be in good condition. There were no obvious ingress points identified. There were no mains breaks, bursts or repairs in the locality of Noorat/Glenormiston. |
| 17 August 2015 (1 hr, 4 min) | Port Fairy clear water storage | Chlorine dosing failed. Supplied with water below 0.2 mg/L chlorine | Port Fairy | An investigation included a root-cause analysis with numerous actions identified. Samples taken on the day indicate no existing contamination within the reticulation or clear water storage. The source water data was reviewed (bores) and had no <i>E.coli</i> or coliforms and there are back flow prevention devices in place. |
| 4 February 2016 | Portland clear water storage | <i>E.coli</i> – 8 MPN/ 100 mL and 200 MPN/100mL coliforms | Portland | An investigation established that: Chlorine residual, pH and other factors at the time of the detection, as well as resampling were not indicative for the presence of <i>E. coli</i> ; Monitoring results indicated that water treatment plant performance leading up to and after the <i>E. coli</i> detection was adequate for the delivery of safe drinking water; Chlorine contact times showed disinfection was adequate at the water treatment plant; Long term verification monitoring results showed that safe drinking water has been consistently supplied over the last 6 years at the Portland Bald Hill WTP, and routine bore and clear water storage tank inspections carried out before and after detection indicate the integrity of the bore and storage lining were adequate. |
| 26 May 2016 | Merino | <i>E.coli</i> – 2 MPN/ 100 mL and 21 MPN/100mL coliforms | Merino | An investigation established that: Chlorine residual, pH and other factors at the time of the detection, as well as resampling were not indicative for the presence of <i>E. coli</i> ; Monitoring results indicated that water treatment plant performance leading up to and after the <i>E. coli</i> detection was adequate for the delivery of safe drinking water; Chlorine contact times showed disinfection was adequate at the water treatment plant; Long term verification monitoring results showed that safe drinking water has been consistently supplied over the last 6 years at both the Casterton WTP and Merino WTP, and routine clear water storage inspections carried out before and after detection indicate the integrity of the storage was adequate. |

Section 18 Incidents

The objective of Section 18 of the *Safe Drinking Water Act 2003* is to indicate where drinking water has not complied with drinking water quality standards. Wannon Water must inform the DHHS when drinking water does not or is not likely to comply with any relevant water quality standard. These are listed at Table 7-2.

Table 7-2 – Section 18 incidents 2015/16

| Date (and Duration) of Incident | Location of Incident | Nature of Incident | Potentially Affected/ Affected Drinking Water Supplies | Actions Taken in Response to Incident |
|---------------------------------|----------------------|--|--|--|
| 30 October 2015 | Warrnambool | Taste and odour | Allansford, Koroit, Warrnambool | Wannon Water took a proactive approach by informing customers of the potential taste and odours by Media release Flushing was conducted; affected raw water storages were isolated and dosed with copper sulphate. |
| 2 February 2016 | Portland | Legionella Sp. 100 org/ml. The reticulation was sampled for all microorganisms that are tested in this locality as a result of the E.coli detect | Portland | The legionella was found not to be the species that is associated with human disease. It is to be noted that Legionella is usually tested at the cooling towers for OH&S reasons for operator safety relating to aerosol creation. It is not usually tested at the customer tap |

Other Incidents

Wannon Water communicates other water quality related events to DHHS. Information relating to these which occurred during 2015/16 is listed in Table 7-3.

Table 7-3 – Other incidents 2015/16

| Date (and Duration) of Incident | Location of Incident | Nature of Incident | Potentially Affected/ Affected Drinking Water Supplies | Actions Taken in Response to Incident |
|--|-----------------------------|--|---|---|
| 24 – 28 August 2015 | Warrnambool WTP | Fluoride dosing pump servicing | Warrnambool, Koroit, Allansford | Notified DHHS of fluoride dosing below the lower process limit for greater than 72 hours. |
| 31 August 2015 – Approximately 4 weeks. | Simpson Raw Water Basin | Algae in basin | Simpson | Storage isolated and dosed with algaecide. Water carting |
| 15 October 2015 | Port Fairy cooling tower | Legionella species | Port Fairy | Super-chlorinated both cooling towers and low level tanks |
| 6 – 14 December 2015 | Warrnambool WTP | Fluoride flow meter fault | Warrnambool, Koroit, Allansford | Notified DHHS of fluoride dosing below the lower process limit for greater than 72 hours. |
| 6 December 2015 – 20 December 2015 | Hamilton WTP | Fluoride flow meter fault and fluoride analyser issues | Dunkeld, Hamilton, Tarrington | Notified DHHS of fluoride dosing below the lower process limit for greater than 72 hours. Installed new flow meter. |
| 19 February – 10 March 2016 | Hamilton WTP | Fluoride flow meter fault and fluoride analyser issues | Dunkeld, Hamilton, Tarrington | Notified DHHS of fluoride dosing below the lower process limit for greater than 72 hours. |
| 17 – 21 January 2016 | Warrnambool WTP | Fluoride shut down due to flow calculation error | Warrnambool, Koroit, Allansford | Notified DHHS of fluoride dosing below the lower process limit for greater than 72 hours. |
| 29 January – 4 March 2016 | Warrnambool WTP | Leak on Fluoride valve fitting and scheduled maintenance | Warrnambool, Koroit, Allansford | Notified DHHS of fluoride dosing below the lower process limit for greater than 72 hours. |
| 26 February 2016 – Approximately 3 weeks | Ewens Hill Reservoir | Algae in storage and Geosmin | Terang, Mortlake | Storage isolated and dosed with algaecide |
| 26 February 2016 – Approximately 3 weeks | Warrnambool storage 1 | Geosmin | Warrnambool, Koroit, Allansford | Storage isolated and dosed with algaecide |
| 26 February 2016 – Approximately 3 weeks | Warrnambool storage 2 | Geosmin | Warrnambool, Koroit, Allansford | Selectively harvested more water from Tank Hill |
| 26 February 2016 – Approximately 3 weeks | Brierly Basin | Geosmin | Warrnambool, Koroit, Allansford | Geosmin at manageable level. |
| 22 February – 8 March 2016 | Warrnambool WTP | Fluoride shut down due to flow scheduled maintenance | Warrnambool, Koroit, Allansford | Notified DHHS of fluoride dosing below the lower process limit for greater than 72 hours. |
| 15 – 29 June 2016 | Warrnambool WTP | Fluoride flow meter maintenance and dosing pump checks | Warrnambool, Koroit, Allansford | Notified DHHS of fluoride dosing below the lower process limit for greater than 72 hours. |

Customer Complaints

Wannon Water is actively committed to the successful and efficient management of complaints and disputes to ensure effective customer service.

Wannon Water's Corporate Complaints Management process is a "roadmap" to complaints management, allowing for a fair and detailed consideration of complaints and provides for genuine internal review if the complainant remains dissatisfied.

The collection, processing and reporting of Wannon Water's complaints is managed through a customer relationship database, allowing Wannon Water to meet its obligations under the Customer Service Code issued by the Essential Services Commission, under its reporting principles. This is also supported by Wannon Water's Customer Charter.

All customer complaints are investigated to determine the cause and significance of the complaint. Operational changes or capital improvements which optimise treated water quality may be implemented in response to valid and significant customer complaints.

In response to a complaint, customers are contacted directly and a site/vicinity inspection conducted. Appropriate action is then taken. This action will vary depending on the nature of the complaint.

Multiple complaints from a single locality are monitored closely. If the number of complaints within the locality exceeds five in any 24 hour period, an incident response team is assembled to investigate the event. Appropriate actions are then taken using the AIMS structure and Wannon Water's Emergency Management Plan.

The ESC definition of a customer complaint was updated for 2015/16. The definition was updated to include a statement that "as a general rule, any customer contact with respect to water quality should be treated as a complaint", which was effective from the 1st July 2015. The effect of this change is that the number of 'complaints' increased refer to Table 7-4; however the total number of complaints for 2015/16 was still very low. A summary of the types of complaints received is presented in Table 7-4, with all localities recording less than 1 complaint per 100 customers.

During 2015/16 there were no instances where more than five water quality complaints were received within any 24 hour period.

Table 7-4 – Customer complaints 2015/16 by type

| Type of complaint | No. of complaints | No. of complaints per 100 customers supplied [^] |
|------------------------------|-------------------|---|
| Discoloured water | 65 | 0.15 |
| Taste/ odour | 46 | 0.11 |
| Blue Water | 0 | 0 |
| Air in Water | 0 | 0 |
| Alleged illness [#] | 12 | 0.03 |
| Other | 10 | 0.02 |

[^] for the purposes of the complaints section, the term "customer" has the same meaning as that used by the Essential Services Commission, that is a customer = a connection

[#] alleged illness complaints include skin irritation.

Wannon Water continued to maintain its proactive approach to customer complaints by continuing to:

- Allocate specific resources to trouble shoot hot spot townships identified in the 2015/16 period
- Maintained resourcing to meet the scheduled flushing program for each of Wannon Water's localities
- Proactive approach taken by Operations Branch to quality trend variances

Hot spot townships

The Port Fairy Township was again flushed, and had a sequestering agent added to the water, just prior to Christmas, to clean the reticulation before the tourist season. These activities kept the number of customer complaints in this locality low.

The Warrnambool system (Warrnambool, Koroit and Allansford) again experienced taste and odour issues relating to blue green algae and geosmin. Wannon Water took a proactive approach by informing customers of the potential taste and odours via a media release on 30 October 2015. The media release also encouraged customers to contact Wannon Water if they had any concerns. Twelve taste and odour complaints were received in the Warrnambool system area between November 2015 and June 2016. Flushing was conducted, affected raw water storages were isolated and dosed with copper sulphate.

8. GLOSSARY

| | |
|-------------------------------|--|
| Adsorption | Process to remove dissolved organic matter, particles, algal toxins and compounds causing taste and odour problems. Granulated activated carbon (GAC) is used for adsorption at Wannon Water. |
| ADWG | Australian Drinking Water Guidelines (2011) |
| AIIMS | Australian Inter-Service Incidents Management System |
| BGA | Blue Green Algae |
| Dissolved Air Flotation (DAF) | Treatment process for coarse removal of particles through air flotation |
| DHHS | Department of Health and Human Services Victoria |
| DP | Disinfection Plant |
| CCP | Critical control point |
| Clarification | Two main primary solids removal processes are utilised; sedimentation and dissolved air flotation |
| Coagulation | Treatment to destabilise colloidal particles (turbidity and colour) by neutralising the surface charge of the particle to allow floc formation. Coagulants used at Wannon Water are ferric chloride, aluminium chlorohydrate (ACH) and aluminium sulphate (alum) |
| Cooling/ aeration towers | Treatment process which cools water via aeration. |
| Disinfection | Treatment process to kill bacteria and viruses. Note all drinking water supplied by Wannon Water is disinfected (chlorination, chloramination or UV disinfection) to ensure that microorganisms are eliminated. Chlorine gas, sodium hypochlorite, aqueous ammonia and UV are used for disinfection. |
| Filtration | Treatment process which remove suspended material by passing through a granular media such as sand. |
| Flocculation | Used to increase the floc size to enhance clarification and aid filtration. Flocculants used at Wannon Water include polyelectrolyte Nalco, Magnafloc, polymer Nalclex and polymer Klaraid. |
| Fluoridation | Treatment process to provide a dental health benefit. Fluorosilicic acid is used for fluoridation at Wannon Water. |
| HACCP | Hazard Analysis and Critical Control Point. A system that identifies evaluates and controls hazards. |
| Mean | The average of a number of numerical values. |
| ML | Megalitre – one million litres |
| NATA | National Association of Testing Authorities, Australia. |
| Oxidation | Process used to convert soluble contaminants to insoluble contaminants for easier removal. Sodium hypochlorite is used for oxidation at Wannon Water. |
| pH correction/ stabilisation | Treatment to adjust pH, to aid coagulation, to prevent corrosion or scaling and to optimise disinfection. Caustic soda, soda ash and hydrated lime are used for pH correction at Wannon Water. |
| Raw water | Water that has not been treated in any way. |
| Raw water detention | Clarification, via settling, microbial die-off and reducing variability in water quality. |
| Risk assessment | The overall process of risk identification, risk analysis and risk evaluation. Risk analysis the systematic process to understand the nature of and to deduce the level of risk. Risk evaluation the process of comparing the level of risk against risk criteria. |
| SDWA | Safe Drinking Water Act 2003 |
| SDWR | Safe Drinking Water Regulations 2015 or 2005 when specified |
| Sedimentation | Treatment process for coarse removal of particles through settling under gravity |

| | |
|---------------|--|
| Sequestration | Treatment process which involves the addition of sequestering agents to keeps dissolved iron and manganese from oxidising and precipitating. Calgon is used as a sequestering agent at Wannon Water. |
| WTP | Water Treatment Plant |

Information regarding water treatment can be obtained from Wannon Water's web site:

www.wannonwater.com.au

Results for water quality parameters can be provided upon request from Wannon Water via:

Tel 1300 926 666

Fax 03 5565 6050

Email info@wannonwater.com.au

Address PO Box 1158 Warrnambool Vic 3280